2022

# Middle School Teacher Perceptions on Implementation of the Math Workshop Model

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Walden University
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Abstract

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by

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MA, Shippensburg University, 2004

BS, Bloomsburg University, 1991

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education: Learning, Instruction, and Innovation

Walden University

August 2022

## Abstract

Mathematics achievement levels in the middle school grades have reportedly been below proficiency for students in the United States. The math workshop model has been identified as a possible approach to increase student achievement in mathematics. The purpose of this generic qualitative study, guided by Mezirow's transformative learning theory, focused on understanding middle school teacher perceptions of the implementation of the math workshop model. The five research questions addressed middle school teacher perceptions of the implementation and influence of the math workshop and how it had transformed their understanding of teaching mathematics. Data were collected through semistructured interviews with nine teachers. Data were analyzed using a content analysis approach, which included developing a coding framework to identify themes. Five themes related to the research questions were identified during the data analysis process. These were as follows: provides structure, shifts the focus on students, time is essential, challenges, and communication. These findings confirmed that the participants perceived that the math workshop model provided structure and shifted the focus on the students, which, in turn, influenced teachers' instructional practices. Collaboration could provide an avenue for the sharing of instructional strategies as well as for addressing challenges, such as time, that teachers face when implementing the math workshop. It is also recommended that future studies be conducted with a larger sample employing mixed methods. Findings could contribute to positive social change by providing guidance to teachers in implementing the math workshop model to enhance students' achievement levels.

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Acknowledgements

I would like to acknowledge God, my family, friends, and committee for helping me with making it through this long journey. This has been a long, trying, and eventful journey but a rewarding one. Through this journey, I have learned a lot and grown as a person and an educator. I want to thank my family for their support and encouragement. I also want to thank Dr. Gee and Dr. Jayasena for their patience and guidance through this process. I truly appreciate them and am very thankful for their support.

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# Chapter 1: Introduction to the Study

In this study, I explored middle school teacher perceptions pertaining to the implementation of the math workshop model in middle school classrooms. The math workshop model has been identified as a strategy that can be used to improve teaching and learning mathematics in middle school (Sharp et al., 2019). The terms math and workshop have been used in a variety of ways in mathematics, but math workshop is a specific model for the teaching of mathematics. The math workshop model is a framework of instruction that teachers can use to structure their classroom teaching. The math workshop model encompasses a minilesson, independent practice, small group instruction/guided mathematics, and a closing. The math workshop is a new structure to help teachers implement strategies that have been researched and shown to be beneficial in increasing student understanding of mathematics. However, there is little research on implementing the math workshop model in middle school classrooms. The math workshop is a new approach used by the teachers in the targeted school system in this study. Over the past 2 years, middle school mathematics teachers in this school system have been required to implement the math workshop model. Looking at teacher perceptions of implementing the math workshop model will help in understanding the influence, if any, that the model has had on classrooms and their instructional practices. The data from this study could help the participants in this study learn from other participants who experienced the same successes and challenges with implementing the math workshop model. The results could also help all educators to better understand implementation of the math workshop model in classrooms. This study may contribute to

social change, as learning about implementing a math workshop model could assist educators in understanding what is needed to further support adolescents' achievement in mathematics.

In this chapter, I provide background information on the problem derived from research literature related to the math workshop and explain the problem and the purpose of the study. I also include the research questions, describe the conceptual framework that was used to guide the study, and provide a rationale for the nature of the study. Finally, definitions of key terms, assumptions, scope and delimitations, limitations, significance, and a summary of key points are provided in the chapter.

## Background

Achievement levels in middle school mathematics have reportedly been below proficient for middle school students in the United States (National Assessment of Educational Progress [NAEP], 2019). According to the NAEP 2019 mathematics report card, approximately 66% of eighth-grade students scored below proficient level. For over 60 years, educational stakeholders have made improving student performance in mathematics a priority by focusing efforts to improve teaching and learning of mathematics (Sharp et al., 2019). One such effort is the implementation of the math workshop model. At the time of this study, only two research studies had been located about the use of the math workshop model; however, there was research on the individual components that make up the math workshop model.

Current practices in mathematics classrooms include the use of cooperative learning groups (Erdogan, 2018), hands-on experiences, models and manipulatives, and

guided and independent practice, as well as the development of problem-solving skills (Marita & Hord, 2017). These practices are critical components that are implemented within the structure of the math workshop (Lempp, 2017). Researchers have found that cooperative learning and reflective thinking positively affect seventh-grade students' critical thinking skills (Erdogan, 2018). It should be noted that the term secondary, used in this study, is inclusive of middle and high school grades. Secondary inservice teachers acknowledged that cooperative learning and making connections were successful strategies used with students in their mathematics classes (Clooney & Cunningham, 2017). Problem-solving skills are another strategy used in mathematics classrooms. A review of research literature conducted by Marita and Hord (2017) indicated that secondary students were better able to solve mathematical problems when they were provided with problem-solving strategies. Mathematics instruction should be rigorous and student-centered, and it should foster inquiry (National Council of Teachers of Mathematics [NCTM], 2014). Student learning, especially in mathematics, is strongly impacted by teachers and their practices (NCTM, 2014). Therefore, additional research is needed to identify those teaching practices that positively influence middle school student learning.

One instructional model that has been introduced to mathematics teachers to increase student engagement and achievement is the math workshop model. The math workshop model is a framework (Sharp et al., 2019) for instruction that allows instructional changes. The math workshop model consists of four major parts: minilesson, independent work, small group instruction/guided mathematics, and closure

or share time. A current search of the research literature resulted in two studies concerning the math workshop model approach; however, only one of the studies dealt with teacher perceptions on implementing the math workshop model (Hedman, 2016; Sharp et al., 2019). Sharp et al. (2019) conducted a study examining elementary, middle, and high school teachers' perspectives on implementing the math workshop. The authors indicated that the math workshop model was an effective teaching strategy; however, the authors felt the results could not be generalized due to the small number of participants in the study.

Growing efforts to improve teaching and learning have led to a lot of studies looking at how teachers learn (Chauraya & Brodie, 2018; Kennedy, 2019; Kovacs, 2018; Louws et al., 2017; Matherson & Windle, 2017; Osamwonyi, 2016; Serviss, 2019; Wood et al., 2017) and how they teach (Gheith & Aljaberi, 2018; Gulistan et al., 2017; Marita & Hord, 2017; Tchoshanov et al., 2017). The most frequently used method of teacher learning is professional development (PD). In a literature review, Matherson and Windle (2017) found that sit and get PD was no longer effective. Instead, teachers preferred PDs that were focused on active teaching, assessment, observation, and reflection. The researchers also found that teachers acknowledged that collaboration with peers is needed to be effective. In another study, Kennedy (2019) investigated three types of PD programs and found that teachers preferred PD programs that targeted strategic thinking that focused on learning how students learn and strategies for engaging and responding to their students. Osamwonyi (2016) stressed the importance of training teachers in new skills and methods to be effective and efficient in their duties.

Teacher training, however, does not always occur in PD programs. Studies have shown that collaboration and professional learning communities (PLCs) are additional methods that teachers use to learn new strategies, content, and skills (Anderson, 2019; Chauraya & Brodie, 2018; Serviss, 2019; Wood et al., 2017). While these studies have provided insight into how teachers learn, additional research is needed that focuses on how teachers perceive implementing new initiatives in the math workshop model.

Teaching mathematics requires teachers to be knowledgeable of teaching skills, content, and mathematics concepts (Tchoshanov et al., 2017). In addition, self-efficacy plays a significant part in teacher confidence and student academic success (Gulistan et al., 2017). Studies have shown that teacher knowledge and self-efficacy are vital to student academic achievement. Consequently, more research is needed on teachers' perceptions of their knowledge and self-efficacy with implementing the math workshop model.

## Problem Statement

The problem that this study focused on is middle school teacher perceptions of the implementation of the math workshop as a means to improve student performance in mathematics in order to raise the achievement level of middle school students. Academic achievement levels in mathematics have reportedly been below proficiency for middle school students in the United States (NAEP, 2019). As a result, stakeholders have placed priority on focusing efforts to improve teaching and learning (Sharp et al., 2019). One such effort is the use of the math workshop model. A review of current literature resulted in only one research study specifically on teacher perceptions of implementing the math

workshop model in the middle school classroom. The current study provides insight into teacher perceptions of implementing the math workshop model in the middle school classroom within one school system and thus assists in filling this gap in the literature.

## Purpose of the Study

The purpose of this study was to better understand middle school teacher perspectives of the implementation of the math workshop model. An approach that was used to assist in addressing the gap was the generic qualitative paradigm. The generic qualitative paradigm is based on understanding how people see, view, approach, and experience the world and make meaning of those experiences and specific phenomena within it (Ravitch & Carl, 2016, p. 7). The data for the study were collected using a generic qualitative approach using semistructured interviews with the selected participants. The data collected thus were used to understand teacher perceptions of implementing the math workshop model in middle school classrooms.

## Research Questions

The purpose of this study was to better understand middle school teacher perspectives of the implementation of the math workshop model in middle school classrooms. The main research question used to guide this study is below, followed by subquestions:

1. What are middle school teacher perceptions of the implementation of the math workshop model?

a. What are middle school teacher perceptions regarding the strategies used when implementing the math workshop model in the middle school classroom?
b. What are middle school teacher perceptions regarding the influence of the math workshop model on their instructional practices?
c. How do teachers perceive collaboration among themselves when implementing the math workshop model in their classrooms?
d. What are the perceptions of the teachers in relation to the challenges and issues as well as problems they face when implementing the math workshop model in their teaching in the middle school?

## Conceptual Framework

Transformative learning theory formed the basis of the conceptual framework used in this study. Transformative learning theory focuses on the process a person goes through to transform their frames of reference or their perspectives (Mezirow, 1997). Mezirow (2000), the founder of transformative learning theory, acknowledged that the way people interpret their experiences results in their frames of reference. According to Mezirow (2000), adults go through a process when learning something new. Central to that process is the ability to formulate new dependable beliefs pertaining to their experiences. Additional information on the connection of transformative learning theory to this study is provided in Chapter 2. Transformative learning theory was used to frame the questions, which focused on the change strategies teachers may adopt as well as the problems, issues, and challenges they faced during the implementation process. I

analyzed teachers' perspectives on their experiences with the implementation of the math workshop model through the lens of transformative learning theory.

## Nature of the Study

Through this generic qualitative study, I explored middle school teacher perceptions of the implementation and influence of the math workshop model in the middle school classroom. A generic qualitative study was chosen because I studied a phenomenon in its real-life context and did not analyze student achievement or the outcome of implementing the model. A qualitative research method of inquiry is used to understand the ways that people see, view, approach, and experience the world and make meaning of their experiences (Ravitch & Carl, 2016, p. 7). A generic qualitative study consists of a detailed inquiry into a bounded entity in which the researcher either examines a relevant issue or reveals phenomena through the process of examining the entity within its social and cultural context (Denzin & Lincoln, 2011). Using a generic qualitative study allowed me to describe and analyze middle school teachers' perceptions of their implementation of the math workshop model and the influence that this new initiative had on their instructional practices. The purpose of this study was to better understand teacher perceptions of the implementation of the math workshop model in the middle school classroom. Additional information regarding the use of a generic qualitative study is provided in Chapter 3.

Data derived from the interviews conducted with the selected participants were the main data source in this study. The interviews lasted about 45 minutes with each of the selected 12 middle school mathematics teachers who had implemented the math

workshop model in their classrooms. These selected participants were a part of a school system that had recently identified the math workshop model as an initiative to be implemented in middle school mathematics classrooms. In addition, these participants had been implementing the math workshop model in their classrooms for at least 2 years.

## Definitions

Many of the terms in this study are used in education and educational literature. Some of the following terms are related to or are components of the math workshop model, and some are related to the conceptual framework and the methodology.

*Differentiation* is the process of using a wide variety of teaching techniques with lessons and providing multiple levels of activities for the same concept to meet students' needs (Suprayogi et al., 2017).

*Formative assessment* is a teaching practice in which information on students' understanding is used to provide feedback to promote teaching and learning processes (Pinger et al., 2018b).

A *generic qualitative study* is a detailed inquiry into a bounded entity in which the researcher either examines a relevant issue or reveals phenomena through the process of examining the entity within its social and cultural context (Denzin & Lincoln, 2011).

*Instrumental-use multiple case sampling* is a process in which a researcher selects multiple cases of a phenomenon to understand the phenomenon (Patton, 2015).

The *math workshop model* is a framework of instruction and a philosophy of how a mathematics class can be structured (Reynolds, 2018; Sharp et al., 2019).

For a *semistructured interview*, the researcher prepares ahead of time a limited number of questions focused on a specific topic with the potential to ask follow-up questions (Rubin & Rubin, 2012).

*Student-centered learning* is a constructivist approach to learning equated with active learning, choice learning, and a shift from teacher to student (Eronen & Kärnä, 2018).

*Transformative learning* is a way to transform a frame of reference that has been problematic to make it more acceptable and justifiable (Mezirow, 2000).

## Assumptions

As the researcher in this study, I recognize that it is important to acknowledge that the research may have been shaped by my values and assumptions (Ravitch & Carl, 2016). Things that are accepted as true by a researcher and those who may read research are considered assumptions. In this generic qualitative study, the following assumptions were envisaged. First, it was assumed that the participants for this research were employed full time in the school system chosen for this study. Second, it was assumed that the participants had acquired a standard teaching certificate in the state in which the school system is located and had worked at one of the middle schools within this school system for at least two full academic calendar years or longer. Finally, it was also assumed that the participants had implemented the math workshop model and provided honest responses to each interview question.

## Scope and Delimitations

For this generic qualitative study, I was seeking to better understand middle school teacher perceptions of the implementation of the math workshop model. The math workshop model was introduced to the teachers in the middle schools in the chosen school system a little over 2 years ago, when they were instructed to begin implementing the model within their classrooms within that school year. Their perceptions of implementing the math workshop model in their classrooms may provide insight for others looking to implement the math workshop model. The scope was limited to only middle school mathematics teachers in one public school system in the southeastern part of the United States. There are approximately 45 middle school mathematics teachers within this school system. Therefore, the sample size, which was 12 participants, was limited to the middle school mathematics teachers who volunteered to be interviewed. With rich, concise details of the phenomenon, readers may be able to thoroughly understand it and make connections to their situations (Shenton, 2004).

## Limitations

A limitation in this study was the inability to generalize the findings to a broad spectrum of schools due to the small sample size specific to a school system in the southeastern part of the United States. However, the data provide valuable information pertaining to the experiences and perceptions of the selected group. In addition, the current literature on the topic was limited, so the insights from this study may help to provide a foundation for further research. Another limitation that I anticipated was difficulty in finding teacher participants who were willing to participate in this study.

Middle school mathematics teachers in the targeted school system were required to implement the math workshop. All middle school teachers within the specific school system were invited to participate, and it was possible to get the required number of participants. However, I was not able to obtain the required number from the targeted school system. I reached out to other school systems in the same area via email to gather more participants.

## Significance

The math workshop model is an innovative model that was new to many teachers in the targeted school system for this study. With a current search of the research literature resulting in only locating two studies that focused on the math workshop model, the results from this study may enrich knowledge related to the field of mathematics education by providing insight into middle school teacher perceptions of implementing the math workshop model. Teacher perceptions of the math workshop could assist educational leaders in designing professional development sessions on creating the math workshop model and how best to use it in the classroom, thus potentially increasing student engagement and achievement. The results of the study could also inform educators of the benefits and challenges of implementing the math workshop model, which could be used to improve and enhance mathematics instruction. The results of this study could also be instrumental in redesigning the curriculum to better meet the needs of students through the math workshop model. Finally, this study could contribute to social change, as learning about implementing a math workshop model could assist teachers in understanding what is needed to further support adolescents in mathematics. Improving

instructional practices in the mathematics classroom, along with possible curricular changes, may lead to enhancing student achievement.

## Summary

In this study, I attempted to provide insight into teacher perceptions of implementing the math workshop model in the middle school classroom. Academic achievement levels in mathematics have reportedly been below proficient for middle school students in the United States (NAEP, 2019). The math workshop model is a framework that stakeholders have turned to for improving teaching and learning (Sharp et al., 2019). In this chapter, I have highlighted literature to support the math workshop model, the purpose of the study, the research questions, conceptual frameworks that were used to guide the study, and definitions of key concepts. I have also acknowledged some assumptions and limitations associated with this study. In the next chapter, I give a detailed review of the literature used for this study. I begin with the conceptual framework, address how teachers and students learn, and end with the components of the math workshop model.

# Chapter 2: Literature Review

The aim of this study was to understand better middle school teachers' perceptions of implementing the math workshop model in their classrooms. The focus of this literature review is providing background knowledge in several areas related to the study. The first section provides information on the conceptual framework used to guide this study. Transformative learning theory explains adult learning. This study focuses on teacher learning and teachers' perceptions when the math workshop model was implemented in their classroom. The next section focuses on professional development, its foundation, and the current influence of professional development on teacher learning and teacher behaviors related to math workshop model implementation. The third section provides information regarding teaching mathematics and teacher preparation, specifically pertaining to teaching middle school mathematics and any issues or recommendations regarding teacher preparation. The next section deals with the math workshop model and the key components of the math workshop (differentiation, student-centered learning, and formative assessment).

I used several databases such as EBSCO, Google Scholar, ERIC, Sage, and ProQuest journals to search for relevant and current literature. The following search terms were used in the literature search: *transformative learning theory, adult education, professional development, teacher learning, teacher behaviors, math workshop model, differentiation, student-centered learning, formative assessment, teacher knowledge, self-directed learning, collaboration, professional learning community,* and *continued learning.*

## Conceptual Framework

Mezirow's (1997) transformative learning theory formed the basis of the conceptual framework used in this study. Transformative learning theory focuses on the process a person goes through to transform their frames of reference or their perspectives. To transform a frame of reference, a person engages in critical self-reflection and critical discourse. A frame of reference, or meaning perspective, is the assumptions, cultural or psychological, through which a person understands and transforms new experiences (Mezirow, 1997). Mezirow (2000) acknowledged that the ways people interpret their experiences result in their frames of reference. Habits of mind are tools, skills, experiences, and tendencies that people use in difficult situations in order to respond in a knowledgeable and insightful way. A frame of reference is comprised of habits of mind that include perspectives influenced by sociolinguistic, moral-ethical, epistemic, philosophical, psychological, and aesthetic factors. These factors are expressed as points of view that comprise a collection of concepts, beliefs, judgments, and feelings that shape an interpretation.

A point of view is an expression of a habit of mind. However, points of view can easily be influenced and changed as a result of reflection (Mezirow, 1997). Habits of mind and points of view are two dimensions that encompass cognitive, conative, and emotional components. The cognitive component involves a level of conscious thinking, reasoning, and remembering. The conative component consists of a level of intentionality or acting purposefully. The emotional component involves feelings. People make meaning of their experiences, which requires conscious thinking. This form of thinking

can lead to purposeful action and naturally involves feelings. For example, a teacher's experience with implementing a program could change their premises, which impacts their habit of mind. A positive experience with implementing a new program could develop a positive habit of mind and point of view. Habits of mind can also add to prejudice, stereotypes, and unexplained beliefs and assumptions, creating limitations and forming subconscious barriers that individuals cannot go beyond. For example, a teacher who has had prior negative experiences with implementing new programs, for any reason, can develop a negative habit of mind that creates a subconscious barrier to implementing any new applications. Habits of mind strongly influence a person’s frames of reference.

Frames of reference hold a person's values and sense of self and provide a sense of stability, coherence, community, and identity. A person will judge others' points of view against their own and will strongly defend their own if necessary. A person's viewpoints that challenge frames of reference may be dismissed as distorting, deceptive, ill mentioned, or crazy (Mezirow, 2000). According to Mezirow (1997), transformations in frames of reference take place through critical reflection.

Critical reflection is a vital component of transformative learning. Mezirow (1997) indicated that transformation of a frame of reference occurs through critical reflection on assumptions. There is a difference between reflection and critical reflection. Reflection can have many meanings. This term may refer to awareness of an object, event, or state; to allowing thoughts to wander over something; or to imagining alternatives. In other words, reflection involves intentionally assessing actions. Critical

reflection is distinctly different. Critical reflection can be influenced by assimilated values, which make it implicit or explicit where the process of choice is applied (Mezirow, 1998). Mezirow (1994) described critical reflection as not only involving a critique of assumptions to determine their credibility and value, but also critical examination of the origins, nature, and consequences of those assumptions. Most reflection takes place within the context of problem solving. Two distinct capabilities are required for effective critical reflection: the development of critical self-reflective capacity and the ability to exercise reflective judgment (Mezirow, 2003). In other words, an adult has the potential to engage in critical self-reflection and the ability to engage in critical discourse that involves assessing assumptions. An adult engaging in reflection should have these two capabilities.

There are three types of reflection: content reflection, process reflection, and premise reflection (Mezirow, 1994, p. 224). Content reflection examines the problem's context and answers the question What is the problem? It requires looking back and reflecting on what was done. Process reflection involves looking at the problem-solving strategies used to determine if something was missed and answers the question What was missed? It involves considering the causes and any other factors that may be connected to actions. The question Why is this important? is an examination of the basis of the problem, which involves premise reflection. This question requires the person to see the bigger picture of what is happening within their value system. Mezirow (1998) indicated that when an adult engages in critical self-reflection on an assumption, this process involves critiquing a premise in which a problem has been defined. He also

acknowledged that critical reflection is purposeful, consistent, objective, and principled thinking. The key to transforming one's frame of reference is to be critically reflective of assumptions.

There are two ways that fixed frames of reference are transformed: objective reframing and subjective reframing. Objective reframing entails critical reflection on the assumptions of others who may have been involved in a situation. It is the most common form of transformative learning. When a person critically reflects on their assumptions and the reasons for a limited, abnormal, or unhealthy frame of reference, this is subjective reframing. Mezirow (2000) indicated that points of view can be transformed by critically reflecting on assumptions that support the content and process of problem solving. Engaging in critical reflection to make an informed and reflective decision before acting on it is a requirement of transformative learning (Mezirow, 2000).

Critical reflection is a significant component in the learning experiences in adulthood (Mezirow, 1990). An adult can evaluate previous knowledge to construct new knowledge when they engage in critical reflection. According to Mezirow (1990), critical reflection allows a person to address questions of justification for the assumptions that a problem is based upon. Critical reflection involves looking for the reasons *why*. Reflective thinking is driven by confusion and doubt, which forces a person to inquire into, find, and resolve a problem. Mezirow (2000) indicated that points of view could be transformed by critically reflecting on assumptions that support the content or process of problem solving. Therefore, engaging in critical reflection is essential to problem solving and potentially transforming frames of reference.

The second key aspect of transformative learning is constructive discourse. According to Mezirow (1997), transformative learning is rooted in the way people communicate. Validating how one understands or arrives at the best judgment concerning a belief is done through discourse (Mezirow, 1997, p. 10). Discourse is described as the dialogue involved in assessing beliefs, feelings, and values (Mezirow, 2003). It is also defined as the process in which people have an active discussion with others to understand better the meaning of an experience (Mezirow, 2000, p. 14). Ideal circumstances are needed for effective discourse. These circumstances include participants having all of the necessary information to engage in the conversation. They should feel free from coercion, have equal opportunities to participate in the various roles of the conversation, be empathetic and open minded, and be willing to listen, compromise, and act based on their best judgment of the situation (Mezirow, 1997). Engaging in discourse requires participants to be willing and ready to seek understanding and potentially reach some agreement. Discourse is not about being right or winning an argument. It is about finding common ground, welcoming differences, and seeing another person's point of view (Mezirow, 2003). Learning is a social process that requires interactions and discussions to make meaning. Effective discourse becomes essential to making meaning and increasing knowledge, which is essential for transformative learning. Transformative learning is associated with adult learning. Mezirow (2000) acknowledged that adults can genuinely re-evaluate their opinions on important issues and potentially alter those strong opinions and grow consciously as people. He also

asserted that becoming critically reflective on one's assumptions is more likely to occur in adults than in children and adolescents.

Adults go through a process when learning something new. Central to the adult learning process is the ability to formulate dependable beliefs about experiences by assessing the context, search for an informed agreement on their meaning and justification, and then make a decision based on insights from the process (Mezirow, 2000). Mezirow (1990) identified three types of learning: instrumental, communicative, and reflective. Instrumental learning is the most basic of the learning types a person engages in. It is task-oriented problem solving and involves a significant level of reflection. When an adult asks how they can best learn information, they are engaging in instrumental learning. Communicative learning consists of the learner attempting to understand what is meant by another's speech, actions, or writing. The learner focuses on achieving coherence by asking such questions as when and where. Reflection in communicative learning is crucial because it is a way to make sure that patterns of similarity have been accurately identified and interpreted. Meaning is constructed when the unfamiliar has been interpreted. Reflective learning is evident in both types of learning, but it is most apparent in communicative learning. Daily, people challenge what is told to them when it does not fit into their meaning perspectives or they have doubts. Reflective learning can occur through discourse that requires a person to put aside their prior judgments, attempt to hold their biases in check, and critically review evidence and arguments to decide justification about the expressed idea. Each type of learning involves three learning processes: learning within meaning schemes, learning new meaning

schemes, and learning through meaning transformation. A learner working in the learning-within-meaning-schemes process is taking what they already know and expanding, complementing, and revising their pre-existing system of knowledge. The second learning process, learning new meaning schemes, requires a learner to acquire a new set of beliefs, judgments, and feelings that are compatible with existing meaning schemes and perspectives. The last learning process is where the actual transformation of perspective occurs. Learning through meaning transformation occurs when a learner reorganizes meanings and begins to transform.

Transformative learning is a way of problem solving. Mezirow (2000) indicated that transformative learning is a way to transform a frame of reference that has been problematic to make it more acceptable and justifiable. Transformations are usually the result of some occurrence or event that requires meaning or clarification. Before a person can take immediate action, delay action, or affirm an existing pattern of action, they must go through the transformative learning process by defining, redefining, or reframing a problem. According to Mezirow (2000), a person goes through a series of steps to transform or solve a problem.

Understanding how teachers learn has been the focus of several recent studies. Many of these studies utilized transformative learning theory as the conceptual framework guiding the research. Arshavskaya (2017) conducted a study using transformative learning theory to analyze teacher learning through teacher blogs and interviews. The purpose of the study was to address a gap in the process of learning to teach using teaching practicum blogs. Two preservice language teachers from the same

university were enrolled in a teaching program that required them to describe and reflect on their experiences using a personal blog. Both participants were assigned to observe and coteach courses at the university. Data from interviews, blogs, and video recordings of lesson planning and reflection sessions with mentors were analyzed. Aspects of transformative learning theory were used to analyze the data. Findings indicated that writing was an important tool in bringing about teachers' development of professional expertise. However, in a blogging environment, not all teachers experienced success. One implication from the study that pertains to this current study is that the theory of transformative learning represents a useful theoretical lens to see adult learners' successful, or not so successful, transformational experiences.

Maintaining and enhancing knowledge, skills, and attitudes were the focus of a case study conducted by Namaganda (2020) that explored the experiences of librarians learning pedagogical skills. Ten librarians from six African countries attended the PedSkills course in Uganda. Transformative learning theory was the conceptual framework used to guide the study. Data were collected from semistructured interviews in which participants shared reflections on their learning experiences. Findings indicated that participants could see distortions in their beliefs, feelings, and attitudes and examine their practices critically. Through individual reflection and discourse with others, participants were able to reflect on their habits of mind critically. A prominent theme of perspective transformation of teaching and increased self-confidence in facilitating learning was also found in the data. The changes in perspectives were associated with the opportunities given during the course for discourse and reflection on learning. This

study's implications indicated that reflective activities and group discussions were critical in helping participants to see the realization of the transformations that a person experiences and should be integrated into professional development programs.

Cavender et al. (2020) conducted a phenomenology study investigating transformative learning in a 10-day education abroad program in Greece. Seventeen college students participated in the program. The activities and assignments were designed with the stages of the transformative learning process in mind. Data were collected from a final essay assignment, audio recordings of guided group discussions, instructor observations, and field notes. Findings indicated three overarching themes that were used to create a framework of transformative travel that travelers can use with one travel experience or as an approach to their travel experiences throughout a lifetime to understand better how their *being-in-the-world* evolved. The three themes referred to where travelers direct their energy to elicit transformative outcomes: themselves, their experiences, and people and places. The authors acknowledged that this study was the first of its kind and suggested that purposeful approaches to transformative learning produce more meaningful outcomes for learners. Further research is needed on the framework to discover additional factors that explain transformative travel.

## Foundations of Professional Development

Teaching is a complex profession with changing and growing demands, and teachers must become lifelong learners to be high-quality educators. To implement new strategies or programs, such as the math workshop model, teachers must continually update their skills, knowledge, and experiences to meet the ever-changing educational

needs of a global economy. In 1997, President Clinton acknowledged the critical need to improve the quality of teachers in American classrooms during his State of the Union Address (National Center for Education Statistics, 1999). He issued a Call to Action to address the growing concern over the conditions of education and the need for excellent teachers. The education system was charged with preparing children to compete in a complex global workplace by providing them with the knowledge, information, and skills needed to succeed. Excellent teachers are essential to this educational system.

In response to these concerns, a study was conducted to investigate the profile of the quality of the nation's teachers (NCES, 1999). The study specifically focused on teachers' learning and the environments in which they work. The findings highlighted that teachers' professional preparations are essential to improving K-12 education. Teaching practices must be revised to meet the requirements of any education reform. The constantly changing demands of teaching require high-quality teachers to be capable and willing to learn and relearn their trade to meet those demands continuously. Continued learning is the continual development of professional practice and expertise (Cervero & Daley, 2016). In the early 1900s, the first attempts of continuing professional education were seen in the medical profession. Over time, more professions began to incorporate continued professional educational practices. In the 1960s, educators recognized the similarities across the many professions continued professional education processes, which led to the development of continued professional education as a field of practice. There are many purposes of continued professional education; it depends on the individuals and their beliefs, values, and approaches to using their expertise. In education

and other fields such as healthcare, continuing education credits are required for educators to continue practicing in their field. Continued learning is the key to building teacher capacity for effective teaching. There are many forms that continued learning can be. Two key forms of continued learning that teachers engage in to build their capacity are formal professional development programs and collaboration with colleagues (NCES, 1999).

Formal professional development (PD) was identified as an essential form of continued learning for teacher development. It was identified as a goal, Goal 4, in the National Education Goals developed by governors in 1989 (US Department of Education, 1994). The goal states: By the year 2000, the nation's teaching force will have access to programs for the continued improvement of their professional skills and the opportunity to acquire the knowledge and skills needed to prepare students for the next century (US Department of Education, 1994). As a result of this goal, teachers from some schools and school districts were required to participate. Opportunities for PD varied from college courses to opportunities through their schools in workshops or conferences. Over time the concern with the effectiveness of PD programs grew. Traditional PD programs were criticized for many reasons. PD programs were either too short, lacked continuity, provided no follow-up or feedback from experts, were usually isolated from the teachers' classroom and school context, or took a passive approach to the training (NCES, 1999). Matherson and Windle (2017) conducted a literature review of the research on PD. They found that sit and get PD was no longer an effective way for teachers to get the PD they needed or desired. The literature indicated the most useful PD focused on active teaching,

assessments, observation, and reflection. It was also acknowledged that collaboration among teachers is needed for PD to be effective. It is easy to see why the traditional PD programs were criticized and the need for better-planned programs to be developed. Some studies have shown that different types of PD have been beneficial to educators and support the need for continual learning through these programs (Kennedy, 2019; Kovacs, 2018; Osamwonyi, 2016; Serviss, 2019; Wood et al., 2017).

## Types of Professional Development for Educators

Teachers learning to implement the math workshop model should engage in some form of PD. Teacher learning can happen through organized PD programs, collaboration with colleagues, and self-directed learning (Anderson, 2019; Chauraya & Brodie, 2018; Kennedy, 2019; Kovacs, 2018; Louws et al., 2017; Osamwonyi, 2016; Serviss, 2019; Wood et al., 2017). No matter the means for learning, teachers are always learning, and their needs should be accounted for when planning or evaluating their PD. In this section, I first address the research on how teachers learn in organized PD programs. Then I discuss how teacher learning occurs through collaboration. Last, I present information on how teachers learn in self-directed ways.

Kennedy (2019) examined research on PD and the underlying assumptions about the nature of teaching and teacher learning. She identified three types of PD programs from the analysis. The first type was PD programs that focused on teaching behaviors. In her analysis of previous studies of PD, Kennedy found that researchers tried to identify a set of teaching behaviors by breaking down teaching into practices then determined which methods were connected to student achievement. Those practices were then used

to design a PD program to teach those behaviors to teachers. The second type of PD programs focused on increasing content knowledge. In this type researchers switched from teaching behaviors to what teachers need to know. The third type of PD focused on strategic thinking that allowed teachers to better understand how their students made sense of their lessons and offered strategies for engaging and responding to their students. This last type of program has seen the most significant positive impact on teacher effectiveness (Kennedy, 2019). This is because this third type of PD program allowed teachers to continue learning and improving their practices after the PD program was finished. The research Kennedy conducted showed that PD programs offer many benefits for effective and meaningful teacher learning and these programs are influential in transforming teacher practices and mindsets. However, additional research is needed on what PD program or support assists teachers implementing the math workshop model and their perceptions of those PD programs on their ability to implement the math workshop model in their classrooms.

In a qualitative inquiry study conducted by Kovacs (2018), transformative teacher learning was examined from the perspective of teacher PD. Teacher transformative learning was described as learning that potentially touches the person's emotions, enables thought and reflection, and causes internal action (Kovacs, 2018). The purpose of the study was to determine what constitutes transformative teacher learning and the changes and challenges that the teachers in these schools faced in supporting such transformation. The researchers used the concepts of change, challenge, and transformation to determine the impact on teacher PD as it pertained to implementing changes to create a student-

centered learning environment. The schools and data used for this study were a part of a more extensive study conducted that investigated teacher learning in innovative learning environments and were engaged in student-centered reflective pedagogical practices.

Results of the study by Kovacs (2018) indicated that teacher transformative learning does not happen in isolation. Teachers engaged in collaboration often to prepare lessons, discuss challenges and any opportunities that may be available in the upcoming period. Osamwonyi (2016) also investigated teacher collaboration as an inservice education practice in Nigeria. He recommended that efforts should be made to include activities that incorporate small groups so that participants can learn from each other. Osamwonyi defined inservice education as the relevant courses and activities in which a teacher currently working in the classroom may participate to upgrade their professional knowledge, skills, and competence in the teaching profession. Wood et al. (2017) also acknowledged the importance of collaboration on teacher learning. The researchers met with teachers to identify how and what opportunities were provided for teachers to learn to teach new curriculum. An initial 3-day workshop introducing the rubrics was provided to teachers and support throughout the action research. Teachers repeatedly met for 4-6 months to design, discuss, and redesign, if the evidence supported it, the process. In these three studies, the researchers provided evidence that collaboration was an essential factor in teacher transformative learning. This information was helpful in planning my study as collaboration among teachers was an important aspect that was looked at in my study when implementing the math workshop model.

Another form of collaboration that has also shown a positive effect on preparing teachers to meet the demands of education is the professional learning community (PLC). A PLC is a network or team of educators who meet regularly to share their ideas to enhance their teaching practice and create a learning environment where all students can reach their fullest potential (Serviss, 2019). The development of learning communities was an effective way to improve teachers' continued learning (Miller, 2020; NCES, 1999; Serviss, 2019). Anderson (2019) conducted a qualitative study to better understand teacher PD specific to mathematics. Participants were given a list of learning topics and learning partners and were asked to identify which of the topics listed were ones they wanted to know more about when acquiring new knowledge about mathematics teaching and learning. Findings indicated that teachers would use multiple learning communities to develop a better understanding of a topic. This study was not about traditional PLC, but it supports the idea that teachers will seek others to develop their knowledge of a concept. This study helped guide the development of interview questions for the research regarding resources teachers used to help them implement the math workshop model in their classrooms.

In contrast, Chauraya and Brodie (2018) conducted a qualitative study investigating how high school mathematics teachers were affected by participating in a traditional PLC. The researchers also wanted to address a gap in the research on PD. Five mathematics teachers, and the first author as the facilitator, made up a PLC team at the same high school. They engaged in weekly planning meetings to work on professional learning activities. These activities included analyzing learner errors, interviewing

selected learners to understand their reasoning in their errors, identifying the learning needs of the students, reflecting on their understanding of the mathematics concepts, designing and teaching those concepts, and reflecting on videotapes of those lessons. Results showed that when participants had a shared focus, active mutual engagement and agreed-upon methods, strategies, and ways of doing things, teacher learning in a PLC is supported. The researchers also acknowledged the importance of the role of the facilitator in a PLC.

However, teachers also reported challenges (Kovacs, 2018). Teachers acknowledged that they had to dedicate more time and attention to the methods and specific classroom practices of a student-centered learning environment at the beginning of their work. One school found that creating a sense of belonging, collaboration, and ownership was a way to combat the challenges they encountered. The other school also found that by creating a community of support among the teachers, they could work and learn together to tackle their challenges. Challenges can be a part of learning anything new; however, collaborating with others going through the same thing or having gone through the same thing can help overcome those challenges.

A key factor identified in the previous studies was collaboration or a community of support among the teachers (Chauraya & Brodie, 2018; Kovacs, 2018; Osamwonyi, 2016; Serviss, 2019; Wood et al., 2017). Having that support and freedom to share ideas was very important in expanding the teachers' knowledge and skills. For example, in the NCES report (1999), the second key form of continued learning that builds teacher capacity is collaborating with colleagues. Teachers, researchers, and policymakers

acknowledged collaboration as essential to teacher continuing education (Matherson & Windle, 2017; NCES, 1999). Collaborating on school activities within school and across schools has the potential to produce positive and long-lasting changes. These types of activities provide the basis for transformative learning.

Another aspect of teacher transformative learning through PD is reflection. Kovacs (2018) found that changing teacher practice through transformative learning involved some form of reflection. From the principal's viewpoint, continuous reflection seemed to be why teachers continuously expanded and worked on their profession. Finding from Chauraya and Brodie (2018) also showed that the use of reflection to create new meaning is a key process in transformative learning and the discourse teachers engage in when collaborating in a PLC.

Many of the studies discussed in this section indicated that some form of PD supported teacher transformative learning. Kovacs (2018) determined that teacher transformative learning could only occur if the PD were healthy and those involved were open to new ideas and supported by others. Based on the findings in this study, it appears it is important to remember that if applying transformative learning to teacher PD, it needs to encompass the many layers of expansive learning, integrate the knowledge of practice, and provide a sense of empowerment and emotional satisfaction. Wood et al. (2017) also found that certain conditions were needed to be in place to support teacher learning. In their study, the researchers found that teacher learning through collaborative PD groups needed (a) clear separation of teaching and learning, (b) provide contrasted learning experiences by varying the teaching design and looking for learner responses, (c)

opportunities to share the experiences that allowed for generalization and the ability to create a different relationship that reconnects to teaching and learning, and (d) overcome the constraints of a syllabus and assessment. Osamwonyi (2016) found that teachers' professional inadequacies created gaps that could be filled through inservice education. He recommended that inservice education programs need to be well-planned with clearly defined goals for growth and improvement of instruction and leadership skills. He also acknowledged that the focus of inservice education programs should be job-related tasks that are real, practical, and relevant to participants. These studies indicate that PD was an important factor in teacher transformative learning and recommend that if using PD to transform teachers' teaching practices, there are criteria that should be considered when planning a PD. The information embedded in these studies helped me to identify problems and issues that should be focused on when planning a PD program.

In the studies in the paragraphs above, evidence supports the two key forms of continued learning most utilized by teachers. However, teacher learning is not always through PD or collaboration with colleagues, some teachers assume responsibility to learn on their own. In the following paragraph, one study investigated teachers and their reasons for learning.

Some learning is self-directed. Self-directed learning is defined as the ability to take control of the goals and purposes of learning and assume ownership of learning (Louws et al., 2017). There are different phases of the self-directed learning process. These phases include needs assessment, planning, engaging in learning, and evaluation. Learning needs are defined as discrepancies or gaps between the desired competency and

the learner's current ability levels. Louws et al. (2017) conducted a mixed-methods study of teacher self-directed learning conceptualized as what, how, and why teachers want to learn. According to Louws et al. (2017), teachers have a high level of ownership over their learning. The authors indicated that teachers' self-directed learning is informed by many factors: problems experienced in practice, school climate, recent learning experiences, tasks and responsibilities, and national and school policies. Teachers assessed their needs based on these factors and decided what needs to be learned that will be valuable to their work situation. Findings indicated that all teachers preferred to learn about subject matter-specific domains. Early and late-career teachers had a strong preference for learning climate and classroom management. All teachers preferred to stay informed and up-to-date, and teachers preferred to learn about something that was interesting to them or something that was important to learn about. However, how teachers learn varied slightly.

Louws et al. (2017) acknowledged that motivation to learn varies among teachers based on their years of experience. They found that early-career teachers were intrinsically motivated for instructional, personal, and career goals. Mid-career teachers' learning was inspired by the desire to impact students' learning. Late-career teachers' interest in their subject seemed to be what drives their motivation. Regardless of which stage a teacher may be in, PD programs rarely consider these stages or how to support them when in the workplace; sometimes, teachers must take learning into their hands. Based on their findings, the authors argued that when considering PD, it should be organized, formal learning activities, and include the self-directed learning teachers

engage in at the workplace. This study provided insight into what PD programs teachers found to be the most effective in their learning and impactful to their teaching behavior.

The studies in this section provided insight into the different opportunities offered to teachers to enhance their learning. PD programs, collaboration with colleagues, and self-directed learning each have benefits and challenges. This study looked at how teachers perceive the learning from any or all of these types of learning influenced their ability to implement the math workshop model in their classrooms.

## Teacher Perceptions on Implementing Strategies

There are many ideas, strategies, and programs in education that researchers, stakeholders, and publishers perceive will work to improve student achievement. Acknowledging teacher perception of the implementation of any of these should be an important consideration for all involved. Several studies (Owens-Cunningham, 2021; Phinazee, 2021; Plaisir, 2020; Smith et al., 2019) were conducted that examined teacher perceptions on implementing strategies in their classrooms. Owens-Cunningham (2021) conducted a study to examine teacher perceptions of implementing differentiated instruction strategies in a middle school classroom. Owens-Cunningham found that teachers indicated a need for effective PD related to strategies specific to mathematics. Teachers reported a disconnect when they were required to participate in PD programs that did not help them to grow professionally. This ties in with some of the research found on PD programs discussed in the above sections (Matherson & Windle, 2017; Osamwonyi, 2016).

Teachers in a study conducted by Plaisir (2020) also acknowledged that PD was essential. The lack of quality PD was an issue for teachers trying to implement student-centered learning strategies. Smith et al. (2019) also found that supporting teachers with quality PD activities was key to teacher success in implementing new strategies. Providing PD helps teachers to improve their understanding when implementing a new program (Phinazee, 2021).

Implementing a new program or strategy can come with some challenges and struggles. Teachers reported time (Owens-Cunningham, 2021), limited resources (Owens-Cunningham, 2021; Phinazee, 2021), student behavior and motivation (Owens-Cunningham, 2021; Plaisir, 2020), losing control of the classroom (Plaisir, 2020) and pressures of curriculum and testing (Plaisir, 2020) as challenges they faced when implementing a new strategy. However, most teachers in these studies reported that they recognized the importance of the strategy and chose to persevere through these challenges (Owens-Cunningham, 2021; Phinazee, 2021). Some teachers reported that they received helpful information and felt supported in their implementation process (Smith et al., 2019). Smith et al. acknowledged that implementation of a strategy or program can be successful if the institution has a strong sense of community and collaboration. These two factors aid in the sustainability of a program (Smith et al., 2019).

Teachers are essential to any learning institution and their thoughts, ideas, and concerns pertaining to what goes on in that institution should be seriously heard and considered. In these studies, teachers recognized the need for and importance of the

strategy or program in which they were implementing as well as the challenges they faced. Researchers reported that PD was a big concern for teachers (Owens-Cunningham, 2021; Phinazee, 2021; Plaisir, 2020; Smith et al., 2019), either there was no PD to support them or the PD that was offered did not meet their needs. Researchers reported that effective PD was key to implementing a strategy or program efficiently and with fidelity. The results from these studies show that based on teacher perceptions teachers want and need effective PD to enhance their professional growth and ensure that implementation of any strategy and program is successful.

## Teaching Mathematics

Because teaching is a complicated process, it is impossible to teach without planning, which requires thinking, analyzing, and reflecting on every aspect of that process (Gheith & Aljaberi, 2018). This can create much pressure on teachers. Obtaining insight into teacher perceptions of these aspects of teaching, especially regarding implementing the math workshop model, can be important to helping teachers alleviate the added pressure of teaching. In addition, teaching middle school mathematics can be even more challenging due to the many personalities adolescents possess when they come to school. There is significant pressure on teachers to help all students achieve success in mathematics and other subjects (Marita & Hord, 2017). The Common Core State Standards for Mathematics (CCSM), which was launched in 1989, were developed to promote systemic improvement in mathematics education (National Council of Teachers of Mathematics, n.d.). The CCSM standards were developed with the hope that implementing the standards would promote college and career readiness. The

expectations of rigorous accountability and gains towards college and career readiness have placed more pressure on teachers to help all students achieve success with challenging mathematics and develop higher levels of thinking and problem-solving skills (Marita & Hord, 2017). Teachers must be prepared to meet students' needs and meet the current education reform requirements and expectations.

Teacher preparation involves teacher knowledge, teacher attitude, and teacher behavior. Teachers of mathematics must be knowledgeable of teaching skills, content, and mathematical explanations (Tchoshanov et al., 2017). Results from a mixed-methods study conducted by Tchoshanov et al. (2017) indicated that teacher knowledge of mathematics is vital to student performance at the lower secondary level. Knowledge, along with attitude and beliefs, are components that influence teacher behavior. In a study by Gulistan et al. (2017), it was recommended that teachers should update their content knowledge to help build their self-efficacy, which they found had a high correlation between teacher self-efficacy and student achievement. Teachers may strengthen their self-efficacy by attending workshops, conferences, or seminars where highly expert teachers share their knowledge in mathematics teaching and learning.

As stated in the paragraphs above, teaching mathematics can be challenging, and there are many factors teachers must consider when planning and teaching mathematics (Tchoshanov et al., 2017). This study aimed to better understand teacher perceptions of implementing the math workshop model. These studies highlight the many facets a teacher must consider when planning in a traditional mathematics class. However, there

was little known regarding teacher perceptions of how the math workshop model has transformed their way of planning and teaching.

**Effective Teaching Strategies for the Middle Schooler**

Teaching mathematics can be challenging, especially when teaching adolescent students. Research has been conducted to investigate teaching strategies that improve learning in middle school mathematics classrooms (Aljarrah & Baioumy, 2020; Enriquez et al., 2018; and Retnowati et al., 2016). A study by Aljarrah and Baioumy (2020) indicated a positive correlation between the teacher's teaching strategies and the level of metacognition skills of students. This positive correlation indicated the critical role teaching strategies play in developing and improving student metacognition levels. The findings indicated teaching strategies of cooperative learning, group method, and active learning positively impacted the level of mathematical skills. Retnowati et al. (2016) also found that collaborative learning was more effective than individual learning during problem-solving tasks. Aljarrah and Baioumy (2020) recommended updating patterns of teaching methods and developing a mathematics curriculum that includes a variety of mathematical and metacognitive skills that can be taught to students.

Enriquez et al. (2018) also acknowledged the importance of utilizing different teaching strategies to implement tasks. Researchers met with teachers to learn why they chose a particular teaching strategy at a specific time during a task. It was revealed that each teacher was intentional with the strategy that was chosen for a specific time. This process highlighted the importance of reflecting on the teaching strategies and activities used in the classroom for student learning. It acknowledged that selecting teaching

strategies before implementation helped the teachers to be clear about their intentions. From the explanations given by the teachers, the authors recommended that teachers be careful when selecting strategies to use with students. While all strategies are used to produce a better learning experience for students, teachers must determine which strategies are appropriate.

In contrast to these studies, Retnowati et al. (2016) found that collaboration is not effective in all situations. Researchers conducted a study to examine interactions between two strategies: worked examples and collaboration. Findings indicated that there was no significant difference between using worked examples with collaborative learning versus individual learning. Findings also indicated that for high complexity tasks, collaborative learning was not an advantage. This study showed that while collaboration can be an effective strategy to use with students during mathematics class, there are situations in which independent learning can be just as useful for learners.

These three studies provided insight into strategies believed to be effective for middle school students. Collaboration was one strategy that all the studies indicated was an effective strategy to use with middle school students (Aljarrah & Baioumy, 2020; Enriquez et al., 2018; Retnowati et al., 2016). Collaboration is an essential component of the math workshop model. This study examined teacher perceptions of collaboration as a strategy used in the math workshop model approach.

**Teaching Adolescent Students**

Teachers who work with middle school students should be aware of some strategies that seem to work well with this age. Darling-Hammond et al. (2020) suggested

three principles for teachers' instructional practices that work with adolescents. The first principle suggests building on and expanding students' prior knowledge and experience. Teachers should take what a student has already learned and create or structure activities that will blend what a student knows with what they want and need to learn. These activities should be challenging and introduce students to rich experiences that support continuous learning. This principle supports the differentiation component of the math workshop model. Once the teacher identifies what students know, that information should be used to develop and assign instruction and activities to enhance student learning.

The second principle recommends teachers support conceptual understanding, engagement, and motivation by ensuring tasks are relevant problem-oriented tasks (Darling-Hammond et al., 2020). These tasks should include explicit instruction about key ideas and opportunities for inquiry. Agustiani and Bahrun (2019) acknowledged that conceptual understanding is an essential foundation for students learning mathematics. Mathematics is a subject that is formulated from interrelated concepts therefore in the teaching and learning of mathematics teachers should encourage and support students to develop their conceptual understanding. During the math workshop, students are assigned to stations (Lempp, 2017). Activities in these stations should be relevant, incorporate some form of problem-solving tasks, and foster conceptual understanding. Because these stations can be done independently, it is essential that instructions are clearly written and easily understood. Usually, multiple students are assigned to a station together, which allows for the opportunity for inquiry and discussion.

The third principle encourages teachers to allow students to develop their metacognitive capacity and strategic learning capacity (Darling-Hammond et al., 2020). Metacognitive capacity refers to the ability to think about their thinking. Irvine (2021) indicated that metacognition is what students need to do before solving a problem. Mathematical processes such as selecting tools and strategies, connecting, reflecting, reasoning, and proving require some degree of metacognition (p. 45). Metacognition is also important in problem solving. Irvine stressed that teachers must be intentional in teaching metacognitive skills. Students who acquire these skills may not only improve their achievement in mathematics but also build their abilities to self-regulate which can positively impact other areas of learning. Strategic learning involves modeling thinking and providing explicit strategy instruction and scaffolds for self-monitoring of the thinking and actions. It also involves frequent opportunities for self and peer assessment. This principle focuses on the student as a learner (Darling-Hammond et al., 2020). The math workshop model is a student-centered driven approach to teaching math. The responsibilities are placed on the student to take ownership of their learning.

Darling-Hammond et al. (2020) also acknowledged the importance of collaborative learning as a classroom tool that can be used to enhance student learning. Collaborative learning provides students with opportunities to learn from peers, articulate their ideas, and develop metacognitive skills. Components of the math workshop model are designed for students to collaborate in the classroom. The research in this study (Darling-Hammond et al., 2020) provided information on principles teachers can use in their instructional practices that work with adolescents. Irvine (2021) discussed the

importance of metacognition. However, additional information is needed on how teachers perceive these principles and their effectiveness with adolescents within the math workshop model. This study provided insight into teacher perceptions of how they use the math workshop model, which has an emphasis on using students' prior knowledge and experience, conceptual understanding, engagement, and student-centered learning environment.

## Math Workshop Model

Teachers and their practices have a significant effect on student learning, especially in mathematics (NCTM, 2014). The math workshop model has been introduced to teachers as an instructional framework that can be used in their classrooms. The math workshop model is a framework of instruction and a philosophy of how mathematics class can be structured (Lempp, 2017; Reynolds, 2018; Sharp et al., 2019). The math workshop model is intended to include students in the teaching process, making them a crucial part of the process (Thompson, 2016). The structure emphasizes student-centered learning and a growth mindset.

The math workshop model's core components include a minilesson, math stations or centers, and closing or sharing (Lempp, 2017; Thompson, 2016). The minilesson, which is approximately 10-15 minutes, involves the teacher providing instruction on the required content to the whole class. During a minilesson, the teacher introduces the content or reinforces a concept taught with a brief review. During stations or centers, students work independently or with guided practice from the teacher. Independent practice, which is approximately 20-30 minutes, students work by themselves or with a

partner on various assignments that meet their needs. Guided practice is small group instruction with the teacher. Students that may need additional time to learn the content are identified and scheduled to meet with the teacher. This is scheduled at the same time as independent practice, and students rotate through stations and guided practice in that 20-30-minute time frame. Both independent and guided practices incorporate differentiation. Differentiation is the process of using a wide variety of teaching techniques with lessons and providing multiple levels of activities for the same concept to meet students' needs (Suprayogi et al., 2017). Differentiation is a key factor in the math workshop model (Lempp, 2017; Thompson, 2016).

The final phase of the math workshop model is closing or sharing time. In the last 10-15 minutes of class, the teacher regroups students back to the whole group. This is an opportunity for the teacher to check in with students to assess their progress. In the final phase, the teacher clarifies any misunderstandings, explains or justifies thinking, reviews strategies, and discusses struggles (Thompson, 2016). The time frames for each component of the math workshop can be adjusted to fit the needs of a class, and the math workshop does not have to be done every day. Teacher discretion is encouraged when implementing the math workshop (Thompson, 2016).

Key aspects of the math workshop model are based on differentiation, student-centered learning, and formative assessment (Thompson, 2016). These key aspects are discussed further in the following section.

**Differentiation**

In 2002 President Bush enacted the No Child Left Behind (NCLB) Act that required schools to identify gaps in student achievement based on test scores and alter teacher practices to close these gaps. This prompted a recommendation called Response to Intervention (RtI), a multitiered approach that identifies and supports students with learning and behavior needs (Bondie et al., 2019). Differentiation instruction (DI) was a practice suggested to implement RtI effectively (Bondie et al., 2019).

Not all learners progress at the same pace or with the same learning techniques, behaviors, or interests. Ismajli and Imami-Morina (2018) described DI as instruction that has taken into consideration the subject and the needs of the learner. Ismajli and Imami-Morina conducted a study that aimed to analyze the influence of interactive strategies in understanding information based on each learner's abilities and needs. Results indicated that students prefer different ways and forms of learning to meet their needs. However, teachers were not adequately prepared to provide differentiated instruction. The researchers recommended that teachers be trained in planning lessons that consider each learner's development, and effective strategies of matching instructions with learners' interests and abilities should be applied. Suprayogi et al. (2017) also acknowledged the importance of teacher professional development as it pertains to teacher efficacy and beliefs related to DI implementation. Suprayogi et al. (2017) defined DI as a teaching approach that considers differences between students, acknowledges their strengths, and accommodates their limitations. The researchers conducted a mixed-methods study to determine the variable (teacher self-efficacy, teaching beliefs, and teacher background)

linked to implementing differentiated instruction. Results indicated there was a significant relationship between teacher self-efficacy and DI implementation. This study looked at teacher perception of DI as a component of the math workshop model.

A key component of the math workshop model is DI (Lempp, 2017; Thompson, 2016). The math workshop model is a student-centered approach to teaching and learning. The math workshop's implementation involves the teacher planning lessons and activities centered around student needs based on an assessment. These lessons and activities should vary in levels and interests. During the math workshop model, a portion of the class period is dedicated to independent study. Independent study can be in the form of stations or independent seatwork. During this phase of the math workshop, students are working on activities that are on their level that reinforces the concept being taught in class. During this time, the teacher conferences with small groups of students to support or extend their learning. These two phases of the math workshop model are opportunities for DI to be implemented in the mathematics classroom.

**Student-Centered Learning**

Since the early 2000s, there has been a strong push in education to shift from a teacher-centered approach to teaching and learning to a student-centered approach (Eronen & Kärnä, 2018; Kaput, 2018). The teacher-centered approach essentially is the teacher delivering a clear, focused, explicit, and systematic sequence of instruction until mastery has been reached. Researchers (Rao et al., 2017) acknowledged this approach as instructivist, highly dependent on the teacher. Student-centered learning is a constructivist approach. According to Singhal (2017), student-centered learning

acknowledges students' interest, giving them a voice in the learning experience. Student-centered learning has several different meanings and can look different from classroom to classroom. It has been equated with active learning, choice in learning (Eronen & Kärnä, 2018), personalized learning, project-based learning differentiated instruction, center-based classroom, and flipped classroom (Kaput, 2018).

A qualitative study conducted by Eronen and Kärnä (2018) investigated junior high school students' experiences with learning mathematics based on self-guidance, use of technology, and minimalist instruction. After the project, students wrote reports of their experiences during the project. Data from these personal reports indicated that most students were satisfied with their learning and found collaborative student-centered learning to be a powerful method of solving mathematics problems. Talbert et al. (2019) also acknowledged the positive influence of student-centered instruction on student engagement in mathematics. Talbert et al. conducted a qualitative study investigating whether student-centered instruction engaged African American students differently. The researchers acknowledged that student-centered instruction practices had become a central part of the teaching to promote student engagement in mathematics. According to the researchers, their findings provided evidence that allowing students to take ownership and responsibility in their learning can positively change the quality of their involvement in mathematics coursework in comparison to the teacher-directed approach.

However, student-centered learning is not easy to implement (Eronen & Kärnä, 2018). Eronen and Kärnä found that expectations and motivations regarding the goals, implementation, and outcomes can vary for teachers and students. In their study, Rao et

al. (2017) found that students were not as productive in student-centered learning environments if the group's dynamics were off. Rao et al. conducted a qualitative study examining the challenges and supports engrained in a student-centered mathematics curriculum within a classroom that supported constructed learning. Findings indicated that most students were able to develop skills needed to be productive in the student-centered learning environment and take advantage of peer support. However, it was also noted that each student learns and struggles in different ways, impacting student confidence in learning. It is evident from these two studies that student-centered learning can have a positive impact on student learning if the goals, expectations, and motivations are clearly defined by the teacher and students understand their role in this type of environment (Eronen & Kärnä, 2018; Rao et al., 2017).

Based on the findings, Rao et al. (2017) presented some implications for mathematics teachers considering student-centered learning mathematics classrooms. Teachers must create an environment that allows students to feel comfortable taking an active role and sharing responsibility for their learning. Students need to be taught the behaviors and skills required to engage in a student-centered environment; teachers must transform from a lecture or demonstration approach to a facilitator-guided approach. Eronen and Kärnä (2018) also concluded that students need an understanding of the student-centered learning process. Teachers must ensure students are aware of the importance of collaboration and the student-centered learning process's goals.

The results of these studies indicate that students prefer to learn in a student-centered learning environment (Eronen & Kärnä, 2018; Rao et al., 2017; Talbert et al.,

2019). It was also determined that the interactions, collaborative learning opportunities, and active learning environment of a student-centered learning environment could benefit all students. However, additional research is needed on teacher perception of implementing a student-centered learning environment, especially in the math workshop model. There is a strong emphasis on student-centered learning in the math workshop model. Developing a student-centered learning environment involves finding out where students are in their learning. One way to determine where students are is to use formative assessments. In the next section, I discuss formative assessments, what they are, and how teachers can best use these to drive their instruction.

**Formative Assessment**

A third key component of the math workshop model is formative assessment. Formative assessment is a teaching practice in which information on students' understanding is used to provide feedback to promote teaching and learning processes (Pinger et al., 2018b). There are two primary purposes of formative assessment. The first is to provide information to teachers and administrators about students' learning to guide them in designing instruction. The second purpose is to provide feedback to students about their progress to help them determine how to close gaps between their performance and their targeted learning goals (Rakoczy et al., 2019). The effectiveness of formative assessment depends on understanding its purpose and quality of implementation. Implementing formative assessments requires a series of obtaining information through some form of assessment, interpreting the information, and making adjustments to improve the teaching and learning processes. The quality in which this is delivered

impacts the effectiveness of formative assessment. Finding out what students already know to help them further their understanding is a requirement of formative assessment. Teachers should ensure that they, the teachers, have a solid understanding of the content, how that content will be communicated, and the performance expectations for every student (Beesley et al., 2018).

Gathering information for diagnostic purposes and providing feedback are the critical components of formative assessment (Rakoczy et al., 2019). When gathering diagnostic information, teachers must ensure that the information obtained is reliable and valid. Several criteria should be considered to determine the reliability and validity of the information. The instrument used for diagnosis should be aligned with the instruction and specific to the content. The assessments should be ongoing and interconnected so that a pattern of student learning can be detected. Teachers should have knowledge of principles, strategies, and techniques needed to provide supportive and practical feedback to students to meet their needs. Lastly, teachers need help to implement formative assessment in their instructional practices (Rakoczy et al., 2019).

Providing feedback ensures that learners focus on their learning goals, learning progress, and learning strategies. Rakoczy et al. (2019) acknowledged that the purpose of feedback is to highlight the gaps between the student's current understanding and performance and the targeted goal. How a learner perceives the feedback from a teacher is vital to the effectiveness of that feedback. In a mixed-methods study, Jónsson et al. (2018) investigated the differences in teachers and students' perceptions regarding feedback and how teachers and students perceive assessments in the Icelandic context.

Jónsson et al. (2018) found that there is a discrepancy in how teachers and students perceived student involvement in assessment, quality of feedback, and students' use of feedback. The authors recommended that further studies that included researching the impact of dialogue on feedback, assessment strategies used by teachers for implementing feedback for further learning, and how students perceive that feedback were needed.

Formative assessments can include teacher-directed assessment, self-assessment, peer-assessment, oral and written assignments, and assessments with varying degrees of formality (spontaneous questioning or formal curriculum-aligned assessments). For any of the assessments to be considered formative assessments the information from these assessments should be used to improve students' learning (Rakoczy et al., 2019). The essence of formative assessment is informed action. Teachers should know how to respond to the information obtained through assessments and adjust their instruction according to the students' needs (Rakoczy et al., 2019). Well-defined formative assessment has been linked to significant gains in student achievement across all ages and subjects and has its most significant positive impact on students who struggle in mathematics (Beesley et al., 2018).

These authors defined formative assessment as an evidence-based process of gathering information on three questions to support a learning cycle: a) where am I going, b) how am I doing now, and c) where do I go next? Beesley et al. acknowledged that feedback is an active part of the process and can address the task, students' processing of the task, suggestions for what to work on next, and scaffolds for the individual student. Pinger et al. (2018a) conducted a study that was part of a more extensive quasi-

experimental study investigating the impact of formative assessment interventions on learning. Findings indicated that in classes where cognitive activation was low, student achievement was positively impacted by formative assessment interventions. However, in high cognitive activation classes, there was less gain for students from formative assessment interventions. In a second study, that was a part of the same extensive quasi-experimental study mentioned before, Pinger et al. (2018b) also found positive results with feedback provided by the teacher and student achievement. They looked at how the aspects of the quality of formative assessment delivery affected mathematics achievement and interest. The researchers concluded that the way formative assessment is generated and delivered does affect cognitive and motivation processes.

One teacher used his classes to test formative assessment processes. Vogelzang and Admiraal (2017) conducted a classroom action research study to determine the impact of formative assessment on student achievement. Test results showed that using formative assessment interventions had a statistically significant effect on student achievement, suggesting teacher and peer feedback helped students in their learning. Teacher can use formative assessment for adaptive teaching to support students' conceptual understanding and emotional needs.

There are many ways that teachers can set up their math workshops to fit into their daily schedules; however, the components of the math workshop model remain the same. The studies in this section above show that these components positively impact student learning (Beesley et al., 2018; Bondie et al., 2019; Eronen & Kärnä, 2018; Ismajli & Imami-Morina, 2018; Jónsson et al., 2018; Pinger et al., 2018a; Rakoczy et al., 2019;

Rao et al., 2017; Suprayogi et al., 2017; Talbert et al., 2019; Thompson, 2016). All these components are related to each other in some way. A teacher utilizing differentiation should be determining activities based on data received from some form of assessment such as formative assessment. The activities are specific to each student's needs, therefore creating a student-centered learning environment. Student learning should be the ultimate result of implementing the math workshop model in the classroom.

## Summary

This literature review focused on studies that examined transformative learning theory, teacher professional development, teaching mathematics, teaching middle schoolers, and key components of the math workshop model. Mezirow's (1990, 1994, 1997, 1998, 2000, & 2003) research on adult learning was the guiding framework used in this literature review. Educators are required to continue learning throughout their professional careers. This is predominately done through some form of PD. Studies indicated that teachers are more willing to change their teaching behaviors when the PD is relevant (Kennedy, 2019; Kovacs, 2018; Osamwonyi, 2016; Serviss, 2019; Wood et al., 2017), which involves support and collaboration with colleagues (Kovacs, 2018; Wood et al., 2017).

Studies (Gheith & Aljaberi, 2018; Gulistan et al., 2017; Tchoshanov et al., 2017) indicated that teaching mathematics requires teachers to be knowledgeable in the content and have strong self-efficacy. These two factors have been associated with positive impacts on student performance, especially middle school students. Utilizing strategies that foster student learning is also key to student performance. Some of these strategies

included collaborative grouping, building on students' prior knowledge and experiences, using problem-oriented tasks, and allowing students to reflect and assess their learning. These strategies are reinforced in the math workshop model. The math workshop model is an approach to teaching mathematics that is student-centered and can increase student performance. However, research on the math workshop model is limited, especially in the middle school mathematics classroom. This study aimed to better understand the perceptions of middle school mathematics teachers on implementing the math workshop model in their mathematics classrooms. In the next chapter I discuss the research design and rationale, the role of the researcher, methodology, data collection and analysis, and trustworthiness.

# Chapter 3: Research Method

The purpose of this study was to better understand middle school teachers' perceptions of the utilization and influence of the math workshop model and how it transformed their understanding of teaching mathematics in the middle school classroom. The study used the generic qualitative paradigm. Data for the study were gathered through interviews conducted with the selected participant teachers to understand the viewpoints pertaining to their perceptions of the implementation and influence of the math workshop model.

In the sections to follow, I discuss the design used for this study, my role as the researcher, the criteria used to select participants, the instrument used to interview the participants, and the process adopted to analyze the data. I discuss issues of trustworthiness and ethical procedures. Finally, I end the chapter with a summary of all the main points.

## Research Design and Rationale

The purpose of this study was to better understand middle school teachers' perceptions of the utilization and influence of the math workshop and how it transformed their understanding of teaching mathematics. The following main research question and subquestions were used to guide this study:

1. What are middle school teacher perceptions of the implementation of the math workshop model?

a. What are middle school teacher perceptions regarding the strategies used when implementing the math workshop model in their middle school classroom?
b. What are middle school teacher perceptions regarding the influence of the math workshop model on their instructional practices?
c. How do teachers perceive collaboration among themselves when implementing the math workshop model in their classrooms?
d. What are the perceptions of the teachers in relation to the challenges and issues as well as problems they face when implementing the math workshop model in their teaching in the middle school?

**Phenomenon of Study**

The phenomenon addressed was middle school teacher perceptions of the implementation of the math workshop model. The math workshop model is an instructional framework that had been introduced to mathematics teachers to use within their classrooms. It is a framework of instruction and a philosophy of how mathematics classes can be structured (Reynolds, 2018; Sharp et al., 2019). In addition, this framework is intended to include students in the learning process, making them a crucial part of the process (Thompson, 2016). The math workshop framework was a new concept for many of the teachers at the middle school level in the school district that was the focus of this study.

**Research Tradition**

For this study, I used a generic qualitative research approach. A qualitative research method of inquiry is used to understand the ways that people see, view, approach, and experience the world and make meaning of their experiences (Ravitch & Carl, 2016, p. 7). In a qualitative study, researchers investigate a phenomenon in their natural settings and try to make meaning of the experiences of the people involved. I chose a qualitative research method for this study because I wanted to better understand how middle school teachers perceived the implementation of the math workshop model. This research method worked best in trying to understand teacher perceptions.

I selected a generic qualitative study over ethnography, narrative research, phenomenology, case study, and grounded theory approaches for several reasons. Ethnography emphasizes in-person field study and requires the researcher to be immersed in a cultural setting as a participant-observer (Ravitch & Carl, 2016). Ethnographic research did not apply to this situation because I was not immersed in each participant's cultural setting. Narrative research focuses on one or two individuals and involves gathering data from stories they tell (Ravitch & Carl, 2016). Narrative research could not be applied to this situation because more than one or two participants were involved in this study. Phenomenology can be both a research method and a philosophy (Ravitch & Carl, 2016). The phenomenology research method focuses on the lived experiences of individuals and how they perceive those experiences. Phenomenology could have applied to this study; however, a generic qualitative study was chosen instead. Ravitch and Carl (2016) expressed that a case study involves studying a case of contemporary, real-life

events. A case study method requires multiple sources for data collection. Grounded theory too was not acceptable for this study, as I did not build up a theory pertaining to the subject under study. This study used only one source, interviews, for data collection. The focus of this study was on the perceptions of middle school teachers as it pertained to the implementation of the math workshop model of one school system in the southeastern part of the United States; therefore, a generic qualitative study was a good fit.

A generic qualitative study consists of a detailed inquiry into a bounded entity in which the researcher either examines a relevant issue or reveals phenomena through the process of examining the entity within its social and cultural context (Denzin & Lincoln, 2011). The generic qualitative research method involves studying a case, or multiple cases, of real-life events by employing various data sources such as observations, interviews, documents, and other sources (Ravitch & Carl, 2016). This study examined teacher perceptions of the implementation of the math workshop model.

## Role of the Researcher

In qualitative research, the researcher is the main source (Ravitch & Carl, 2016; Rubin & Rubin, 2012) for data collection. Therefore, the role of the researcher must be a central consideration in qualitative research. Positionality, essential to understanding the researcher's role, encompasses the researcher's role and identity as they intersect and relate to the research's context and setting. It consists of many roles and relationships between the researcher and the participants (Ravitch & Carl, 2016; Rubin & Rubin, 2012). Besides being the researcher, I am also a middle school mathematics teacher, mathematics department chair for my school, and the PLC lead for my grade level. I did

not ask the teachers within my building to participate in this study, as we frequently discuss the math workshop model. However, the other middle school mathematics teachers within the district I work in, over whom I have no authority, were requested kindly to be the participants in this study. Out of the participants who expressed willingness to participate in the study, I selected the required number of participants based on the scheduled criterion on a first-come basis.

### Researcher Bias

Being this close to the study required me to make sure that my perceptions, attitudes, beliefs, and biases were not evident in the reporting of this study's results. Researcher reflexivity, which involved assessing my identity, positionality, and subjectivity, was an active and ongoing process (Ravitch & Carl, 2016). One way to ensure that I remained vigilant and continually reassessed myself was to keep a journal. As the researcher, I found that keeping a journal allowed me to reflect in greater depth into the participants' meanings and intentions and my meanings and intentions pertaining to the study. In addition, I used a journal as a source of data; the research process's transparency aided in keeping my biases at bay. In addition to being a teacher, another role I had as the researcher was as the interviewer. I was solely responsible for interviewing the participants. I also transcribed the interviews, analyzed the data, and wrote a detailed report describing the data.

## Methodology

The participants for this study were middle school mathematics teachers who have been implementing the math workshop model in their classrooms for at least the last

2 years. The participants were a part of a school system in the southeastern part of the United States who have been implementing the math workshop model in the middle schools for the last 2 years.

**Sampling Strategy**

Patton (2015) described instrumental-use multiple case sampling as a process in which a researcher selects multiple cases of a phenomenon to understand the phenomenon. When applied, multicase studies generate generalizable findings that can be used to inform changes in practices, programs, and policies. Instrumental-use multiple case sampling allowed me to select the teachers from the different middle schools in this school system who would provide the most relevant data about how middle school mathematics teachers perceived the implementation of the math workshop model. The participants for this study were chosen to better understand teacher perceptions of implementing the math workshop model in the middle school classroom.

**Participant Selection Criteria**

Instrumental-use multiple case sampling allowed me to select the teachers who would provide the most relevant data about how middle school mathematics teachers perceived the implementation of the math workshop model. This study was specific to one school system in the southeastern part of the United States. There are 16 elementary schools, five middle schools, and three high schools in the selected locality. It was from the middle school teachers in that school system that the participants for the study were selected. The selected participants had been teaching mathematics in a middle school in this system and had implemented the math workshop model at least for 2 school years.

Because this was specific to the selected school system, there were approximately 45 teachers who could have been used to gather data for this study. The intent was to get 12 teachers from among them to participate. This number provided rigorous, ethical, and thorough answers to aid in answering the research questions.

**Recruitment**

There are five middle schools within this school system and approximately 45 middle school mathematics teachers. A letter of invitation was distributed to all middle school mathematics teaching members of the school district involved in this study to recruit the required number of teachers to participate. Along with the invitation (Appendix B), I included my name and contact information, a willingness to participate form, a summary, the purpose of the study, and confidentiality procedures. The required number of 12 was selected on a first-come basis. If more than 12 responses had been received, their information would have been kept in case I needed to reach them later if any of the selected participants decided to drop out of the study. I did not get the required number in the first instance, so I sent a second and third invitation to solicit more participants (Appendix C). I still did not obtain the required number of participants from this school system; therefore, I reached out to a neighboring school district for participants. I was able to obtain participants after reaching out to the other school district. Due to this attempt, I was able to gather nine participants for this study. Once the participants were identified, I sent an email to each one of them, which included a consent form, an explanation of the purpose of the study and their rights as participants in the study, my contact information, and any other pertinent information that they needed

pertaining to the study. It was also stated that they were free to drop out of the study at any phase without any obligation.

In some of the studies discussed in Chapter 2, small sample sizes were used to investigate multiple topics (Pinger et al., 2018a; Rao et al., 2017; Sharp et al., 2019). These studies consisted of 17, two, and eight classroom teachers, respectively. These studies were reviewed and published, validating the methods and results. I aimed to find 12 participants; after five rounds of emails, I found nine. Because responses to questions were similar, my codes and themes showed saturation; therefore, I stopped recruitment at nine participants. According to Ravitch and Carl (2016), generalization is not the goal of purposeful sampling and qualitative research; therefore, a large sample size was not needed. Moreover, this study's purpose was to better understand teacher perceptions of the implementation of the math workshop in a particular school system; therefore, the study was limited to just those teachers who fit the identified criteria.

**Instrumentation**

Data collection consisted of conducting semistructured interviews. In a semistructured interview, there is a focus on a specific topic, and a limited number of questions are prepared in advance (Rubin & Rubin, 2012, p. 31). Follow-up questions can also be prepared for further clarification. Using semistructured interviews allowed me to ask the questions I developed for the interview (see Appendix A) and ask additional follow-up questions based on the participants' responses (Rubin & Rubin, 2012). A voice recorder was used to capture participants’ responses to the questions. The research of the literature was used to guide in developing the interview questions, which were created by

me, were viewed by my dissertation committee, and allowed me to remain on task during the interview process. The interview questions were written to gather as many rich details as possible to put together a story of the teacher's perceptions of implementing the math workshop model. The questions focused on aspects of the math workshop model, how each participant used each aspect in their classrooms, and the potential impact those aspects had on the transformation of the teacher. See Appendix A for the research and interview questions' alignment.

## Procedures for Recruitment, Participation, and Data Collection

Participants for this study were recruited from a specific school system. The middle school mathematics teachers in this school system had been implementing the math workshop model in their classrooms for the last 2 years. Teachers who had been a part of this process were asked to participate in this study. An invitation was emailed to all middle-level mathematics teachers requesting their participation in the study. The goal was to get 12 teachers to agree to participate.

### *Participation*

Teachers who agreed to participate in the study received a consent form, an explanation of the purpose of the study and their rights as a participant, my contact information, and any other pertinent information. Before interviewing the participants, I informed each participant that they could exit the study with no consequences at any time. I also requested permission to contact them again should I need further clarification on any part of the interview. Once I completed the interview, I thanked each participant for their cooperation and informed them that they had completed their part in the study.

### *Data Collection*

Data collection occurred through semistructured interviews. An interview protocol, which consists of the interview questions, is used to guide an interview; however, in a semistructured interview, other questions can be asked based on comments given by the interviewee (Rubin & Rubin, 2012; see Appendix A). I used the same interview protocol for each interview to ensure that all participants were asked the same questions. Each participant faced an interview of 45- to 60-minute duration that was conducted offsite. Options for locations were given to each participant to choose where the interview was done, including a private room at the library or their home. This process helped establish comfort and trust between the participants and me. The one-on-one interview was scheduled for 45-minute time blocks. I took notes and audio recorded the interview with the participant's permission. In addition, I requested permission to follow up with each participant to review their transcript for any misinterpretations and get clarification if needed. In addition, I indicated to the participants that I would contact them again if any further information or clarification of the recorded data was needed.

## Data Analysis Plan

Qualitative data analysis is the intentional, systematic scrutiny of data at various stages and moments throughout the research process (Ravitch & Carl, 2016, p. 217). The key elements of data analysis for this study were reviewing the data; creating codes, categories, and themes connecting information to each of the related research questions; and writing a report up to describe what the data said, making the story so that the reader felt a part of the experience. I also made sure that the information was detailed and

relevant while at the same time checking for coherence, readability, and validity. After completing the interviews, the first task I undertook was transcribing the interviews from the audio recordings while at the same time reviewing my notes to check for any discrepancies. Next, I read through the transcripts and identified relevant concepts, themes, and examples, and I labeled them directly on a copy of the transcript (Rubin & Rubin, 2012; Saldana, 2016). The themes and concepts identified in the first review of the transcripts were used as the codes. This process was the first step in a process called coding, which involves classifying or categorizing individual pieces of data (Babbie, 2017). For each participant's response, I assigned a code or codes.

The second part of this process was connecting these codes with a retrieval system so that I could easily find them when needed. In addition to coding, I also wrote memos or notes to help with distinguishing the codes used, reflections on the concepts, relationships between the concepts, theory related ideas, and methodological issues. According to Babbie (2017) keeping memos or notes, also known as memoing, is an essential behavior a researcher needs to utilize throughout the data-collection and analysis processes. It was important to have a clear account of what was meant by the codes and connections used in the analysis. I created a codebook that provided detailed descriptions of each code and the coding using numeric or mnemonic codes (Saldana, 2016). Next, I used a Word document to organize and analyze the data from the interviews. A sort and a resort were used to compare the data to create a complete picture of each interviewee's responses. After summarizing the results, I looked for concepts that could be generalized. The final stage of this plan was to report on the trustworthiness of

the study. In the next section I will explain the issues of trustworthiness and how I addressed them for this study.

A critical step to confirming concepts and themes was to account for any discrepant cases. Discrepant cases refer to any data that may not fit a particular pattern or current understanding of the data (Ravitch & Carl, 2016, p. 262). To ensure that all discrepant cases were addressed, I analyzed and reanalyzed the data looking for any evidence that was disconfirming or evidence that challenged and complicated the findings. This process challenged my preconceived notions and possibly required me to change some of the themes and concepts to fit the data.

## Issues of Trustworthiness

Trustworthiness in a qualitative study has been challenging to address; however, criteria have been identified that researchers can use to guide them through their study. There are four criteria: credibility, transferability, dependability, and confirmability (Ravitch & Carl, 2016; Shenton, 2004).

### Credibility

The credibility of a study indicates the researcher's ability to consider all the problems that occurred in a study and deal with the patterns that are not easily explained (Ravitch & Carl, 2016, pg. 188). There are several provisions researchers can take to ensure their study has credibility. For this study, the following provisions were taken. I used a well-accepted research method. In addition, I maintained a reflexive journal during the study, which helped me identify my research biases and the other problems that I encountered during the study so that the reader would have a clear picture of the research

process. I also undertook steps to establish participant validation. Participant validation, also known as member checking, refers to allowing the participant to check the interview data for misinterpretations (Ravitch & Carl, 2016; Shenton, 2004).

**Transferability**

In a qualitative study, the researcher must present the findings so that the reader has a thorough understanding of the phenomenon, enabling them to make connections in their situations (Shenton, 2004). This is transferability. To ensure transferability, I provided rich, thick details of the phenomenon, such as dates, times, data collection methods, and restrictions.

**Dependability**

In addition to providing details of the phenomenon, details of the study's processes were reported. This process ensured dependability (Shenton, 2004). Future researchers can follow the process and potentially get similar results. An interview guide was developed for this study. The guide was used to conduct the interviews required for this study.

**Confirmability**

The last criterion for trustworthiness is confirmability. Confirmability involved the steps I took to separate my preferences from the participants' experiences and ideas and report the findings as authentic representations of those experiences (Ravitch & Carl, 2016). To meet this requirement, I disclosed my beliefs, attitudes, and biases within the report. I also explained the decisions I made, and the methods used in the study, which were included in detail in the reflexivity journal that I maintained throughout my study.

**Ethical Procedures**

In qualitative research, it is imperative that the researcher understands, considers, and approaches their role with humility (Ravitch & Carl, 2016). One way to ensure this is to provide the participants with a consent form. The consent form is an agreement to participate in the research before it begins (Ravitch & Carl, 2016). This form was clear about what I was asking the participants to do so that if they had questions, these could be answered before the actual interview. Within the consent form, an explanation of the purpose of the study was given and a statement about the voluntary nature of the study, a list of requirements as participants, and how they could withdraw from the study. A statement of confidentiality was also included in the consent form.

To access the teachers who teach middle school mathematic I used the district website to locate middle school teachers district email address. Once I located the names of mathematics teachers, I contacted them via the district email. I sent an email inviting them to participate in the study. An explanation of the purpose of the study was in the invitation letter. This email included my email for those interested in responding and a request for their personal email to continue communicating. Those that responded received the consent form.

Maintaining the confidentiality of participants throughout the study will be essential. Participants were assigned the letter P with a number as P1, P2…P12 to report the data. The original names were kept in a confidential, password-protected file on my personal computer in my home office. All interviews were conducted at a neutral location of the interviewee's choice after school to protect each participant's privacy.

The last measure that was used to ensure that the study was ethical was the Walden Institutional Review Board (IRB) committee. The participants were not contacted until approval for the study from Walden IRB committee was received, approval number 11-18-21-0618358. Therefore, following the guidelines and recommendations from the IRB committee was essential in ensuring the study remained ethical.

## Summary

In this chapter, I discussed the purpose of the study, the research design and rationale, the researcher's role, and the methodology that was used in this study. I also discussed how the participants were recruited and the instrument that was used to gather data, and how the data was collected. Also, I presented the plan to analyze the data, how I addressed the trustworthiness of the study, and ethical procedures that needed to be followed throughout the study. In the next chapter, I report the setting, demographics, data collection, data analysis, evidence of trustworthiness, and results of the study.

# Chapter 4: Results

## Introduction

The purpose of this study was to better understand middle school teachers' perceptions of the utilization and influence of the math workshop and how it transformed their understanding of teaching mathematics. The following main research question and subquestions were used to guide this study:

1. What are middle school teacher perceptions of the implementation of the math workshop model?
    a. What are middle school teacher perceptions regarding the strategies used when implementing the math workshop model in their middle school classroom?
    b. What are middle school teacher perceptions regarding the influence of the math workshop model on their instructional practices?
    c. How do teachers perceive collaboration among themselves when implementing the math workshop model in their classrooms?
    d. What are the perceptions of the teachers in relation to the challenges and issues as well as problems they face when implementing the math workshop model in their teaching in the middle school?

In this chapter, I discuss the setting of the study, participant demographics, data collection and analysis, evidence of trustworthiness, results of the study, and a summary.

## Setting

The settings for this study were school districts in the southeastern part of the United States. Initially, one school district was targeted to select participants. I was able to recruit five participants from this initial school district. To obtain the minimum number of participants needed for the study, I reached out for potential participants in two additional surrounding school systems. I was able to get the nine participants with the recruits from the other systems.

All participants were selected based on given criteria for the study: teaching mathematics and implementing the math workshop model at the middle school level for at least 2 years and implementing the math workshop model in their classroom at least 2 days in a week.

## Demographics

The participants in this study were employed in public middle schools for the 2021–2022 school year. Of the nine participants, five were employed in one school district, and the other four participants were employed by another school district. There were eight females and one male teacher among the participants. Five teachers taught sixth grade, three taught seventh grade, and one taught eight grade mathematics. All participants had taught middle school mathematics for at least 4 years and implemented the math workshop for at least 2 years (see Table 1).

**Table 1**

*Participant Descriptions*

| Participant | Gender | Grade taught | Years teaching | School |
|---|---|---|---|---|
| P1 | Female | 8 | 6 | Targeted school |
| P2 | Female | 7 | 7 | Targeted school |
| P3 | Female | 6 | 28 | Other school |
| P4 | Male | 6 | 9 | Targeted school |
| P5 | Female | 6 | 15 | Other school |
| P6 | Female | 7 | 17 | Other school |
| P7 | Female | 6 | 5 | Targeted school |
| P8 | Female | 7 | 7 | Other school |
| P9 | Female | 6 | 8 | Targeted school |

## Data Collection

In this generic qualitative study, I interviewed nine middle school mathematics teacher participants using Zoom. Initially, I planned to obtain participants from a targeted school system in the southeastern part of the United States. I sent emails out to the middle school teachers in the targeted school system. Several teachers responded, but of those responses, only four met the criteria for this study. Because I could not find the required number of participants from the selected district, I reached out to other school systems where I was able to find more participants to complete the number I wanted. I sent each participant an invitation to participate (Appendix B) along with my name and contact information. I sent follow-up emails (Appendix C) once a week for 2 weeks after the first

week. Once I received responses agreeing to participate, I sent the consent form in a separate email and asked for a date and time for each interview. Initially, several teachers from the targeted school system responded, but not all met the criteria for the study. Of those first responders, only three teachers met the criteria. Each teacher scheduled a time in the evening that was convenient for them to be interviewed. Interviews were conducted via Zoom with these two participants. After a period of another 2 weeks without additional desired responses from the targeted schools, I sent emails to teachers in a local school system. I also requested permission from the IRB to recruit teachers using the snowballing effect and through social media. Several teachers from that school system responded indicating that they were willing to participate, but only two followed through with the process. Both teachers met the criteria for this study. I sent the consent form and arranged dates and times to conduct the interviews. Both interviews occurred in the evening, via Zoom, at a time that was convenient for the participants to be interviewed. One of the participants was able to provide additional teachers to contact for this study. I sent an invitation email (Appendix G) to these teachers. Both agreed to participate in the study. An email that contained the consent form, my contact information, and a request for a date and time for the interview was sent to each teacher. The last two participants were late responders from the targeted school system. Each received the consent form, my contact information, and a request for a date and time for the interview. This process took about one and a half months to obtain the nine participants and complete interviews.

I collected data via Zoom due to health safety concerns. Each participant chose a date and time that were convenient for them to privately Zoom with me for the

interviews. The interviews were conducted in the evening during the week between 6 p.m. and 8 p.m. These times were after work and allowed participants to handle personal things before the interviews. I was also alone in my home at the time of each interview. I used Kaltura media to transcribe each recorded interview. The interviews, which were scheduled to be approximately 45 minutes in length, varied among participants. The overall time frame for each interview was between 25 and 35 minutes. Some of the participants shared more details about their experiences with the math workshop model than others. Each interview was recorded using the recording feature in Zoom. The file was then uploaded and transcribed using the Kaltura media program. I then wrote a summary of each interview and sent it to each participant via email to read and confirm that I captured their thoughts accurately. Only two participants responded indicating that the summaries were accurate.

There was one minor issue with the internet during one of the interviews. The connection kept dropping, and the recording was interrupted. After the third time the connection dropped, we made other arrangements to complete the interview. I sent an email with the remaining questions that we were not able to complete during the initial interview. The participant responded with written responses via email within 3 days. All other interviews were conducted in one sitting, and all participants agreed to my request that if I needed any clarifications, I could reach out to them at any time.

## Data Analysis

Before beginning the analysis of the data, I went back over the transcripts while listening to each recording to make sure that the responses were captured accurately.

Each file was labeled according to the participant's identifiers, which consisted of the letter P for participant and the number they were in relation to which number interview I was conducting. Neither the transcripts or the recordings had any information that could be used to identify participants. After confirming the transcriptions, I created a document to record each participant's responses to the questions. This allowed me to begin identifying patterns, categories, and themes in the responses.

To begin this process, I used open coding. Open coding is the initial classification and labeling of concepts in qualitative data analysis (Babbie, 2017). I examined and re-examined all transcripts and the data tracking spreadsheet I created, seeking to identify the key concepts with each passage. For example, when analyzing responses from participants, responses such as decrease transition time (P1) and need more time (P4) were coded as time constraints. Participants who provided responses such as hitting all my kids (P3), I can really meet kids where they are (P4), and so I use it to meet my kids where they are (P5) were coded as meeting students' needs. Some other codes that were identified in the data were as follows: expectations and routines, planning instruction, grouping students, differentiated activities, structure of workshop, small group, intentional about instruction, beneficial to students, minilesson, student-centered, independent work time, collaboration between colleagues, collaboration between students, and student ownership. The following patterns were identified within the codes: framework, structure, expectations, small groups, time constraints, meeting students' needs, design instruction, student-centered, and student ownership. After identifying the patterns, I read through the passages again looking for connections with which to

organize the patterns. Organizing the patterns helped in identifying central concepts that best described the patterns. This process is referred to as *selective coding* (Babbie, 2017). These central concepts became the themes (see Table 2).

**Table 2**

*Data Analysis Process*

| *Excerpt* | *Code* | *Theme* |
|---|---|---|
| The challenge that I still experience with the workshop model is decreasing transition time for my students | Time constraint | Time is essential |
| I need more time to teach math, 60 minutes is not enough to truly do math workshop | Time constraint | |
| So I use it to meet my kids where they are | Meeting students' needs | Shifts the focus on students |
| It was just something different and I really like I was hitting all my kids | Beneficial to students | |
| It's a framework for instruction that sections off periods of time that are devoted to a specific task | Sectioned framework | Provides structure |
| Our district does a good job of educating us on the structure of it | Structure | |
| Just make sure that we have a good flow for a structure of a lesson | Structure of a lesson | |
| Every week my colleagues and I share resources, we talk about how our students are doing, what the skills that we're teaching | Teacher collaboration | Collaboration is key |

| | |
|---|---|
| I think any job you have to have collaboration. I think no matter how good you are, how bad you are, how nervous you are, I think you only get better if you collaborate | Teacher collaboration |
| The entire activity is collaboration, everything is designed so they have to work … and lots of things that force that collaboration | Student collaboration |
| I think that kids should talk more than I'm talking because I learned the person doing the most talking in a room, it's the person that's doing the most learning. | Student collaboration |

After creating the themes, I then looked to see how these themes connected to the research questions. I labeled each theme with the number of the research question(s) it directly answered (see Table 3). There are five themes: (a) provides structure, (b) shifts the focus on students, (c) time is essential, (d) challenges, and (e) communication is key. I present the findings according to the research questions and the connection to the themes in the Results section.

As stated in Chapter 3, a critical step to confirming concepts and themes was to account for any discrepant cases. Discrepant cases refer to any data that may not fit a particular pattern or current understanding of the data (Ravitch & Carl, 2016). To ensure that all discrepant cases were addressed, I analyzed and reanalyzed the data, looking for any evidence that was disconfirming or evidence that challenged and complicated the findings. This process challenged my preconceived notions and required me to change some of the themes and concepts to fit the data. More details pertaining to discrepant cases are discussed in the results section.

**Table 3**

*Themes That Addressed the Research Questions*

| Theme | Research question |
|---|---|
| Theme 1: Provides structure | SQ2: What are middle school teacher perceptions regarding the influences of the math workshop model on their instructional practices? |
| Theme 2: Shifts the focus on students | SQ1: What are middle school teacher perceptions regarding the strategies used when implementing the math workshop model in the middle school classroom? |
| Theme 3: Time is essential | SQ1: What are middle school teacher perceptions regarding the strategies used when implementing the math workshop model in the middle school classroom?<br><br>SQ2: What are middle school teacher perceptions regarding the influences of the math workshop model on their instructional practices?<br><br>SQ4: What are the perceptions of the teachers in relation to the challenges and issues as well as problems they face when implementing the math workshop model in their teaching in the middle school? |
| Theme 4: Challenges | SQ4: What are the perceptions of the teachers in relation to the challenges and issues as well as problems they face when implementing the math workshop model in their teaching in the middle school? |
| Theme 5: Communication is key | SQ1: What are middle school teacher perceptions regarding the strategies used when implementing the math workshop model in the middle school classroom?<br><br>SQ3: How do teachers perceive collaboration among themselves when implementing the math workshop model in their classrooms? |

## Evidence of Trustworthiness

Trustworthiness in a qualitative study is challenging to address; however, criteria have been identified that researchers can use to guide them through a study. There are four criteria: credibility, transferability, dependability, and confirmability (Ravitch & Carl, 2016; Shenton, 2004).

### Credibility

The credibility of a study indicates the researcher's ability to consider all the problems that occurred in a study and deal with the patterns that are not easily explained (Ravitch & Carl, 2016, p. 188). As stated in Chapter 3, to ensure credibility, I used member checking. I summarized each participant's response and emailed the summaries to them. Each participant was asked to read through the summary and to respond if there were any discrepancies or misunderstandings. Only two responded to the email containing their summaries. They confirmed that I summarized their responses accurately. I also used a reflexive journal. I occasionally wrote my thoughts down to clear my mind so that I could better focus on the data. All participants who were chosen were knowledgeable about teaching mathematics to middle school students and had at least 9 years of teaching experience. Lastly, my analysis included direct quotations from the transcripts to show the reader the results rather than to describe in my own words. This is how I ensured credibility.

### Transferability

As stated in Chapter 3, in a qualitative study, the researcher must present the findings so that the reader has a thorough understanding of the phenomenon, enabling

them to make connections in their situations (Shenton, 2004). To ensure the transferability of this study, I provided a description of the recruiting process, the interview guide used to conduct interviews, and how data were collected. I also provided a description of the data analysis process, including the coding process; rich, detailed descriptions of the participants' responses and perceptions; and how the codes and responses were used to draw conclusions. I also recruited participants from different grade levels and years of experience. There were five participants who taught sixth grade, three who taught seventh grade, and one who taught eighth grade. The years of experience ranged from 9 years to 29 years of teaching. Four of the participants were from a school system outside of the targeted school system for this study. The participants in this study varied across many factors and their different experiences, as given by their responses, could assist in providing insight from this research and assist in ensuring transferability.

**Dependability**

As stated in Chapter 3, details of the study's processes were reported to establish dependability (Shenton, 2004). Future researchers can follow the process and potentially get similar results. An interview guide and an email invitation were developed for this study. The interview questions in the guide were developed based on the research from Chapter 2 and feedback from committee members. The guide was used to conduct the interviews required for this study. The process used to analyze the data, transcribing the interviews, member checking, and coding was provided so that readers could understand

how the codes and themes were developed. Both the interview guide and invitation were included so that other researchers can replicate the recruitment process.

### Confirmability

The last criterion for trustworthiness is confirmability. Confirmability involved the steps I took to separate my preferences from the participants' experiences and ideas and report the findings as authentic representations of those experiences (Ravitch & Carl, 2016). I worked to keep my preferences separate from the participants by jotting down my thoughts while I was reading through transcripts, jotting down random thoughts I may have developed, and notes on participants' comments during interviews. I also included direct quotes from the transcripts to show the reader the results rather than to describe in my own words.

## Results

In this section, I present the findings related to the research questions. The data are organized by the main research question and the four sub questions. There were five themes that were identified through the analysis and were connected to the research questions.

### Main Research Question

The main research question explored the perceptions of middle school teachers regarding the implementation of the math workshop model. Two themes emerged related to the perceptions of teachers with regards to implementation: *provides structure* and *shifts the focus on students*.

### *Provides Structure*

A prominent theme that emerged from the data as it relates to the math workshop model was the idea of structure. This framework consisted of three sections which participants identified as facets they use within their classroom: minilesson, work time, and closure. When analyzing responses from participants, comments such as framework for instruction and the structure of it, the minilesson, the activity, the closing were coded as structure of workshop. P1 identified the math workshop model as a framework for instruction that sections off periods of time that are devoted to a specific task". P4 said "the math workshop model makes sure that we have a good flow for a structure of a lesson". In addition to P1, P2 also noted the professional development they received indicating that it centered around the structure of the math workshop model. Participants also implied that during the PD trainings these teachers were provided with examples of time frames the workshop model could look like within their classrooms. Six of the participants (P1, P2, P4, P7, P8, P9) acknowledged that within their classrooms the workshop model consisted of a minilesson, small group or independent work, and closure.

This theme answered the main research question regarding teacher perception of the implementation of the math workshop model. Participants perceived that structure was essential to the implementation of the math workshop model.

### *Shifts the Focus on Students*

Another prominent theme that emerged from the data as it relates to the math workshop model was the overwhelming consensus that students are the focus when using

the math workshop model. All nine participants acknowledged implementing the math workshop model allowed them to meet their students' needs. Meeting students' needs refers to providing appropriate leveled activities or working with students in a teacher-led small group. Referring to this aspect P5 stated it as:

> highflyers moving them forward going deeper into whatever you're working on at the time, the kids who need remediation, perfecting whatever you're working on, or even for the kids who you know you're trying to push them to deepen their understanding.

All participants indicated the math workshop model provided them an opportunity to best meet the needs of their students as opposed to how they previously taught. P4 confirmed this idea when he stated,

> I wasn't sold at first but after I kind of got some buy-in I kind of started saying that oh this does work, this does help the kids to like math, like school…I can really meet kids where they are, and once I started seeing that my students started growing more in math I was definitely sold about math workshop.

Participant 7 shared the idea that they thought the math workshop model was not only essential, but it really catered to the individual student needs. It was evident that P7 believed the math workshop model allowed for differentiation.

*Shifts the focus on students* is another theme that answers the main research question regarding the implementation of the math workshop model. Participants perceived that implementing the math workshop model within their classrooms provided the opportunity to meet the needs of all their students.

**Subquestion 1: Strategies Used**

SQ1 is related to teacher perceptions regarding the strategies used during math workshop. Three themes emerged related to teacher perceptions regarding the strategies: *shifts the focus on students*, *time is essential*, and *communication is key*.

***Shifts the Focus on Students***

According to the data that emerged, teachers perceived the math workshop model met students' needs in a variety of ways. Meeting students' needs was a pattern that led to the theme *shifts the focus on students*. All participants shared that meeting students' needs could include leveled activities that could be done independently, with partners or small groups, or meeting with the teacher in a small group to receive some individualized instruction. P8, described group work as:

> Implementing the group work and implementing the small groups I think I'm giving the kids a small environment to ask questions and stuff like that and that processing time that I think they sometimes need and don't get in whole group.

Peer groups were identified as being the most influential component of the math workshop model. One participant, P3, acknowledged that notion when she stated, "they get to work with peer groups, that kind of pushes those kids to do better, to work harder when they work in those groups with their peers … so beneficial." P5, going a step further acknowledged the long-time effect working in small groups has on students when she said, "cooperative learning is not only helpful now but also sets them up for this type of environment when they enter the working field." Through their responses, participants acknowledged the positive impact the math workshop had on meeting student needs.

Participants perceived that allowing students to work with peers who were on the same levels optimized the learning experience for their students.

The concept of leveled activities was also identified by four of the participants as a means of meeting student needs. Some participants called this differentiating, others called it scaffolding or leveling. The idea was still the same no matter what term was used. Participants would gather some data on their students understanding of a topic and use that data to assign students to activities that were on their level. P3, emphasized this point when she stated: "It's a good time to differentiate … teach everything the same to all the children. this is a good time to take data … and then take those same topics and kind of tailor them to who needs what level." P1 described how this worked within her classroom as follows:

> Most days I have at least two levels of activities depending on where they are. Some days before they find their level of activity there's a small assessment between my minilesson that the result on that assessment gives them their level. It determines what level they are on. Sometimes they get to self-assess and choose what levels they think they need to practice on.

Most participants agreed developing leveled activities and assigning them to students as one of the best ways to meet their students' needs.

According to what emerged from the data, it was evident that meeting students' needs was a major focus all the participants at some point in their interview mentioned as an important part of their workshop model. P4 commented, "I have to realize that it's not always my way … the math workshop is designed for them." All participants identified

strategies they used during the implementation of the math workshop model in their classrooms. Participants perceived these strategies to be highly effective with their students. The strategies identified were using differentiation and small groups.

In relation to the research questions, this theme answered SQ1, which focused on teacher perceptions of the strategies used during workshop. Participants perceived that utilizing small groups and leveled activities allowed them to meet their students' needs, thus shifting the focus onto students.

### *Time Is Essential*

Another theme that emerged from the data as it relates to the math workshop model was time. One pattern associated with time was student work time or independent work time. This was a pattern found throughout the data. Participants described student work time or independent time as the time during workshop in which students worked on the leveled activities developed to meet their needs. Seven of the participants (P1, P2, P3, P4, P5, P8, and P9) acknowledged the student work time was the most influential on the way students learned mathematics. One participant, P1, acknowledged the practice time was most influential, but only if the mini lesson worked. Other participants shared the independent time was good because students could "ask me whatever questions they need" (P2) or "they get to work with peer groups, kids on their same level" (P3). Another participant who liked having students work together said "it was very beneficial to their learning; cooperative learning sets them up for the working field" (P5). Most participants stressed the importance of work time on student learning. Throughout the data there were several mentions of time and its impact on the implementation of the math workshop

model in these participants' classrooms. This theme also answered SQ1 regarding teacher perceptions of strategies used in math workshop. The responses from the participants provided insight into teacher perceptions on the strategy of independent work time used in workshop and the influence that strategy had on instructional practices. Teachers found student independent work time to be beneficial to student learning.

### *Communication Is Key*

In response to the interview question asking participants to describe how students collaborate during math workshop, all participants shared when and how students collaborated in their classrooms. All participants indicated students collaborate during the work time, either with partners or within the small groups they are assigned. One participant, P3, shared "everything is designed so they have to work together… forced collaboration." Some participants expressed the importance of student collaboration. P4 implied the significance of this idea when she stated, "I like to think kids should talk more than I'm talking because I learned that the person doing the most talking in a room is the person doing the most learning." Making sure students knew how to have these conversations was important to participant 5. This participant shared the way she provided "math talk" bookmarks for students at the beginning of the year to help them learn how to collaborate with one another. However, P5 also stated that once students know how to collaborate the conversations become much deeper and more interesting. Two participants, P6 and P7, explained how they use collaboration during small groups. P6 said "I make them talk to each other, look at each other's whiteboards…they feed off each other." During small groups, P7 "monitors the conversations and how they're

talking through the problems and making sure they use the right vocabulary." According to these participants student collaboration was another strategy used to enhance student learning within their classrooms.

Student collaboration was perceived to be an essential strategy used for learning during the implementation of the math workshop model in these participants' classrooms. This theme answers SQ1 regarding teacher perceptions of strategies used in math workshop.

**Subquestion 2: Influences and Instructional Practices**

SQ2 is related to teacher perceptions regarding the influence of the math workshop model on their instructional practices. Two themes emerged from the data that relate to teacher perceptions regarding the influence of the math workshop model on their instructional practices: *provides structure* and *time is essential*.

***Provides Structure***

A pattern found for the theme of structure was the idea of expectations. When analyzing the participant responses, comments such as "they come in and immediately jump right into the mini lesson" (P2), "I always start with a mini lesson" (P4), and "I set my expectations for students" (P5) were some of the comments that emerged from the data. P1 acknowledged the math workshop model was useful because the kids know what to expect almost every day in my class. P5 and P7 stressed the importance of setting expectations for workshop at the beginning of the year. P5 ventured to say:

> If you don't have classroom management and train your kids and set your expectations of how this is going to go and practice when you're first starting out,

> if they don't do it right you got to shut it down, bring them back okay let's try this again.

Setting expectations was key to the overall structure of the math workshop model and its success in these teachers' classrooms.

A second pattern found for the theme structure was the idea of intentionality with instruction. Participants acknowledged that the math workshop model helped them to be more intentional with their instruction. This view was expressed by P2, who stated the mini lesson was developed based on student work: She stated that "I do feel like I do a solid job taking whatever they do independently and looking at it and using that to determine the mini lesson the next day, to try and get exactly what they need help on." P3 expressed the same viewpoint when she indicated a similar thought "you teach everything to everybody, get some informal data and look at it and see who needs what." P1 acknowledged the influence math workshop model had on their instruction when she stated. "It helps me be intentional with my warmups, my assessments, and it guides my planning and activities. It's useful in that when I'm planning, I know what spaces I need to fill for instruction". Structure can be described in various ways; however, the information shared by the participants in this study indicated structure was key to their success in implementing the math workshop model within their classroom.

The different patterns that led to the theme *provides structure* answers SQ2 which focused on the influence the math workshop model had on teacher instructional practices. Setting expectations and being intentional with instruction were patterns participants acknowledged were important and influenced their practices.

### *Time Is Essential*

Another theme that emerged from the data as it relates to the math workshop model was time. Some phrases that were found in the data which led to the theme of *time is essential* were: timed framework, not enough time, more time needed, decreasing transition time, and independent work time. Two participants described the math workshop model as consisting of being a "timed framework" (P1), and "time that should be in each piece of the workshop model" (P2). These descriptions were in response to an interview question asking participants to describe their understanding of the math workshop model.

In response to a different interview question P5 commented the math workshop model "takes time to build up to perfect it". Another participant, P7, also implied that the math workshop model took a lot of planning and time to get it the way they felt it worked best for them and the students. Two participants, P2 and P1, acknowledged adjustments had to be made to implement the math workshop model. P2 shared the view that more time was needed: "I dropped warmups to give more time for the mini lesson and independent work time." P1 commented the use of the math workshop model "shortened the lesson time and increased student work time." Teaching takes time, and as these participants indicated, implementing the math workshop model required a lot more time than some participants were given. This was challenging for them, but they adjusted to make the workshop model work for their students.

The different patterns that led to the theme *time is essential* answered SQ2 regarding the influences of the math workshop model on teacher instructional practices.

Participants perceived that time was an essential component and that often more time was needed to implement the math workshop model.

**Subquestion 3: Collaboration with Colleagues**

SQ3 is related to teacher perceptions regarding collaboration among themselves when implementing the math workshop model. There was one interview question that specifically focused on collaboration among the teachers and was used to create the theme *collaboration is key.*

***Collaboration Is Key***

Seven participants, P2, P3, P4, P6, P7, P8, and P9 indicated that collaboration with colleagues occurred during their PLC meetings. However, the level of collaboration differed. P2 shared the thought that collaboration was limited: "we collaborated a little bit in our PLC. I actually think my PLC partner does a little less of the math workshop model...more whole group stuff versus mine is mini lesson and independent work." The other participants shared different experiences. Participant 3 spoke highly of the experience as:

> It was great. I think any job you have to have collaboration. I think no matter how good you are, how bad you are, how nervous you are, how competent you are, I think you only get better if you collaborate. There's always somebody that sees things differently than you that will view things differently, that will approach things differently.

P4 felt the math workshop model was "definitely beneficial because teaching is not a lone profession." Participant 6 confirmed this viewpoint when she shared her thoughts as "it

was scary, didn't know how it was going to work [PLC meeting] because they seemed so well-versed in it…and I was just like how am I going to do all this". P6 was able to figure out how to implement the math workshop model with the help of the PLC. In addition to PLCs, participant 7 also collaborated with an outside organization. Some of the ideas used in her classroom came from this organization. Collaboration between colleagues was key to helping these participants work through and implement the math workshop model in their classrooms.

Through their responses, participants provided insight into the effect collaborating with colleagues had on their efforts to implement the math workshop model. This led to the theme *communication is key* which answers SQ3 regarding collaboration among themselves when implementing the math workshop model in their classrooms.

**Subquestion 4: Challenges**

SQ4 related to teacher perceptions in relation to the challenges and issues they faced when implementing the math workshop model. The theme *challenges* answered SQ4.

***Challenges***

There were several areas participants identified as challenges: time, planning activities, and the closure part of the workshop model. P1 indicated they struggled with time during workshop: "the challenge that I still experience with workshop is decreasing transition time for my students so that I am not wasting five minutes changing from the mini lesson to now get out your computer and boot it up." Another participant, P4, shared that their current schedule did not provide enough time: "it's really hard to do within 60

minutes. I need more time." School schedules seemed to be a big concern for most of the participants. Participant 2, as stated earlier, stopped doing warmups, a quick skills check, to give more time to the mini lesson and independent work time.

Planning activities was also a challenge for most participants. One of the components of the math workshop model is the individual work time, which is recommended to be differentiated to meet student needs. One participant, P7, shared: "the variety of resources is most definitely the most daunting and the hardest to implement because you have to do so much planning to get to that point." Participant 9 expressed similar concerns: …centers but its only because I normally have one activity people are working on in different groups…would like to add more centers [centers = activities]." Finding different activities for students was a concern but also the time for the activities. Participant 1 acknowledged the challenge of "varying practice activities at differentiated levels for every day." Not only finding different activities at different levels but incorporating them into the daily schedule was common with other participants. Participant 4 expressed "that planning activities that are going to last" was a challenge. Concern that the students would either zoom through the activities or the activities would take too long also led to planning challenges. Planning appropriate number and levels of activities was also expressed as a challenge for participant 6: "scaffolding, that's the most difficult. Do I pick three assignments, or do I pick two…or do I find that middle ground…my biggest concern is catching those people on the in-between." Finding the right type of activities was very challenging for a few of these participants.

In addition to having the right number and levels of activities one participant, P5, also mentioned finding material that is engaging was a challenge and could be a problem: "If you just give them worksheets that's not fun, not engaging, they're not going to finish it and you're going to have a mess." The planning of activities had an impact on how these participants implemented the math workshop model in their classrooms. This theme, *challenges*, provided insight into the issues lack of time and lack of resources for planning activities participants faced while implementing the math workshop model in their teaching in the middle school and answers SQ4 regarding the challenges teachers faced when implementing the math workshop model.

In Chapter 3 I stated that if there were any discrepancies, it would be handled by reanalyzing the data looking for any evidence that was disconfirming or evidence that challenged and complicated the findings. When asked to explain their understanding of the math workshop model only three participants described it using terms like framework or structure. All other participants describe the math workshop model with phrases such as "a way to supplement our curriculum", P3, or "kind of meeting kids where they are", P5. These types of responses complicated my belief that participants were knowledgeable about the math workshop model as a framework for instruction.

## Summary

Chapter 4 detailed the responses to the main research question and sub questions of this study. There were two themes that answered the main research question regarding teacher perceptions of implementing the math workshop model: *provides structure* and *shifts the focus on students*. SQ1 regarding the strategies used when implementing the

math workshop model was answered through themes *shifts focus on students*, *time is essential,* and *communication is key*. *Provides structure* and *time is essential* were themes that answered SQ2 regarding the influences of the math workshop model on teacher instructional practices. Participants emphasized the importance of collaborating with colleagues in their efforts to implement the math workshop model. The theme *communication is key* answered SQ3 regarding teacher collaboration during the implementation of the math workshop model. The challenges and issues participants identified were used to answer SQ4 regarding the challenges teachers faced during the implementation of the math workshop model. In Chapter 5, I provide a discussion, interpretation of the findings, and limitations of the study. I also include recommendations, implications, conclusions, and a summary of the study.

# Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this generic qualitative study was to better understand middle school teachers' perceptions of the utilization and influence of the math workshop model and how it transformed their understanding of teaching mathematics in the middle school classroom. This study was conducted with the intention of providing administrators, mathematics coaches, and teachers with insights on the strategies, influences, and challenges that teachers experienced while implementing the math workshop model in their classrooms. The interpretation of the findings, limitations of the study, recommendations, implications, and conclusion are discussed in this chapter.

The findings from the study were centered around five themes. These themes, which answered the research questions, were as follows: (a) teacher instructional practices were influenced by the math workshop model, (b) the challenges teachers face impact the implementation of the math workshop model, and (c) utilizing the math workshop model helps with meeting students' needs.

## Interpretation of the Findings

There were five research questions developed for this study to better understand middle school teachers' perceptions of the implementation of the math workshop model. The key findings that centered around these research questions were discussed in greater detail in Chapter 4. In the following section, these findings will be interpreted and discussed under each of the research questions to show how these confirm, disconfirm, or extend knowledge in the related discipline areas by comparing these with the peer-reviewed research findings described in Chapter 2.

The main research question of my study explored the perceptions of middle school teachers regarding the implementation of the math workshop model. Participants in this study perceived that using the structure of the math workshop model allowed them to focus on their students' needs. Six of the participants acknowledged using the structure of the math workshop model within their classrooms. The core components of the math workshop model include a minilesson, math stations or centers, and closing or sharing (Lempp, 2017; Thompson, 2016). Participants shared that they learned about the math workshop model through PDs offered either by their district or by their school. This is consistent with research suggesting that teacher learning can happen through organized PD programs, collaboration with colleagues, and self-directed learning (Anderson, 2019; Chauraya & Brodie, 2018; Kennedy, 2019; Kovacs, 2018; Louws et al., 2017; Osamwonyi, 2016; Serviss, 2018; Wood et al., 2017). The above three components of the math workshop model were the foundation that teachers used for the flow of their classes while implementing the math workshop model.

Another aspect related to structure that emerged from the data was the importance of setting expectations for students for the math workshop, knowing what to expect almost every day, which led to reducing behavioral problems with students. This was an indication that the math-workshop model helped these participants to reflect on and be more intentional about their instruction and that the teachers used information obtained from their students to guide their instruction and plan their activities. Research conducted by Enriquez et al. (2018) supported these findings, suggesting that reflecting on teaching strategies and activities used for student learning helped teachers to be clear about their

intentions. The findings are also supported by Mezirow's (1997) research on transformative learning, or adult learning, which further confirms my findings. According to Mezirow (1997), critical reflection is a vital component in transformative learning.

Participants in this study also perceived that implementing the math workshop model allowed the focus to shift from teacher to students. The findings indicated that the math workshop model allowed the teachers to meet students' needs. It was evident from the findings that the strategy of adopting small groups was effective and the most influential part of the workshop. This finding correlates with the work of Aljarrah and Baioumy (2020), who also found that cooperative learning, group method, and active learning positively impacted the level of mathematical skill. Retnowati et al. (2016) also found that collaborative learning was more effective than individual learning during problem-solving tasks, which is also consistent with the findings from my study. Both studies support what participants in this study recognized as a positive impact on student learning. This helps to confirm my findings as consistent with the research literature in that students' learning is enhanced when working with peers.

Participants also perceived that using leveled activities allowed them to meet students' needs. Leveled activities were a form of differentiation. Teachers would use different forms of assessments to determine levels that students were working on within a specific topic. Then students were grouped and given assignments based on their levels. This finding correlates to a study conducted by Ismajli and Imami-Morina (2018), who described differentiation as instruction that has taken into consideration the subject and the needs of the learner. The findings are also consistent with research done by Lempp

(2017) and Thompson (2016). Both researchers identified that the implementation of the math workshop model involved planning lessons and activities centered around student needs based on an assessment. In another study, researchers explained the importance of building and expanding on students' prior knowledge and experience (Darling-Hammond et al., 2020), suggesting that teachers should take what a student has already learned and create or structure activities that will blend what a student knows with what they want and need to learn. The findings related to differentiation from this study are consistent with the above research showing that teachers were utilizing a strategy, differentiation, that has been proven to bring about positive results. Based on these findings, incorporating small groups and differentiating, or leveling, activities was essential to meeting the needs of students.

Participants also perceived that there was a positive impact with regard to independent work time on student learning. In discussing independent work time, participants spoke of students working on their academic levels with other peers and how students had choice. According to the research, this is conducive to a student-centered learning environment. Singhal (2017) described student-centered learning as acknowledging students' interest, which gives them a voice in the learning experience. Based on the findings, teachers perceived that giving time for students to work independently to practice concepts was important to enhancing student learning. Thus, the study findings endorse what Singhal ascertained.

In relation to challenge and issues, teachers perceived time and lack of resources as their major concerns. In describing the challenges, participants revealed that time in

planning activities and implementing the Closure had an impact on the teachers' efforts to implement the math workshop model. In my study, all but one of the participants spoke of the significance of time as it relates to the math workshop model. The pattern of time as a challenge emerged from the findings, which emphasized the lack of time in teacher schedules to implement all parts of the workshop model. Participants shared their concerns about time as it pertained to the three components of the workshop model. Not having enough time to implement all these components daily was very challenging. This acknowledgement of the challenge that the lack of time presented for these participants is consistent with research conducted by Owens-Cunningham (2021). Owens-Cunningham also reported that time was a challenge for teachers when implementing a new program.

Planning activities referred to the leveled activities for students to practice. In specifically describing this challenge, participants spoke about the difficulty with trying to vary practice activities, planning activities that were going to last for the class period or having a solid plan to keep students engaged. Participants even spoke of the lack of resources needed to aid in planning these activities. This finding is consistent with the research conducted by Owens-Cunningham (2021) and Phinazee (2021) acknowledging limited resources as a challenge that was encountered when teachers were implementing a new strategy or program. Encountering challenges is expected when trying to implement something new. Participants shared their challenging experiences, and as they maneuvered around these challenges, they were engaging in transformative learning. According to Mezirow (2000), transformative learning is a way of problem-solving.

Mezirow (2003) also suggested that learning is a social process that requires interaction and discussion to make meaning. Participants spoke of the significance of collaboration as it related to the math workshop model. Participants perceived that collaboration between colleagues and between students was instrumental in planning and implementing the math workshop model and student learning. In describing collaboration between colleagues, participants spoke about how beneficial it was to share ideas with someone and get feedback. Collaboration, or discourse, is a key aspect of transformative learning. Mezirow (2000) described *discourse* as a "process of active discussion with others to better understand the meaning of an experience" (p. 14). The experiences with collaboration that participants described in this study concur with Mezirow's research.

The significance of collaboration also correlates with research suggesting that teacher transformative learning does not happen in isolation (Kovacs, 2018) and teachers will seek others to develop their knowledge of a concept (Anderson, 2019). Teachers, researchers, and policymakers acknowledged collaboration as essential to teacher continuing education (Matherson & Windle, 2017; NCES, 1999). Results of this study extend the current literature on teacher perceptions on the implementation of the math workshop model, which may be used to inform the development of training programs for teachers implementing the math workshop model. The findings may also support developing training programs that will be transferable to teachers who do not teach math. Further, it is interesting to note that the findings from the literature did not reveal any information that disconfirmed the findings in my study.

## Limitations of the Study

This study had a few limitations. First, this study had a sample size of nine teachers and was limited to middle school teachers. Additionally, this study had limitations because participants were not all from the targeted school system. To obtain the minimum number of participants needed for the study, I reached out for potential participants in two additional surrounding school systems and through social media. A second limitation was the limited diversity of the group of teachers. All but one teacher were females. However, all teachers taught mathematics in the middle school setting and had been implementing the math workshop model for at least 2 years. Another limitation, as stated in Chapter 1, was the limited current literature on the math workshop model. At the time of this study, there were only two studies on the math workshop model, one of which included teacher perceptions. Researcher bias was another limitation. As a middle school mathematics teacher, I quite naturally had thoughts concerning the math workshop model. To keep these thoughts at bay, I maintained a journal to reflect on my meanings and intentions. This allowed me to separate my thoughts from those of the participants and report their thoughts more accurately.

## Recommendations

There are several recommendations for future studies that could be made based on the findings. First, I recommend using a larger, more diverse sample. This would allow for more data to be collected from more teachers from a variety of middle schools, which could assist in transferability of the findings. In addition, having more diverse group of teachers participate in a future study could assist with providing rich descriptions of the

experiences and perceptions of teachers, which would lead to facilitating transferability. Second, I recommend that future studies broaden the focus to include middle school teachers who teach different subjects who are using the workshop model. Having teachers from all subject areas could assist with providing insight into the perceptions of the impact that the workshop model has on instructional practices and student learning. Third, I recommend using a mixed methods approach that includes collecting data via interviews from teachers and survey responses from students who have learned in a workshop model classroom. With this approach, the data collected could provide rich, detailed descriptions of the impact of the workshop model from a larger sample of people. Obtaining data from students could also provide insight into their perceptions of the impact that the workshop model has on their learning. Using a mixed methods approach might help with developing a better understanding of the math workshop model. Fourth, I recommend that school leaders allocate more time in the daily schedule for teachers to effectively implement all components of the math workshop model. An additional recommendation is the allocation of time for teachers to plan together. This could provide opportunities for teachers to discuss issues or concerns and collectively find solutions.

## Implications

The purpose of this generic qualitative study was to better understand middle school teachers' perceptions of the utilization and influence of the math workshop model and how it transformed their understanding of teaching mathematics in the middle school classroom. Findings from my study provide insights through the responses of middle

school mathematics teachers who had implemented the math workshop model for at least 2 years. These findings could add to the existing, but limited, knowledge on this topic.

This study contributes to positive social change because it explored perceptions of the implementation of the math workshop model through the lens of teachers. By looking through this lens, insight was provided that could assist teachers to enhance adolescents' achievement level in mathematics. This study uncovered five themes through the perspective of teachers. At least one participant from each grade level of middle school was represented in this study. This not only enriched the descriptions for a deeper understanding about the topic, but also provided insight to afford a better understanding of the implementation of the math workshop model in the middle school setting.

Findings from this study could impact teacher training as it relates to the math workshop model. This study revealed that structure was instrumental in the implementation of the workshop model. An implication for practice could be in the planning of professional development sessions, ensuring that the sessions contain clear and concise explanations of the structure of the math workshop model. This could impact teachers' understanding of what is needed to incorporate the workshop model into their daily schedules. In addition to PD sessions, this study could have implications for curriculum development. Findings could assist educators in developing curriculum that is more consistent with the math workshop model, which supports differentiation and thus assisting in meeting the academic needs of all students.

Another implication for practice is for administrators who create bell schedules to take into consideration the time needed for workshop implementation in the classroom

and ensure that teachers are given time to effectively implement the workshop model. Findings from my study can also contribute to understanding the challenges that teachers face while using the math workshop model. Teachers explained that the lack of time given for the workshop and the difficulty with planning activities were the biggest challenges that they faced. This finding has implications for practice of regularly scheduled meetings between stakeholders to discuss issues and solutions. These critical conversations have implications for transformative learning to occur with teachers. According to Mezirow (1997), a key aspect of transformative learning is constructive discourse. Teacher transformation of instructional practices could be influenced by these conversations and possibly increase the frequency of the use of the workshop model in classrooms.

Findings also revealed what teachers perceived as beneficial practices associated with the implementation of the math workshop model. These included using leveled activities based on student needs, using small groups or partners, and independent work time. These findings have implications for practice for teacher training on how to incorporate independent work time and small groups into classes and create differentiated activities to meet students' needs.

## Conclusion

Achievement levels in middle school mathematics have reportedly been below proficient for middle school students in the United States (NAEP, 2019). With all the responsibilities that are expected of teachers, the most critical one is helping students achieve academic success. This study focused on teacher perceptions in relation to the

implementation of the math workshop model. Teachers perceived that implementing the math workshop model provided a better opportunity to help their students achieve academic success. Using the framework of the math workshop model, specifically the independent work time, shifted the focus to students. Teachers perceived this to be very beneficial to student academic success. Looking at teacher perceptions of implementing the math workshop model could help in better understanding the influence that the model had on their instructional practices and possibly inform ways to develop professional development on the math workshop model.

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Appendix A: Research and Interview Questions Alignment With Conceptual Framework

| *Research Question:* ***What are middle school teacher perceptions of the implementation of the math workshop model?*** | | |
|---|---|---|
| **Sub Research Questions** | **Interview Questions** | **Conceptual Framework** |
| ***What are middle school teacher perceptions regarding the strategies used when implementing the math workshop model in the middle school classroom?*** | What is your understanding of the math workshop model? What does it mean to you? | Indicates a frame of reference in which the other responses (interview questions) will be based on |
| | What supports did you receive to help implement the math workshop model? Was it helpful? | Possible indication of participating in constructive discourse (communicating with others) |
| | What supports did you need to help implement the math workshop model? | Possible indication of critical reflection |
| | Please describe how you use or used the math workshop in your classroom. | Possible indication of transforming instructional practices |
| | What is your opinion/view of using the math workshop model in your classroom? | Critical reflection on experience |
| | What do you feel about using the math workshop model in the middle school classroom? | Critical reflection on experience |
| | Do you use any special strategies which you feel would help you to improve your teaching mathematics? | Possible indication of transforming instructional practices. |
| | If you use any meaningful strategies when implementing the math workshop model, what are those? From where did you get those strategies? | Possible indication of transforming instructional practices.<br>Critical reflection on experience |
| | What is your understanding of the math | Indicates a frame of reference in which the |

| | | |
|---|---|---|
| ***What are middle school teacher perceptions regarding the influence of the math workshop model on their instructional practices?*** | workshop model? What does it mean to you? | other responses (interview questions) will be based on |
| | What components of the math workshop model did you find to be the easiest to plan? | Critical reflection on the experience |
| | What components of the math workshop model did you find to be the easiest to implement? | Critical reflection on the experience |
| | How is the math workshop model different from how you previously taught or currently teach when not using the math workshop model? | Critical reflection on the experience |
| | What component(s) of the math workshop model do you think was most influential on the way students learned mathematics and why? | Critical reflection on the experience |
| | Do you believe that your beliefs about teaching have transformed since implementing the math workshop model? Explain | Critical reflection on the experience |
| | Please describe how you use or used the math workshop model in your classroom. | Critical reflection on the experience |
| | Do you think that the use of the math workshop model influenced the way of teaching math in the middle school? | Critical reflection on the experience |
| | What is your viewpoint pertaining to the use of this model when teaching middle school students? | Critical reflection on the experience |
| | How is the math workshop model different from how you previously taught or | Critical reflection on the experience |

| | | |
|---|---|---|
| | currently teach when not using the math workshop model? | Possible indication of transforming instructional practices. |
| ***How do teachers perceive collaboration among themselves when implementing the math workshop model in their classrooms?*** | What supports did you receive to help implement the math workshop models? Was it helpful? | Possible indication of participating in constructive discourse (communicating with others) |
| | Did you collaborate with colleagues regarding the math workshop? If so, what are your thoughts on that collaboration? | Possible indication of participating in constructive discourse (communicating with others) |
| | Describe your collaboration with other math teachers before and after implementation of the math workshop. | Critical reflection on the experience<br>Possible indication of participating in constructive discourse (communicating with others) |
| ***What are the perceptions of the teachers in relation to the challenges and issues as well as problems they face when implementing the math workshop model in their teaching in the middle school?*** | What components of the math workshop model did you find challenging to implement? | Indicates the possible barriers a teacher had to work through in transforming their instructional practices; critical reflection on experience |
| | What components of the math workshop model did you find to be challenging to plan? | Indicates the possible barriers a teacher had to work through in transforming their instructional practices; critical reflection on experience |
| | What challenges did you encounter implementing the math workshop model in your class? | Indicates the possible barriers a teacher had to work through in transforming their instructional practices |
| | Describe when and how students collaborate during math workshop. | Critical reflection on instructional practices |
| | Describe how you used formative assessment to | Critical reflection on instructional practices |

| | | |
|---|---|---|
| | plan activities for the math workshop. | |
| | Describe how you created a student-centered learning environment during math workshop. | Critical reflection on instructional practices |

# Appendix B: Invitation

Hello,

I hope this note finds you well.

I am in the Walden PhD program. As part of my dissertation, I am seeking middle school mathematics teachers to participate in an interview for my study. The study is looking at teacher perception of the implementation of the math workshop model in their middle school classroom. The purpose of the study is to better understand teacher perceptions of this process of implementation.

Agreeing to participate will include completing an Informed Consent statement (I will e-mail this to you after I receive your reply email); and allowing me to interview you in person. The whole process should take approximately 45 minutes of your time.

Please let me know if you would be willing to participate. Your participation is voluntary, and there is no monetary stipend for your participation. I do have a deadline, so we will need to begin the process by [*date*] and finish the interview by [*date*].

You can contact me by phone [] or e-mail [] if you have any questions.

Donna Mack

# Appendix C: Follow-Up Email

Hello,

I hope this note finds you well.

I am following up with you concerning a previous email sent to you requesting your participation in my study. I am in the Walden PhD program. As part of my dissertation, I am seeking middle school mathematics teachers to participate in an interview for my study. The study is looking at teacher perception of the implementation of the math workshop model in their middle school classroom. The purpose of the study is to better understand teacher perceptions of this process of implementation.

Please let me know if you would be willing to participate. Your participation is voluntary, and there is no monetary stipend for your participation. I do have a deadline, so we will need to begin the process by [*date*] and finish the interview by [*date*].

You can contact me by phone [] or email [] if you have any questions.

Donna Mack

## Appendix D: Decline Participation Email

Hello,

I hope this note finds you well.

I appreciate that you took the time to respond to my request for participation in my study. I received responses from many people. After reviewing the criteria set for the study, I have decided that you do not meet the requirements for the study, or I have met the required number of participants for the study. However, if you are eligible, I may still consider you should a participant decide not to continue with the study.

I appreciate your interest in the study and hope that this does not discourage you from participating in future studies.

Donna Mack

## Appendix E: Invitation Email to Teachers Outside the Targeted School System

Hello,

I hope this note finds you well. I am a Walden PhD student conducting a study for my dissertation. As part of my dissertation, I am seeking middle school mathematics teachers to participate in an interview for my study. The study is looking at teacher perception of the implementation of the math workshop model in their middle school classroom. The purpose of the study is to better understand teacher perceptions of this process of implementation. A participant must meet the following criteria to be included in the study:

1. Teaching mathematics and implementing the math workshop model in the middle school level for at least 2 years.
2. Implemented the math workshop model in their classroom at least 2 days in a week.

Please let me know if you would be interested in participating. The interview should take approximately 45 minutes of your time. Your participation is voluntary, and there is no monetary stipend for your participation. I do have a deadline, so we will need to begin the process by [*date*] and finish the interview by [*date*].

You can contact me by phone [] or e-mail [] if you have any questions.

Donna Mack

# Appendix F: Referral Invitation

Hello,

I hope this note finds you well. I am a Walden PhD student conducting a study for my dissertation. Your name was given to me as a possible participant for my study. As part of my dissertation, I am seeking middle school mathematics teachers to participate in an interview for my study. The study is looking at teacher perception of the implementation of the math workshop model in their middle school classroom. The purpose of the study is to better understand teacher perceptions of this process of implementation. A participant must meet the following criteria to be included in the study:

1. Teaching mathematics and implementing the math workshop model in the middle school level for at least one semester.
2. Implemented the math workshop model in their classroom at least 2 days in a week.

Please let me know if you are interested in participating. The interview should take approximately 45 minutes of your time. Your participation is voluntary, and there is no monetary stipend for your participation. I do have a deadline, so we will need to begin the process by [*date*] and finish the interview by [*date*].

You can contact me by phone [] or e-mail [] if you have any questions.

Donna Mack