Strengthening Tier One Instruction in the Mathematics Classroom by Increasing Teacher Mathematics Content Knowledge and Pedagogy

Cynthia Becton French

University of Mississippi

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STRENGTHENING TIER ONE INSTRUCTION IN THE MATHEMATICS CLASSROOM

BY INCREASING TEACHER MATHEMATICS CONTENT KNOWLEDGE AND PEDAGOGY

A Dissertation

presented in partial fulfillment of requirements

for the degree of Doctor of Education

in the Department of Leadership and Counselor Education

The University of Mississippi

by

Cynthia French

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ABSTRACT

The purpose of this applied research study was to strengthen Tier I instruction within seventh and eighth-grade mathematics classrooms. This applied research study uses three elements; professional learning communities, consistent content-specific professional development, and increased student achievement to strengthen Tier I instruction in middle school mathematics and measure student academic growth. Interviews, surveys, statewide assessments, and benchmark scores were used in this study as measures for program success. Using these elements to support Tier I instruction can lead to increased student achievement in mathematics at the middle school level.
DEDICATION

This dissertation is dedicated to my mother. Though she is not here to see the implementation or completion of this dissertation, she has always been my greatest supporter.
LIST OF ABBREVIATIONS AND SYMBOLS

DMS – Diligence Middle School
IDT – Instructional Development Team
IPG – Instructional Practice guide
MAAP – Mississippi Academic Assessment Program
MDE – Mississippi Department of Education
MKT – Mathematical Knowledge of Teaching
PD – Professional Development
PGS – Professional Growth System
PL – Performance Level
PLC – Professional Learning Communities
RTI – Response to Intervention
SY – School Year
TST – Teacher Support Team
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Last, but certainly not least, I am thankful to my Jesus, without Him I would be nothing. Philippians 3:14
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Chapter I

Statement of the Problem

In accordance with the Mississippi Department of Education, Diligence Middle School (DMS) follows the Three Tier Instructional Model for instructional practices and remediation. Tier I should consist of quality classroom instruction of the Mississippi College and Career Readiness Standards. At the beginning of each school year, student data is assessed to determine if Tier II or III interventions are needed. DMS uses Mississippi Academic Assessment Program (MAAP) scores, Star math diagnostic scores, and student’s grades from the previous school year as the data points to determine if interventions are needed for these students. A performance level of two or below on the MAAP, and Star scores two grades below level, will result in Tier II placement. If a student failed, or was on Tier III the previous school year, they will begin the current school year on Tier III interventions. In addition, students who score a level one on the MAAP or three grade levels below their current grade on diagnostic tests will begin Tier III interventions.

At the beginning of the 2021-2022 school year, 60 (11.2%) seventh and eighth-grade math students at DMS scored performance level one (PL1) and were also two or more grade levels below their academic grade on the STAR math diagnostic test. In addition, 167 (31.7%) seventh and eighth-grade math students at DMS scored performance level two (PL2) and were two or more grade levels below their academic grade on the STAR math diagnostic test. Of these students, 30 were one level below grade, 49 were two levels below grade, 41 were three levels below grade, and 31 were four or more grade levels below their academic grade according to
their STAR math diagnostic test. This data indicates 66.34% of seventh and eighth-grade students were performing below grade level.

When the Tier Intervention Committee met at the beginning of the year to determine which students needed interventions according to their MAAP and STAR scores, committee members were alarmed by the high percentage of students performing below grade level and began the process of meeting collaboratively to discuss possible plans of action.

**Description of the Context**

Diligence Middle School (DMS) in rural Mississippi is located literally on the “other side of the tracks.” It began as the African American school prior to integration. When desegregation was fully implemented, the DMS building became the upper elementary with grades three through six. Around 2001, grades three and four were relocated back to the elementary/high school campus, and grades five through eight became the middle school.

Diligence, Mississippi (a pseudonym) is a small rural town in central Mississippi. The city population in the 2019 Census was just over 3,500 with 565 (15.8%) Hispanic residents. DMS is one of two stand-alone middle schools in the district. Grades five through eight are housed at DMS with a principal and an assistant principal, counselor, five inclusion teachers, two self-contained special education teachers, a gifted teacher, librarian, English Language Learner teacher, band and assistant band directors, and two Physical Education coaches. Fifth grade has two teams of three teachers (Math, Science, and Language/Social Studies) who serve children for approximately two hours and 20 minutes each period, and grades six through eight consist of six teachers per grade and they serve children on a 50-minute, seven-period schedule.

DMS serves 526 students in total with a faculty of 41 certified faculty members and five teacher assistants. Of these certified staff members, four English teachers and two math teachers
are alternate route certified. Alternate route teachers enter the teaching profession through an alternate degree program having earned a bachelor’s degree in a profession other than education. These teachers apply for an emergency license to teach and enter an educational program to take teacher training classes while they are actively teaching in a school. These teachers are in essence completing “on the job training” because they are completing course work while they teach. The student demographics of the school are 182 Caucasian students (34.6%), 172 African American students (32.7%), 168 Hispanic students (31.9%), two Asian students (<1%), and two American Indian students (<1%). Of the Hispanic population, 45% are limited English speakers.

The main industry in the city of Diligence is a chicken processing plant, and many chicken farms surround the city. Approximately 80% of the parents either work at the plant, on a chicken farm, or drive up to an hour away for employment. Students are also involved on the chicken farms at times, and many live in small, travel trailers on these farms. In many two-parent homes, parents working at the chicken plants are often on shift at opposite times for one parent to be home when the children are home, especially in the Hispanic population. A large portion of our students are in a one parent home, and all these factors make it difficult to have high participation when conducting conferences, parent nights, open houses, etc.

At DMS a significant concern is the number of students placed on Tier II or Tier III for remediation each year with little to no improvement. The school serves students on Tiers II and Tier III who are below grade level performance. Tier II students are to receive approximately 30 minutes of remediation, three times per week with progress monitoring every other week, while Tier III students are to receive approximately 30 minutes of remediation five days a week with progress monitoring taking place weekly. This means a Tier II student must have remediation 90 minutes per week and a Tier III student must have remediation 150 minutes per week. Even in
groups of five students, it would take four full-time remediation teachers to provide 30 minutes of reading remediation for the number of students on Tier III. The purpose of Tier remediation is to help students improve their skills to grade level so they are no longer failing and can be removed from Tier interventions, however most students are never removed for lack of improvement.

Other areas of concern stem from the number of alternate route teachers at DMS. These teachers did not have the traditional training for educators which should include how to use effective instructional strategies in the classroom. Though an alternate route teacher should have a strong understanding of their content because their licensure endorsement is based on their content classes, understanding how to teach the content may not have been a focus of the instructional classes. Many teachers are also at a deficit in understanding how to use the data from assessments to drive the instruction within their classroom. Understanding data, while not only an alternate route teacher issue, has been more prevalent with our alternate route teachers than with our traditional education teachers.

As the Tier chairperson, in addition to the assistant principal and an instructional leader of the school, I am aware of the ineffectiveness of current remedial practices in this setting. One probable reason for this ineffectiveness could be the amount of time it takes to remediate so many students effectively. There are not enough minutes in the day. Secondly, students often receive instruction below grade level during intervention sessions. During Tier meetings, teachers explain the skills being remediated with each student and provide updates on each student’s progress. As the committee discusses each student in detail, the consensus is typically to keep remediating since the data does not indicate the student is improving enough to be moved from Tier interventions.
As an instructional leader, I am in classrooms daily and often observe teachers working with groups of remedial students during P.E., band, and sometimes computer class or even the social studies instructional time allotment. Students often feel as though they are being punished when pulled for remediation from these classes, and some students may not want to put sufficient effort into the remediation. This frustrates the teacher as well as the student which then causes behavioral issues. DMS has also hired tutors to come in specifically to work with our students who receive Tier instruction or remediation to lighten the load on the teachers, still little improvement is made.

**Justification of the Problem**

Diligence Middle School students have been assessed with the MAAP assessment according to the Mississippi state mandates. In the spring of the 2017-2018 school year, DMS school performed at a 24.8% proficiency rate with a 46.4% growth, and 48.9% growth for the lowest 25% of students. In the spring of the 2018-2019 school year, DMS school performed at a 24.8% proficiency rate with 48.1% growth, and 53% growth for the lowest 25% of students. The COVID-19 Pandemic hit the state of Mississippi in March 2020 causing the school system to shut down. This resulted in schools not assessing students with the MAAP assessment in the spring of 2020, therefore no data is available to compare. In the spring of the 2020-2021 (SY 2021) school year, DMS once again assessed their students. After having the fourth nine weeks of SY 2020 shut down and the first half of SY 2021 on a modified schedule of A days and B days, DMS Math proficiency was 18.1% for the entire school. Fifth grade proficiency for SY 2021 was 17%, sixth grade proficiency was 16%, seventh grade proficiency was 19%, and eighth grade proficiency was seven percent. While proficiency levels were low before the Pandemic, there was a definitive decrease in proficiency after the Pandemic.
At DMS, 281 students out of a total 526 (53.4%) students are performing two or more grade levels below in reading, and 156 (30%) are performing two or more grade levels below in math. Of these students, the lowest 90 have been placed on Tier II and Tier III remediation. Logic would dictate all these students should be on some form of Tier instruction, but the committee members determined teachers and tutors would not be able to adequately remediate all students below grade level and provide effective instruction in the classroom. Having such a high number of students in need of intensive interventions causes one to consider the possibility of ineffective Tier I instruction. There should be no more than 25% of students on Tier II or Tier III within a school (Shapiro, n.d.). At DMS, the numbers unfortunately greatly surpass that percentage.

As a prior eighth-grade math teacher it was common for students to come to me with a hatred of math. Students had experienced failure and dejection in this subject, and they no longer had any hope within themselves for success. One of the first questions I used to ask my students was how many liked math (most did not), and a discussion of why. Most often students expressed difficulty with basic operations, fractions, and decimals. I would then explain I was going to give them a calculator which would work those difficult skills for them, and I would teach them how to use it correctly. The only thing they had to promise me is to pay attention to the steps and the processes we were going to learn and give me their best effort.

When I became lead teacher, then assistant principal when I began performing observations, it became evident the high number of intervention students could be a result of ineffective Tier I instruction at both the elementary and the middle school levels. Teachers were teaching the Mississippi College and Career Readiness Standards, and therefore believed they were providing effective Tier I instruction. However, it is necessary for instruction to not just be
given, but to be high quality and engaging (Shapiro, n.d.). Instructional practices such as asking high-level questions, providing actionable feedback, students implementing the feedback, and giving praise when appropriate are some of the necessary factors of effective Tier I instruction (Kurtz & Roach, 2015). For our students to be successful academically, we must improve Tier I instruction, but we must also determine a way for our students to make academic gains when they come to us with such great deficits.

**Significance of the Study**

By increasing teachers’ instructional and pedagogical skills and understanding, Tier I instruction should become more effective which could decrease the number of students needing remedial interventions. The expectation is this action research plan will provide a greater understanding of the importance of Tier I instruction, strengthen teacher skills and content knowledge, and provide guidance to implement instructional strategies to increase the effectiveness of classroom instruction.

**Purpose Statement**

The purpose of this applied action plan is to improve Tier I instruction through using acceleration teaching to bring students to grade-level instruction. By working collaboratively, subject area teachers, administrators, and interventionists, will plan together weekly and provide pre-requisite skills needed for the current grade level standard being taught in the classroom. By providing intentional instruction on prerequisite skills relative to the unit standard being taught, teachers expect to increase student performance when working on grade level material. The central phenomenon of this study is to address the instructional needs of students who are currently on Tier II or III intervention plans.
Quantitative data used will include students’ grades, EnCase benchmark scores, and ultimately MAAP data. Teachers will formatively assess students by using exit tickets after each lesson to determine the level of understanding within their class of students. The student standard summary report for our EnCase benchmark tests also provides the percentage of mastery for individual students for each grade level standard. The school administers three EnCase benchmark tests throughout the school year and will be able to track student progress utilizing the data from these assessments.

The participants of this study are primarily the students of DMS, but we also include the teachers as they strive to improve their pedagogy and instructional knowledge implemented through improved classroom instruction. Students will provide data through classroom grades, benchmark scores, and state test scores; teachers will analyze the data as it is provided as a means of differentiating and strengthening their instructional levels. Teachers will also provide data through surveys of professional development and professional learning community engagement as well as through interview questions to determine teacher professional growth and effectiveness in the classroom.

**Research Questions**

The research questions to be answered in this applied action plan are as follows:

1. Does consistent, content-specific professional development strengthen tier one instruction in the classroom as evidenced by quarterly benchmark scores, end of the year state MAAP scores, and teacher personal growth based on the Instructional Practice Guide (IPG) by Achieve the Core?
2. Do teachers believe consistent, content-specific professional development is beneficial in strengthening classroom instruction according to self-reflective teacher surveys?

3. Do collaborative professional learning communities help teachers increase instructional and pedagogical skills as evidenced by observations using the Instructional Practice Guide (IPG) by Achieve the Core?

4. Do content-specific, professional development sessions increase teacher efficacy based on self-reflection teacher survey results and interviews?

5. Will proficiency levels on the Mississippi Academic Assessment Program (MAAP) 2022 mathematics exam in eighth grade improve significantly compared to proficiency levels on the MAAP 2021 mathematics exam in seventh grade after the implementation of consistent, content-specific professional development?

6. Will proficiency levels on the MAAP 2022 mathematics exam in seventh grade improve significantly compared to proficiency levels from the MAAP 2021 mathematics exam in sixth grade after the implementation of consistent, content-specific professional development?

**Summary**

Chapter I introduces the research and implementation for the program implementation. As Chapter I developed, an analysis of the problem, statement of the purpose, and the research questions to be answered were presented to provide focus for the research to increase teacher instructional capacity. The literature presented in Chapter II provides an introduction for the questions presented and relevant research to assist in answering these questions. The literature focuses on effective math instruction and student achievement, building organizational capacity,
and instructional coaching which helps create a framework for the action plan presented in
Chapter III which describes the action plan, and the methodologies for assessing the
instructional-improvement program.
Chapter II
Review of Literature

Introduction

Year after year, schools are faced with an overwhelming number of students placed on Tier II or Tier III intervention levels of instruction. Unfortunately, teachers and administrators struggle to find time to provide effective interventions to fill the learning gaps of these students, assess progress monitoring, and document all the above in an efficient manner with credible results. In addition, few students exit the intervention process because they seldom show adequate growth. It is the belief of this researcher the issue is not within the Tiers II or III process, but rather is a Tier I issue developed from the beginning of a student’s academic pathway.

In order to provide strong Tier I instruction, giving more than 80% of students the necessary skills to be successful, teachers must have the expertise to provide instruction using evidence-based strategies (Kurz et al., 2015). The instructional leaders at Diligence Middle School (DMS) have struggled in recent years with the high number of students assigned to intervention levels. Of the 526 students in the school, approximately 180 students, schoolwide, meet the criteria to be placed on either Tier II or Tier III levels.

The targets of this literature review are the necessary components to strengthen Tier I instruction to decrease the number of students requiring interventions. The first section of this chapter will provide a summary of building teacher capacity through content-rich, professional development. The second section of this chapter will focus on collaboration of subject area
teachers through professional learning communities to increase teacher pedagogy and efficacy. The final section will explore the effectiveness of strong Tier I instruction on student achievement. The significant amount of research on these topics should help improve Tier I instruction in the middle school classrooms at Diligence Middle School.

**Content-Specific Professional Development**

Professional development is a leading component for teacher improvement (Guskey, 2002). Guskey believes effective professional development increases teacher competency and instructional effectiveness. In his research, Guskey found the actual professional development was not the crucial point, but teacher’s attitudes and instructional beliefs changed when they observed growth in their students after successful implementation of the professional development. Guskey also found when teachers enjoy teaching more and have greater passion when they implement professional development and see the benefits of the training transferred to their students.

Additionally, Guskey (2009) noted workshops are criticized and considered wasteful of both time and money, but all research product showing growth within the classroom include workshops. Workshops typically bring an outside expert to work with teachers and facilitate the implementation with teachers. Guskey determined, however, for workshops and professional development to improve student outcomes, implementation of the training must be effective and consistently applied in the classroom.

Coherent professional development is key to school capacity building according to King and Newmann (2001). Teachers must improve their knowledge and skills to improve student achievement, but traditional professional development includes principles such as having teachers concentrate on instruction and student outcomes using materials teachers may deem
irrelevant in the professional development, and therefore do not apply what they learn to their instruction. Traditional professional development also posits teachers must have many opportunities to study, apply, and receive feedback on taught innovations, but professional development activities are usually a half or whole day at most. This results in workshops providing no long-term application these opportunities. Traditional professional development calls for teachers to collaborate with other professionals, usually relying on outside resources and lecture instead of facilitating collaboration and implementation. Lastly, traditional professional development contends teacher learning will occur when teachers have input over the process and content of professional development which creates “buy-in,” but professional development is usually provided from a district or state edict with little input from teachers. King and Newmann determined when school-wide professional communities have a clear and shared purpose for student learning, implement staff collaboration to achieve this purpose, and facilitate professional reflective inquiry from the staff on the unique challenges they face, and then provide professional development for teachers specific to their needs and the needs of their students, resulting in improved instruction would reach a greater capacity (2001).

Professional development must be more than just a meeting providing information to teachers. According to Darling-Hammond and McLaughlin (1995), effective teacher professional development should be engaging with a concrete task teachers use daily. Professional development should also be collaborative and involve more than just sitting and listening. Professional development should be related to teachers’ instructional work with students as well as ongoing and supported throughout the year (Taton, 2015).

Taton (2015) asserts teachers need a new type of professional development due to the constant struggle students are currently experiencing in mathematics. According to Taton, it is
not enough to provide content-specific professional development, but the professional development must also include pedagogical development to encourage inquiry in the classroom to increase student understanding of the why and not just the how a process works. Taton (2015) acknowledges traditional mathematical instruction typically consists of teachers providing direct instruction consisting of a list of rules and procedures for students to follow to complete the math problems. He also notes, many people can perform complex mathematical problems when shopping or cooking, but when those same problems are on paper in a test question, they cannot complete the tasks. Mathematics teachers need to understand how to connect mathematics to the real world and incorporate relative problem-solving skills for students to grasp the concepts completely and not only focus on the numbers and the words. Taton argues professional development should be modeled to teachers in this same manner so teachers can understand and learn how to apply these skills with their students.

**Teacher Capacity Development**

Lindvall (2017) examines the question of what constitutes effective professional development for teachers. The author states there are five critical features which are content focus, active learning, coherence, duration, and collective participation. Content focus should not solely be on the actual subject matter, but it should also focus on the teacher’s pedagogical content knowledge, especially when the professional development is working toward improving achievement in mathematics. Teachers must also participate in active learning which range from observing other teachers to reviewing student work. However, the active participation and learning activities must be sustained even after the professional development session has stopped or it is not effective. Coherence is another feature of effective professional development which has teachers coordinating instruction as well as assessments in a coherent system aligned with
district practices and policies which are advocated by the professional development. Many times, professional development presents elements which seem like separate entities and are not part of the process required by the district and therefore is not sustainable or effective. The level of duration of the professional development is important in determining its effectiveness. Professional development is often a one-time session, but for it to provide sustainability it must be spread over a period of time with multiple meetings between teachers and facilitators giving feedback and providing follow up support. The final critical feature Lindvall discusses is collective participation. Teachers from the same school, grade level, or department all taking part in the same professional development and interacting with each other and actively collaborating and openly discussing issues they encounter provide a greater benefit for both teacher and student achievement.

Wilcox and Angelis (2012) suggest professional development does not only come through workshops but can also be obtained through visiting other classrooms and schools to observe instructional strategies. Professional development can be formal or informal, but if it effects teacher instruction and student learning it will enhance student achievement in the school. Wilcox and Angelis found high-performing schools developed professional development through implementation of teacher leaders and administrators addressing the internal needs of the school which were identified by the teachers. The authors found teachers believed their instructional practices were more effective after attending these targeted professional development sessions pertaining to specific instructional weaknesses.

Rush and Young (2011) identified the purpose of professional development is to increase the instructional practices of the teacher in the classroom which should correlate to a greater increase in student learning. Rush and Young argue for professional development to be effective
it must also transform teacher practices, beliefs, and attitudes to provide stronger motivation to continue their path of professional development and implementation. Rush and Young believe as teachers observe improvement in student achievement, the teacher attains greater motivation to continue personal instructional development.

Kurz et al. (2015) noted general education teachers seldom have data collected to show the effectiveness of tier one instruction. Tier one instruction should meet the needs of most of the students in the classroom effectively with high-quality and evidence-based instructional strategies, but unfortunately this is more of an assumed skill more so than one which is documented.

Response to intervention (RTI) systems should include evidence-based instructional methods used in high-quality instruction in the general education classroom which is considered Tier I. Students who are not successful at the Tier I level are then identified as needing Tier II or Tier III level interventions based on certain criteria. However, a concern has risen as to whether or not educators possess the skills and expertise needed. Most fidelity checks focus on Tier II or Tier III intervention qualities while the effectiveness of Tier I instruction is merely an assumption in many cases.

**Instructional Coaching**

Teachers often struggle in finding or choosing strategies, which will enhance the skills currently being taught. In a study on the beliefs teachers have concerning coaching and professional development effectiveness, Rush and Young (2011) found teachers at all educational levels feel there is some effectiveness to teacher practice when working with an instructional coach. Of the highest ranked activities, teachers believed having help to choose
appropriate instructional strategies and modeling of those strategies was the most effective use of
time in professional development.

Mangin (2014) acknowledges one way to provide evidence-based professional
development is through instructional coaching. Instructional coaches provide a variety of
instructional strategies through modeling in the classroom, provide feedback to teachers from
observations, work with teachers to understand assessment data, and provide one-on-one
conversations with teachers concerning specific classroom and instructional needs. By
implementing instructional coaching, teachers have access to high-quality professional
development at their school building on a day-to-day basis. Many educators are viewing
instructional coaching as a means for professional development to implement transformational
activities in the classroom resulting in increased teacher performance and development (Bennet

Additional research studies indicate advantages to implementing instructional coaching
as a means of improving professional development. Some of these advantages include cost
effectiveness and increasing teacher efficacy in the process (Keller, 2007). Another instructional
coaching gain is an opportunity for teachers to learn through observation in their own classroom.
Teachers then implement and practice new strategies and receive immediate feedback from the
instructional coach as well as personal reflection, (Shidler, 2009).

When examining how mathematics coaching impacts the practices of teachers, Bengo
(2016), found time spent with an instructional coach builds trust between the teacher and coach
which may have a greater impact on the effectiveness of instructional coaching. When
instructional coaching occurs within the teacher’s classroom, the teacher is supported with
teaching strategies which are evidence-based and feedback and guidance are provided immediately (Snyder et al., 2015).

**Professional Learning Communities**

Stosich (2016) found support from experts embedded within a teachers’ normal day, such as instructional coaches and principals, are instrumental in providing time for collaborative planning among teachers. Stosich (2016) also acknowledged teachers who participate in collaborative planning and inquiry exhibited improved instruction.

Thoonen, Sleegers, Oort, Peetsma, and Geijsel (2011) studied multiple influences on teaching practices. Their results suggested a strong indicator of teaching practices is the amount of time and quality of teacher’s collaborative, professional learning communities. Thoonen et al. contends, if structure and consistency is not evident in professional learning communities, teachers may not demonstrate significant change in their practices.

In order to build capacity through professional learning communities, there must be structure, expectations, and a strong focus on student learning (Anfara & Mertens, 2012). As instructional leaders implement professional learning communities, ensure the environment of the school is collaborative in nature, and provide the tools and resources needed, they facilitate clearly defined learning goals and high-quality instruction. In fact, Mangin (2014) suggests a school’s success depends on the ability of leadership and staff to work collaboratively and build instructional capacity. The authors found common planning times can be critical in facilitating professional learning communities, which is dependent upon school leadership to schedule accordingly. Common planning, however, can provide time for grades or subject areas to develop shared goals and values to implement a culture of best practices within the classrooms. It
can also provide teachers time to engage in collaborative reflection to obtain insight from colleagues.

Akiba and Liang (2016) also found teachers participating in strong professional learning communities have a greater effect on student achievement growth than teachers only participating in individual activities or taking college classes. In professional learning communities, teachers collaborate on issues specific to their classroom and seek input from their team. This formal collaboration concerning an actual problem of practice provides hands-on experience and instructional growth for the teacher. By reflecting and discussing with a team of teachers, information is gained, and informational strategies are developed in collaboration.

Jaquith (2013) acknowledges by creating collaborative opportunities for teachers, instructional skills improve. In professional learning community meetings teachers are able to discuss with other teachers’ different approaches to content and curriculum. However, school administrators must understand the importance of these collaborative meetings and the potential impact on student achievement. Jaquith posits the importance for administrators to be involved in these professional learning communities to provide structure, enable an environment conducive to teacher learning, and to ensure the focus of conversations is on instruction and student learning.

Park, Lee, and Cooc (2019) conducted their study on the necessity of principal support, professional learning communities, collective responsibility, and group teacher expectations and their effects on student mathematics achievement. Results identified the importance of school leadership in teacher learning as it indirectly affects teacher attitudes and behaviors, which are connected to student achievement. As teachers project high expectations, students experience greater growth and academic achievement in mathematics. It is also important to note the group-
level expectations is important in relation to student achievement. Teachers must have a common vision, set of goals, and a collective approach to instruction. Overall, researchers found professional learning communities conducted a collaborative manner have a positive effect on student mathematic achievement.

Huguet, Marsh, and Farrell (2014) discovered in their study many teachers did not understand the necessity of data driven instruction or how to incorporate it in their classroom. With the implementation of professional learning communities and data specific conversations, teachers believed they improved in their understanding of data and how to use it to drive their instruction. With an onsite instructional coach providing guidance and facilitating discussions, teachers collaboratively dissected classroom and benchmark data to determine areas of strength and weakness. As teachers continued to collaborate through further professional learning community meetings, they observed increased growth in their students’ academic achievements.

**Student Academic Achievement**

According to Ottmar, Rimm-Kaufman, Larsen, and Berry (2015), only 40% of fourth grade students reach math proficiency in America. Due to this lack of proficiency, substantial attention has been given to teacher effectiveness in the mathematics classroom and the teacher’s role in student achievement. These researchers also found teachers are struggling with content and pedagogical knowledge exacerbating the low student achievement issue. In Ottmar, et al.’s analysis of the quantitative research of the effectiveness of the Responsive Classroom to change the relationship between mathematics teachers and student mathematics achievement, the researchers discovered teachers who increased the use of standards-based practices had students who exhibited greater advancement in mathematics skills (2015).
In their research, Koellner, Jacobs, and Borko (2013) found teachers who possess specialized content knowledge, pedagogical knowledge, and knowledge of their student population had a stronger effect on student achievement in relation to peers not possessing such knowledge. These teachers possess the ability to make relative connections to their students’ mathematical instruction and are able to teach those mathematical skills in a mathematically and developmentally logical manner. (Ferrini-Mundy et al., 2007).

Teachers possessing the ability to effectively provide mathematic instruction have a “Mathematical Knowledge for Teaching” or MKT. These teachers understand the content and are able to provide instruction on a deeper level, provide clear and distinct explanations of skills and concepts, and provide appropriate instructional materials while challenging their students on a greater cognitive level. In this study, Koellner et al., focused on training teachers to provide quality mathematics instruction. Further, the focus was on implementing strong professional learning communities which indicated positive gains in teachers’ MKT and content knowledge skills (2013).

Mayotte, Wei, Lamphier, and Doyle (2013) acknowledge in their study on capacity building, strong professional development is much more effective and has a greater ability to affect student achievement when it can improve teacher’s and administrator’s skills and motivation. When teachers and administrators become a collective unit, with the same goal and vision, to improve student achievement, and collaborate to provide teachers with the learning they need individually and collectively, student learning growth occurs. Mayette et al., (2013) also found as teachers work in teams, the expertise and experience of everyone is shared with the professional learning community enhancing a common structure and language across
departments which causes teachers to perceive their collaboration having a positive effect on student achievement.

Granberg (2016) conducted research concerning the importance of allowing a productive struggle for students in mathematics class. A productive struggle is one of the eight mathematical teaching practices established by the National Council of Teachers of Mathematics (2014). Granberg acknowledged as students persevered through their struggle, they developed a stronger grasp of the concept. Students had to readjust their approach to problems in order to see processes and outcomes from a different viewpoint. As students discovered their mistakes, through collaboration with the teacher and other students, they could determine how to adjust and complete the problems correctly.

In Clarke and Roche’s (2018) study of engaging students in mathematics learning in a purposeful manner which is beneficial to all students (2018). The researchers also noted many students in middle grades have developed a negative attitude toward mathematics. Students have the ability to differentiate between a fundamental or an enjoyable task and teacher disposition toward these tasks can have an effect on student perception. The researchers found students became more engaged and motivated to complete tasks when they were allowed to explore the process as teachers provided with guided questioning and prompts to support learning in relation to not giving direct instruction regarding what students did incorrectly.

In McMeeking, Orsi, and Cobb’s (2012) study on the effects of teacher professional development on mathematic student achievement, the authors found teachers engaging in professional development to better understand how to deliver inquiry-based mathematics instruction with a focus on deeper content level produced a higher student proficiency percentage on state mathematics assessments. The researchers found teachers who engaged in multiple
professional development activities developed more student proficiency than teachers did with fewer professional development engagement.

**Conclusion**

Diligence Middle School (DMS) recognizes the need for increased teacher capacity to enhance student academic growth. The Instructional Development Team (IDT) used the research found in this chapter to develop an action plan to address DMS’s instructional needs. This research provided a framework, which aided the development of the action plan defined in Chapter III. The action plan integrates the elements of the research to promote building capacity in teachers through strengthening teachers’ content and pedagogical knowledge.
Chapter III

Introduction

This chapter presents the applied research design and methods used in this research to increase content and pedagogical knowledge of middle school mathematics teachers to improve tier one instruction in the classrooms at Diligence Middle School (DMS). Applied research is designed to address a problem of practice as well as improve organizational effectiveness by developing the capacity for organizational learning (Yarbrough et al., 2011). The methods of the applied research design guiding this research are presented and explained.

Chapter III is divided into three parts. Initially, an explanation is presented of the collaborative development of the action plan to address the problem of low content and pedagogical knowledge. This section includes an overview of collaborating stakeholders, a review and timeline of the improvement process, existing research guiding the work, and an examination of the internal data analyzed to create the action plan.

The second section of this chapter presents the full action plan. The research questions from Chapter I are addressed in this section. Each of the six research questions is designed to guide the evaluation of one of the three elements of the action plan. Each element includes one or more measurable goals. This section provides the details of exactly what will take place for each element: what systems will be in place, what participants will be expected to do and accomplish, what timelines will be followed, what resources (time, materials, funding, etc.) will be required, and who will be responsible for each activity or action item required of participants.
The final section of Chapter III presents the program evaluation of the action plan to be conducted during one year of implementation of the improvement plan. Formative and summative assessments are used for each element of the action plan. Each element is evaluated using multiple sources of qualitative and quantitative data. The focus of the evaluation will be to determine the level of goal attainment and to assess the organizational development occurring throughout this applied research process. All the research questions will be answered with data collected and analyzed through the program evaluation process.

Development of Action Plan

The DMS Instructional Development Team (IDT) developed the action plan and are collaborating to implement the plan. These stakeholders used the research contained in Chapter II to determine the most important elements to be addressed within the plan.

During the 2020-2021 SY, an Instructional Development Team (IDT) was formed to develop and implement a plan to increase teacher capacity in the mathematics classrooms at Diligence Middle School. This team included the principal, the instructional leader/assistant principal, the mathematics curriculum director of the county, the Teacher Support Team (TST) chairperson, and five math teachers.

Collaborative meetings were centered around examining diagnostic data, grades, and benchmark data throughout the school year. Data from the SY 2019-2020 MAAP was not available to examine due to the COVID 19 Pandemic and students not taking the MAAP test in the spring of 2020. The conversation became more focused on how teachers could be more effective in the classroom and teach the content with greater instructional gains. After a series of discussions and meetings, the IDT agreed there were adequate teaching efforts in the classroom because teachers planned, taught, and assessed students based on the Mississippi College-and-
Career-Readiness Standards, yet classroom assessments and benchmark scores did not align. When MAAP scores from the 2020-2021 school year (SY) were released in July 2021, the resulting scores matched the data from the benchmarks indicating a decline in student academic achievement (Table 1). The teachers believed math concepts were taught effectively, but questions on the MAAP assessment were asked with a more difficult rigor and required greater understanding than students had obtained. Also, when teachers struggle teaching a concept, there is no another teacher in the same grade and subject with whom to collaborate to better understand the concept. Throughout these meetings and discussions, the instructional team and teachers agreed, content-specific professional development was needed to help teachers develop instructional strategies, deeper content knowledge, and an understanding of how to use data to drive instruction to become more effective.

Table 1

7th and 8th Grade Benchmark and MAAP Score Comparison

<table>
<thead>
<tr>
<th>7th Grade</th>
<th>1a</th>
<th>1b</th>
<th>2a</th>
<th>2b</th>
<th>3a</th>
<th>3b</th>
<th>4</th>
<th>5</th>
<th>Proficiency %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark 3</td>
<td>2</td>
<td>10</td>
<td>16</td>
<td>19</td>
<td>31</td>
<td>13</td>
<td>19</td>
<td>1</td>
<td>18%</td>
</tr>
<tr>
<td>MAAP</td>
<td>0</td>
<td>8</td>
<td>11</td>
<td>23</td>
<td>30</td>
<td>19</td>
<td>10</td>
<td>8</td>
<td>15%</td>
</tr>
<tr>
<td>8th Grade</td>
<td>0</td>
<td>10</td>
<td>14</td>
<td>14</td>
<td>28</td>
<td>22</td>
<td>22</td>
<td>0</td>
<td>20%</td>
</tr>
</tbody>
</table>

Benchmark data retrieved from https://encase.te21.com/Dashboard
MAAP data retrieved from https://www.mdek12.org/OPR/Reporting/Assessment/2020-21

The first phase of this action plan consisted of compiling data from the mathematics classes throughout the 2020-2021 SY, including diagnostic scores, benchmark scores, and
MAAP scores, to use as a baseline for the 2021-2022 SY. The Instructional Development Team (IDT) also met with teachers individually to discuss the Instructional Practice Guide (IPG) by Achieve the Core for the 2020-2021 school year to determine areas of focus for each teacher. The district mathematics curriculum director, the principal, and the instructional leader also met with multiple consulting firms to retain a mathematics consultant to serve as a mathematical coach for the 2020-2021 school year.

The second phase of the plan was developing content-specific professional development and professional learning communities. These collaborative models are key elements in delivering effective mathematical instruction (Koellner et al., 2013). The IDT and the mathematics coach reviewed observation and assessment data from the 2020-2021 SY to determine the greatest areas of instructional needs for teachers. The school district also provided districtwide professional development for teachers at the beginning of the 2021-2022 SY for one day and one other day at the beginning of the third nine weeks. This provided an opportunity for teachers to collaborate with others teaching the same content, even though it was very limited. The mathematics coach continued to provide strategic professional development throughout the school year for the teachers at DMS.

Finally, the principal and assistant principal worked with the counselor of Diligence Middle School to provide a schedule for common planning each week for the math teachers to collaboratively plan, analyze data, and develop strategies for instructional use. The mathematics coach was also involved in guiding teachers in implementing effective PLCs. Within the PLC meetings, teachers discussed strategies used during instructional time, difficulties in teaching specific objectives, and the standards assessed through benchmark testing which were not showing growth, and how to adjust instruction of those specific standards.
Action Plan Overview

During the implementation of the action plan, this applied action research study will answer the following questions:

1. Does consistent, content-specific professional development strengthen tier one instruction in the classroom as evidenced by quarterly benchmark scores, end of the year state MAAP scores, and teacher personal growth based on the Instructional Practice Guide (IPG) by Achieve the Core?

2. Do teachers believe consistent, content-specific professional development is beneficial in strengthening classroom instruction according to self-reflective teacher surveys?

3. Do collaborative professional learning communities help teachers increase instructional and pedagogical skills as evidenced by observations using the Instructional Practice Guide (IPG) by Achieve the Core?

4. Do content-specific, professional development sessions increase teacher efficacy based on self-reflection teacher survey results and interviews?

5. Will proficiency levels on the Mississippi Academic Assessment Program (MAAP) 2022 mathematics exam in eighth grade improve significantly compared to proficiency levels on the MAAP 2021 mathematics exam in seventh grade after the implementation of consistent, content-specific professional development?

6. Will proficiency levels on the MAAP 2022 mathematics exam in seventh grade improve significantly compared to proficiency levels from the MAAP 2021 mathematics exam in sixth grade after the implementation of consistent, content-specific professional development?
The action plan encompassed three elements to answer the preceding questions. The action plan was conducted during the 2021-2022 school year with an approximate cost of $30,650. The first two elements of the action plan addressed building capacity for the seventh and eighth-grade mathematics teachers. The first element focused on increasing content and pedagogical knowledge through professional development, and the second element focused on building the capacity of teachers collectively through professional learning communities. The third element addressed student achievement growth on the EnCase benchmarks and MAAP mathematics scores. Appendix A provides a table containing the action plan, goals, timeline, participants, and methods of evaluation for each element. Tools used for element evaluation such as surveys, Instructional Practice Guide (IPG), and interview questions are included in Appendices B through F.

**Element 1: Content Specific Professional Development**

The first element of this action plan involves creating professional development for the mathematics teachers to improve pedagogy, increase content knowledge, and learn how to use their class data to drive instruction. The need for content specific professional development is evident when reviewing classroom data and observations. Throughout the school there was more teacher-centered instruction than student-centered instruction, and though the standards were taught, mastery of standards was not evident in state test scores.

Through collaboration with district curriculum directors and other county administrators regarding how to develop teacher pedagogy and content knowledge most effectively, the school Instructional Development Team decided to hire a mathematics consultant as an instructional coach to provide targeted professional development, observations, strategic feedback, and help develop our teachers into student-centered instructors.
Element 2: Professional Learning Communities

The second element of this action plan involves implementing and developing strong, site-based professional learning communities (PLC’s) providing weekly time for collaboration among subject area teachers. School administrators worked with district curriculum directors and subject area consultants to develop weekly PLC discussion topics and activities to help enhance teacher’s instructional strategies. Each subject area had common planning time during the day, and teachers met multiple days during the week to plan collaboratively, discuss engagement strategies, and interpret and evaluate classroom and benchmark data. At the beginning of each school year, administrators and the mathematics instructional coach lead these PLC meetings, but as the year progressed, teachers began to facilitate and lead the meetings themselves.

Element 3: Increased Student Achievement

The third element addresses student achievement. Students are administered benchmark assessments three times per year in October, January, and March to determine if adequate student growth is on track to meet an established growth target for the state assessment administered in April. After the first assessment in October, student scores are compared to the 2020-2021 school year Mississippi Academic Assessment Program (MAAP) to determine projected growth is met for the upcoming MAAP assessment. Teachers meet with students individually in their daily intervention period to record each student’s individual test data and set individual goals for the second benchmark. After the second benchmark assessment, students will again meet individually with teachers and determine if adequate growth was met, develop an intervention plan if growth was not met, and set a goal for the final benchmark test. After the first benchmark, as an instructional leader of the school, I will be meeting with students individually to look at
their data folders and discuss their goals for the upcoming weeks. In each term, I will meet at least once with each student.

**Timeline**

The action plan was enacted in July 2021 as state test scores were released by the Mississippi Department of Education (MDE). The principal, assistant principal, and instructional coach conferenced with each teacher about class test scores. During these conferences teachers expressed dissatisfaction with their student’s scores. Teachers also did not believe these test scores accurately reflected individual teaching efforts. Through these collaborative conversations with teachers, the principal, assistant principal, and instructional coach determined there was a need for in-depth, content knowledge instruction and guidance to move the instructional focus from teacher-centered to student-centered learning.

At the beginning of August 2021, the Instructional Development Team (IDT) met with a consulting group to discuss the needs of their school, as well as teachers, to develop a plan to increase the instructional practices of Diligence Middle School (DMS) teachers. The plan consisted of providing professional development for teachers to have a greater understanding of the standards they teach and the rigor to which it should be taught, and how to implement research-based, instructional strategies to ensure student-centered learning.

In September 2021, external consultants began conducting professional development meetings with teachers twice a month to assist in deconstructing and analyzing standards and strategies for teaching the standards with the rigor students will be tested with in April. During this professional development time, the consultants also provided guidance for implementing research-based instructional strategies to facilitate student-centered learning in their classrooms.
After the first benchmark test is administered at the end of the first nine-week term in October, the IDT will meet with the administrators and teachers to disaggregate test data, determine the amount of growth students showed from the 2020-2021 MAAP test to the benchmark, and to identify areas of focus for the next school term. Teachers will then meet with students individually and discuss each student’s individual progress. The teacher and student will then develop individual goals for improvement. Students are active stakeholders in goal setting, and each student will document his progress in a data folder to keep track of classroom assessment scores and benchmark scores. When the second benchmark is administered in January, collaborative meetings will be held with the IDT, administrators, and teachers to analyze the new data to determine the amount of growth students were showing and to develop new areas of focus for the next term. After administering the third benchmark, another meeting will be conducted to determine areas of remediation and review to prepare for the MAAP test.

Resources

Resources to be paid for include consultant fees, opportunity costs, and substitutes for teachers during the school day for professional development. Meetings and the implementation and development of the plan will require extensive time during the school year. The consultant fees are $1,500 per day, and the district has contracted 10 days for the 2021-2022 SY for a total of $15,000.

Opportunity costs are also quite substantial in this plan. Time away from classrooms for professional development for three full days, two half days of professional development, and two weekly PLC meetings to collaborate with other teachers to develop pedagogy and content knowledge decreases actual teacher planning time. These meetings cause teachers to work more after school hours to ensure lessons are planned, grading is complete, etc. The average teacher
salary for the 2020-2021 SY for Scott County was $45,423 which is $37.34 per hour. Five math teachers will attend each of these meetings. A full professional development day generates a cost of $246.64 per teacher ($3,699), a half day $121.36 per teacher ($1,213), and two hour long PLC meetings each week for 28 weeks costs approximately $74.68 per teacher ($10,455). The cost for five teachers will total approximately $15,367.

**Stakeholder Responsibility**

Diligence Middle School serves grades five through eight and delivers half of the county’s test scores for these grades. The Instructional Development Team was formed and consists of the principal, the assistant principal as the instructional leader, the district mathematics curriculum director, and five math teachers at the school. This team met in July 2021 to review the test data from the 2019-2020 school year. The 2019-2020 school year data was the first data to be delivered by the Mississippi Department of Education since the beginning of the COVID 19 Pandemic of 2019. Students represented in this data consisted of both virtual and onsite learners for the 2019-2020 school year. This data includes the last quarter of the 2018-2019 school year when Mississippi schools were completely shut down and virtual learning was mandated for Diligence Middle School. Very few students had access to adequate internet in their homes, and many did not have devices to use for schoolwork. Therefore, during the COVID 19 Pandemic, the school provided packets of work for students, but without the ability to communicate with teachers few students completed the packets.

The first phase the committee developed was to provide intense, professional development focusing on increasing teacher content knowledge and pedagogy with the school instructional leader as well as to hire a mathematics consultant to work with DMS mathematics teachers. The next phase consisted of developing and executing professional learning
communities with the strategic focus of helping teachers understand their class assessment data and how to use class data to drive daily instruction. The final phase of the action plan is increasing student achievement through stronger classroom instruction with data driven focus on skills students will be assessed on in the spring.

**Data Collection Plan**

The specific intent of this study is to strengthen the instructional skills and pedagogical knowledge of teachers in the fifth through eighth-grade classrooms at Diligence Middle School (DMS). The overall goal is to increase student achievement through incorporating content-specific, professional development and enriching professional learning communities as pathways to strengthening tier one instruction. Both qualitative and quantitative data will be collected throughout this action plan to evaluate its effectiveness.

**Content-specific Professional Development**

The first element is providing content-specific, professional development. The data collected from this element will be gathered from teacher interviews, professional development evaluation surveys, observation notes, and support logs. Park, Lee, and Cooc (2019) found in their study, teachers who participate in a collaborative professional learning community (PLC) have greater academic expectations which in turn increases student achievement. The math teachers of DMS will attend two county-wide professional development sessions led by math consultants and other mathematics teachers in the county to increase their knowledge and improve pedagogy in their subject, as well as provide help with pacing guides and data analysis.

In January 2022, a math consultant began working with DMS teachers twice a month during PLC’s to provide teacher-specific professional development and work one-on-one with teachers in their classrooms and during planning periods to provide individualized help in each
teacher’s area of struggle. Surveys provide qualitative information from teachers regarding how they feel their planning and preparation improves after being able to collaborate with subject area teachers at the school level and across the district.

**Professional Learning Communities**

The second element is developing strong professional learning communities. The data gathered from this element will be in the form of Professional Learning Community (PLC) surveys from the five math teachers at DMS, data analysis diagnostics, benchmark data, MAAP scores, and teacher interviews. The math team consists of five math teachers at DMS. The team meets weekly to collaboratively discuss teaching strategies, pacing guides, assessments, benchmark data, and data from diagnostic assessments. The data regarding PLC’s will be primarily qualitative. This team works together to analyze their individual, as well as their collective, data to determine increases in benchmark and diagnostic scores and to predict the school’s accountability score based on the Mississippi Academic Assessment Program (MAAP) test at the end of the school year. Beginning in January 2022, a math consultant began working with this team to increase teacher efficacy, provide onsite professional development, and lead teachers during PLCs to a greater understanding of their data. Observation feedback was provided to guide teachers to a deeper understanding of their content and pedagogy, as well as providing teachers with a stronger skill set to provide a richer student-centered classroom. This data is provided by the administrators, instructional coach, peer observations, and curriculum directors.

**Increased Student Achievement**

The third element of this action plan is increased student achievement. The data to be gathered from this element will be more quantitative in nature, including scores from benchmark
tests, classroom summative tests, diagnostic tests, and the spring MAAP assessment. Teachers analyze their data after every unit, diagnostic, and benchmark test while tracking the results on a spreadsheet to identify growth occurring for their students. These analyses are discussed in PLCs with the math team and the Instructional Development Team bimonthly. Data from the 2018-2019 and 2020-2021 school years will be used to compare to the resulting 2021-2022 school year data to determine how much growth occurred since the 2018-2019 SY. Data was also gathered through pre- and post-assessments with diagnostic baselines, benchmarks, and ultimately MAAP state test scores. Data utilizes scale scores directly from MAAP test scores. It is understood the strength of the data in this research is always dependent upon multiple factors (is the student having a good day, not feeling well, etc.) which may be out of the teacher’s control.

**Program Evaluation**

The specific intent of this study is to strengthen the instructional skills and pedagogical knowledge of teachers in the fifth through eighth-grade classrooms at Diligence Middle School (DMS). The overall goal is to increase student achievement through incorporating content-specific, professional development and enriching professional learning communities as pathways to strengthening tier one instruction. Both qualitative and quantitative data is utilized throughout this action plan to evaluate its effectiveness.

The purpose of this evaluation plan is to determine the success of the applied action research of providing teachers with skills and the professional knowledge to strengthen their tier one instructional levels. This program evaluation also serves as a guide into future school years as the collaborative team uses data from the program to continue the focus of this program.

This mixed methods action plan utilizes both qualitative and quantitative data. Triangulation will occur by tracking teacher’s qualitative data from interviews, surveys, and
observational notes and feedback, and incorporating them with students’ MAAP scores to determine if there is an increase in student achievement as teachers improve their efficacy and pedagogy.

**Evaluation of Content-specific Professional Development**

The first element of the plan to be evaluated is the professional development element using multiple methods to determine progress. Teachers will be given a survey (Appendix B) to determine if individual content and pedagogical skills in mathematics improve through the professional development. The survey contains both multiple choice and open-ended questions and will be administered after each professional development session.

The professional development element will also be evaluated by using the instructional pacing guide (IPG) (Appendix C). The IPG was adapted from the Achieve the Core IPG. Classroom observations will be conducted throughout the school year using the IPG. Each section of the IPG will be focused on individually throughout the school year. This tool provides both qualitative and quantitative data to be used in the assessment of teacher instructional practices.

Teachers will also participate in an interview (Appendix D) to evaluate the professional development element. Questions will be asked of teachers to understand the focus areas each teacher needs assistance in strengthening. The interview questions focus on teacher needs for building teacher capacity and mathematics instructional learning and coaching.

**Evaluation of Professional Learning Communities**

The second element of the plan to be evaluated is Professional Learning Communities (PLC’s). The goal of this element is to develop stronger, more effective instructional practices among the middle school mathematics teachers and to provide the opportunity to maintain
professional growth. A survey (Appendix E) will be administered to teachers to determine their implementation level of mathematical practices throughout the school year. This survey will be administered at the beginning, middle, and end of the school year. A second survey (Appendix F) will be administered after each PLC to determine the effectiveness of the PLC.

Evaluation of Increased Student Achievement

The last element of the plan to be evaluated is student achievement growth and proficiency on EnCase benchmarks and the MAAP assessment. The IPG will be used to determine if effective teaching practices are being implemented in the classrooms. The EnCase benchmarks are a research-based assessment program our county purchased which is aligned to the common core standards assessed on the MAAP. The progress students make on the EnCase benchmarks are proposed to be a representation of the scores to be produced on the MAAP. The EnCase benchmarks will be given three times during the school year in October, January, and March. These benchmarks will be used to determine if students show adequate growth for the year, and teachers will use this data to drive their classroom instruction. At the end of the school year, the MAAP assessment is given as the ultimate evaluation tool to determine if adequate growth is shown in student academic achievement.

Data Analysis

In the first element of the action plan, content-specific professional development, the data is primarily qualitative in nature. As teachers work with the consultant/math coach and strengthen content knowledge and pedagogical skills, the data collected from surveys, interviews, and observations using the IPG evaluation tool and classroom walkthrough checklists describe an evolution of teacher proficiency and efficacy. In the second element of the action plan, developing strong professional learning communities, teachers gain an understanding of
data procured from formative and summative assessments. Driving inquiries such as how to analyze the data and how to utilize the data to drive their instruction, aids teachers’ use of the data collected to represent a progression of strategically planned lessons with thoughtful insight given to prerequisite skills needed for student understanding. Teacher evaluations of PLCs are measured by teacher surveys and interview questions. In the third element of the action plan, this study explores the phenomenon of increasing student achievement scores as teachers increase their capacity to teach with greater depth in their content and more engaging instructional strategies while utilizing data driven instruction.

Mixed methods triangulation will occur by tracking qualitative data from interviews, surveys, and observational notes and comparing it to the student academic achievement scores to determine any increase as teachers improve their efficacy and pedagogy. Each piece of data will be used to answer one or more of the research questions presented earlier. Table 2 identifies each research question and the data type and tool to be used to answer the question.
Table 2

*Research Questions, Data Collections tools, and Explanation Alignment*

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data Collection Tool</th>
<th>Explanation</th>
</tr>
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<tbody>
<tr>
<td>Question 1</td>
<td>EnCase Benchmark</td>
<td>Benchmark and MAAP data will be used to determine if student scores have increased by having professional development and strong professional learning communities throughout the year. Professional Development Survey</td>
</tr>
<tr>
<td>Question 2</td>
<td>Professional Development Survey</td>
<td>The professional development survey will provide qualitative data of teachers’ reflections of the benefits of the professional development. Teacher Interview</td>
</tr>
<tr>
<td>Question 3</td>
<td>Instructional Practice Guide (IPG)</td>
<td>The instructional practice guide will be used to document progress of instruction throughout the school year. Professional Learning Community (PLC) Survey</td>
</tr>
<tr>
<td>Question 4</td>
<td>Teacher Interview</td>
<td>The teacher interview will be used to determine teachers believe the provided professional development sessions increase their efficacy concerning classroom instruction. Professional Development Survey</td>
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<td>Question 5</td>
<td>EnCase Benchmark</td>
<td>MAAP data will be used to determine if eight grade student mathematics scores have increased after implementation of professional development and strong professional learning communities throughout the year. Scores and MAAP data</td>
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<tr>
<td>Question 6</td>
<td>EnCase Benchmark Scores and MAAP data</td>
<td>MAAP data will be used to determine if seventh-grade student mathematics scores have increased after implementation of professional development and strong professional learning communities throughout the year.</td>
</tr>
</tbody>
</table>

**Conclusion**

This applied action research plan commenced in May 2020 at the end of the 2019-2020 school year as teachers meet with administration and discuss areas of teacher needs to facilitate an increase in student scores and motivation in the following year. In July 2020 a collaborative team will meet to determine steps to be taken to increase efficacy, content knowledge, and pedagogy. This action plan will continue through May 2022. The evaluation portion of this plan will begin in May 2021, even though it should be noted short-term evaluations and analyses will be taking place throughout the 2020-2021 school year. Evaluations and analyses will continue through the summer of 2022 with a possibility of continuing into the fall term of 2022-2023 depending on state test results.
Chapter IV: RESULTS

Introduction

The purpose of this study was to build capacity in seventh (7th) and eighth (8th) grade mathematics teachers to increase student achievement. This study began to address low content and pedagogical skills of 7th and 8th grade mathematics teachers and the low academic student achievement of mathematics at Diligence Middle School. This applied research study includes a program evaluation and began with a thorough investigation of literature on mathematics instruction and student achievement, professional development, and effective professional learning communities. The analysis of this literature provides a foundation for increasing student achievement through teacher capacity growth. By examining research related to mathematics instruction and student achievement, this study identifies key factors to contribute to successful teaching and increased student achievement.

The literature discussed in Chapter II formed the foundation for the development of the action plan presented in Chapter III. Chapter III describes the action plan for addressing the issues of low teacher content and pedagogical knowledge and an evaluation of the program to determine if the goals were met effectively. This action plan outlined the elements of the program consisting of professional development and collaborative professional learning communities. A variety of tools to evaluate the success of the program includes surveys, interviews, and observations. Chapter III also discusses which data collection tools were used to
answer each research question and explained the alignment of each. The data collected were analyzed and are presented in this chapter.

In Chapter IV, the results of each of the research questions are presented. First, Chapter IV contains the evaluation of each element and answers the following research questions which were presented in Chapter I:

1. Does consistent, content-specific professional development strengthen Tier I instruction in the classroom as evidenced by quarterly benchmark scores, end of the year state MAAP scores, and teacher personal growth based on the Instructional Practice Guide (IPG) by Achieve the Core?
2. Do teachers believe consistent, content-specific professional development is beneficial in strengthening classroom instruction according to self-reflective teacher surveys?
3. Do collaborative professional learning communities help teachers increase instructional and pedagogical skills as evidenced by observations using the Instructional Practice Guide (IPG) by Achieve the Core?
4. Do content-specific, professional development sessions increase teacher efficacy based on self-reflection teacher survey results and interviews?
5. Will proficiency levels on the Mississippi Academic Assessment Program (MAAP) 2022 mathematics exam in 8th grade improve significantly compared to proficiency levels on the MAAP 2021 mathematics exam in 7th grade after the implementation of consistent, content-specific professional development?
6. Will proficiency levels on the MAAP 2022 mathematics exam in 7th grade improve significantly compared to proficiency levels from the MAAP 2021 mathematics exam
in 6th grade after the implementation of consistent, content-specific professional
development?

Secondly, this chapter will report the data results to evaluate the entire program and its
impact on student achievement. An accounting of improvements made in learning are also
reported in this chapter. A comparison of the data from the SY 2020-2021 and SY 2021-2022 are
presented. Finally, this chapter concludes with a summary of the results.

**Research Question One**

The first research question sought to determine if content-specific professional
development strengthens Tier I instruction in the classroom. The EnCase benchmark assessment
was utilized as a tool to determine growth for students throughout the school year. This
assessment was administered three times during the 2021-2022 school year. The first assessment
established a baseline for each student, and the subsequent assessments were used to determine
growth and to provide a projection of each student for the upcoming MAAP test at the end of the
school year.

Diligence Middle School Mathematics teachers administered the first benchmark
assessment during the September 28-September 30 window as required by the school district.
This assessment was given through EnCase online. As shown in Table 3, DMS assessed 99 7th
grade students and 105 8th grade students. The average percentage score for 7th grade was 50%,
and the average percentage score for 8th grade was 46%. The district grade level mean scores
were 52% for 7th grade and 49% for 8th grade. This data indicated a proficiency projection for
7th grade at 24% and 18% for 8th grade at DMS, and the district proficiency projections were
31% and 23% respectively. The standard deviation (SD) of the data set at DMS was 17.7 for 7th
grade and 14.1 for 8th grade. The results are presented in Table 3.
### Table 3

*EnCase Benchmark 1 September 2021 Data*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>Grade Level Mean Score</th>
<th>Grade Level Projected Proficiency</th>
<th>Standard Deviation (SD)</th>
<th>District Grade Level Mean Score</th>
<th>District Grade Level Projected Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>50%</td>
<td>24%</td>
<td>17.7</td>
<td>52%</td>
<td>31%</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>46%</td>
<td>18%</td>
<td>14.1</td>
<td>49%</td>
<td>23%</td>
</tr>
</tbody>
</table>

### Table 4

*EnCase Benchmark 1 September 2021 Performance Level Data*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>PL 1</th>
<th>PL 2</th>
<th>PL 3</th>
<th>PL 4</th>
<th>PL 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>2</td>
<td>19</td>
<td>18</td>
<td>52</td>
<td>8</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>10</td>
<td>24</td>
<td>51</td>
<td>19</td>
<td>1</td>
</tr>
</tbody>
</table>

On the MAAP mathematics assessment, a performance level three (PL3) indicates on-grade level skills and is passing, a performance level four (PL4) is considered to be proficient and slightly above average, and a performance level five (PL5) is considered advanced and above grade level. According to Table 4, in the first administration of the EnCase Benchmark, results indicated 18 students scored a PL3 and passed, 52 7th grade students scored proficient (PL4), and eight students scored advanced (PL5). Students who score a performance level one or two are below grade level and in need of remediation. There were 19 7th grade students scoring at performance level two (PL2) and two students scored a performance level one (PL1). In 8th grade, 51 students scored a PL3 and passed the assessment. An additional 19 students scored a PL4 indicating proficiency, and one student scored a PL5 indicating above grade level skills.
There were 24 students scoring a PL2, and 10 students scoring a PL1 indicating a need for remediation.

The second EnCase Benchmark Assessment was administered during the December 13-17 testing window as mandated by the school district. The teachers administered the benchmark assessment during a block of time which was not to exceed 180 minutes. As indicated in Table 5, 99 7th grade students and 105 8th grade students took the December EnCase assessment. The average percentage score for 7th grade was 40%, and the average percentage score for 8th grade was 37%. The district grade level mean scores were 42% for 7th grade and 42% for 8th grade. This data indicated a proficiency projection for 7th grade at 28% and 10% for 8th grade at DMS, and the district proficiency projections were 30% and 18% respectively. The standard deviation for 7th grade at DMS was 13.5 and 13.9 for 8th grade.

As noted in Table 6, of the 7th grade students assessed, 43 students passed with a PL3, 27 students scored a proficient PL4, one student scored an advanced PL five, and 28 students did not pass with performance levels of one and two. Of the 105 eighth-grade students assessed, 66 students did not meet the criteria to pass the assessment with performance levels one and two, 29 students scored a PL3 to meet passing criteria, nine students scored a PL4, and one student scored an advanced level PL5.

**Table 5**

*EnCase Benchmark 2 December 2021 Data*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>Grade Level Mean Score</th>
<th>Grade Level Projected Proficiency</th>
<th>Standard Deviation (SD)</th>
<th>District Grade Level Mean Score</th>
<th>District Grade Level Projected Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>40%</td>
<td>28%</td>
<td>13.5</td>
<td>42%</td>
<td>30%</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>37%</td>
<td>10%</td>
<td>13.9</td>
<td>42%</td>
<td>18%</td>
</tr>
</tbody>
</table>
Table 6

*EnCase Benchmark 2 December 2021 Performance Level Data*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>PL 1</th>
<th>PL 2</th>
<th>PL 3</th>
<th>PL 4</th>
<th>PL 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>5 (+3)</td>
<td>23 (+4)</td>
<td>43 (+25)</td>
<td>27 (-25)</td>
<td>1 (-7)</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>13 (+3)</td>
<td>53 (+29)</td>
<td>29 (-22)</td>
<td>9 (-10)</td>
<td>1 (N/C)</td>
</tr>
</tbody>
</table>

*Note.* The change from Benchmark Assessment 1 to Benchmark Assessment 2 is indicated in parentheses.

N/C indicates No Change in the data between administrations.

The differences between the first and second benchmark mean scores are illustrated in Table 7. Mirroring the downward trend illustrated by the changes in performance levels in Table 6, based on the data from the fall and winter EnCase benchmark assessments, the mean scores of both grade levels decreased. Seventh grade scores decreased by 20% and eighth grade scores also decreased by 20%. The district grade level mean score for eighth grade also decreased by 14%, however, the district seventh grade mean score increased by 35%.

Table 7

*Difference Between Benchmark (BM) 1 and Benchmark (BM) 2 Means*

<table>
<thead>
<tr>
<th>Grade</th>
<th>DMS BM 1 Mean</th>
<th>DMS BM 2 Mean</th>
<th>%Difference Between Means</th>
<th>District BM 1 Mean</th>
<th>District BM 2 Mean</th>
<th>%Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>50%</td>
<td>40%</td>
<td>-20%</td>
<td>31%</td>
<td>42%</td>
<td>+35%</td>
</tr>
<tr>
<td>8th</td>
<td>46%</td>
<td>37%</td>
<td>-20%</td>
<td>49%</td>
<td>42%</td>
<td>-14%</td>
</tr>
</tbody>
</table>

Projected proficiency levels are indicated in Table 8. Seventh grade students’ projected proficiency levels increased by 17%, but eighth grade proficiency levels decreased by 57%. The district projected proficiency levels for both seventh and eighth grade decreased on the second
benchmark assessment. For seventh grade, levels decreased by three percent, and eighth grade levels decreased by 22% across the district.

**Table 8**

*Difference Between BM 1 and BM 2 Projected Proficiency*

<table>
<thead>
<tr>
<th>Grade</th>
<th>DMS BM 1 Proj. Prof.</th>
<th>DMS BM 2 Proj. Prof.</th>
<th>% Difference Between Proj. Prof.</th>
<th>District BM 1 Proj. Prof.</th>
<th>District BM 2 Proj. Prof.</th>
<th>% Difference Between Proj. Prof.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>24%</td>
<td>28%</td>
<td>+17%</td>
<td>31%</td>
<td>30%</td>
<td>-3%</td>
</tr>
<tr>
<td>8th</td>
<td>23%</td>
<td>10%</td>
<td>-57%</td>
<td>23%</td>
<td>18%</td>
<td>-22%</td>
</tr>
</tbody>
</table>

Upon examination of individual scores for growth, regression, or maintenance, results indicated 53 7th grade students at DMS regressed from benchmark assessment one to benchmark assessment two, 12 students maintained their performance levels, and 34 students indicated growth. Of the 8th grade student scores examined, 62 students regressed from benchmark one to benchmark two, 20 students maintained their performance levels, and 23 students indicated growth. These results are displayed in Table 9.

**Table 9**

*Benchmark 1 to Benchmark 2 Student Growth, Maintenance, or Regression*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>Number of Students Regressed</th>
<th>Number of Students Maintained</th>
<th>Number of Students Showing Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>53</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>62</td>
<td>20</td>
<td>23</td>
</tr>
</tbody>
</table>

The final administration of the EnCase benchmark assessment was administered from March 8-March 12. Each teacher administered the assessment in his/her classroom. Table 10 indicates 99 7th grade students and 105 8th grade students were assessed. The 7th grade mean
score at DMS was 42% with a projected proficiency rate of 28% and a standard deviation of 14.7. The district grade level mean for 7th grade was 45% with a projected proficiency rate of 33%. Eighth-grade students at DMS had a mean score of 37% with a projected proficiency rate of 11% and a standard deviation of 11.7. The district grade level mean for eighth grade was 41% with a projected proficiency rate of 22%.

Table 10

*EnCase Benchmark 3 March 2022 Data*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>Grade Level Mean Score</th>
<th>Grade Level Projected Proficiency</th>
<th>Standard Deviation (SD)</th>
<th>District Grade Level Mean Score</th>
<th>District Grade Level Projected Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>42%</td>
<td>28%</td>
<td>14.7</td>
<td>45%</td>
<td>33%</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>37%</td>
<td>11%</td>
<td>11.7</td>
<td>41%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Table 11 indicates 36 seventh grade students were projected to score proficient with a PL4, two students were projected to score advanced with a PL5, 39 students were projected to pass with a PL3, and 22 students are still in need of remediation scoring a PL2. Eighth-grade students projected 13 PL4 scores, 30 PL3 scores, and 62 PL one and two scores needing remediation.

Table 12 exhibits the difference in means between the second and third benchmark means for both DMS and the district. There was an increase of five percent in mean scores for 7th grade at DMS, but 8th grade scores did not have any change. As a district, 7th grade scores increased by seven percent, however, the 8th grade average scores decreased by two percent.
Table 11

*EnCase Benchmark 3 March 2022 Performance Level Data*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>PL 1</th>
<th>PL 2</th>
<th>PL 3</th>
<th>PL 4</th>
<th>PL 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>0 (-5)</td>
<td>22 (-1)</td>
<td>39 (-4)</td>
<td>36 (+9)</td>
<td>2 (+2)</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>6 (-7)</td>
<td>56 (-3)</td>
<td>30 (+1)</td>
<td>13 (+4)</td>
<td>0 (-1)</td>
</tr>
</tbody>
</table>

*Note.* The change from Benchmark Assessment 2 to Benchmark Assessment 3 is indicated in parentheses.

Table 12

*Difference Between BM 2 and BM 3 Means*

<table>
<thead>
<tr>
<th>Grade</th>
<th>DMS BM 2 Mean</th>
<th>DMS BM 3 Mean</th>
<th>Difference Between Means</th>
<th>District BM 2 Mean</th>
<th>District BM 3 Mean</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>40%</td>
<td>42%</td>
<td>+5%</td>
<td>42%</td>
<td>45%</td>
<td>+7%</td>
</tr>
<tr>
<td>8th</td>
<td>37%</td>
<td>37%</td>
<td>0%</td>
<td>42%</td>
<td>41%</td>
<td>-3%</td>
</tr>
</tbody>
</table>

In Table 13, the difference between 7th and 8th grades projected proficiency levels for both DMS and the district are displayed. The 7th grade DMS proficiency levels projected no change, but the district levels projected a decrease of 21%. The DMS 8th grade proficiency levels projected a ten percent increase, and the district projected a 22% increase.

Table 13

*Difference Between BM 2 and BM 3 Projected Proficiency*

<table>
<thead>
<tr>
<th>Grade</th>
<th>DMS BM 2 Proj. Prof.</th>
<th>DMS BM 3 Proj. Prof.</th>
<th>Difference Between Proj. Prof.</th>
<th>District BM 2 Proj. Prof.</th>
<th>District BM 3 Proj. Prof.</th>
<th>Difference Between Proj. Prof.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>28%</td>
<td>28%</td>
<td>0%</td>
<td>42%</td>
<td>33%</td>
<td>-21%</td>
</tr>
<tr>
<td>8th</td>
<td>10%</td>
<td>11%</td>
<td>+10%</td>
<td>18%</td>
<td>22%</td>
<td>+22%</td>
</tr>
</tbody>
</table>
According to Table 14, results indicate 45 seventh-grade students regressed from benchmark assessment two to benchmark assessment three, seven students maintained their scores, and 46 students showed growth. Of the eighth-grade student scores examined, 26 students regressed from benchmark two to benchmark three, 33 students maintained their scores, and 46 students exhibited growth.

**Table 14**

*Benchmark 2 to Benchmark 3 Student Growth, Maintenance, or Regression*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>Number of Students Regressed</th>
<th>Number of Students Maintained</th>
<th>Number of Students Showing Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>45</td>
<td>8</td>
<td>46</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>26</td>
<td>33</td>
<td>46</td>
</tr>
</tbody>
</table>

In April 2021, DMS 7th and 8th grade students were administered the 2021 MAAP mathematics assessment. As indicated in Table 15, 99 7th grade students and 105 8th grade students were assessed. The mean scores were 59% for 7th grade and 51% for 8th grade. Seventh grade students scored 33% proficient or advanced, and eighth grade students scored 15% proficient or advanced with a standard deviation of 15.5 and 13.5 respectively. In the district, 32% of 7th graders and 39% of 8th graders were proficient or advanced.
Table 16 displays the breakdown of performance levels for both 7th and 8th grade students at DMS for the 2022 MAAP assessment. In 7th grade there were five students scoring PL1, 23 scoring PL2, 38 scoring PL3, 32 scoring PL4, and one student scored a PL5. Of the 8th grade students assessed, 16 scored PL1, 38 scored PL2, 35 scored PL3, 15 scored PL4, and one student scored a PL5.

Table 16

MAAP 2022 Performance Level Data

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Students</th>
<th>PL1</th>
<th>PL2</th>
<th>PL3</th>
<th>PL4</th>
<th>PL5</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>99</td>
<td>5</td>
<td>23</td>
<td>38</td>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>8th</td>
<td>105</td>
<td>16</td>
<td>38</td>
<td>35</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

During the month of August 2021, as mathematics teachers met in PLC’s with the school instructional leaders and mathematics coach, teachers analyzed MAAP data from the 2021 school year to determine areas of strengths and weaknesses. As the school year progressed and observations were completed, feedback was provided to teachers based on the IPG noting strengths and weaknesses in classroom instruction. Feedback was shared with teachers in post-observation meetings with instructional leaders and incorporated into PLC meetings to provide
an opportunity for collaboration to determine solutions for areas of concerns. Teachers scored lowest on the IPG in the Core Action 3 section across the board. One teacher was experienced in providing a productive struggle and collaborative discussions while four teachers were not. All five teachers struggled with implementing the district mandated curriculum because they had not been trained fully on all the resources supplied and the format of many of the instructional designs. All five teachers struggled to provide work for their students utilizing grade level material and needed help in understanding how to scaffold for those students not ready for grade level standards at the beginning of the school year as indicated by their 2020 MAAP scores and end of year grades. Topics for PLC’s were derived from these concerns, along with benchmark and classroom assessment data. Teachers were also provided specific professional development sessions with the mathematics consultant to target individual concerns for each classroom to strengthen their instruction and own personal growth.

**Research Question Two**

The second research question sought to determine if teachers believe consistent, content-specific professional development is beneficial in strengthening classroom instruction. Various tools were used to determine how teachers felt about the impact professional development had on their classroom instruction. Such tools included a professional development survey, a teacher pre-survey before the study began and post-survey after the study, and teacher interview questions.

A consultant worked onsite with teachers providing professional development on four days during the spring. After each professional development session, teachers filled out a survey to note how the teachers felt the session benefited their instructional abilities. The survey contained questions for the teachers to rate the presenter and the material from one to five with
five being high. There were also four open-ended questions giving the teacher the opportunity to provide feedback in a qualitative manner. The results indicated teachers were satisfied with the information gained from the consultant and believed the strategies and information learned from her helped teachers develop as a mathematics teacher. One teacher discussed her appreciation for working with someone in a small group for professional development. She explained it was easier to have meaningful conversations and ask questions concerning the relative issues of our students and school when it is just our teachers and not in a large setting with teachers from across the district or state. Another teacher noted how much more sense the strategies make when she can watch them in action in a classroom and not just hear the instruction.

According to the pre- and post-teacher surveys, all teachers felt they were doing a better job at the end of the year engaging students in the classroom and using data throughout their lessons to guide their instruction. Teachers also noted a better understanding of the foundation of their content, it helped begin an understanding of the guiding questions needed to ask of students to help understand the concept being taught.

When teachers were questioned in the interview process, there were multiple responses concerning the most beneficial influence of professional development on their instructional practice. All teachers (100%) stated modeling a lesson or strategy was the most beneficial for them, while only 40% stated receiving a list of observations in the classroom was beneficial. However, when questioned further, teachers did feel the conversations concerning the observations did provide a greater impact on their instructional practice.

**Research Question Three**

The third research question sought to determine if collaborative professional learning communities help teachers increase instructional and pedagogical skills. The tools used to make
this determination were the PLC Survey and the IPG. The use of these tools served as an indicator for teachers’ perceptions of the effectiveness of the professional learning communities, as well as to document any changes in teacher’s instructional practices throughout the year.

An analysis of the IPG data indicated teachers improved in classroom instruction through stronger questioning techniques and sequences and in developing a better understanding as to how to ask questions to facilitating and assisting students through a productive struggle. Teachers also implemented comprehension checks throughout lessons to gauge student understanding and adapted their instruction based on those checks. Feedback to one teacher included the suggestion to have students work one or two steps of a lengthy problem, have shoulder partners, followed by check work, and a teacher check and provide support for those who are struggling before moving to the next step of the process. Previously, the teacher would work a problem in its entirety and students would get lost in the process when they did not understand a step. As the teacher implemented this strategy, students were able to grasp the process and move forward in the content with greater understanding.

As noted in Table 17 only 50% of faculty members at the first PLC meeting felt their students grew academically as a result of teacher participation prior to this study, but by the end of the study, 100% of teachers believed their students grew as a result of their participation in PLC’s. Prior to this study only 75% of teachers felt instructional practices changed and improved due to PLC’s, but by the end of the school year 100% of the teachers believed their practices had changed and improved.
Table 17

*PLC Survey Results*

<table>
<thead>
<tr>
<th>Question</th>
<th>First PLC</th>
<th>Last PLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC members work together to learn and implement new skills at work.</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>PLC members are committed to the improvement of the school and increasing student achievement.</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>PLC members work together to develop and implement plans to meet the needs of students.</td>
<td>85%</td>
<td>85%</td>
</tr>
<tr>
<td>PLC members learn through engaging in collective discourse.</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PLC members respect each other’s ideas.</td>
<td>75%</td>
<td>90%</td>
</tr>
<tr>
<td>PLC members are committed to the implementation of the curriculum.</td>
<td>80%</td>
<td>95%</td>
</tr>
<tr>
<td>PLC members conduct data analysis to determine if their instructional practices are productive.</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>My instructional practices have changed as a result of actively participating in PLCs.</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>My classroom instruction has improved as a result of actively participating in PLCs.</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>I believe my students have grown academically as a result of my participation in PLCs.</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Research Question Four*

The purpose of the fourth research question was to ascertain if content-specific, professional development sessions increased teacher efficacy based on a self-reflection teacher survey and an interview with the teachers. The professional development survey was given after
each full day session on four separate days. In section A, the teachers rated the organization of the sessions, relevance of the session, and knowledge and preparedness of the instructor the highest rating, a five. In section B, which focuses on the impact of the program there are also positive ratings. Content knowledge enhancement, relevance, professional growth, and satisfaction with PD consistently received a rating of five from all teachers. Teachers A, B, C, and D consistently gave “strengthened my teaching skills” a rating of five, while Teacher E responded with a rating of four. The categories of “strengthened my knowledge of effective practices” and “training will be useful in my career” both received ratings of five from all teachers, with each category receiving a rating of four one time. Overall, the professional development survey resulted in high ratings across the different aspects indicating these sessions had a positive impact on teacher content knowledge and professional growth.

In the teacher interviews, all teachers expressed their delight for the relevance, ease of implementation, and support given with the professional development. A common complaint teachers had for many PD sessions were they are “sit and get” sessions. The sessions offered through this study included applicable strategies, actionable feedback, and modeling in each session, and in each teacher’s classroom on separate days, to demonstrate the content taught in the sessions. Teachers stated multiple times it is important for teachers to see the implementation of strategies within their small group sessions, rather than have the instructions on implementation delivered verbally. One teacher explained it as being taught to add and subtract by watching the teacher write at the chalkboard versus having blocks to manipulate as the teacher shows you how to use the paper algorithm. It is essentially hands-on learning for teachers.
Research Question Five

The fifth research question sought to determine if eighth-grade students grew significantly according to their mathematics MAAP scores after consistent, content-specific professional development. According to Table 18, 8th grade scores decreased overall. Students scoring a performance level four or five are considered proficient or advanced. Table 18 indicates 22 students were proficient and/or advanced in the 2021 SY, but only 16 students were proficient or advanced in the 2022 SY after the implementation of this study. A performance level three is passing (on grade level). There were 46 students scoring PL3a or PL3b in SY 2021, whereas only 35 students scored the same in SY 2022. Any score below a PL3 requires remediation. In SY 2021, 37 students needed remediation, but 54 students needed remediation in SY 2022. Based strictly on growth, eighth-grade students would have only received 25 growth points out of a possible 100 in the Mississippi accountability model for DMS. This number is found by dividing the number of students showing growth (26) by the total number of students assessed (105) multiplied by 100. The number of points DMS would receive for proficiency for the 2022 SY is the number of students scoring a PL four or five (16) divided by total number of students assessed (105) multiplied by 100, which would equal 15 points out of 100.

Although the change in 8th grade illustrates a 20% reduction in the number of students passing the MAAP assessment, the effect on the accountability outcomes is difficult to emotionally process. The loss of accountability points associated with the eighth-grade class is staggering. The shifting from “on grade level” to “below grade status” amounts to a 10% reduction in proficiency, but the impact on proficiency points far exceeds the ten percent threshold.
Table 18

Eighth-grade Summary Comparison for SY 2020-2021 and SY 2021-2022

<table>
<thead>
<tr>
<th></th>
<th>Number Students 2021</th>
<th>Grew</th>
<th>Maintained</th>
<th>Regressed</th>
<th>Number Students 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL 1a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>PL 1b</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>PL 2a</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>PL 2b</td>
<td>28</td>
<td>9</td>
<td>2</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>PL 3a</td>
<td>27</td>
<td>2</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>PL 3b</td>
<td>19</td>
<td>0</td>
<td>5</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>PL 4</td>
<td>19</td>
<td>*12</td>
<td>0</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>PL 5</td>
<td>3</td>
<td>***1</td>
<td>0</td>
<td>**2</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>26</td>
<td>18</td>
<td>61</td>
<td>105</td>
</tr>
</tbody>
</table>

Note.
*Performance Level 4 receives a growth point in the accountability model even though the PL does not increase to a 5.

**Performance Level 4 counted as a regression since student was a PL 5 in previous year, and does not count as growth points in the accountability model.

*** Performance Level 5 counted as maintained since there is no higher level to achieve, but counts as growth in the accountability model.

Research Question Six

The fifth research question sought to determine if 7th grade students grew significantly according to their mathematics MAAP scores after consistent, content-specific professional development. Table 19 indicates 20 students were proficient and/or advanced in the 2021 SY, and 33 students were proficient or advanced in the 2022 SY after the implementation of this
study. This illustrates a 60% increase in Proficient and Advanced student achievement.

Similarly, in 2021 testing, a total of 66 students were successful in successfully meeting the required cut scores for successful transition to the next grade level. The number of successful test takers rose to 71 in the 2022 SY. The overall success rate grew by nearly eight percent among seventh graders. There were 46 students who scored PL3a or PL3b in SY 2021, whereas only 38 students scored the same in SY 2022. Somewhat related, in SY 2021, 33 students were in need of remediation, while the number of remediated students decreased to 28 for SY 2022.

Seventh-grade students obtained 61 growth points out of a possible 100 in the accountability model for DMS. This number is found by dividing the number of students showing growth (60) by the total number of students assessed (99) multiplied by 100. The number of points DMS would receive for proficiency for the 2022 SY is the number of students scoring a PL4 or PL5 (33) divided by the total number of students assessed (99) multiplied by 100, which would equal 33 points out of 100. Seventh-grade proficiency scores for the 2021 SY amounted to 17 points, therefore, there is an increase of 16 points for the 2022 SY.
Table 19

*Seventh-grade Summary Comparison for SY 2020-2021 and SY 2021-2022*

<table>
<thead>
<tr>
<th>Performance Level</th>
<th>Number Students 2021</th>
<th>Grew</th>
<th>Maintained</th>
<th>Regressed</th>
<th>Number Students 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL 1a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PL 1b</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>PL 2a</td>
<td>12</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>PL 2b</td>
<td>11</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>PL 3a</td>
<td>26</td>
<td>11</td>
<td>10</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>PL 3b</td>
<td>20</td>
<td>11</td>
<td>3</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>PL 4</td>
<td>20</td>
<td><em>17</em></td>
<td>0</td>
<td>3</td>
<td>32</td>
</tr>
<tr>
<td>PL 5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>60</td>
<td>24</td>
<td>15</td>
<td>99</td>
</tr>
</tbody>
</table>

Note.

*Performance Level 4 receives a growth point in the accountability model even though the PL does not increase to a 5.

Conclusion

The results of this study were varied. Results of surveys, interviews, and improvements in individual IPG evaluations for teachers suggest an increase in instructional and pedagogical skills throughout this study. Chapter Four also discusses teacher reflections on professional development prior to this study and the professional development implemented and the successes teachers believe they are now experiencing in their classrooms as a result. These combined results suggest DMS teachers are making headway in building capacity as a mathematics team. Data from the MAAP assessment suggests 7th grade students grew significantly from the 2021 MAAP assessment, but the 8th grade students demonstrated a significant decrease. Chapter Five
will explore this phenomenon and discuss possible contributing factors. Chapter Five will also provide recommendations for developing further teacher capacity, detail limitations of the study, and compare the results of the 2022-2023 school year with the results of this study.
Chapter V:
Discussion

Introduction

This applied research study aims to build the capacity of the mathematics teachers in seventh (7th) and eighth (8th) grade at Diligence Middle School, resulting in improved student achievement. This research study seeks to increase both teacher content and pedagogical knowledge. Multiple strategies are incorporated to develop the content and pedagogical knowledge as well as the practices of teacher instructional skills. These research-based strategies include professional development embedded within the school day (Taton, 2015), instructional coaching (Mangin, 2014), collaborative planning (Stocish, 2016), professional learning communities (Anfara & Mertens, 2012), and professional development specific to DMS mathematics teacher needs (Darling-Hammond & McLaughlin, 1995).

In addition to the research-based strategies incorporated, six research questions guide the study. These questions used are to determine if 7th and 8th grade mathematics proficiency levels would improve on the MAAP mathematics assessments after content-specific professional development and the implementation of PLCs with a high level of fidelity.

The questions also endeavor to determine how teachers felt concerning the effect of professional development and PLCs on their instructional skills and students' growth.

This chapter discusses the findings of Chapter Four and offers conclusions and recommendations based on those findings. First, a summary of the program's development and elements designed to build teacher capacity will be discussed. Next, an overview of the program
evaluation will be discussed. A discussion of the limitations of the study and the successes of the study will follow. Finally, a discussion of the researcher’s inferences and recommendations based on the results of this study are discussed.

**Development of the Program**

The need for this applied research program manifested itself over a period of time as the researcher moved from a classroom teacher heavily involved in the Tier process to becoming the lead teacher for DMS and ultimately becoming the assistant principal of DMS. When the researcher began working on the Tier Committee at the middle school, it provided insight into how poorly the entire school performed in mathematics. At this time, an understanding developed that there was an issue with Tier I instruction. Each grade level had 30-40% of students on Tier II or Tier III for remediation, and the remediation services could not be implemented with fidelity because it was generally felt there was not enough time to do so.

In the first year in which the researcher was the assistant principal, DMS was placed on school improvement status by the Mississippi Department of Education due to Special Education students not performing to expectations. This meant DMS had not shown adequate growth with special education students over the last three years. Therefore, a program had to be written and documented to ensure these students received the appropriate support to succeed academically.

**Program Evaluation**

The researcher facilitated the formation of the Instructional Development Team needed to develop a plan to increase teacher capacity within the mathematics classrooms at DMS. It was determined through collaborative meetings with the IDT that content-specific professional development was needed for the teachers at DMS. It was further decided that it needed to be implemented with fidelity, consistently, and with structure throughout the school year. The belief
of the IDT was student mathematics achievement would increase if teachers received the support and development needed.

**Element: Professional Learning Communities**

Professional learning communities (PLCs) at DMS prior to this research study were inconsistent. The meeting often devolved into a gripe session and seldom was productive for teachers. Before the 2021-2022 SY began, mathematics teachers and administrators met to develop norms for PLCs to ensure meetings were both productive and effective. The basis for the PLCs was centered around the four critical questions of a PLC concerning students: What do we want students to know and be able to do?; How will we know if they learned it?; How will we respond when some students do not learn it?; and How will we extend learning for those who are already proficient? These four questions, developed by Richard DuFour, helped teachers unpack many issues experienced in their instructional endeavors. By working through the process of answering the four guiding questions, teachers began to focus on the needs of the students instead of only on the pacing guide. By focusing on the needs of the students, teachers could determine student academic gaps and provide specific content support to assist students in achieving greater academic success.

**Element: Professional Development**

Professional development provided by the school district prior to this action plan has been a source of contention for teachers. It was a whole group and one size fits all mentality. Conversations with the IDT revealed teachers felt it could have been more beneficial, and many felt professional development was a waste of time. When the IDT met with teachers to determine their needs, teachers were very clear on their desire to have specific professional development targeting teacher instructional needs to support student academic growth. As these needs were
conveyed to the IDT, which included county-level administrators, a shift in professional development implementation for district PD days began. Smaller PD sessions were provided for grade-level bands and subject area content bands, making those PD days more meaningful. At DMS, the consulting firm used by the district assigned a specialized consultant who was particularly strong in middle school mathematics instruction. The assignment was based on the needs assessment of the teachers and administrators, resulting in the consultant coming to the school and providing PD to only DMS teachers. The consultant also facilitated some of the PLC meetings, incorporating the four questions of a PLC, assisting teachers in utilizing their data to drive their instruction, observing and providing feedback in the classrooms, and modeling lessons for every teacher.

Teachers also participated better when PD was embedded during the school day without requiring more of their personal time after school. Teachers recognized the importance of the change in their mindset and could relate it to students being required to complete homework after school. If teachers could not see the relevance and importance of after school PD, they made the connection with students not seeing the relevance of after school homework.

By the end of the school year, teachers discussed their feelings of growth as classroom teachers and were excited to plan for the 2022-2023 SY. Teachers believed growth in the 2022-2023 SY would be even more significant since the implementation of the planning process and strategies would begin at the beginning of the year to help students sooner.

**Element: Student Academic Achievement**

Throughout the implementation of this study, student achievement presented itself in multiple formats. As teachers first began implementing more struggle time into lessons, students did not know how to react. One class had serious student misbehavior issues because the teacher
allowed too much time for struggle, and students became frustrated, quit, and then acted out. The misbehavior resulted in the teacher needing more time to provide clarity for the struggle content due to dealing with the behavior. When this was observed in a classroom walkthrough and discussed with the teacher, it was clear he, as an inexperienced teacher, did not realize the misbehavior was due to student shutdown and frustration. After coaching and providing guidance to understand the underlying cause, the teacher implemented a time system to provide think time and gradually increased the time throughout the school year. By the end of the year, students could work through a productive struggle without completely shutting down because the process was understood, and comprehension of the content would be gained because the teacher would provide guidance.

This study focused only on seventh and eighth-grade scores, and the results would be deemed inconclusive in determining if the program was successful based on the MAAP scores. Seventh grade showed significant growth, but eighth grade did not show growth. Eighth grade showed significant regression. However, this program was implemented in grades five through eight. Grades five, six, and seven showed growth on the 2021-2022 SY MAAP scores. Only the eighth grade showed a regression in proficiency on the MAAP scores. Looking at the larger picture, the researcher would say there is sufficient evidence of the program’s success.

Limitations of the Study

Throughout the implementation of this research study, several limitations arose. One of the limitations of the study was the number of participants. Only two teachers are employed for the seventh and eighth grades. One teaches seventh-grade math, and the other teaches eighth-grade math. They are also married, have three children under the age of five, and the seventh-grade teacher delivered her fourth child in March 2022. Both teachers seldom missed work in a
typical year, but during the 2021-2022 SY, both missed multiple days due to COVID-19 being passed through the family. Teacher absences also affected these teachers' participation in PLCs and professional development. Upon returning to work, the researcher met with these teachers and guided them through the missed content, but the collaboration with the fifth and sixth-grade teachers could have been stronger. Had this research included the fifth and sixth-grade level mathematics scores, there would have been a more significant positive effect. Fifth-grade mathematics students scored 26% proficient on the 2021-2022 MAAP, with 68% of students exhibiting growth, and sixth-grade students scoring 27% proficient, with 54% exhibiting growth.

Another factor concerning the seventh and eighth-grade teachers was experience and educational levels. The seventh-grade teacher was beginning her fourth year teaching in the 2021-2022 SY. The seventh-grade teacher graduated from a traditional education program at Mississippi State University. The eighth-grade teacher was beginning his second year teaching as an alternate route teacher in the 2021-2022 SY. The eighth-grade teacher also graduated from Mississippi State University. The eighth-grade teacher was the only teacher generating a regression in scores. His lack of experience is most likely a contributing factor.

It is, however, important to recognize the difference in the capacity of both the seventh and eighth-grade teachers and the growth of each teacher. The seventh-grade teacher was more experienced and had a better understanding of classroom content and management, but the eighth-grade teacher was beginning with a minimal understanding of content and management. Therefore, while the eighth-grade students may not have shown as much growth on the MAAP test, it is clear through IPG scores the eighth-grade teacher’s capacity increased through this study.
Under normal circumstances, school administration provides feedback from formal and informal observations throughout the school years, and a Professional Growth System (PGS) score is assigned to each teacher based on observations. Due to COVID-19, the Mississippi Department of Education did not require PGS scores to be assigned to teachers for the 2019-2020, 2020-2021, or 2021-2022 school year. Therefore, no PGS scores for either teacher during the school years before this study. Since PGS was still not required during this research in the school year 2021-2022, the researcher used the IPG format to track the growth of teacher instructional skills. The seventh-grade teacher had an end-of-the-year score of 2.10 for the 2021-2022 school year based on the IPG, and the eighth-grade teacher had an end-of-the-year score of 1.97.

Another limitation was the inconsistency of PLCs. Even though PLCs were implemented, and teachers were leading the sessions to a degree, PLCs were still being led primarily by the researcher or the consultant coach. As noted earlier, the seventh and eighth-grade teachers were absent multiple days, including PLC days. Sixth, seventh, and eighth-grade teachers had common planning, but fifth-grade teachers were not always able to join the PLC due to the fifth-grade activity schedules. Therefore, it is not a meeting when one or two teachers are absent simultaneously. Time was used for one-on-one conferences and coaching with whichever teacher was present, but it hindered the consistency of the PLCs.

Another contributing issue was the PLC meetings were less productive if not facilitated by the researcher. Teachers struggled to stay on topic when leading PLCs themselves. In one teacher-led PLC, teachers analyzed benchmark data and identified bubble students within two to three points of the next score level to focus on during small group time. The meeting recorder noted Teacher C asked Teacher B about a particular student and the specific issue he was having
with focus. Since Teacher B taught the student last year, she had prior knowledge of the student’s situation. In this instance, the conversation became about the student’s home life issues and less about the academic issues. The conversation never regained academic focus. Teachers B and C stated they “did not accomplish much” when it was time for the meeting to end. This occurrence was not uncommon when teacher-led PLCs took place.

**Recommendations**

Future research on this subject could be strengthened by repeating the study and including a larger sample size to include all teachers and students in the school. This research study only included two mathematics teachers out of five in the school. Research could be extended to include all district-wide mathematics classes. By extending the research sample, greater significance and applicability could be derived from the outcome.

A second recommendation is to prepare for implementing common planning for all mathematics teachers. Two fifth-grade teachers have schedules entirely different from the sixth, seventh, and eighth-grade level mathematics teachers. However, providing time during the day for these teachers to collaborate with other grade-level teachers is crucial. By examining the flow of the 2021-2022 SY, teachers should also have specific training on implementing and leading PLCs. Additionally, by providing a pre-scheduled time once every nine-week period for collaboration across the district with common grade-level mathematics teachers, consistency could be far more substantial throughout the district. An additional recommendation for the district would be providing specialized training for substitute teachers to be in classrooms during PLC meetings could minimize learning loss while increasing teacher instructional capacity.

One final recommendation involves extending this research study over a longer period, at least three to five years, is recommended. Teachers who continue to participate in structured
PLCs and meaningful professional development continue to grow in instructional skills and pedagogy. Student academic achievement also increases when teachers are involved in PLCs and professional development (Lindvall, 2017). As new teachers come into the building, novice teachers must be trained in the culture of the school, which includes the culture of professional learning through PLCs and embedding and utilizing professional development. Teachers should also begin to collaborate across the curriculum, demonstrating the connection of multiple subject areas for students. As the study is lengthened in time, extended to other teachers, and expanded across the curriculum, the data collected will show a greater significance in the outcomes.

Conclusion

The research conducted at DMS was implemented with a focus on strengthening Tier I instruction in the seventh and eighth-grade mathematics classrooms by developing the instructional capacity of the teachers. Throughout the 2021-2022 SY, it became clear the motivation and dedication of the teachers and all other stakeholders at DMS were invaluable in implementing this study. Teachers became more dedicated to improving their pedagogical skills to help their students succeed. This researcher believes the DMS mathematics teachers strengthened those pedagogical skills and content knowledge through this study and, as a result, have helped students achieve growth. The structure of the PLCs and the professional development developed strength in the instructional practices needed to increase student achievement. Moving forward in my practice, it is my intention to incorporate the elements of this study on a larger scale with the entire faculty of the school in which I am now working. It is my belief these practices will enhance any school’s instructional levels, teacher capacity, and increase student achievement overall.
References


doi.org/10.14507/epaa.v22n56.2014


National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. NCTM.


APPENDICES
### APPENDIX A

*Action Plan*

<table>
<thead>
<tr>
<th>Element</th>
<th>Goal</th>
<th>Timeline</th>
<th>Participant</th>
<th>Evaluation</th>
</tr>
</thead>
</table>
| Professional Development    | To increase the content and pedagogical knowledge of teachers.  
                             |                         | July 2021 – March 2022       | Instructional Math Leader, Outside Math Consultant, and Mathematics Teachers | Professional development survey  
                             |                         |                         |                                                                             | (Appendix B)  
                             |                         |                         |                                                                             | Instructional  
                             |                         |                         |                                                                             | practice guide  
                             |                         |                         |                                                                             | (Appendix C)  
                             |                         |                         |                                                                             | Teacher interview  
                             |                         |                         |                                                                             | (Appendix D)  
                             |                         |                         |                                                                             | Teacher survey  
                             |                         |                         |                                                                             | (Appendix E)  
| Professional Learning       | To develop stronger instructional practices of middle school         | August 2021 – May 2022 | Instructional Math Leader and Mathematics Teachers                            | PLC survey  
| Communities                 | mathematics teachers.  
                             |                         |                         |                                                                             | (Appendix F)  
                             |                         |                         |                                                                             |  
                             |                         |                         |                                                                             |  
                             |                         |                         |                                                                             |  
| Increased Student           | To increase student growth and proficiency in mathematics             | October 2021 – March 2022 | Teachers, Instructional Math Leader, and Students                            | EnCase and MAAP data |
| Achievement                 |                                                                      |                         |                                                                             |                                                                            |
APPENDIX B

Professional Development Survey

Please respond to each item by selecting the number which best describes your opinion (5=excellent; 1=poor).

A. Participant Satisfaction

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session/Activity was well organized</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Session/Activity objectives were clearly stated</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Session/Activity assignments were relevant to Session/Activityobjectives</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>All necessary materials/equipment, resources were provided or madereadily available</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Overall instructor performance</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>

B. Impact on Professional Practice

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>This activity enhanced my contentknowledge in the area of mathematics</td>
<td>5 4 3 2. 1</td>
</tr>
<tr>
<td>This activity strengthened my teaching skills based on research of effective practice.</td>
<td>5 4 3 2. 1</td>
</tr>
<tr>
<td>This professional development session strengthened my knowledge of effective teaching practices in mathematics.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>The topics discussed in the professional development session were relevant to me.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>The training provided in this professional development session will be useful in my teaching career.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>This activity enhanced the participant’s professional growth and deepened your reflection and self-assessment of exemplary practices.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>I am satisfied with the professional development I received today.</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>
APPENDIX B (cont.)

C. Comments

How did this workshop relate to your job, and in what way(s) has it caused you to review your job or training activities?

What new ideas have you gained and how do you plan to implement these new ideas in your job or training capacity?

What information was of great value to you?

What specific suggestions do you have to improve this activity?

Additional comments.
**CORE ACTION 1:** Ensure the work of the enacted lesson reflects the Focus, Coherence, and Rigor required by college- and career-ready standards in mathematics.

<table>
<thead>
<tr>
<th>INDICATORS / NOTE EVIDENCE OBSERVED OR GATHERED FOR EACH INDICATOR</th>
<th>RATING</th>
</tr>
</thead>
</table>
| A. The enacted lesson focuses on the grade-level cluster(s), grade-level content standard(s), or part(s) thereof.  
  Mathematical learning goal:  
  Standard(s) addressed in this lesson: | Yes- The enacted lesson focuses only on mathematics within the grade-level standards.  
No- The enacted lesson focuses or mathematics outside the grade-level standards. |
| B. The enacted lesson appropriately relates new content to math content within or across grades. | Yes- The enacted lesson builds on students’ prior skills and understandings.  
No- The enacted lesson does not connect or has weak connections to students’ prior skills and understandings. |
| C. The enacted lesson intentionally targets the aspect(s) of Rigor (conceptual understanding, procedural skill and fluency, application) called for by the standard(s) being addressed.  
  Circle the aspect(s) of Rigor targeted in the standard(s) addressed in this lesson:  
  Conceptual understanding / Procedural skill and fluency / Application  
  Circle the aspect(s) of Rigor targeted in this lesson:  
  Conceptual understanding / Procedural skill and fluency / Application | Yes- The enacted lesson explicitly targets the aspect(s) of Rigor called for by the standard(s) being addressed.  
No- The enacted lesson targets aspects of Rigor that are not appropriate for the standard(s) being addressed. |
## CORE ACTION 2: Employ instructional practices that allow all students to learn the content of the lesson.

### INDICATORS / NOTE EVIDENCE OBSERVED OR GATHERED FOR EACH INDICATOR

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The teacher makes the mathematics of the lesson explicit through the use of explanations, representations, tasks, and/or examples.</td>
<td>4 - A variety of Instructional techniques and examples are used to make the mathematics of the lesson clear. 3 - Examples are used to make the mathematics of the lesson clear. 2 - Instruction is limited to showing students how to get the answer. 1 - Instruction is not focused on the mathematics of the lesson.</td>
</tr>
<tr>
<td>B. The teacher strengthens all students’ understanding of the content by strategically sharing students’ representations and/or solution methods.</td>
<td>4 - Student solution methods are shared, and connections to the mathematics are explicit and purposeful. If applicable, connections between the methods are examined. 3 - Student solution methods are shared, and some mathematical connections are made between them. 2 - Student solution methods are shared, but few connections are made to strengthen student understanding. 1 - Student solution methods are not shared.</td>
</tr>
<tr>
<td>C. The teacher deliberately checks for understanding throughout the lesson to surface misconceptions and opportunities for growth, and adapts the lesson according to student understanding.</td>
<td>4 - There are checks for understanding used throughout the lesson to assess progress of all students, and adjustments to instruction are made in response, as needed. 3 - There are checks for understanding used throughout the lesson to assess progress of some students; minimal adjustments are made to instruction, even when adjustments are appropriate. 2 - There are few checks for understanding, or the progress of only a few students is assessed. Instruction is not adjusted based on students’ needs. 1 - There are no checks for understanding, therefore, no adjustments are made to instruction.</td>
</tr>
<tr>
<td>D. The teacher facilitates the summary of the mathematics with references to student work and discussion in order to reinforce the purpose of the lesson.</td>
<td>4 - The lesson includes a summary with references to student work and discussion that reinforces the mathematics. 3 - The lesson includes a summary with a focus on the mathematics. 2 - The lesson includes a summary with limited focus on the mathematics. 1 - The lesson includes no summary of the mathematics.</td>
</tr>
</tbody>
</table>

1. These actions may be viewed as the course of 2–3 class periods.
### CORE ACTION 3: Provide all students with opportunities to exhibit mathematical practices while engaging with the content of the lesson.

**INDICATORS**

1. Teacher provides few or no opportunities; or very few students take the opportunities provided.
2. Teacher provides some opportunities, and some students take them.
3. Teacher provides many opportunities, and some students take them; or teacher provides some opportunities and most students take them.
4. Teacher provides many opportunities, and most students take them.

**NOTE EVIDENCE OBSERVED OR GATHERED FOR EACH INDICATOR / RATING**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The teacher provides opportunities for all students to work with and practice grade-level problems and exercises. Students work with and practice grade-level problems and exercises.</td>
<td>4</td>
</tr>
<tr>
<td>B. The teacher cultivates reasoning and problem solving by allowing students to productively struggle. Students persevere in solving problems in the face of difficulty.</td>
<td>4</td>
</tr>
<tr>
<td>C. The teacher poses questions and problems that prompt students to explain their thinking about the content of the lesson. Students share their thinking about the content of the lesson beyond just stating answers.</td>
<td>4</td>
</tr>
<tr>
<td>D. The teacher creates the conditions for student conversations where students are encouraged to talk about each other's thinking. Students talk and ask questions about each other's thinking, in order to clarify or improve their own mathematical understanding.</td>
<td>4</td>
</tr>
<tr>
<td>E. The teacher connects and develops students' informal language and mathematical ideas to precise mathematical language and ideas. Students use increasingly precise mathematical language and ideas.</td>
<td>4</td>
</tr>
</tbody>
</table>

If any uncorrected mathematical errors are made during the context of the lesson (instruction, materials, or classroom displays), note them here.

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4. There is not always a one-to-one correspondence between the indicator for this Core Action and the Standards for Mathematical Practice. These indicators represent the Standards for Mathematical Practice that are most highly observed during instruction.

5. All eight of the indicators and student behaviors should be observable in every lesson, though not all indicators exist in all lessons. For more information on teaching practices, see NCTM’s publication Principles to Actions: Ensuring Mathematical Success for All or Eight Mathematics Teaching Practices (based under the principle of Teaching and Learning).
APPENDIX D
Teacher Interview

Academic Background
1. How long have you been in the education field?
2. How long have you been teaching mathematics?
3. How long have you been teaching at Diligence Middle School?
4. At what level do you have the most teaching experience (elementary, middle, or high school)?

Instructional Practice
1. Describe a typical mathematics lesson in your class.
2. What types of instructional techniques are most frequently employed during the course of one of your mathematics lessons?
3. Tell me ways you differentiate your instruction.
4. Has instructional coaching had any effect on your instructional practice? If so, how?

Building Capacity
1. What are the instructional expectations for mathematics teachers at Diligence Middle School?
2. What area(s) of instruction do you feel are your strengths? Why?
3. What area(s) of instruction do you feel you need the most improvement? Why?

Coaching Services Received
1. How often do you receive visits from your instructional coach or content lead?
2. Describe the coaching services you most often receive.
3. What coaching services do you feel are the most beneficial for you?
4. Which coaching services provided are the least beneficial to you?
5. What expectations do you have for an instructional coach?
## Teacher Survey

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>In all or most lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>I engage students in purposeful sharing of mathematical ideas, reasoning, and approaches, using varied representations.</td>
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<tr>
<td>I select and sequence student approaches and solution strategies for whole-class analysis and discussion.</td>
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<tr>
<td>I facilitate discourse among students by positioning them as authors of ideas, who explain and defend their approaches.</td>
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<tr>
<td>I ensure progress toward mathematical goals by making explicit connections to student approaches and reasoning.</td>
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<tr>
<td>I identify what counts as evidence of student progress toward mathematics learning goals.</td>
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<tr>
<td>I elicit and gather evidence of student understanding at strategic points during instruction.</td>
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<tr>
<td>I interpret student thinking to assess mathematical understanding, reasoning, and methods.</td>
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<td>-------------------------------------------------------------------------------------</td>
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<tr>
<td>I make in-the-moment decisions on how to respond to students with questions and prompts that probe, scaffold, and extend.</td>
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<tr>
<td>I reflect on evidence of student learning to inform the planning of next instructional steps.</td>
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<tr>
<td>I advance students’ understanding by asking questions that build on, but do not take over or funnel, students’ thinking.</td>
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<tr>
<td>I make certain to ask questions that go beyond gathering information to probing thinking and requiring explanation and justification.</td>
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<tr>
<td>I ask intentional questions that make the mathematics more visible and accessible for student examination and discussion.</td>
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<td>I allow sufficient wait time so that more students can formulate and offer responses.</td>
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</tbody>
</table>
I anticipate what students might struggle with during a lesson and am prepared to support them productively through the struggle.

I give students time to struggle with tasks and ask questions that scaffold students’ thinking without stepping in to do the work for them.

I help students realize that confusion and errors are a natural part of learning, by facilitating discussions on mistakes, misconceptions, and struggles.

I praise students for their efforts in making sense of mathematical ideas and perseverance in reasoning through problems.

I select tasks that allow students to decide which representations to use in making sense of the problems.

I allocate substantial instructional time for students to use, discuss, and make connections among representations.

I introduce forms of representations that can be useful to students.
<table>
<thead>
<tr>
<th>I ask students to make math drawings or use other visual supports to explain and justify their reasoning.</th>
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<tbody>
<tr>
<td>I design ways to assess students’ abilities to use representations meaningfully to solve problems.</td>
</tr>
<tr>
<td>I ask students to discuss and explain why the procedures they are using work to solve particular problems.</td>
</tr>
<tr>
<td>I connect student-generated strategies and methods to more efficient procedures as appropriate.</td>
</tr>
<tr>
<td>I provide students with opportunities for distributed practice of procedures.</td>
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</tbody>
</table>

APPENDIX F
PROFESSIONAL LEARNING COMMUNITIES (PLC) SURVEY

Please read each question and mark one answer choice.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PLC members work together to learn and implement new skills at work.</td>
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<td>2. PLC members are committed to the improvement of the school and increasing student achievement.</td>
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<td>3. PLC members work together to develop and implement plans to meet the needs of students.</td>
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<td>4. PLC members learn through engaging in collective discourse.</td>
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<td>5. PLC members respect each others’ ideas.</td>
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<td>6. PLC members are committed to the implementation of the curriculum.</td>
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<td>7. PLC members conduct data analysis to determine if their instructional practices are productive.</td>
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<td>8. My instructional practices have changed as a result of actively participating in PLCs.</td>
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<tr>
<td>9. My classroom instruction has improved as a result of actively participating in PLCs.</td>
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<tr>
<td>10. I believe my students have grown academically as a result of my participation in PLCs</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
VITA

Cynthia "Shelly" French

Work History
2022-Current  High School Principal
Scott County School District, Morton, MS

2019-2022  Assistant Principal
Bettye Mae Jack Middle School, Scott County School District, Morton, MS

2018-2019  Lead Teacher
Bettye Mae Jack Middle School, Scott County School District

2013-2018  Middle School Mathematics Teacher
Bettye Mae Jack Middle School, Scott County School District, Morton, MS

1999-2013  Elementary Mathematics Teacher
Morton Elementary School, Scott County School, Morton, MS

Education
2020-Current  Pursuing Doctor of Education: Educational Leadership
University of Mississippi - Oxford, MS

2015-2016  Master of Science: Education
Arkansas State University - Jonesboro, AR

1994-1999  Bachelor of Science: Education
Delta State University - Cleveland, MS

Affiliations
National Board Certification, 2008
Mississippi Professional Educators (MPE)