

A Study of the Elementary Math Program Utilized by a Mid-Missouri School District

A Dissertation

presented to

the Faculty of the Graduate School

at the University of Missouri

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Educational Leadership and Policy Analysis

by

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MAY 2020

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Dedication

This dissertation is dedicated to my wonderful husband, Dave, who believed in me from the very start of this journey and supported me throughout.

Acknowledgments

I would like to thank my professor and advisor Dr. Sandy Hutchinson for everything she has taught me about leadership, education, and life. I am extremely appreciative for all of the time, guidance, encouragement and advice she gave me throughout my doctoral journey. Thank you for choosing me, Dr. Hutchinson, and for believing in me.

I would like to thank my dissertation committee, Dr. Barbara Martin, Dr. Steve Ritter, and Dr. Natalie Tye, for generously donating their time and sharing their expertise to assist me in the dissertation process.

I would also like to thank the University of Central Missouri cohort members who were a part of my very first and very last doctoral team projects. Jenni Hayes, Amanda Minear, and Elmer Ragus. Thank you for everything. I would not have wanted to be on this journey without you.

Thank you to Superintendent Dr. Scott Patrick for suggesting the idea for my dissertation study. I thoroughly enjoyed conducting this study on the district's elementary math program. Thank you to the Warrensburg R-VI teachers and administrators who participated in my study. I greatly appreciated your time, and I learned something from each of you. I am proud to work for a school district that has such dedicated, amazing, caring people who go above and beyond for students.

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Abstract

This qualitative study focused on one Mid-Missouri school district and was designed to collect and analyze teachers' and administrators' perceptions regarding the elementary math program for the purpose of program improvement. The district utilized ability grouping including acceleration for elementary math instruction. This study was analyzed using a constructivist framework and consideration was given to the theories of both Piaget and Vygotsky. Based on teachers' and administrators' perceptions, the accelerated math classes met the needs of the highest ability math students. Overall, according to teachers, the elementary math program did not meet the needs of the lowest students at the fourth and fifth grade levels where the accelerated math classes were being utilized.

Section One:

Introduction to the Dissertation-in-Practice

Background

After the release of the 2009 Program for International Student Assessment (PISA) results, then-Secretary of Education Arne Duncan declared the nation's students are underprepared for successful participation in the world marketplace (Duncan, 2010). Concerning the release of the 2011 Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS), Duncan (2012) stated "a number of nations are out-educating us today in the STEM disciplines – and if we as a nation don't turn that around, those nations will soon be out-competing us in a knowledge-based, global economy" (para. 6). With global assessment comparisons presenting the United States as continually lagging behind other countries, the subject under scrutiny is math as "mathematics is key to all scientific subjects" (Katz, 2015, p. 42). For the United States to be competitive in the global market and to fill science, technology, engineering, and math (STEM) jobs with qualified employees, our nation's schools need to offer high-quality mathematics programs for students from the very start of their education.

Even though schools are placing a "greater emphasis on academic success" and utilizing more challenging curriculum, according to a report overviewing 20 years of TIMSS assessments, students are not achieving in mathematics at levels that will allow them to keep pace with the achievement of students from other countries (Mullis, Martin, & Loveless, 2016, p. 5). The same report noted math concepts, which were previously covered in upper grade levels, have shifted to lower grade levels increasing the rigor in math for younger students (Mullis et al., 2016). The increase in focus on academic success and a more rigorous curriculum have not benefited high school students on the

National Assessment of Educational Progress (NAEP) assessments or the ACT. The Nation's Report Card which is generated by NAEP cited no significant change in the scores for mathematics at grade four or grade eight from 2015 to 2017 ("The Nation's Report Card: NAEP Mathematics Report Card," n.d.). The graduating class of 2018 scored a 20-year record low on ACT math performance (Gewertz, 2018). Not only a record low, there has been essentially no improvement since 1998 in ACT math scores which is troublesome for an economy that increasingly relies on occupations, all of which require high math skills, to be viable (Gewertz, 2018).

Given the continual advances in science, technology, engineering, and other STEM-related fields, "an understanding of mathematics is central to a young person's preparedness for life in modern society" (OECD, 2017, p.66). Analysis of math achievement at the state level, as a register of students' future success, indicates a need to examine schools' math programs. The most recent scores available from the Missouri state-mandated tests which are given to students in grades three through eight are worrisome as grade four produced the highest number of proficient students in math with only 53.9% of students scoring proficient or advanced and each consecutive grade level's percentage of proficient students declined with grade eight having only 30.5% of students scoring proficient or advanced (Missouri Department of Elementary and Secondary Education, 2019). Missouri's state test scores indicate most students will not be prepared with proficient math skills to enter the present-day workforce or the arena of higher education upon graduation. Assessment data indicate the need to make changes for improvement in Missouri's math programs in order to increase student achievement.

Missouri's public school classrooms, just like the rest of the nation's, are filled with diverse student populations. Classes are comprised of students with a vast number of differences, including a wide range of cognitive skills and academic abilities. Throughout the history of education, all stakeholders, those within the school systems and respective researchers, have disagreed about how to group students for instruction (Slavin, 1987). Due to the variances that exist in a self-contained classroom, it is believed that grouping students based on previous academic performance allows for more effective instruction as it is aligned with students' readiness levels (Nomi, 2010). Ability grouping is the practice of grouping students for instruction based on teachers' assessed levels of student academic achievement. The use of ability grouping has been a long-standing, highly controversial debate (Delisle, 2015; Gamoran, 2011; Loveless, 2013a; Loveless, 2013b; Slavin, 1987; Tomlinson, 2015). While the debate wages on, there has been a significant increase in the use of ability grouping over the past decade (Loveless, 2013b).

Statement of the Problem

The math program designated by Warrensburg R-VI School District is structured for elementary grades four and five so that each grade level includes multiple math classes of students working at grade level and one class of students working at an accelerated level. This structuring of classes uses ability grouping to determine which students are placed into the accelerated classes. Through the use of a screening process, teachers identify the students, usually no more than 25, who are working at the highest ability within their grade level. These top students are then placed in the accelerated math class for their grade level. Warrensburg R-VI School District has been grouping fourth and fifth grade students in this manner for at least 31 years (J. Ritchhart, personal

communication, September 2019). The elementary math classes at fourth and fifth grade are referred to as math for the regular grade level math classes and accelerated math for the class containing the students who are determined to be working at the highest math ability.

While the accelerated math classes in this study share the same name as the Renaissance math program, Accelerated Math, which individualizes math practice and assessments for students, this study of math in the Warrensburg R-VI School District does not include any use of Renaissance's Accelerated Math program (Renaissance, 2020). The math classes in the district are simply referred to as accelerated math as the students in them are working at an accelerated level compared to their same grade level peers. However, this study will use Renaissance's Star Math assessment data to provide information about the range of ability levels present within each elementary class in Warrensburg R-VI School District which was analyzed for this study. Star Math, produced by Renaissance, is a comprehensive, computer adaptive assessment program which assesses K-12 math skills and provides extensive data about students' mastery of math concepts (Renaissance, 2019a). While the district does not utilize Renaissance's Accelerated Math program, they do utilize Renaissance's Star Math assessments.

The class of accelerated math students uses the math curriculum for the grade above them; therefore, the accelerated students stay one grade level ahead of their current grade level peers in math. In order to identify which students will be in the accelerated math class and which students will be in the regular grade level math classes, students are grouped by ability based on multiple factors including standardized test scores, grades, and teacher recommendation. Warrensburg R-VI School District is considering the

addition of an accelerated math class for the third grade level at each of its two upper elementary schools. This would necessitate the identification of third grade accelerated math students while they are in second grade.

Problem of Practice

Neihart (2007) stated “academic acceleration of high-ability youth is one of the most well-researched topics in education” (p. 331). Steenbergen-Hu, Makel, and Olszewski-Kubilius (2016) pointed out “ability grouping has been one of the most controversial practices for more than a century” (p. 852). While opponents to ability grouping exist, there is ample research supporting the use of acceleration. From their study which synthesized 100 years of research on the effects of ability grouping and acceleration, Steenbergen-Hu et al. (2016) noted the dominance of the research suggests the use of ability grouping and acceleration can significantly increase the achievement of students at all grade levels. While this study contained a preponderance of research supporting ability grouping, opponents of ability grouping have provided numerous reasons and supporting data indicating why ability grouping should not be used in schools.

The end of the twentieth century saw strong opposition to ability grouping and tracking, and organizations such as the National Governors Association, the NAACP Legal Defense Fund, and the Children’s Defense Fund criticized the use of grouping students by ability (Loveless, 2013a). Buttaro and Catsambis (2019) stated “ability grouping fell out of favor in the late 1980s because many scholars and educational practitioners considered it an ineffective and unfair educational practice” (p. 32). Oakes (2005) claimed the use of tracking unfairly advantaged students whose parents had higher

social and economic statuses, thereby perpetuating inequalities present in society. Neihart (2007) explained the controversy surrounding ability grouping is frequently caused by misunderstanding of terminology. The two terms at the center of the debate which are commonly misinterpreted, yet utilized interchangeably, are tracking and ability grouping.

Tracking, known in Europe as streaming, applies to secondary schools whereby students are placed into a set of courses based on their ability (Neihart, 2007). Neihart (2007) informed the most widely utilized forms of tracking are for college-prep, vocational, and special education. The author further explained “ability grouping includes tracking, but not all ability grouping is tracking” (Neihart, 2007, p. 334). Gentry (2016) and Loveless (2013b) also expressed concerns about the language used in debates on ability grouping, as the terminology being used is often not clearly understood. Collin and Gan (2013) and the National Education Association (2015) use the terms ability grouping and tracking interchangeably, as if there is no difference between the two. The National Education Association (2015) equated ability grouping with tracking by stating “ability grouping, also known as tracking, is the practice of grouping children together according to their talents in the classroom” (para. 1). The movement to ban tracking in the United States was undertaken by Oakes (1985) in order to provide equitable learning for all students. There has been a substantial decrease in the use of tracking; however, most middle and high schools still use ability grouping to place students in classes (Loveless, 2013b).

As the Warrensburg R-VI School District superintendent and administration contemplate restructuring the elementary math program to meet the needs of the students so they can better achieve academic success, more information is needed to plan for

potential change. When considering changes to accelerated programming, Colangelo, Assouline, and Gross (2004) advised “systematic plans to address concerns and potential consequences need to be developed prior to implementation” (p. 10). In accordance with this advice, Gentry (2016) emphasized the importance of knowing how grouping students for instruction affects “teachers’ ability to deliver curriculum, differentiate, accelerate, remediate, and meet individual students’ needs” (p. 127). Teachers can provide valuable insight about how grouping students for math instruction affects both their teaching and the students’ learning and achievement. While research supports the use of ability grouping for math instruction, the perceptions of teachers and administrators regarding Warrensburg’s math program at the elementary level is unknown. Therefore, the problem being addressed is the lack of understanding of the stakeholders’ perceptions as they relate to the elementary math program.

Existing Gap in the Literature

Makel and Plucker (2014) suggested the need to replicate previous studies on grouping and acceleration as the field of education has changed dramatically over time. Plucker and Harris (2015) expressed a need for future studies to examine accelerated options in subject areas and for specific grade levels. Bolick and Rogowsky (2016) concluded in their review of literature on ability grouping for grades kindergarten through sixth that it is undetermined if ability grouping is beneficial or harmful to students’ academic success and emphasized “more research needs to be completed to determine which types of ability grouping are most beneficial for the varying needs of students in today’s classrooms” (p. 47). This study will fulfill these needs in research by focusing on accelerated math at two specific grade levels, fourth and fifth grade and also by focusing

on any ability grouping utilized for the instruction of math at both the second and third grade levels.

Steenbergen-Hu et al. (2016) pointed out it is unknown whether programs that include acceleration are equally effective for all students. The authors further noted the impact of acceleration affects both the students within the accelerated classes as well as those who are assigned to the regular grade level classes (Steenbergen-Hu et al., 2016). Bolick and Rogowsky (2016) concluded from a review of literature on ability grouping that “more research needs to be conducted to determine how the various types of ability grouping affect students with diverse needs differently” (p. 49). This study may inform Warrensburg R-VI School District, as well as other school districts, about the impact of utilizing an accelerated math class on student achievement for both the accelerated students and the students in the regular math classes.

Purpose of the Study

“Unfortunately, plans [for accelerated programming] often are implemented ad hoc, without knowledge or concern for later consequences. As a result, educators learn very little about the problems with acceleration that concern them the most” (Colangelo et al., 2004, p.10). The purpose of this study was to acquire and understand the teachers’ and administrators’ perceptions of Warrensburg’s elementary math program for the intent of program improvement to benefit the learning of all students and to inform the Warrensburg R-VI School District superintendent of the findings of this study. Planning for the future math program with consideration of the articulated perspectives of the stakeholders involved is “crucial, because failure to address issues that are implicitly associated with the variety of accelerative options will diminish the efficacy of

accelerative programs” (Colangelo et al., 2004, p. 11). The Warrensburg R-VI superintendent will be able to factor the teachers’ and the administrators’ perceptions into the planning for the elementary math program.

The efficacy of Warrensburg’s math program is vital to the success of students’ learning and academic achievement. The mathematical foundations learned early in students’ education impact future math performance. OECD (2017) emphasized the importance of mathematical literacy, which “is an individual’s capacity to formulate, employ, and interpret mathematics in a variety of contexts” (p. 67). Mathematical literacy allows students to understand “the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens” (OECD, 2017, p. 67). Warrensburg’s math program needs to be thoroughly and thoughtfully planned to maximize students’ mathematical literacy.

Research Questions

The research questions guiding this study are:

1. What are the second, third, fourth, and fifth grade math teachers’ perceptions of the elementary math program?
2. What are the administrators’ perceptions of the elementary math program?
3. At the beginning of the school year, what was the range in grade equivalents as determined by Star Math for each ability grouped fourth and fifth grade math class in comparison to the range in grade equivalents had the classes not been ability grouped? In addition, what was the distribution of grade equivalents for each second through fifth grade math class?

Theoretical Framework

Constructivism

Constructivism is a means of learning about the world (Brooks & Brooks, 1999) by building “personal interpretations of the world based on individual experiences and interactions” (Ertmer & Newby, 2013, p. 55). “Constructivism requires the acquisition of new conceptual primitives, or of new combinatorial machinery, resulting in the capacity to think thoughts previously *unthinkable* (not merely previously *unthought*)” (Carey, Zaitchik, & Bascandzhev, 2015, p. 38). The theory for this study is based on the work of two prominent constructivist theorists, Piaget and Vygotsky. While Piaget focused on the individual as being primarily responsible for the construction of knowledge, which is known as cognitive constructivism, Vygotsky concentrated on the social influences others have on an individual’s learning, known as social-cultural constructivism (Öztürk, 2016). Piaget’s and Vygotsky’s ideas work hand in hand allowing for a comprehensive view of how an individual develops and learns (Sharkins, Newton, Causey, & Ernest, 2017). Cobb (1994) emphasized “mathematical learning should be viewed as both a process of active individual construction and a process of enculturation into the mathematical practices of wider society” (p. 13). Both cognitive constructivism and social-cultural constructivism are theories that attempt to explain how students learn.

Piaget

Based on his theory of cognitive development, Piaget (1972) pointed out a child’s ability to think abstractly develops in stages: sensorimotor, pre-operational, concrete operational, and formal operational. The progression of learning varies from child to child (Piaget, 1972). Carey et al. (2015) commented Piaget’s constructivism theory is

relevant today although it has been adapted in “light of the insights provided by modern cognitive science and cognitive neuroscience” (p. 51). The authors further noted that Piaget’s work continues to play a role in the research on cognitive development.

Piaget (1965) observed children are active learners, and they avidly interact with the physical and social environments around them to construct mathematical knowledge. Piaget (1972) theorized that children go through a series of sequences to develop abstract thinking, starting with concrete understanding as infants and culminating with abstract thinking as teenagers and adults. When children confront a situation that goes against what they know, they “engage their minds to make sense of the experience” (Finau, Treagust, Won, & Chandrasegaran, 2018, p. 186). Piaget (1963) theorized “intelligence is adaptation” (p. 7) and explained “adaptation must be described as an equilibrium between the action of the organism on the environment and vice versa” (p. 7). Piaget (1963) referred to “the action on the organism on surrounding objects” as assimilation. (p. 7). In other words, when encountered with something new, children adapt their cognitive structures to allow for the new information. The learner assimilates the new information, thereby creating cognitive growth. As not all students develop at the same rate, the use of acceleration is a fitting option for students who develop at a faster rate than their peers.

Vygotsky

The use of acceleration in student learning can be thought of in terms of Vygotsky’s (1978) work on learning and development. While Vygotsky (1978) did not discount the individual’s internal role in learning, he theorized that learning begins when an individual interacts with others, that learning is created through the interdependence of the self and others, including culture. Panhwar, Ansari, and Ansari (2016) commented

“Vygotsky focused on socio-cultural, psychological and historical impacts on individual development by pointing out that mental and educational developments of a person are connected to social, cultural and historical context in which a child is situated” (p.183). Vygotsky (1978) viewed learning as a social event and emphasized the learner should be challenged by adults such as parents and teachers and by more advanced peers to foster learning. The most efficient learning happens when a child can do or figure something out with help when otherwise, the child would not be able to do the same thing independently (Vygotsky, 1978).

To explain the difference between the point the child needs help and the point where the child has acquired the new learning and is now independent, Vygotsky (1978) developed the zone of proximal development (ZPD). The zone of proximal development “is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 86). Merriam and Bierema (2014) described the zone of proximal development as being “just beyond what the learner/apprentice could accomplish by him or herself” (p. 119). Vygotsky (1978) referred to the help from an adult as scaffolding. The zone of proximal development is foundational and creates a bridge to “the subsequent development of a variety of highly complex internal processes in children’s thinking” (Vygotsky, 1978, p. 90). To increase academic achievement, teachers should instruct students at levels slightly higher than those which the students have demonstrated success (Vygotsky, 1978). Dimitriadis (2016) advocated that teachers be knowledgeable about “the principle of ZPD and be able to plan and provide challenging tasks and instructions

(with appropriate support) within the gifted individuals' ZPD" (p. 109). Vygotsky (1978) emphasized the use of the ZPD for planning for the learning needs of all students and indicated that if students fall behind in school, it is most likely the result of poor instruction.

Gambrell, Morrow, and Pressley (2007) explained, according to research regarding best practice, teachers should first assess students' background knowledge and then build upon it by connecting it with "new ideas, skills, and competencies" (p. 22). High-ability learners thrive when teachers provide them with challenging work as new learning is developed when students participate in unfamiliar, complex tasks (Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, 2015). Shayer (2003) stressed "it is essential that designers [of effective teaching] – and those who teach the lessons -- are able to look at their curriculum through mental development (Piagetian) eyes, as Vygotsky argued was essential" (p. 481). Vygotsky (1978) informed when learners are challenged, they are able to problem solve with the assistance of those who are more knowledgeable. Therefore, students placed in accelerated classes benefit from learning from their high-ability classmates.

Design of the Study

As the purpose of this study was to acquire and understand the teachers' and administrators' perceptions of Warrensburg's elementary math program for the intent of program improvement to benefit the learning of all students, a qualitative methodology was most fitting for this study. Creswell (2014) informed "qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (p. 4). The researcher employed effective means of data

collection for a qualitative study utilizing interviews (Creswell, 2014; Creswell, 2016; Seidman, 2013). Analysis of the participants' perceptions involved "an inductive style, a focus on individual meaning, and the importance of rendering the complexity of a situation" (Creswell, 2014, p. 4). Through this study, the researcher conceptualized an understanding of the effectiveness of the elementary math program based on the data collected and made recommendations accordingly.

Setting

The site of this qualitative study was the Warrensburg R-VI School District, located in Warrensburg, Missouri, which has a population of approximately 20,000. All four of Warrensburg's elementary schools were included in this study. Two of the elementary schools house grades preschool through second grade and the other two elementary schools house third through fifth grade. The various grade levels at each of the schools have between six and seven certified classroom teachers. Every elementary classroom teacher teaches math. The fourth and fifth grade levels differ from the other elementary levels, as each of these grade levels has an accelerated math class. One of the fourth grade classroom teachers and one of the fifth grade classroom teachers each have an accelerated math class for the respective grade level. This is made possible as the accelerated math teacher at each grade divides his or her regular grade level math students amongst the other grade level teachers for math instruction and pulls the accelerated math students from each of the other classrooms together to form an accelerated math class. Each elementary grade level consists of approximately 110 to 140 students. Each of the elementary schools houses approximately 400 students, with a total school district population of approximately 3,500 students.

Participants

Purposeful sampling, the selection of “a sample from which the most can be learned,” was utilized in this study in order to gain an understanding of the perceptions of the district’s stakeholders (Merriam & Tisdell, 2016, p. 96). The administrators who were invited to participate in this study included the principal of each of the four elementary schools involved in the study and the district’s director of curriculum and assessment. The teachers who were invited to participate in this study included the second through fifth grade math teachers. Once the district superintendent and building principals granted permission to use their schools in the study, the elementary administrators, the curriculum director, and the second through fifth grade math teachers were sent an email describing the study and inviting them to participate in interviews. Semi-structured, open-ended interviews were conducted with both the administrators and the teachers who agreed to participate in the individual interviews.

Data Collection

Institutional review board (IRB) approval was obtained prior to data collection. Interviews were the primary means of data collection as this study focused on the perception of the participants. Participants are likely to be more candid in individual interviews compared to focus groups and more detailed in their responses to interview questions compared to responses from survey questions. The interview protocol also allowed for further questioning to gain clarification to participants’ responses if necessary. The researcher conducted a total of 26 interviews, which included 21 interviews with second through fifth grade math teachers and interviews with five administrators. The administrators interviewed included the four elementary

administrators and the district's director of curriculum and assessment. The composition of elementary teachers included three second grade teachers, three third grade teachers, five fourth grade teachers, six fifth grade teachers, and all four of the elementary accelerated math teachers, two each from fourth and fifth grades.

Potential participants were sent an email inviting them to voluntarily participate in the study. No individuals were coerced into participating. Consent forms were provided and explained. A description of how the study may potentially benefit the teachers and the schools overall was provided to participants, as the intent of the study was to do no harm and to leave the participants better off than before the study. Participants signed informed consent forms. Collected information was kept confidential (Creswell, 2014).

From the literature review on differentiated math instruction for groups of students within a grade, a set of interview questions was developed to provide the information necessary to answer the research questions. Each teacher and administrator interview was approximately an hour in length. All interviews were held on school property in classrooms designated by the building principals or the teachers. Each of the individual interviews were audio recorded and then transcribed after they were conducted.

In addition to interviews, Star Math assessment data for each of the second through fifth grade math classes were de-identified and collected for analysis in order to provide the Warrensburg R-VI School District with additional background data about the range of readiness levels of the students in each math class. Assessment scores were kept in a secure place and destroyed after the study.

Data Analysis

Constructivism uses social interactions to gather data from the study's participants through observations and interviews (Crotty, 1998). When the researcher uses a constructivist viewpoint, "the goal is to rely as much as possible on the participants' view of the situation being studied" (Creswell, 2014, p. 8). The data collected in this qualitative study was analyzed using a constructivist lens.

Once the interviews were transcribed, the transcripts were coded as suggested by Creswell's (2016) coding process. Throughout the coding process, the researcher remained aware of prior notions about differentiation in math instruction before beginning the study so the data were analyzed without bias (Merriam & Tisdell, 2016). Seidman (2013) reminded researchers of the importance of not analyzing the data with any preconceived theories in mind. After coding each of the transcripts, the individual interview codes were listed and then placed into thematic groupings. Any codes repeated throughout the interviews were noted. From the thematic groupings, the themes from the interviews were noted.

Additionally, field notes and STAR assessment data were reviewed. The range in grade equivalents as determined by Star Math for each ability grouped fourth and fifth grade math class in comparison to the range in grade equivalents had the classes not been ability grouped are reported in the appendix in the section Research Questions Answered. The distribution of grade equivalents for each second through fifth grade math class are reported in the same section of the appendix.

Grade equivalent (GE) scores are norm-referenced scores ranging from 1 to 12.9+. Since Star Math norms are not reported lower than first grade, a GE score below 1.0

would be reported as < 1 (Renaissance, 2019b). Grade equivalent scores allow for national comparison of students' assessment performance. As an example, a fourth grade student with a GE of 5.4 indicates that student performed as well as the average fifth grader at the fourth month in the school year. The grade equivalents reported for Star Math data can be capped at each grade level so that rather than a grade level and month reported, the GE reported is only listed greater than the maximum grade set for reporting purpose. Warrensburg R-VI School District administrators set Star Math data to report a maximum grade equivalent of > 8 for fifth grade students and a maximum of > 7 for fourth grade students rather than report GE scores up to 12.9+.

Limitations, Assumptions, and Design Controls

There are multiple limitations to this study. As this study involved only one Midwest Missouri school district which used unique groupings for elementary math instruction, the ability to generalize the findings to other school districts' math programs is limited. The data collected are specific to the setting for this study, and replication of this study would not be fully possible, as each school setting varies in a multitude of ways. While the transferability of this study is not high, a few of the findings for this study may be relevant for some school settings and some of the recommendations may apply to other schools' groupings for elementary math instruction.

Another limitation of this study is the researcher was a fifth grade teacher in the Warrensburg R-VI School District. Merriam and Tisdell (2016) noted in qualitative research, the researcher is solely responsible for the collection and analysis of data. Furthermore, the authors explained researchers have "shortcomings and biases that can

have an impact on the study” (p. 16). The researcher remained aware of potential bias throughout the study and responded in an ethical manner to limit the influence of bias.

The researcher was mindful of reflexivity. Creswell (2016) defined reflexivity as being “conscious of how my background and personal experiences shape my interpretation of the database” (p. 153). The researcher engaged in self-reflection and tried to eliminate personal bias by being aware of the biases brought into the study (Merriam & Tisdell, 2016). The use of a peer debriefer, to review the interpretations of the data, added validity to the study (Creswell, 2014). The researcher’s university advisor served as an external auditor to enhance the validity of the study (Creswell, 2014).

Design controls were in place throughout the study. In order to ensure the accuracy of the findings, the researcher triangulated multiple forms of data and upon analysis created and justified themes prevalent in the study (Creswell, 2014).

Definition of Key Terms

Students are grouped in a variety of ways in educational settings. Much of the debate over ability grouping is due to the terminology used when discussing ability grouping (Gentry, 2016; Loveless, 2013b; Neihart, 2007). To assist the reader of this study, the types of ability grouping and the terminology discussed in this study are described below.

Ability grouping: Ability grouping is the practice of grouping students for instruction based on teachers’ assessed levels of the students’ academic achievement. Students can be ability grouped within their larger class or between classes in a school (Buttaro & Catsambis, 2019). Loveless (2013b) noted ability grouping is most commonly used at the elementary level in education. Ability grouping is considered homogeneous

grouping as students with similar achievement levels are grouped for instruction (Slavin, 1987). While the term ability grouping is consistently utilized throughout literature, it has more favorably been referred to as attainment grouping so as not to suggest limitations based on inherent ability (Francis et al., 2017a).

Accelerated math: Accelerated math as used by the Warrensburg R-VI School District is the instruction of math that is one grade level ahead of the students' current grade level. Admittance into the accelerated program is based on student ability as demonstrated by such criteria as standardized assessments, daily work in class, and teacher recommendation. While the accelerated math classes in this study share the same name as the Renaissance math program, Accelerated Math, which individualizes math practice and assessments for students, this study of math in the Warrensburg R-VI School District does not include any use of Renaissance's Accelerated Math program (Renaissance, 2020). The math classes in the district are simply referred to as accelerated math as the students in them are working at an accelerated level compared to their same grade level peers.

Acceleration: Acceleration is considered an educational intervention for students who master learning at faster rates than their same age classmates or older students (Pressey, 1949). Acceleration accommodates the "level, complexity, and pace of the curriculum to the readiness and motivation of the student" (Colangelo, et al., 2004, p. xi).

Between-class grouping: Between class grouping is the placement of students into ability groups comprised of students from across the same grade level for instruction such as math or reading.

Differentiation: Differentiation is the practice of accommodating instruction for individual students based on differences in need such as “readiness level, learning style, interests, prior knowledge, experiences, socioeconomic status, personality and social skills” (Valiandes, 2015, p. 17).

Flexible grouping: Flexible grouping is a form of ability grouping based on student assessment and observation in which students are placed temporarily in a group to learn specific skills based upon individual need (Valentino, 2000). Response to Intervention (RtI) is a type of flexible grouping which became popular as schools identified as professional learning communities. With RtI, students of all achievement levels are temporarily grouped with other students for extra instruction to learn a specific concept or skill (Buffum, Mattos, & Weber, 2009), and students are continually regrouped based on their performance on common formative assessments (Muñoz & Branham, 2016).

Formative assessment: Formative assessment is the assessment of students’ learning where the results are used to provide data in order to guide instruction rather than to give a summative grade (Missett, Brunner, Callahan, Moon, & Azano, 2014). The data collected from formative assessments assist teachers in planning to best meet student needs (Missett et al., 2014). Common formative assessments are usually teacher created assessments for the purpose of assessing students’ learning, whereby the students completing the assessments are located in multiple classes across a single grade level. The results of the assessments are then used to create flexible groups for Response to Intervention.

Heterogeneous grouping: In heterogeneous grouping, which is also referred to as mixed-ability grouping (Valiandes, 2015; Slavin, 1987) and detracking (Tereshchenko et al., 2019), students with a variety of achievement levels are grouped for instruction (Valiandes, 2015; Slavin, 1987).

Homogeneous grouping: Students with similar achievement levels are grouped for instruction (Slavin, 1987). Homogeneous grouping is grouping by ability.

Response to Intervention (RtI): Response to Intervention is a type of flexible grouping where students of all achievement levels are temporarily grouped with other students for extra instruction to learn a specific concept or skill (Buffum, Mattos, & Weber, 2009), and students are continually regrouped based on their performance on common formative assessments (Muñoz & Branham, 2016).

Star Math assessments: Star Math, produced by Renaissance, is a comprehensive, computer adaptive assessment program which assesses K-12 math skills and provides extensive data about students' mastery of math concepts (Renaissance, 2019a).

Tracking: Tracking, known in Europe as streaming, applies to secondary schools whereby students are placed into a set of courses based on their ability (Neihart, 2007). Neihart (2007) informed the most widely utilized forms of tracking are for college-prep, vocational, and special education. According to Francis et al. (2017a), tracking “involves separating pupils according to academic ‘ability’ across all (or a majority of) subjects, so that pupils remain in the same group for all or most lessons” (p. 3).

Within-class grouping: Within-class grouping is when a teacher pulls a small group of students from the larger heterogeneous class, often after a whole class lesson, for specific instruction based on the students' need. Gentry and MacDougall (2009)

explained within-class groupings can either be homogenous or heterogeneous, usually depending on the teacher's discretion in order to accommodate student need. Students are regrouped as needed based on teacher assessment of their performance (Buttaro & Catsambis, 2019; Tieso, 2003). Such flexibility with the groupings is used with the intent to meet the needs of all students (Castle, Deniz, & Torta, 2005).

Zone of proximal development (ZPD): The zone of proximal development “is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 86).

Significance of the Study

The findings from this study will inform the Warrensburg R-VI School District administrators and teachers of perceptions and factors that may contribute to the successful planning for the future of the district's elementary math program.

Significant instructional decisions like ability grouping should not be based on conjecture, but by empirical research that provides administrators and educators alike with the knowledge to determine whether ability grouping is an effective instructional practice to implement school wide and/or individual classrooms for elementary students. (Bolick & Rogowsky, 2016, p. 40)

Knowing the math teachers' perceptions about the math program, including how it affects their instruction and their students' learning, can provide valuable insight about possible benefits or disadvantages for student learning. Being informed of the pros and cons of the current math program is crucial as the district plans for the future success of all students.

Successful understanding and retention of early mathematical foundations, or lack thereof, will impact students for the rest of their lives. Therefore, in order to provide the best math education possible, all aspects of the current math program of any school need to be made apparent before decisions are made for reform.

Collins and Gan (2013) commented the organization of students into classes can be readily changed without increased cost. Educational reform that costs little or no money is invaluable as most school districts struggle to maintain balanced budgets while they do more with less. If the results of this study suggest the need for a change in student composition of the math classes, regrouping students is a low or no cost reform to benefit students' math achievement. This study might also provide other valuable information about changes needed for improvement that may require little or no cost for the school district.

Summary

As the United States competes in a global market dominated by ever-advancing STEM based products and services, our school systems strive to provide an education for all students that will allow them to be capable of participating in such a market. Presently, our schools are not producing enough capable students, as indicated by standardized assessments such as ACT and state-mandated tests. With only 30.5% of Missouri eighth grade students scoring proficient or advanced on the Missouri Assessment Program tests, there is need to examine all aspects of math instruction especially at the earliest points possible in the educational system (Missouri Department of Elementary and Secondary Education, 2019c). Such an examination would include how students are grouped for math instruction.

As school districts continually assess their math programs to ensure they are providing the highest quality education for all students, it is necessary to consult the teachers, the individuals who know the math programs best. Teachers can give first-hand input about whether or not a math program is meeting individual student needs. Teachers' perceptions about math programs can reveal concerns and issues with certain aspects of a program that may not be apparent to those in the positions to enact reform. Such concerns need to be addressed in the planning stage before implementing change (Colangelo et al., 2004). As the Warrensburg R-VI School District assesses its elementary math program, the problem being confronted is the lack of understanding of the teachers' and the administrators' perceptions as they relate to the elementary math program. The purpose of this study was to acquire and understand the teachers' and administrators' perceptions of Warrensburg's elementary math program for the intent of program improvement to

benefit the learning of all students and to inform the Warrensburg R-VI School District superintendent of the findings of this study. The findings from this study will be beneficial to the Warrensburg R-VI School District as plans are made for the future of the elementary math program. In addition to benefiting the Warrensburg R-VI School District, the findings from this study can inform planning for other schools' math programs and potentially increase their student achievement.

Section Two:
Practitioner Setting for the Study

Introduction

Leaders of school districts are entrusted with a multitude of responsibilities, but one of the most important responsibilities they have, if not the most important, is the responsibility to ensure a quality education for all students. Warrensburg R-VI School District (2019b) communicates via their website “we are committed to provide effective resources and instruction that foster student success” (para. 4). In the following sentence, the district further conveys the belief “we are committed to effectively prepare students for future success” (para. 4). The superintendent of Warrensburg R-VI School District, Dr. Patrick, and his administrative team continually evaluate the education students receive at all grade levels.

History of the Organization

Warrensburg, Missouri

The Warrensburg R-VI School District is located in Warrensburg, Missouri which is located approximately 50 miles southeast of Kansas City. Incorporated as a city in 1855 and situated inside Johnson County, Warrensburg was originally a township called Warren’s Burg in honor of an early settler, Martin Warren, who settled in the area in 1833 (Warrensburg Convention & Visitors Bureau, 2019). Warren’s blacksmith shop became the county seat for Johnson County in 1836 (Warrensburg Convention & Visitors Bureau, 2019). In addition to the major employers for the area, the University of Central Missouri and Whiteman Air Force Base, other significant employers include Dollar Tree Distribution Center and multiple manufacturing firms including EnerSys Products, Stahl Specialty, Swisher Mower and Machine (Warrensburg R-VI School District, 2019a).

Warrensburg is known as the home of man's best friend due to a famous court case tried in its courthouse in 1870, the Old Drum trial, at which Senator Vest gave a eulogy for the plaintiff's hunting dog, Old Drum, who had been shot by a neighbor. Senator Vest lamented, "The one absolute, unselfish friend that man can have in this selfish world—the one that never proves ungrateful or treacherous—is his dog" (City of Warrensburg, 2019, para. 5). Visitors can tour the historic courthouse where the notorious trial took place, and Warrensburg proudly hosts an Old Drum festival every April for the community to celebrate with their best canine friends.

University of Central Missouri. In addition to honoring man's best friend, Warrensburg supports and honors the University of Central Missouri Mules. The university's mascot was adopted almost a century ago in 1922 by the then teacher training school (University of Central Missouri, 2019). The mascot was chosen in honor of the Jones Brothers Horse and Mule Barn which in the 1800s earned the city recognition as the Missouri mule capital based on their prize winning mules (City of Warrensburg, 2019). The University of Central Missouri began as a state normal school in 1871, and today it is a highly accredited university with a diverse population of more than 12,300 students (University of Central Missouri, 2019). The university's numerous programs of study draw students from almost every state and from 50 other countries (University of Central Missouri, 2019). The University of Central Missouri enriches Warrensburg's culture and economy.

Whiteman Air Force Base. Also enriching Warrensburg's culture and economy is Whiteman Air Force Base which is located about 10 miles east of the city outside of Knob Noster, Missouri. Whiteman Air Force Base is comprised of Air Force, Air Force Reserve, Air National Guard, and Army National Guard. Warrensburg is home to approximately 700 Whiteman veterans. In 2018, Whiteman Air Force Base employed 3,910 active duty military, 1,527 reserve/air and army national guard, and 1,969 civilians for a total of 7,406 employees (Whiteman Air Force Base, 2019). Every summer, approximately 50,000 people attend Whiteman Air Force Base's Wings Over Whiteman Air Show (Warrensburg Convention & Visitors Bureau, 2019).

Warrensburg demographics. The United States Census Bureau (2019) estimated Warrensburg's overall military veteran population at 1,814 and the city's total population at 20,262. The United States Census Bureau (2019) estimated the city's racial breakdown as: 84.5% White, 7.8% Black or African American, 1% American Indian, 2.5% Pacific Islander, 3.7% two or more races, and 3.8% Latino. The median household income for 2017 was \$40,483, and at that same time, an estimated 27.1% of the total population were living in poverty (United States Census Bureau, 2019). According to the United States Census Bureau (2019), 93.6% of persons 25 years and older in Warrensburg have graduated high school or higher, and 42% of persons 25 years and older in Warrensburg have a bachelor's degree or higher. While the University of Central Missouri's student population may affect both income and poverty, both the university and Whiteman Air Force Base contribute to the high levels of education present in Warrensburg's population. The university and air force base both affect the Warrensburg

R-VI School District student population, as well, by increasing the diversity in the student population and causing fluctuations in enrollment.

Warrensburg R-VI School District

Founded in 1866 (Warrensburg Missouri Chamber of Commerce, 2019, para. 1), the fully accredited public school district served 3,351 preschool through twelfth grade students in 2018 (Missouri Department of Elementary and Secondary Education, 2019a). The Warrensburg R-VI School District encompasses 121 square miles (Warrensburg R-VI School District, 2019a). The Missouri School Improvement Program (MSIP), which is responsible for overseeing the accreditation of Missouri's public schools, awarded the Warrensburg R-VI School District a perfect score of 100% on their most recent evaluation (Warrensburg R-VI School District, 2019a). This is quite an honor considering less than 25 Missouri school districts received such a score. Regarding the outstanding MSIP evaluation, Warrensburg's superintendent, Dr. Scott Patrick stated:

This recognition is earned through the hard work and dedication of our staff, our students and our community. The district's primary focus continues to be high student achievement. We accomplish this through a concentration on continual professional development, high-quality teaching strategies and attention to our curriculum. In addition, our staff members provide the support each student needs to succeed. We are fortunate to have an outstanding school board who believes in the importance of high student achievement. Everyone associated with the school district deserves recognition for this distinction. (Warrensburg R-VI School District, 2019a, para. 1)

The district serves its student population in seven different buildings which include four elementary schools, a middle school, a high school, and an alternative high school. Missouri Department of Elementary and Secondary Education (DESE) (2019a) reported the racial breakdown of the 3,351 students as 80.1% White and 7.8% Multiracial (para. 1). The overall free and reduced lunch rate for the district in 2018 was 35.9% (Missouri Department of Elementary and Secondary Education, 2019a). DESE further reported for 2018 the district paid an average teacher salary of \$46,448, an average administrator salary of \$94,047, the average years of experience of faculty as 12.9 years, 62.6% of teachers hold a master's degree or higher, average 14 students per teacher, 18 students per classroom teacher, and 200 students to each administrator (Missouri Department of Elementary and Secondary Education, 2019a).

Missouri Department of Elementary and Secondary Education's (2019a) most recent report for Warrensburg R-VI School District's gifted student population was for the year 2017, with the district having a total enrollment that year of 3,260 students, of which 3.04% were identified as gifted, for a total of 99 gifted students in the district. The Missouri Department of Elementary and Secondary Education (2019a) broke the 3.04% of gifted students down into 1.41% of gifted students not served and 1.63% of gifted students served through the state approved program. Of the 1.41% not served, 89.13% of these students identified as White, and the DESE report indicated the percentages of other racial groups were too small to report (Missouri Department of Elementary and Secondary Education, 2019a). Of the 1.63% of students served through the state approved program, 86.79% of these students were identified as White, and the DESE

report indicated the percentages of other racial groups were too small to report (Missouri Department of Elementary and Secondary Education, 2019a).

Warrensburg R-VI School District boasts about its major achievements. Since 2009, almost 40 million dollars have been spent on both new construction and renovations to update the district's facilities (Warrensburg Missouri Chamber of Commerce, 2019, para. 2). Another accomplishment of the school district is the pervasive use of technology integration for both classroom instruction and student use for learning. Several elementary classrooms have iPads for each student. All of the elementary buildings have classroom sets of technology available for teachers to check out from the library and use with their students.

The school district offers an exceptional, comprehensive range of programs to meet all students' educational needs including preschool, all day kindergarten, and a before and after school program which offers hands-on learning for science, technology, engineering, art, and math and is available at no cost for all students. High school students can participate in Missouri's A+ Program which provides students with tuition assistance at any of the state's public vocational and technical schools or public community colleges. Students may also attend the Warrensburg Area Career Center which "offers programs in information technology management, computer programming, nursing, automobile mechanics, auto body repair, agriculture, building trades, office technology, and cosmetology" (Warrensburg R-VI School District, 2019a, para. 9).

Maple Grove Elementary

Maple Grove Elementary houses preschool through second grade students.

Missouri Department of Elementary and Secondary Education (DESE) (2019a) reported for 2018 the racial breakdown of Maple Grove's 390 students as 1.3% Asian, 5.1% Black, and 4.9% Hispanic, 9% Multiracial, and 79% White. The free and reduced lunch rate for the school in 2018 was 46.6% (Missouri Department of Elementary and Secondary Education, 2019a). The DESE report indicated the percentage of gifted students was too small to report (Missouri Department of Elementary and Secondary Education, 2019a).

DESE further reported for 2018 at Maple Grove the average teacher salary of \$46,723, an average administrator salary of \$100,818, the average years of experience of faculty as 12.3 years, 68.8% of teachers hold a master's degree or higher, 12 students per teacher, 17 students per classroom teacher, and 390 students to each administrator (Missouri Department of Elementary and Secondary Education, 2019a). The principal at Maple Grove Elementary has served 20 years in the district (Missouri Department of Elementary and Secondary Education, 2019a). In addition to a full-time principal, an assistant principal was hired for the 2019 through 2020 school year. This administrative position is a full-time position with half of the time being served at Maple Grove Elementary and the other half at Martin Warren Elementary.

Martin Warren Elementary

Martin Warren Elementary houses third through fifth grade students. Missouri Department of Elementary and Secondary Education (DESE) (2019a) reported for 2018 the racial breakdown of Martin Warren's 393 students as 1.8% Asian, 4.6% Black, 3.6% Hispanic, 6.4% Multiracial, and 83.5% White. The free and reduced lunch rate for the school in 2018 was 36% (Missouri Department of Elementary and Secondary Education, 2019a). The DESE report indicated the percentage of gifted students was too small to report (Missouri Department of Elementary and Secondary Education, 2019a).

DESE further reported for 2018 at Martin Warren the average teacher salary of \$46,703, an average administrator salary of \$86,965, the average years of experience of faculty as 13.9 years, 65.1% of teachers hold a master's degree or higher, 14 students per teacher, 17 students per classroom teacher, and 393 students to each administrator (Missouri Department of Elementary and Secondary Education, 2019a). The principal at Martin Warren Elementary has served 12 years in the district (Missouri Department of Elementary and Secondary Education, 2019a).

Ridge View Elementary

Ridge View Elementary houses preschool through second grade students. Missouri Department of Elementary and Secondary Education (DESE) (2019a) reported for 2018 the racial breakdown of Ridge View's 403 students as 3.2% Black, 1.5% Hawaiian/Pacific Islander, 4.2% Hispanic, 8.2% Multiracial, and 82.1% White. The free and reduced lunch rate for the school in 2018 was 42.8% (Missouri Department of Elementary and Secondary Education, 2019a). The DESE report indicated the percentage

of gifted students was too small to report (Missouri Department of Elementary and Secondary Education, 2019a).

DESE further reported for 2018 at Ridge View the average teacher salary of \$45,481, an average administrator salary of \$74,651, the average years of experience of faculty as 13.3 years, 45% of teachers hold a master's degree or higher, 12 students per teacher, 17 students per classroom teacher, and 403 students to each administrator (Missouri Department of Elementary and Secondary Education, 2019a). The principal at Ridge View Elementary has served 19 years in the district (Missouri Department of Elementary and Secondary Education, 2019a). In addition to a full-time principal, an assistant principal was hired for the 2019 through 2020 school year. This administrative position is a full-time position with half of the time being served at Ridge View Elementary and the other half at Sterling Elementary.

Sterling Elementary

Sterling Elementary houses third through fifth grade students. Missouri Department of Elementary and Secondary Education (DESE) (2019a) reported for 2018 the racial breakdown of Sterling's 438 students as 2.5% Asian, 4.8% Black, 1.1% Hawaiian/Pacific Islander, 5.5% Hispanic, 11.6% Multiracial, and 74.2% White. The free and reduced lunch rate for the school in 2018 was 43% (Missouri Department of Elementary and Secondary Education, 2019a). The DESE report indicated the percentage of gifted students was too small to report (Missouri Department of Elementary and Secondary Education, 2019a).

DESE further reported for 2018 at Sterling the average teacher salary of \$47,613, an average administrator salary of \$74,651, the average years of experience of faculty as

14 years, 74.7% of teachers hold a master's degree or higher, 16 students per teacher, 22 students per classroom teacher, and 438 students to each administrator (Missouri Department of Elementary and Secondary Education, 2019a). The principal at Sterling Elementary has served six years in the district (Missouri Department of Elementary and Secondary Education, 2019a).

Accelerated Math in Warrensburg R-VI School District

While the accelerated math classes in this study share the same name as the Renaissance math program, Accelerated Math, which individualizes math practice and assessments for students, this study of math in the Warrensburg R-VI School District does not include any use of Renaissance's Accelerated Math program (Renaissance, 2020). The math classes in the district are simply referred to as accelerated math as the students in them are working at an accelerated level compared to their same grade level peers.

Accelerated math classes were utilized at Warrensburg Middle School for grades six through eight before they became available for elementary students. Prior to elementary level accelerated math classes, which have been utilized for at least 31 years, (J. Ritchhart, personal communication, September 2019), teachers utilized ability grouping for the subjects of reading and math. Students were placed into ability groups including high, intervention, and on grade level groups according to test scores and daily performance in the subject areas. These groups were considered to be fluid as students could move up or down within the ability groups based on their success (J. Ritchhart, personal communication, September 2019).

Accelerated math classes were first introduced at Sterling Elementary which originally housed only fourth and fifth grade students (J. Finnane, personal communication, September 2019) and was an option for both fourth and fifth grade students (E. Heimsoth, personal communication, September 2019). Students in the accelerated math classes were taught the math curriculum of the grade above them, and a strong emphasis was placed on problem solving strategies (J. Ritchhart, personal communication, September 2019). The original intent of the accelerated classes was to meet the needs of higher performing students and to enable students to take a higher level math class in high school, affording them more math credits upon graduation and allowing them to be better prepared for higher education (J. Ritchhart, personal communication, September 2019).

A variety of criteria were used to determine which students qualified for placement in the fourth and fifth grade accelerated math classes. Some of the criteria utilized at the inception of the accelerated classes included an IQ test, standardized test scores on the Missouri Mastery Achievement and later on the Missouri Assessment Program, math grades, classroom performance, teacher recommendation, and at times, parent input (J. Ritchhart, personal communication, September 2019). Later, all students were given a math test which would be used to identify the students eligible for accelerated math (J. Finnane, personal communication, September 2019). The accelerated math program encountered some challenges over time, as occasionally parents were not pleased if their children were not accepted into the accelerated classes and some issues existed amongst staff surrounding the math program (D. Orr, personal communication, September 2019).

As of the 2019 school year, the only elementary grades in Warrensburg utilizing accelerated math classes are fourth and fifth. At the end of the third grade, all students are given an assessment that serves as a universal screening tool to identify which students will be accepted into accelerated math for fourth grade. In order to be accepted in the district's gifted program, all second grade students are universally screened using an assessment which students take at the end of the school year. Admittance into the gifted program for third grade does not automatically qualify students for accelerated math in the fourth grade. They still go through the same universal screening process at the end of the third grade to qualify for accelerated math. If students do not qualify for accelerated math based on the assessment taken at the end of the third grade, they can still qualify in both fourth and fifth grade for admittance into the program for the following year.

Equitable Opportunity to Learn

Missouri Department of Elementary and Secondary Education (DESE) (2019b) encouraged all school districts to routinely evaluate their program to ensure they are equitable for all students. Part of the equity evaluation included application of the state's equity index rule to examine the participation of all subgroups in gifted programming (Missouri Department of Elementary and Secondary Education, 2019b). A culmination of research on traditionally underrepresented students in gifted indicated "that there are gaps in their content knowledge or basic skills that need to be addressed to help ensure their success in the gifted program" (Missouri Department of Elementary and Secondary Education, 2019b, p. 7). To address these gaps, DESE (2019b) recommended that schools utilize a variety of opportunities to create more equitable learning such as implementation

of Response to Intervention, provide after school tutoring, offer summer enrichment opportunities, and hold parent meetings to explain student learning goals.

Warrensburg R-VI School District implements each of these recommendations for their elementary students. Response to Intervention is being utilized by all Warrensburg elementary teachers as an integral part of their work as professional learning communities. Warrensburg R-VI School District has a grant funded before and after school program called Adventure Club which provides free tutoring services for all elementary students in the program. Students may join Adventure Club, free of charge, at any point during the year. Adventure Club, in conjunction with the district's summer school program, also offers summer enrichment opportunities including field trips. All schools within the district hold parent-teacher conferences to discuss student goals and expectations. The elementary school teachers are held accountable for achieving 100% parent participation rate for parent-teacher conferences. Ideally, all parents will come into the schools for conferences. However, if they are unable to attend a conference at the school, teachers will complete conferences via phone. If teachers are unsuccessful in reaching parents, elementary principals, along with the school counselor or social worker, conduct conferences through home visits. Warrensburg R-VI School District works diligently to ensure equitable learning opportunities for all students.

Missouri Department of Elementary and Secondary Education (2019b), maintained that districts need to ensure equitable learning opportunities for all students and emphasized "pathways with programming for low-income, high-ability learners should begin in kindergarten (or earlier) and continue through grade 12 and beyond" (p. 8). School districts need to allow for entry points to these pathways. According to DESE

(2019b), students who do not qualify for the gifted program should be considered for enrichment programming “to develop an academic or talent aptitude and promote achievement and growth” (Missouri Department of Elementary and Secondary Education, 2019b). DESE (2019b) further explained consideration for gifted programming should not be a one-time incident. Rather, consideration should continue throughout education up to twelfth grade. Accelerated math classes are one way in which the district offers enrichment programming for students. Elementary students within the district also experience enrichment opportunities through the use of Response to Intervention and other flexible ability groupings used within the classroom setting.

The Adoption of New Math Curriculum

In the spring of 2017, the Warrensburg R-VI School District began the process of adopting a new elementary math curriculum. The curriculum director began the process by choosing elementary math textbooks and related curriculum materials from four different companies. The curriculum director received sample teacher manuals, student textbooks, and other related materials for each grade level, kindergarten through sixth, from each of the four companies. The sixth grade materials were needed as the fifth grade accelerated math classes use the sixth grade curriculum. Each of the four elementary buildings in the district received sample curriculum materials for their corresponding grade level teachers to evaluate. Sample materials were placed in central areas in the building where all teachers would have access to them. The curriculum director sent an evaluation form to all elementary teachers, which the teachers then used to rate each of the four companies’ materials. Teachers then sent their completed evaluations back to the curriculum director. The curriculum director utilized this information to narrow the

curriculum selection down to the top two companies according to the teachers' evaluations.

For the next step in the elementary math curriculum adoption process, the curriculum director designated two representatives from each grade level from each of the four elementary buildings to serve on the math curriculum adoption committee. Both of the companies were invited to present an overview of their math curriculum and materials to the adoption committee during a three hour time slot at the district's central office. Each of the companies brought sample materials and the presenters from both companies modeled sample lessons using their math textbooks, online offerings, and student manipulatives from the kits available for purchase. Teachers were allowed to ask questions of each of the company's presenters during the two presentations.

Upon completion of the companies' presentations, all of the teacher representatives on the math curriculum adoption committee met for a three hour collaborative meeting in the computer lab of the district's alternative school to discuss what each of them believed to be the pros and cons of each of the two companies' materials. After a time period of multi-grade small group discussion at different tables, each of the eight groups shared the overall findings of their discussions with the whole group of representatives. Following this sharing time, the curriculum director placed the teachers in eight new small groups. Discussion in these groups centered around once again comparing the pros and cons of the two companies' math materials.

After teachers in the new groups had time to adequately discuss, the curriculum director requested that teachers with strong beliefs about why one company's curriculum and materials were better than another, stand and give a persuasive explanation for their

choices. Once everyone had an opportunity to speak, each table group was asked to come to a consensus about from which company the district should purchase elementary math materials. When every table group had come to a consensus, a vote was taken with each table group revealing their vote. The outcome of the vote was six to two in favor of purchasing the new elementary math curriculum from Math in Focus.

The curriculum director then purchased the Math in Focus materials for each of the grade levels and classes at the four elementary buildings. Materials arrived before the end of the school year, allowing teachers time to review the new curriculum prior to the beginning of the next school year in which they would be utilized. During teacher inservice days in August of 2018, professional development on the new math curriculum was provided to all elementary teachers. Additional professional development was provided two more times during the school year with the district utilizing an instructional coach from a neighboring school district to assist teachers with learning all of the aspects of the Math in Focus curriculum. Professional development was again provided in August of 2019 prior to the start of the new school year with the same instructional coach leading the professional development. For the 2019 professional development, the teachers were divided into two groups, lower and upper elementary, to better facilitate meeting the instructional needs of the various grade levels.

Organizational Analysis

The Warrensburg R-VI School District, the organization which is the focus for this study, was analyzed using Bolman and Deal's (2013) four-frame model which allows a situation to be viewed through four different lenses: structural, human resource, political, and symbolic. Howard, Logue, Quimby, and Schoeneberg (2009) noted the

practice of reframing or “using multiple frames helps organizations and individuals go beyond the limitations of habitual perception to achieve a more systems-level perspective” (p. 26). Viewing this study in light of the four different frames involves thinking about the instructional options for math from multiple perspectives, thereby, promoting the development of a variety of ideas for change which will be beneficial for providing recommendations for improvements for the district’s elementary math program (Bolman & Deal, 2013). As Warrensburg R-VI School District administrators seek to evaluate the elementary math program and continually improve learning for all students, Bolman and Deal (2013) explained utilization of the frames can help predict possible difficulties inherent with change, ultimately facilitating overall success. The authors warn failure ensues when only the structural frame is considered, neglecting the human, political, and symbolic frames (Bolman & Deal, 2013). While the Warrensburg R-VI School District functions primarily within the structural and human resource frames as noted for the purposes of this study, all four frames warrant analysis.

An assumption of the structural frame specifies measures for coordination and control must be in place for the various aspects of an organization to function in a complementary manner (Bolman & Deal, 2013). The Warrensburg R-VI School District structure is designed in a manner which aligns to Mintzberg’s (1979) model of structural configuration and, as such, all diverse efforts of the components mesh and complement the others. The components of Mintzberg’s (1979) model include the strategic apex, the middle line, the operating core, the technostructure and the support staff (Bolman & Deal, 2013; Mintzberg, 1979). The superintendent and the school board comprise the strategic apex, and together they monitor the environment and establish the district’s mission

(Bolman & Deal, 2013). The middle line consists of building administrators and other members of the administrative team who oversee the measures in place for coordination and control within the schools and ensure necessary resources are available to meet the needs of the students (Bolman & Deal, 2013). The operating core is made of all of the teachers who provide the service of educating the students (Bolman & Deal, 2013). The support staff consists of the numerous staff such as custodians, secretaries, and paraeducators who assist the administrators and teachers in order for the successful operation of the schools (Bolman & Deal, 2013). The technostructure is comprised of the specialists who regulate the district's operations (Bolman & Deal, 2013). For the school district, the technostructure consists of employees within the school system as well as those outside of the school such as members of state and federal government who oversee education.

The structural frame is a fitting lens through which to view the Warrensburg R-VI School District as the essential purpose of education is to educate all students, and this purpose is realized when all students meet their goals and master the learning objectives. The structural frame assumes the purpose of organizations is the realization of goals and objectives (Bolman & Deal, 2013). The structural frame focuses on “an organization's circumstances, including its goals, technology, and environment” (Bolman & Deal, 2013, p. 42). Bolman and Deal (2013) pointed out structure needs to be planned with consideration of the end goals, the unique environment, and the available resources, especially the human resources. When Warrensburg R-VI school district administrators decided it was time to adopt a new math curriculum, they considered all of the aforementioned: the overall desired goals, the unique environment of the district

including the academic needs of the students and professional development for the teachers, and the funding available for curriculum materials.

Bolman and Deal (2013) explained when designing the social architecture of an organization, there are two important questions to ask “How do we allocate responsibilities across different units and roles? And, once we’ve done that, how do we integrate diverse efforts in pursuit of common goals?” (p. 44). The Warrensburg R-VI School District has appropriated responsibilities for all employee positions within the district. At the elementary level, teachers are informed of their responsibilities through their contractual agreements, faculty handbooks, and meetings with the building administrators and their professional learning teams. As a professional learning community, the district teachers are structured by teams according to subject area or grade level. Each professional learning community team is responsible for achieving common goals set forth by the team as well as by building and district administrators.

The entirety of public education ubiquitously depends on what “people do to and for one another” (Bolman & Deal, 2013, p. 113). The human resource frame provides the means to empower teachers and all other school district employees by promoting involvement, continual improvement to practice, teamwork, and recognition of the significance of the work (Bolman & Deal, 2013). As a professional learning community, the Warrensburg R-VI school district fosters teams which will redesign instruction to meet students’ needs and infuse their work with meaning as they collaborate to achieve goals. The human resource frame emphasizes the importance of analyzing the relationship amongst people and the organizations they belong to and determining if the needs of each are being fulfilled (Bolman & Deal, 2013). Warrensburg’s curriculum

director coordinated the math curriculum adoption process and ensured the needs of the district's students and teachers were taken into consideration in order to select curriculum that best fit the needs.

The adoption of a new elementary math curriculum results in a substantial expenditure for a school district. Public schools are continually expected to do more with less; therefore, public schools do not often experience the adoption of a new curriculum which encompasses teacher manuals, textbooks for every student, and other supplemental materials for both teachers and students. The political frame involves the allocation of limited resources within an organization and places politics at the center of the decision making (Bolman & Deal, 2013). Prior to the adoption of the new math curriculum, Warrensburg's elementary teachers used a plethora of math resources to aid in math instruction, including math textbooks that had been purchased by the district over 20 years ago. In order to meet the expectations of student achievement set forth by the state, Warrensburg administrators needed to provide teachers with a common resource that included instructional support for a majority of the state's math standards.

Warrensburg students, staff, alumni, and community members take great pride in being the Warrensburg Tigers. As you drive around Warrensburg and the surrounding countryside that is part of the school district, several Warrensburg Tigers signs can be seen proudly representing the community's support of the schools and their sports teams. The symbolic frame highlights how people make sense of and give meaning to the disorderly world around them (Bolman & Deal, 2013). Students, their parents, and community members recognize the tiger as a symbol for the school district and join in the celebrations and the traditional rituals of the district. Sporting events, homecoming,

award ceremonies, and graduations bring together people who support the students, teams, staff, schools, the district, and education.

Teachers touch students' lives and forever change them. Alumni often remember the symbolic aspects of their education. Almost every graduate can tell you a story about a favorite teacher. "We carry lessons of teachers, parents, and others with us. Their exploits, animated through stories, serve as guides to choices we make in our personal lives and at work" (Bolman & Deal, 2013, p. 253). All of the symbolic aspects of the Warrensburg R-VI School District help to create the culture which is apparent and can be witnessed in each of the district's schools and at ceremonies and events. The symbolic frame allows us to connect emotionally and passionately to the Warrensburg schools and what the district represents.

Leadership Analysis

The Warrensburg R-VI School District's administrative team cumulatively shares a considerable number of years of service to the district. The administrators and their number of years of service in the district, according to Missouri Department of Elementary and Secondary Education (DESE) (2019b), are as follows: superintendent, 17 years; assistant superintendent of student services, eight years; assistant superintendent of support services, 12 years; director of curriculum and assessment, nine years; high school principal, nine years; principal of the alternative school, 20 years; middle school principal, 22 years; Maple Grove Elementary Principal, 20 years; Martin Warren Elementary Principal, 12 years; Ridge View Elementary Principal, 19 years; and Sterling Elementary Principal, 6 years. DESE (2019b) did not report the number of years in district for the assistant principals at the high school and middle school. The middle

school acquired a new half-time assistant principal position in the fall of 2019, as did the four elementary schools. The middle school assistant principal also serves half-time in a teaching position. Maple Grove Elementary and Martin Warren Elementary share an assistant principal which equates to a full-time administrative position. Ridge View Elementary and Sterling Elementary share an assistant principal which also equates to a full-time administrative position.

Warrensburg's administrative team acts as both leaders and managers. Kotter (1990/2011) pointed out "leadership and management are two distinctive and complementary systems of actions" (p. 37). Northouse (2016) similarly explained "leadership and management are different concepts that overlap" (p. 17). Northouse (2016) further commented that "management traditionally focuses on the activities of planning, organizing, staffing, and controlling, whereas leadership emphasizes the general influence process" (p. 17). Leadership and management both involve working with people and accomplishing tasks; yet, they are quite distinct from one another. Leadership is defined as "a process whereby an individual influences a group of individuals to achieve a common goal" (Northouse, 2016, p. 6). The purpose of management, as explained by Kotter (1990), is "to provide order and consistency to organizations" (Northouse, 2016, p. 13). Kotter (1990/2011) further stated that "management is about coping with complexity," and "leadership, by contrast, is about coping with change" (p. 38). Kotter (1990/2011) asserted "to be effective, organizations need to nourish both competent management and skilled leadership" (p. 13). Each administrative leader in Warrensburg impacts the teachers and other support staff by

offering encouragement and guidance throughout the multifaceted, ever-changing, day-to-day operations within the district, as well as the arena of education.

Kotter (1990/2011) indicated that leaders set a direction based on their vision and plan for the short term as well as for the long term. Superintendent Dr. Patrick and his administrative team lead the Warrensburg R-VI School District with a vision of quality education for all students. “We are committed to provide effective resources and instruction that foster student success” in order “to effectively prepare students for future success” (Warrensburg R-VI School District, 2019b, para. 4). Dr. Patrick and his administrative team continually assess the quality of the curriculum and the instruction provided to the districts’ students for the purpose of providing the best education possible for all students.

Implications for Research in the Practitioner Setting

Leaders are continuously striving to better understand the environments they are functioning in (Ancona, Malone, Orlikowski, Senge, 2007/2011). When evaluating best practice for all students, administrators and teachers need to meet the unique needs of the school settings in which they are practicing (Dirkx, 2006). Dr. Patrick deems an evaluation of the math programming at the elementary level necessary to provide data to district administrators and teachers about the effectiveness of the program as to whether or not it is meeting the needs of all students. Warrensburg R-VI School District currently utilizes ability grouping for elementary math instruction in the form of regular and accelerated math classes. Obtaining the elementary math teachers’ perceptions about students’ learning and their perceptions about the grouping practices for math will

provide valuable information about the district's unique context for the purposes of math program evaluation.

In an era of educational accountability, school administrators are evaluating academic programs and contemplating change. At times, change is necessary for programs to improve. Bolman and Deal (2013) noted people usually desire change, but they do not want to have to change what they are doing. Warrensburg R-VI School District has been implementing the use of ability grouping for elementary math instruction longer than the current central office administrators, the elementary administrators and the elementary math teachers have served in the district.

Bolman and Deal (2013) emphasized change within an organization is a multifaceted task. The authors further noted "planning without broad-based participation that gives voice to the opposition almost guarantees stiff resistance later on" (Bolman & Deal, 2013, p. 377). Bolman and Deal (2013) advised visionaries need to predict possible organizational conflicts to minimize the possible barriers that may impede change. This study will allow teachers to have a voice in assessing the elementary math program. In addition, it may provide district leaders with beneficial information about issues that may arise if changes are made to the current practices of the elementary math program.

Summary

It is evident that Warrensburg R-VI School District strives to maximize student achievement and to prepare all students for future success. The district is structured according to Mintzberg's (1979) model of structural configuration. As such, the superintendent shares his vision, oversees the changes in the environment, and sets a course of action (Bolman & Deal, 2013). The rest of the district's administrators oversee

the complex daily operations in their various settings and provide their teachers and staff with evaluative feedback and necessary resources (Bolman & Deal, 2013). The teachers are responsible for following the directives set forth by the superintendent and the administrative team. The distinct efforts of each of the components of the district's organizational structure work together to achieve the mission of fostering student success. In an effort to help ensure success for all students, the superintendent desires a review of the long-standing practice of ability grouping for math instruction.

Section Three:
Scholarly Review for the Study

Introduction

United States politicians are notorious for a litany of public comments calling for educational reform. Much of the outcry has surrounded the nation's ability to be a competitive force in the global marketplace. Media portrays the United States educational system as not being as effective as the educational systems of other nations leading to a societal demand for improvements in science, technology, engineering, and math in the nation's public schools. For the United States to be competitive in the global market and to fill science, technology, engineering, and math (STEM) jobs with qualified employees, our nation's schools need to offer high-quality mathematics programs for students beginning at the start of their education.

Schools are responding to the demand by focusing on the increase of student achievement through a more rigorous curriculum and pushing skills that were once propriety of higher grade levels into the lower grades (Mullis, Martin, & Loveless, 2016). The response by schools for improvements in student achievement has not been successful. Standardized assessments still indicate the need for an increase in the number of students scoring at the proficient and advanced levels ("The Nation's Report Card: NAEP Mathematics Report Card," 2017). In fact, on the ACT, an assessment that is often used as an indicator of student college readiness, students' scores in math are at an all time low (Gewertz, 2018). Not only is an understanding of mathematical concepts necessary in order to function effectively in everyday life, such knowledge is also vital for the comprehension of STEM concepts (Katz, 2015). "Early math knowledge is one of the strongest predictors of math grades in high school, high school graduation, and college entry" (Fuson, Clements, & Sarama, 2015, p. 64). "Young adolescents with

profound talent in mathematical and verbal reasoning hold extraordinary potential for enriching society by contributing creative products and competing in global economies” (Kell, Lubinski, & Benbow, 2013, p. 658). Given the importance of STEM careers and the goods and services that come from them, it is imperative for American students to receive a high-quality education which includes an understanding of mathematical concepts and the ability to apply them (OECD, 2017).

Missouri’s students fared no better in public opinion of obtaining adequate success than the rest of the nation’s students on standardized math tests (Missouri Department of Elementary and Secondary Education, 2019c). Only 30.5% of Missouri’s students preparing to enter their freshman year of high school scored either proficient or advanced (Missouri Department of Elementary and Secondary Education, 2019c). At this point, it becomes nearly impossible for students to become college-ready by their high school graduation. Buttaro and Catsambis (2019) explained as lower achieving students progress through their education, they may benefit from ability grouping where teachers provide them different modalities of learning; however, the authors warned “placement for even one year in a particular ability group in the early grades predicts differences in students’ educational experiences years later, as they are about to finish middle school and enter high school” (p. 33). Buttaro and Catsambis (2019) further noted restriction of students to the same groupings increases the gaps in student achievement each year students are maintained in those same groups. Buttaro and Catsambis’ (2019) findings have important implications for school planning teams that are considering the use of ability grouping. Missouri educators, along with educators from across the nation, will

need to critically examine the various ways in which they group students for instructional purposes.

Warrensburg R-VI School District is planning the reformation of its elementary math program in order to ensure the highest quality math education is made available to all students but also so every student can show an increase in achievement. An accelerated math class is offered at each of the fourth and fifth grade levels. The accelerated math students are instructed using the curriculum of the following grade level; therefore, fourth grade accelerated math students are being taught fifth grade math curriculum and the fifth grade accelerated math students are being taught sixth grade math curriculum. Accelerated math students are identified for entry into the accelerated math class at the third grade level based on assessments, grades, and teacher recommendation. Students not in the accelerated class can later be identified for acceleration the following year of school using similar criteria. Warrensburg R-VI School District is contemplating the addition of an accelerated math class for third grade students who would be identified for acceleration while they are in second grade.

In order to best meet the needs of all students, Warrensburg R-VI School District's administrators and planning team will need to analyze the current math program noting what is working well for student learning and what needs to be changed for improvement. Concerns need to be identified and well-thought plans need to be made to address them during the planning stage of the math program (Colangelo et al., 2004). Park and Datnow (2017) explained "teachers, school leaders, and district administrators share overlapping spheres of influence on curriculum and instruction" (p. 303). While the administrative team in Warrensburg holds the authoritative decision making power to use

accelerated classes for upper elementary math instruction, teachers “have a great deal of autonomy in determining classroom grouping practices” (Park & Datnow, 2017, p. 303). It is imperative during the planning stage to understand the teachers’ perceptions regarding the current math program (Gentry, 2016). The perceptions of teachers and administrators about Warrensburg’s math program at the elementary level are currently unknown. Therefore, the problem being addressed is the lack of understanding of the stakeholders’ perceptions as they relate to the elementary math program.

Changes to accelerated courses are often implemented on an impromptu basis without consideration of teacher input or future impact on student learning (Colangelo et al., 2004). Many times in education, changes made in curriculum and instruction are impromptu and inadequately researched before implementation (Colangelo et al., 2004). The purpose of this qualitative study is to collect and analyze data regarding the perceptions of the teachers and the administrators regarding the current math program and to inform the Warrensburg R-VI School District superintendent of the findings of this study to benefit the planning of the math program.

Theoretical Framework

Constructivism

Constructivism is “a way of coming to know one’s world” (Brooks & Brooks, 1999, p. 23). According to constructivist theory, learners “build personal interpretations of the world based on individual experiences and interactions” (Ertmer & Newby, 2013, p. 55). The theory for this study is based on the work of two prominent constructivist theorists, Piaget and Vygotsky. While Piaget focused on the individual as being primarily responsible for the construction of knowledge, which is known as cognitive

constructivism, Vygotsky concentrated on the essential impact others have on an individual's learning, known as social constructivism (Öztürk, 2016). Both cognitive constructivism and social constructivism are learning theories that attempt to explain how students learn.

Piaget

Based on his theory of cognitive development, Piaget (1972), pointed out children's ability to think abstractly develops in stages: sensorimotor, pre-operational, concrete operational, and formal operational. Piaget (1972) further stated "the rate at which a child progresses through the developmental succession may vary" (p. 1). The author advocated the view that when encountered with something new, children adapt their cognitive structures to allow for the new information. As not all students develop at the same rate, acceleration is a fitting option for students who develop at a faster rate.

Vygotsky

The use of acceleration in student learning can be thought of in terms of Vygotsky's (1978) work on learning and development. Vygotsky (1978) viewed learning as a social event and emphasized the learner should be challenged. According to Vygotsky (1978), the fastest learning happens when a child can do or figure something out with help when, otherwise, the child would not be able to do the same thing independently. To explain the difference between the point where the child needs help and the point where the child has acquired the new learning and is now independent, Vygotsky (1978) developed the Zone of Proximal Development. This zone is considered to be "just beyond what the learner/apprentice could accomplish by him or herself"

(Merriam & Bierema, 2014, p. 119). Vygotsky (1978) indicated it is while in this zone that the learner experiences the most optimal learning.

Gambrell, Morrow, and Pressley (2007) explained teachers should first assess students' background knowledge and then build upon it by connecting it with an introduction to new concepts and expectation of students to perform at higher proficiency levels. High-ability learners thrive when teachers provide them with challenging work as new learning is developed when students participate in unfamiliar, complex tasks (Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, 2015). Vygotsky (1978) informed when learners are challenged, they are able to problem solve with the assistance of those who are more knowledgeable. Students placed in accelerated classes benefit from learning from their high-ability classmates.

An Overview of Ability Grouping

Why Schools Use Ability Grouping

Vastly diverse student populations. The United States' public schools are comprised of vastly diverse student populations. Students come to school with a wide range of differences too numerous to list, but some main differences include home life, race, socio-economic status, cultural background, language, previous academic achievement, cognitive skills, and background knowledge in general. Castle, Deniz, and Torta (2005) observed the range of student ability in one classroom can vary from three to five years. Missouri's public schools mirror the diversity of the rest of the nation. Both in the past and present day, due to the vast differences amongst students in just one classroom, educators struggle to determine the most effective way to group students for instruction (McKeen, 2019; Slavin, 1987, 1990). The practice of ability grouping is most

common in large public schools having student populations with vastly diverse racial, academic, and socio-economic differences (Bolick & Rogowsky, 2016; Condrón, 2008; Nomi, 2010). Nomi (2010) noted the use of ability grouping was less common in smaller public and private schools and schools with admittance requirements. One way in which teachers accommodate the vast number of student differences and learning needs is through the use of differentiation.

When teachers differentiate for students, they plan instruction based on individual student needs. Differentiation often requires teachers to adapt lessons designed for whole class instruction to meet the unique needs of individual students. Valiandes (2015) explained in order for differentiation to be effective, it is necessary for teachers to have sufficient content knowledge concerning the subject matter they are teaching. In addition to having basic content knowledge, teachers also need to be knowledgeable about each individual student's needs and abilities (Valiandes, 2015). While the use of differentiation is beneficial as it promotes equity in learning for all students (Valiandes, 2015), it is not often possible, as it requires a vast amount of planning time teachers normally do not have. Ability grouping, on the other hand, is a more feasible practice for teachers as less planning time is required to differentiate for a few groups of students rather than for several individual students.

Benefits both students and teachers. In the United States, it is common practice for students in the same class to receive the same instruction either as a whole class or in smaller heterogeneous groups (Loveless, 2013b). However, ability grouping in the United States is on the rise (Loveless, 2013b), and ability grouping students for instruction is routine practice in several countries (Chmielewski, 2014). Studies indicate the practice of

ability grouping benefits both students and teachers. Ability grouping is thought to be more beneficial than whole class instruction as it minimizes the number of differences by grouping students who are similar in achievement for instruction, thereby benefitting all students (Nomi, 2010) and the teachers as well, as they will not have as many student needs to plan for and address during instruction. Chorzempa and Graham (2006) surveyed first through third grade teachers and found the number one reason teachers gave for ability grouping was to better meet individual students' needs, indicating the teachers believed ability grouping was beneficial to students' learning.

Professional learning communities. Professional learning communities (PLCs) are pervasive throughout our nation's schools. DuFour, DuFour, Eaker, and Many (2010) define a professional learning community as "an ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve" (p. 11). DuFour (2004) proposed three core principles of PLCs: ensure that students learn, create a culture of collaboration, and continually focus on results. DuFour (2004) explained if schools adopted these three big ideas as core principles for their PLCs, they will stand the test of time and not go by the wayside like so many other educational reforms. "PLCs can be a vehicle for closing the gap between a school's overall organizational strategy and the individual students needing personalized support and interventions" (Muñoz & Branham, 2016, p. 37). In a professional learning community, teachers collaborate to provide the best possible instruction to positively impact student learning.

Response to Intervention. The findings from some studies are indicating that schools utilizing high levels of collaboration are demonstrating higher levels of student achievement (Ronfeldt, Farmer, McQueen, & Grissom, 2015; Goddard, Goddard, & Tschannen-Moran, 2007, & Goddard et al., 2010). From a study which included data on over 9,000 teachers and 336 schools in Florida, Ronfeldt et al. (2015) observed the greatest increases in student achievement in both reading and math resulted when teacher collaboration focused on assessment. PLCs utilize common formative assessments as a means of continually monitoring student learning. Missett et al. (2014) indicated the intentional use of formative assessments as a means of evaluating student readiness levels provides teachers with data to appropriately pace learning for individual students and increases the use of ability grouping. PLCs monitor assessment data to identify students in need of intervention to improve student learning. Several schools have created a block of time set aside in the school day for students for Response to Intervention (RtI).

RtI is a model for identifying individual student needs, subsequently providing tailored interventions to meet those needs, and continually monitoring the outcomes to make changes as needed to increase student learning (Seedorf, 2014). The RtI model allows all students the opportunity to increase their achievement based on personalized, differentiated instruction designed to meet their unique needs (Seedorf, 2014). Differentiated instruction involves more than just the grouping of students. Differentiated instruction takes into account the pacing of the curriculum, the curriculum content itself, the ability level and the learning style of the learner, including the learner's interests (Tomlinson, 2014). RtI utilizes flexible grouping, whereby students are continually placed into new groups based on the data collected from common formative assessments

(Muñoz & Branham, 2016). Flexible grouping practices utilized in conjunction with collaborative teams such as PLCs promote equitable learning for all students (Anthony & Hunter, 2017). With an ever increasing population of schools utilizing PLCs and RtI, ability grouping is a common and prevalent practice in K-12 education.

The Ongoing Debate About the Use of Ability Grouping

For just as long as it has been practiced, ability grouping has been a topic of debate (Francis et al., 2017a; Delisle, 2015; Loveless, 2013a; Loveless, 2013b; Slavin, 1987, 1990; Steenbergen-Hu, et al., 2016; Tomlinson, 2015). Even though unrelenting controversy surrounds the use of ability grouping, a significant number of United States students are grouped by ability the moment they enter the nation's public education system (Catsambis, Mulkey, Buttaro, Steelman, & Koch, 2012) and most elementary teachers have utilized ability grouping in one form or another during the span of their educational careers (Bolick & Rogowsky, 2016). Often the findings from studies on ability grouping at the elementary level contradict one another, further inciting the debate on whether or not schools should practice ability grouping (Bolick & Rogowsky, 2016). Although the debate wages on, ability grouping is widely practiced in schools not only in the United States but also around the world.

Proponents of Ability Grouping

Research indicates benefits. While opponents to ability grouping and acceleration exist, there is ample research supporting its use (Colangelo, Assouline & Marron, 2013; VanTassel-Baska, 2010; Wood, Portman, Cigrand, & Colangelo, 2010). Teachers professed they can more easily meet the individual needs of students when the range of abilities in a class is reduced (Anthony, Hunter, & Hunter, 2016; Cheeseman &

Klooger, 2018; Dimitriadis, 2019). Collins and Gan (2013) concluded that homogeneously grouping students based on past performance significantly increased both their math and reading scores and further maintained that ability grouping has advantages for all levels of learners. Slavin (1987) commented ability grouping is beneficial for math instruction, as it is shown to increase student achievement. A synthesis of 21 empirical studies conducted since 1995 on math performance at the elementary level found the use of differentiation, especially when instituted in a supportive environment as part of school reform, had a small overall positive effect on students' academic achievement (Deunk, Smale-Jacobse, Boer, Doolaard, & Bosker, 2018).

Meets all students' needs. Park and Datnow (2017) explained in their study on ability grouping and differentiated instruction in an era of data-driven decision making that ability grouping and differentiated instruction happen concurrently. Valiandes (2015) advocated for the use of differentiation for students grouped by ability, as it promotes equity in learning for all students and affords students a higher quality education. Differentiating instruction for students, although it can be a challenge, is necessary in order to address a wide range of needs, especially the needs of higher ability math students in heterogenous classrooms (Dimitriadis, 2019). Differentiation provides a means for students' individual needs to be met, thereby allowing them the opportunity to reach their fullest potential as learners.

Within-class grouping is effective. Slavin (1987, 1990) argued ability grouping should be utilized as an efficient means of instruction, as all students will be able to benefit from instruction geared toward their needs. Slavin (1988) noted that the within-class grouping practices found to be effective all had similar aspects: students spend most

of the day in a heterogeneous grouping, students regroup for reading and math as needed based upon their achievement, groups were flexible and changed often, and instruction was tailored to meet the needs of each group. A meta-analysis by Kulik and Kulik (1992) which analyzed 51 studies on ability grouping indicated the use of within-class ability grouping had a significant overall positive effect on student achievement. Another meta-analysis by Puzio and Colby (2010) which analyzed 15 studies on within-class grouping on reading achievement indicated that within-class grouping had a positive effect on students' overall reading achievement.

Acceleration best for high ability. Assouline, Colangelo, VanTassel-Baska, and Lubinski-Shoplik (2015) maintained acceleration is the best instructional practice for gifted and talented students. Without an option for acceleration, high ability students are disadvantaged as learners in an average heterogeneous class comprised of students with vastly diverse ability levels (Dimitriadis, 2016). Brulles, Peters, and Saunders (2012) advocated the view that by utilizing a variety of student groupings for learning, along with differentiated instruction which includes accelerated options, schools will have the capacity to meet the needs of their highest ability students. Dimitriadis (2016) explained in an effort to prepare for national assessments, teachers divert their attention to low-ability students, with high-ability students required to work on their own. According to Vygotsky (1978), these high-ability students cannot be successful on their own in reaching their fullest academic potential without teacher assistance.

Steenbergen-Hu et al. (2016) noted from their study, which synthesized 100 years of research on the effects of ability grouping and acceleration, the dominance of the research suggests ability grouping and acceleration can significantly benefit K-12

students' academic achievement. Additionally, the authors observed that ability grouping significantly benefited the overall achievement for gifted and talented students and provided for some social and emotional benefits as well. While researchers have concluded that acceleration has benefits for students, Steenbergen-Hu and Moon (2011) suggested that acceleration can form a cooperative association between P-12 and higher education. Such a bridge fosters the continuation of learning, increases the chance that more students will graduate and go on to STEM careers, and ultimately assists with the nation's effort to increase its position in the global market.

Opponents of Ability Grouping

Produces harmful effects. While there is a preponderance of research supporting ability grouping, opponents of ability grouping have provided numerous reasons and data indicating why ability grouping should not be used in schools. In the school setting, students often gain a realization of their own abilities when they are put into situations where they are compared to other students (Woods, 2019) such as when they are placed into ability groups. This realization and placement into ability groups potentially may have harmful emotional or social effects for students (Colangelo, Assouline, & Gross, 2004) which includes the development of a fixed mindset (Cheeseman & Klooger, 2018). Students with fixed mindsets believe they have a fixed or set amount of intelligence; therefore, they think they are unable to become smarter or learn more (Dweck, 2010).

Placement into ability groups sometimes comes with labels or leads to labels placed on students. Opponents do not want to impose labels on students that convey a negative connotation or produce harmful emotional or social effects. The notion that some students are more able is widely socially accepted, but the notion that others are not

as able or less able is often controversial. (Bradbury, 2018). Categorization of students by ability inherently implies that a student is not as able. Labels imposed on students in low ability groups can negatively impact student achievement (Francis et al., 2017b). Bolick and Rogowsky (2016) commented there is no definitive answer to whether or not ability grouping has harmful emotional or social effects on students.

Lacks positive research support. Opponents of ability grouping continually point out the lack of research supporting it as an effective instructional strategy. Ability grouping is widely accepted and utilized even though research indicates the use of ability grouping is not an effective practice (Francis et al., 2017a; Slavin, 1990; Taylor et al., 2017). A study by Hornby and Witte (2014) identified no “positive consequences or specific advantages of between-class ability grouping” for average students (p. 93). McKeen (2019) found no significant effects in achievement for first through fourth grade students who were sorted into flexible groups for instruction in math. Sorenson, Cook, and Dodge (2017) concluded heterogeneous classes of students demonstrated higher achievement than more homogeneously grouped classes in elementary grades; however, more homogeneously grouped classes outperformed heterogeneous classes in later grades, especially in math.

While ability grouping appears to benefit some students, there is not substantial research supporting benefits for all students. A synthesis of 21 empirical studies conducted since 1995 on math performance at the primary level did not find an overall positive or negative effect between- or within-class ability grouping (Deunk et al., 2018). Furthermore, the synthesis of the 21 empirical studies showed ability grouping had a small negative effect for low-achieving students and resulted in no significant effects for

average- or high-ability students (Deunk et al., 2018). Even though several studies find ability grouping to be ineffective, it is still widely utilized in various forms.

Impedes equity in learning. The movement to ban tracking, a form of ability grouping, in the United States was facilitated by Oakes (1985) in order to provide equitable learning for all students. Oakes (1985) vehemently argued to abolish tracking in schools and emphasized the use of tracking segregates students and perpetuates inequalities for marginalized students. In addition, Oakes (1985) pointed out ability grouping causes lower achieving students to decline academically due to the lack of the higher achieving students' impact on their learning. Loveless' (2013b) observations supported Oakes' (1985) conclusion that grouping students segregates students. Loveless (2013b) observed regardless of the type of ability grouping, the practice of grouping unavoidably splits students by a multitude of social characteristics including race and socioeconomic status which can be statistically correlated with ability. Structuring differentiation with fixed ability grouping fosters segregation as it involves the creation of homogenous groupings that rarely ever change (Park and Datnow, 2017). Student groups that do not change essentially equate to tracking.

The end of the twentieth century saw strong opposition to ability grouping and tracking, and organizations such as the National Governors Association, the NAACP Legal Defense Fund, and the Children's Defense Fund criticized the use of grouping students by ability (Loveless, 2013a). Buttaro and Catsambis (2019) explained the use of ability grouping dropped in the late 1980s as academia deemed the practice ineffective and unequitable. The use of tracking was found to unfairly advantage students whose parents had higher social and economic statuses, thereby perpetuating inequalities present

in society (Gamoran, 2011; Oakes, 2005) and widening achievement gaps in schools (Oakes, 2008). Almost three decades after ability grouping was generally considered to be unequitable, the use of tracking has decreased significantly in the United States; however, several middle and high schools still group students for classes by ability (Loveless, 2013b). Woods (2019) pointed out “students learn the category they belong to...these categories, these labels, stay throughout life, not just throughout schooling” (p. 37). As the United States incessantly battles inequalities not only prevalent in the public education system but throughout society as a whole, international achievement comparisons reveal the countries which do not use ability grouping score the best (Anthony & Hunter, 2017; Boaler, 2014).

Involves teacher bias. Multiple studies have indicated that teachers’ biased perceptions of students’ abilities lead to inequity in students’ learning (Campbell, 2015; Reeves, Boyle, & Christie, 2001; Devine & McGillicuddy, 2016; Macqueen, 2013; Mazenod et al., 2019; Missett, Brunner, Callahan, Moon, Azano, 2014; Thomas, Smees, Madaus, & Raczek, 1998). Teachers often have the autonomy and authority to group students as they see fit. Construction of student groups usually involves a fair amount of bias on the part of teachers as they make decisions based on their own perceptions and expectations of students’ ability and behavior. Teachers often group students based on the needs of an entire class as a whole rather than on the needs of specific individual students (Missett et al., 2014). Due to teacher discretion, students are sometimes placed into ability groups not solely based on their learning, but also based on their behavior (Woods, 2019). In addition to behavior, gender-stereotyped expectations can also affect some teachers’ evaluations of students’ skills (Catsambis et al., 2012). Mazenod et al. (2019)

cautioned teachers' expectations may limit lower ability students' chances of reaching their greatest potential as independent learners. Teachers' perceptions, expectations and biases all factor into whether or not students receive an equitable education.

A study by McGillicuddy and Devine (2018), involving a national survey of teachers in Ireland, indicated teachers held different expectations for different learners. Teachers maintained higher expectations for students in the higher ability groups and held lower expectations for the students in the lower ability groups (McGillicuddy & Devine, 2018). Moreover, according to the survey results, teachers indicated classroom management was more challenging when there were high numbers of low ability and special education students (McGillicuddy & Devine, 2018). McGillicuddy and Devine (2018) held the position that "ability grouping is an act of symbolic violence" which is purposely manipulated in the school setting in order to sustain the larger societal hierarchy (p. 98). Such boundaries impede an equitable education for all students.

The National Education Association. The National Education Association (NEA) (2015) noted opponents of ability grouping claim the practice of grouping by ability is not beneficial for students. Furthermore, opponents assert the use of ability grouping separates marginalized students into tracks where they are provided with a low quality, unequitable education. The organization took an oppositional stance to ability grouping proclaiming the use of tracking is discriminatory on the basis of economic status, ethnicity, race, and gender, and must be abolished in the public education (National Education Association, 2015).

Missouri Department of Education. In a report about identifying and serving underrepresented students, Missouri Department of Elementary and Secondary Education (DESE) (2019b) noted:

One of the most significant barriers to the identification of low-income, high-ability learners and the development of their abilities and talents is inaccurate perceptions held by teachers and school administrators about the capabilities of these students and the strengths of their families. (p. 8)

DESE (2019b) explained barriers for low income students exist and removing the barriers will not be easy as multiple steps are necessary: educating the teachers and administrators, changing the identification process for gifted programming to ensure equity, and creating a culture which fosters the learning of all high-ability students.

Requires more research. Francis et al. (2017a) pointed out the socioeconomic inequality of ability grouping. Through analysis of existing literature, the authors created themes to identify seven explanations for the lack of achievement of students in the low attaining ability groups (Francis et al., 2017a). The seven key problems Francis et al. (2017a) identified were inappropriate placement into groups, lack of flexibility in the groups, inequitable quality of instruction among various groups, teacher bias in expectations of various students, inequity of pedagogy and curriculum used and assessment given to various groups, the impact of ability grouping on students, and the aforementioned factors leading to a self-fulfilling prophecy for students. Each of the seven problems represent a need for more research and discourse on the use and effects of ability grouping.

Summary

Politicians, the media, and various other critics portray the United States' educational system as needing improvement in the areas of science, technology, engineering, and math. Schools are focusing on increasing student achievement through a more rigorous curriculum. This focus has not been successful in increasing standardized assessment scores, especially in math which is essential for all STEM subjects. As an understanding of mathematical concepts is necessary to function effectively in everyday life (Katz, 2015), students must receive a high-quality education which includes an understanding of mathematical concepts and the ability to apply them (OECD, 2017). The Missouri Department of Elementary and Secondary Education (2019a) reported only about one-third of Missouri's students about to enter their freshman year of high school scored either proficient or advanced on the state's eighth grade math assessment. Missouri educators, along with educators across the rest of the nation, will need to critically examine their math programs to increase student achievement in mathematics.

One aspect of math education, which researchers and educators are examining, is the use of ability grouping for instruction. Nomi (2010) suggested ability grouping is considered beneficial for all students as it reduces the range of student differences a teacher faces during instruction by grouping together students who are similar in achievement for instruction. Ability grouping is often considered beneficial for teachers because they will not have as many needs to address during instruction. There are a variety of ways in which students can be grouped for instruction, and a number of studies have been conducted on their effectiveness. Findings from these studies have been in

opposition with one another causing a controversial debate about whether or not ability grouping should be utilized in our nation's public schools.

The work of constructivist theorists Piaget and Vygotsky can be utilized to examine how students learn. Piaget (1972) informed not all children learn at the same rate, as their developmental stages vary. Vygotsky (1978) theorized that learning is created through the interdependence of the self and others, including culture, and informed when learners are challenged, they are able to problem solve with the assistance of those who are more knowledgeable. Based on the findings of Piaget and Vygotsky, ability grouping is an effective way for students to learn. As researchers and educators study how students learn in hopes of increasing student achievement, it is necessary to examine instructional practices such as ability grouping in light of previous literature, noting both the benefits of ability grouping for students, as well as the potential harm to students that may come from it. While public schools strive to improve student achievement, educators need to ensure that effective instructional practices are being utilized and that all students receive a high-quality, equitable education that prepares them for future success.

Section Four:
Contribution to Practice

The idea for this study was suggested by Warrensburg R-VI Superintendent Dr. Scott Patrick, as one of the needs of the district was an evaluation of the math programming at the elementary level. The following executive summary and PowerPoint presentation were created as the written means of communication to inform the Warrensburg R-VI School District of pertinent information about the study. This information includes the purpose of the study, a brief overview of the theoretical framework, the methodology of the study, the research questions, the key terms, results, themes, discussion, study limitations, and recommendations.

Executive Summary

A STUDY OF THE ELEMENTARY MATH PROGRAM UTILIZED BY A MID-MISSOURI SCHOOL DISTRICT

Statement of the Problem

As the Warrensburg R-VI School District administration contemplates the restructuring of the elementary program, more information is needed to plan for potential change. While research supports the use of ability grouping for math instruction, the perceptions of teachers and administrators regarding Warrensburg's math program at the elementary level is unknown. The problem being addressed is the lack of understanding of the stakeholders' perceptions as they relate to the elementary math program.

Purpose of the Study

The purpose of this study was to acquire and understand the teachers' and administrators' perceptions of Warrensburg's elementary math program for the intent of program improvement to benefit the learning of all students and to inform the Warrensburg R-VI School District superintendent of the findings of this study.

The idea for this study was proposed by Dr. Scott Patrick, Superintendent of Warrensburg R-VI.

Theoretical Framework

Constructivism

Constructivism is a means of learning about the world (Brooks & Brooks, 1999) by building "personal interpretations of the world based on individual experiences and interactions" (Ertmer & Newby, 2013, p. 55).

The theory for this study is based on the work of two prominent constructivist theorists, Piaget and Vygotsky. While Piaget focused on the individual as being primarily responsible for the construction of knowledge, Vygotsky concentrated on the social influences others have on an individual's learning (Öztürk, 2016).

Design of the Study

A qualitative methodology was most fitting for this study as qualitative research explores and makes sense of the meaning that individuals or groups of people assign to societal problems (Creswell, 2014).

The primary means of data collection was one-to-one interviews, and an inductive analysis process was utilized to concentrate on individual meaning and to help conceptualize an understanding of the complexity of the problem (Creswell, 2014).

Participants included 21 second through fifth grade teachers, the four elementary principals, and the district's director of curriculum and assessment for a total of 26 participants.

Research Questions

1. What are the second, third, fourth, and fifth grade math teachers' perceptions of the elementary math program?
2. What are the administrators' perceptions of the elementary math program?
3. At the beginning of the school year, what was the range in grade equivalents as determined by Star Math for each ability grouped fourth and fifth grade math class in comparison to the range in grade equivalents had the classes not been ability grouped? In addition, what was the distribution of grade equivalents for each second through fifth grade math class?

*Adapted from Ronald Knight-Beck (2015)

Presented by Lisa J. Barabas

A STUDY OF THE ELEMENTARY MATH PROGRAM
UTILIZED BY A MID-MISSOURI SCHOOL DISTRICT

<u>Themes</u>	<u>Recommendations</u>
<ul style="list-style-type: none"> An individual approach is necessary Grouping students is crucial Accelerated classes are meeting the needs of the highest math students Collaboration is driving math instruction Opportunities for growth in the math program 	<ul style="list-style-type: none"> Provide necessary resources Offer professional development Boost human resources Optimize time Provide equity
<u>Research Questions Answered</u>	
<p>RQ1: What are the second, third, fourth, and fifth grade math teachers perceptions of the elementary math program?</p> <p><u>The Adoption of a new curriculum:</u> Desire to have implemented new curriculum differently, New series is a learning curve and second year of implementation is better, Resources: materials to differentiate, time, professional development</p> <p><u>Ability grouping:</u> Broad range of readiness levels, Differentiate to meet students' needs, Necessary to utilize small ability groups in grade level math, Not able to meet students' needs in grade level math classes, Accelerated math is meeting the needs of the higher ability math students</p> <p><u>Professional Learning Community (PLC) and Response to Intervention (RtI):</u> Culture of collaboration exists amongst teachers, Room for improvement with PLC meetings, RtI is only serving the lowest ability math students</p>	
<p>RQ2: What are the administrators' perceptions of the elementary math program?</p> <p><u>The Adoption of a new curriculum:</u> New series is a learning curve for teachers, parents, and students, Teachers can easily differentiate with the new curriculum</p> <p><u>Ability grouping:</u> Individualize instruction for every child, Administrators disagree about offering accelerated math classes</p> <p><u>Professional Learning Community (PLC) and Response to Intervention (RtI):</u> Teachers work together and find the best teaching method, Teachers communicate and make decisions together, RtI is data driven and serves the students in need of intervention</p>	
<p>RQ3: At the beginning of the school year, what was the range in grade equivalents as determined by Star Math for each ability grouped fourth and fifth grade math class in comparison to the range in grade equivalents had the classes not been ability grouped? In addition, what was the distribution of grade equivalents for each second through fifth grade math class?</p> <p>A majority of the grade level math classes maintain a broad range of readiness levels even though the highest students are pulled out for accelerated math.</p>	
<u>References</u>	
<p>Brooks, J. G., & Brooks, M. G. (1999). <i>In search of understanding: The case for constructivist classrooms</i>. Alexandria, VA: ASCD.</p> <p>Creswell, J. W. (2014). <i>Research design: Qualitative, quantitative, and mixed methods approaches</i> (4th ed.). Thousand Oaks, CA: Sage.</p> <p>Ertmer, P. A., & Newby, T. J. (2013). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. <i>Performance Improvement Quarterly</i>, 26(2), 43–71. Retrieved from https://doi-org.proxy.mvl.missouri.edu/10.1002/piq.21143</p> <p>Öztürk, D. S. (2016). Is learning only a cognitive process? Or does it occur in a sociocultural environment?: "Constructivism" in the eyes of preschool teachers. <i>Journal of Education and Training Studies</i>, 4(4), 153-159. Retrieved from http://proxy.mvl.missouri.edu/login?url=https://search-proquest-com.proxy.mvl.missouri.edu/docview/1826521928?accountid=14576</p>	

*Adapted from Ronald Knight-Beck (2015)

Presented by Lisa J. Barabas



A STUDY OF THE ELEMENTARY MATH
PROGRAM UTILIZED BY A
MID-MISSOURI SCHOOL DISTRICT

Presented By
Lisa J. Barabas



INTRODUCTION

- ❖ Our nation's schools strive to offer high-quality mathematics programs for students.
- ❖ Missouri's state test scores indicate most students will not be prepared to enter the present-day workforce or the arena of higher education upon graduation.



United States politicians are notorious for a litany of public comments calling for educational reform. Much of the outcry has surrounded the nation's ability to be a competitive force in the global marketplace.

Media portrays the United States educational system as not being as effective as the educational systems of other nations leading to a societal demand for improvements in science, technology, engineering, and math in the nation's public schools.

For the United States to be competitive in the global market and to fill science, technology, engineering, and math (STEM) jobs with qualified employees, our nation's schools need to offer high-quality mathematics programs for students beginning at the start of their education.

Less than a third of Missouri's students preparing to enter high school scored proficient or advanced on the state's standardized assessment (Missouri Department of Elementary and Secondary Education, 2019c).

STATEMENT OF THE PROBLEM

- ❖ While research supports the use of ability grouping for math instruction, the perceptions of teachers and administrators regarding Warrensburg's elementary math program is unknown.
- ❖ Therefore, the problem being addressed is the lack of understanding of the stakeholders' perceptions as they relate to the elementary math program.



Concerns need to be identified and well-thought plans need to be made to address them during the planning stage of the math program (Colangelo, Assouline, & Gross, 2004).

Changes to accelerated courses are often implemented on an impromptu basis without consideration of teacher input or future impact on student learning (Colangelo et al., 2004). Many times in education, changes made in curriculum and instruction are impromptu and inadequately researched before implementation (Colangelo et al., 2004).

Park and Datnow (2017) explained “teachers, school leaders, and district administrators share overlapping spheres of influence on curriculum and instruction” (p. 303). While the administrative team in Warrensburg holds the authoritative decision making power to use accelerated classes for upper elementary math instruction, teachers “have a great deal of autonomy in determining classroom grouping practices” (Park & Datnow, 2017, p. 303).

It is imperative during the planning stage to understand the teachers' perceptions regarding the current math program (Gentry, 2016). The perceptions of teachers and administrators about Warrensburg's math program at the elementary level are currently unknown. Therefore, the problem being addressed is the lack of understanding of the stakeholders' perceptions as they relate to the elementary math program.

PURPOSE OF THE STUDY

The purpose of this study was to acquire and understand the teachers' and administrators' perceptions of Warrensburg's elementary math program for the intent of program improvement to benefit the learning of all students and to inform the Warrensburg R-VI School District superintendent of the findings of this study.



The idea for this study was suggested by Warrensburg R-VI School District Superintendent Dr. Scott Patrick.

RESEARCH QUESTIONS

The following research questions guided this study:

1. What are the second, third, fourth, and fifth grade math teachers' perceptions of the elementary math program?
2. What are the administrators' perceptions of the elementary math program?
3. At the beginning of the school year, what was the range in grade equivalents as determined by Star Math for each ability grouped fourth and fifth grade math class in comparison to the range in grade equivalents had the classes not been ability grouped? In addition, what was the distribution of grade equivalents for each second through fifth grade math class?



All of the second through fifth grade math students take the Star Math assessment at the beginning of each school year. These data allow for comparison for each of the fourth and fifth grade classes between the range in grade equivalents in the ability grouped classes and the range in grade equivalents had the classes not been ability grouped. These data also indicate the range of readiness levels for math instruction present in each elementary math class.

Grade equivalent (GE) scores are norm-referenced scores ranging from 1 to 12.9+. Grade equivalent scores allow for national comparison of students' assessment performance. As an example, a fourth grade student with a GE of 5.4 indicates that student performed as well as the average fifth grader at the fourth month in the school year. Warrensburg R-VI School District administrators set Star Math data to report a maximum grade equivalent of > 8 for fifth grade students and a maximum of > 7 for fourth grade students.

DEFINITION OF KEY TERMS

Ability grouping is the practice of grouping students for instruction based on teachers' assessed levels of students' academic achievement.

Accelerated math as used by the Warrensburg R-VI School District is the instruction of math that is one grade level ahead of the students' current grade level.



Accelerated math is offered at the fourth and fifth grade levels.

This study of math in the Warrensburg R-VI School District does not include any use of Renaissance's Accelerated Math program (Renaissance, 2020). The math classes in the district are simply referred to as accelerated math as the students in them are working at an accelerated level compared to their same grade level peers.

Accelerated math classes were utilized at Warrensburg Middle School for grades six through eight before they became available for elementary students. Accelerated math classes have been utilized for at least 31 years in district (J. Ritchhart, personal communication, September 2019).

At the end of the third grade, all students are given an assessment that serves as a universal screening tool to identify which students will be accepted into accelerated math for fourth grade. In order to be accepted in the district's gifted program, all second grade students are universally screened using an assessment which students take at the end of the school year. Admittance into the gifted program for third grade does not automatically qualify students for accelerated math in the fourth grade. They still go through the same universal screening process at the end of the third grade to qualify for accelerated math. If students do not qualify for accelerated math based on the assessment taken at the end of the third grade, they can still qualify in both fourth and fifth grade for admittance into the program for the following year.

THEORETICAL FRAMEWORK

- ❖ Constructivism is a means of learning about the world (Brooks & Brooks, 1999). An understanding of the world is based on the interpretations of one's experiences (Ertmer & Newby, 2013).
- ❖ Piaget (1972) advocated the view that children's ability to think abstractly develops in stages and that when encountered with something new, children adapt their cognitive structures to allow for the new information.
- ❖ Vygotsky (1978) theorized that learning begins when an individual interacts with others, that learning is created through the interdependence of the self and others and the surrounding cultural context.



Based on his theory of cognitive development, Piaget (1972) pointed out a child's ability to think abstractly develops in stages: sensorimotor, pre-operational, concrete operational, and formal operational. The progression of learning varies from child to child (Piaget, 1972). Vygotsky (1978) viewed learning as a social event and emphasized the learner should be challenged by adults such as parents and teachers and by more advanced peers to foster learning. Vygotsky (1978) developed the zone of proximal development (ZPD). The zone of proximal development "is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). To increase academic achievement, teachers should instruct students at levels slightly higher than those which the students have demonstrated success (Vygotsky, 1978).

While Piaget focused on the individual as being primarily responsible for the construction of knowledge, which is known as cognitive constructivism, Vygotsky concentrated on the social influences others have on an individual's learning, known as social-cultural constructivism (Öztürk, 2016). Piaget's and Vygotsky's ideas work hand in hand allowing for a comprehensive view of how an individual develops and learns (Sharkins, Newton, Causey, & Ernest, 2017).

DESIGN OF THE STUDY

- ❖ A qualitative methodology was most fitting for this study as qualitative research explores and makes sense of the meaning that individuals or groups of people assign to societal problems (Creswell, 2014).
- ❖ The site of this qualitative study was the Warrensburg R-VI School District.
- ❖ The primary means of data collection was one-on-one interviews, and an inductive analysis process was utilized to concentrate on individual meaning and to help conceptualize an understanding of the complexity of the problem (Creswell, 2014).



As the purpose of this study was to acquire and understand the teachers' and administrators' perceptions of Warrensburg's elementary math program for the intent of program improvement to benefit the learning of all students, a qualitative study was appropriate for this study.

The researcher conceptualized an understanding of the effectiveness of the elementary math program based on the data collected.

PARTICIPANTS

- ❖ This study utilized purposeful sampling in order to best gain an understanding of the perceptions of the district's stakeholders.
- ❖ Participants included 21 second through fifth grade teachers, the four elementary principals, and the district's curriculum director for a total of 26 participants.
- ❖ The composition of the teachers included 3 second grade teachers, 3 third grade teachers, 5 fourth grade teachers, 6 fifth grade teachers and all 4 of the accelerated math teachers, 2 each from fourth and fifth grades.



Participants were sent an email describing the study and inviting them to participate in interviews. Semi-structured, open-ended interviews were conducted. All interviews were approximately an hour in length. Interviews were held at the elementary school buildings.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ **Desire to have implemented new curriculum differently**

- ❖ A third grade teacher expressed, "I wish the current program that we're using now would have been introduced a year or two at a time so we could have seen more of a slow spiral by introducing it at a lower level."



This study involved 26 participants: five administrators, 21 teachers: 3 second grade, 3 third grade, 5 fourth grade, 6 fifth grade, and all 4 of the elementary accelerated math teachers, two each from fourth and fifth grades.

The district has 49 second through fifth grade classroom teachers. Approximately 43% of these teachers were interviewed.

Teachers desired gradual implementation starting at the lowest grades rather than an all at once implementation at the elementary level.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ **New series is a learning curve**

- ❖ A fourth grade teacher explained, "We are getting our children to think a different way versus what we grew up learning which was memorization. We didn't understand how things worked. We just were told this is why it works. As time goes on, we're needing our kids to understand the why behind everything because if they don't understand the why, they can't problem-solve."



The new series has proven to be quite a learning curve for teachers, students, and parents. The new curriculum emphasizes conceptual learning rather than just learning the algorithm and procedures to solve a problem.

Parents have expressed an inability to help students with math.

Most teachers indicated they often have to start instruction from a place that students understand and build background knowledge before continuing forward with a lesson.

Several teachers mentioned they are still learning the new math curriculum and the various strategies presented.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ **Second year of implementation is better**

- ❖ A second grade teacher shared, "Last year when we introduced it, I was like holy cow! My kids we're like, 'I don't even know what this means.' And I'm like, 'Well, I don't either.' So, we were put in this boat together. This year is like, oh my gosh, so much better. So, I feel like I'm still seeing a wide variety of ability, but I feel like I'm seeing a lot more students that know a lot more than before."



Several teachers, including second grade through accelerated fifth grade, commented that teaching using the Math in Focus curriculum is going more smoothly this year than last year. The teachers credit this year being better than last year for two main reasons. The first reason is they are now more familiar with the new series, and the second reason is that the students have had a year of learning using the new materials, becoming familiar with the vocabulary and the problem solving methods. Most teachers implied the adoption of the new curriculum was overwhelming for both teachers and students.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ Believed no outside resources allowed

- ❖ A third grade teacher expressed, "It's hard the way that we teach kids now. It's even hard to explain. I think sometimes it confuses your little guys on the many different ways or strategies to get to a certain number. Those little tricks of the trade that don't follow the teacher's manual, I still have to use those because it helps kids get it, get to that understanding and be able to remember it for life. It makes it more fun. They can sit there, and they can sing the song. And you see them when they take a quiz or they do a Kahoot or they do something, you can see them singing the song. You're going to take whatever tricks you have in your toolbox to help them understand it, and when you have students who come back and say, 'I remember. I remember.' Then you know that somewhere along the line, you made that difference in how they're remembering those things."



Initially, no outside resources other than the new curriculum were allowed for math instruction in order for teachers to gain familiarity with new curriculum.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ **Resources: materials to differentiate, time, professional development**

- ❖ A fifth grade teacher commented, "I do the best I can. I know that with the curriculum we're using now, you can go online to get work at different grade levels, which is kind of helpful but not really. It doesn't quite match up to what I need. And so, I honestly haven't found a great way to meet all of the students' needs. When you're tied to a curriculum, I find it difficult. I still find extra resources out there, and I still will pull kids to just do basic facts because you can't leave them stranded."
- ❖ Almost every elementary math teacher interviewed stated in one way or another an identical point of view expressed by one accelerated math teacher who said, "I think we need more time for math."
- ❖ A fifth grade teacher shared, "I feel like the support that has been given to us was very broad and not very specific, and so therefore, you're learning it on your own. You're doing what you can do."



In order to provide differentiated instruction, teachers need access to a wide range of resources to meet students' diverse learning needs.

Teachers believe resources for effective math instruction are imperative (materials to differentiate, more time needed for instruction, issues with pacing guide, lack of professional development on new curriculum).

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ **Math needs to be practical yet fun**

- ❖ A fifth grade teacher shared, "We need to learn some ways to make things more interactive between the teacher and the students, or student to student, so that the teaching isn't all me on the stage."
- ❖ A third grade teacher commented, "I help the kids relate to everyday things. Those everyday problems are not a part of a teaching manual. You've got to help students try to relate to what goes on out there, real life, and it helps them become more excited about what they're learning."



While most teachers expressed a genuine desire to engage all students in learning math, a majority of the teachers admitted to having concerns about whether or not math is as fun as it used to be prior to the implementation of Math in Focus. Teachers expressed concerns with utilizing only the Math in Focus materials and neglecting other resources that would perhaps better appeal to and engage students. Teachers at each grade level noted the excessive number of worksheets they now are required to use along with the lengthy assessments. Another concern that was repeatedly mentioned was that Math in Focus seems to be too teacher centered and not necessarily student centered.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

❖ **Broad range of readiness levels**

- ❖ A second grade teacher explained, "When I give the pretest, I've got kids that will miss all of them, and I've got some that will get all of them right. It depends on the topic with the math series we use."
- ❖ A fifth grade teacher shared, "It seems like the longer I've been teaching, the greater their range. Not sure if that's in my head, but I feel like that's what's happening. And it's becoming more difficult to reach their needs."



The Warrensburg R-VI School District has a diverse student population. One of the ways in which the students differ is in their range of readiness to learn new concepts and skills. Teachers described their math classes as having a wide range of readiness levels.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

❖ **Need to assess prior knowledge**

- ❖ Teachers described a multitude of ways they assess students' knowledge including utilizing pre-assessments, asking questions, giving a few introductory problems, and analyzing historical data such as test scores and report cards. A third grade teacher shared, "Sometimes if I see that there's a real issue. Then I might even go back and talk to their previous teacher."
- ❖ A second grade teacher also indicated her constant use of assessment. She shared, "Well, I think like every day when you're meeting with them, you have to use their prior knowledge to know kind of where to start if you're introducing a concept. So, I use it every day, every lesson."



Every teacher expressed the importance of assessing students' prior knowledge for teaching new math concepts.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

❖ **Differentiate to meet students' needs**

- ❖ Teachers explained that while their classes include a wide range of readiness levels, they are also comprised of a variety of different types of learners. A fourth grade teacher shared, "I feel like I'm all over the place in math because I know I've got visual learners. I've got the kids that have the tactile, that need to touch it. So, we learn different methods to do the problems."
- ❖ A fifth grade teacher shared, "I use accommodations such as reading the questions aloud to them, providing a list of steps to solve the problems, or taking the standard down maybe a grade level or more."



All teachers who were interviewed explained that they modify work and differentiate instruction for their math students. Teachers described various modifications they make for individual students and discussed how they differentiate instruction through the use of small groups. Teachers explained that with Math in Focus, they teach a whole group lesson first and then work with small groups of students which have different needs.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

❖ **Teacher expectations differ for different students**

- ❖ A fifth grade teacher commented, "I would like to just say that my expectations are high for all students, but high for one student would be a different high for another student."
- ❖ A second grade teacher confided, "There are certain kids that I don't expect for them to be meeting grade level expectations. I mean, that's just not going to happen because they're just so far behind for various reasons, but I want them to always be growing."



Teachers indicated they held different expectations for students performing at different levels.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

- ❖ Necessary to utilize small ability groups in grade level math
 - ❖ Teachers indicated the groups formed for small group math instruction are constantly changing based on the students' needs.
 - ❖ A third grade teacher commented, "My groups change frequently based on the concept, the skill, on Star scores, and my observations."
 - ❖ A second grade teacher explained, "If students are able to grasp concepts more quickly, I place them into larger groups with up to six in a group. For those who don't grasp concepts as readily, there may be only two students in the group."



All teachers indicated that they use some form of grouping during their math classes.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

- ❖ Not able to meet students' needs in grade level math classes
 - ❖ A majority of the teachers interviewed indicated they are not able to meet the diverse range of needs in their math classes even with the higher level students pulled out of the mix for the accelerated classes. Several teachers explained that due to time constraints, behavior issues, and the vast range of ability levels, they spend the majority of their time outside of the whole group lesson focusing on their lowest level students.



Teachers explained that the higher level students, those performing at grade level and above, are able to work independently. According to constructivist theorist Vygotsky (1978), learning is created through the interdependence of the self and others, and learners can have success with challenging material with the assistance of those who are more knowledgeable. With this in mind, students who are left to work independently are at a disadvantage. These students may not reach their fullest learning potential without assistance from the teacher or higher level peers who are not available to give assistance as they are in the accelerated classes.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

- ❖ Accelerated math class is meeting the needs of higher ability math students
 - ❖ A fourth grade teacher shared, "For the students that leave to go to accelerated, they need a little bit more of a challenge, a faster pace. They can learn skills quicker and be challenged more than what they could in my class."
 - ❖ A fifth grade teacher expressed, "I think it's good for them to have a different teacher and different peer group to be surrounded by, with peers that are intellectually on the same level as them."



Overall, teachers indicated the accelerated classes meet the needs of the highest ability math students. Teachers explained that the accelerated math classes provide enrichment and challenge for higher level math students.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Professional Learning Community (PLC) & Response to Intervention (RtI)**

❖ Culture of collaboration exists amongst teachers

- ❖ A fifth grade teacher explained, "We share a lot of our ideas. We share a lot of our resources. We have a very positive collaborative team in fifth grade. We all bring our own strengths. So, if your strength isn't math, there's someone there who can who can pull you out, or save you, or teach you how to teach it, or show you where the passion lies in something."



For the most part, teachers indicated positive outcomes from being members of a professional learning community. Several teachers commented that they are able to gain ideas to improve math instruction from their team members during collaboration meetings. Most teachers indicated that they would like more time during collaborative meetings to discuss strategies for teaching math. Some teachers indicated that they do not get much time for grade level collaboration. Other teachers expressed that while they have collaboration time with their team, math is not always on the meeting agenda. Overall, teachers are happy to have a team to collaborate with regarding their responsibilities as teachers.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Professional Learning Community (PLC) & Response to Intervention (RtI)**

❖ **Room for improvement with PLC meetings**

- ❖ I think most of the time in our PLC community we really focus on our pacing and how we're doing there, and I wish we could focus a little bit more on the actual lesson piece of what we're teaching the students instead of how are we going to get through this the quickest way.
- ❖ One teacher commented, "Unfortunately, I feel like our collaboration time with our grade level this year has not been as frequent as it has in the past."



While teachers were positive about being members of a professional learning community, many expressed that they had areas of concern about their collaboration time. For some of the teachers, the concern was a lack of time with their grade level team members to collaborate, while other teachers indicated their teams could make better use of their collaborative time together. A few teachers also commented that more time needs to be allocated for discussing math during collaboration.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Professional Learning Community (PLC) & Response to Intervention (RtI)**

❖ **RtI is only serving the lowest ability math students**

- ❖ A fifth grade teacher shared, "The small groups are usually no greater than three students, so then even the low students are not really getting the help that they need. We are taking the lowest of the low, so only a very small percentage actually benefit. So, say, I had three in my goal group but I have ten or possibly twelve in my class that struggle with that concept, that's just one-fourth of the kids that had that need. And then we're told by administration, well, those are Tier one. And so, we just keep on trying, but it's a big group of kids rather than just that tiny little group of kids who actually need extra support."



A component of the professional learning community is Response to Intervention (RtI). Warrensburg R-VI School District utilizes RtI to meet students' individual needs and increase student learning. A majority of the teachers indicated that instructional time during the school day is set aside for RtI time. Each of the schools in the district are utilizing the RtI time in different ways to meet the needs of their students.

RQ1: WHAT ARE THE SECOND, THIRD, FOURTH, AND FIFTH GRADE MATH TEACHERS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Professional Learning Community (PLC) & Response to Intervention (RtI)**

❖ **Students lack number sense and basic facts fluency**

- ❖ A fifth grade teacher commented, "The students that are truly the lowest performing are lacking number sense. They have really deep misconceptions that I think it takes a lot of time. Those are kids that it takes maybe years to make small gains. They're the students that struggle with the foundational skills. Usually you will see behavior issues because they get frustrated, and they have avoidance behaviors."



Teachers at all grade levels expressed their lowest math students lack number sense and fact fluency.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ Lacked flexibility at first in order to get used to the new curriculum

- ❖ An administrator shared, "I feel like with the new curriculum we haven't been able to be as flexible and not that it's like a heavy mandate. I believe we needed to get used to the new curriculum. I feel like we're a little more flexible, and I'm sure that'll just continue as we get a feel for it."



Several of the teachers interviewed conveyed that they were directed to use only the Math in Focus materials for math instruction and not to pull from or utilize any other resources.

While this administrator's comments implied some flexibility with the resources used for math, a number of teachers' comments in the interviews suggested they did not believe they were able to utilize any other resources beyond Math in Focus.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Adoption of a new curriculum**

❖ **New series is a learning curve for teachers, parents, and students**

- ❖ An administrator explained, "The jobs that your children will have may not have even been invented yet, so we are not trying to teach rote memorization. We're trying to teach kids to be thinkers, and in order for us to do that, they're going to have to learn some of these new concepts. Are they going to get the same answer that you do? Yes, they probably are, but they're going to get it their way because they're thinking about parts of a whole. And when you were in school, you just needed that answer, and you didn't have to show work. You just put down the answer, and you had to roll on. But we need kids to be thinkers because we need them to be able to do any job that they're going to be faced with. And in order for them to do that, we've got to teach them thinking skills."



The new math series has proven to be quite a learning curve for teachers, students, and parents.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

- ❖ **Adoption of a new curriculum**
- ❖ Teachers can easily differentiate with the new curriculum
 - ❖ One administrator suggested, in order to meet the needs of all students, "You might go and pull a different grade level or lower grade level material."
 - ❖ Another administrator shared, "I feel like we have, especially with online components, that we have the resources to challenge our students in the classroom."



Warrensburg R-VI School District administrators all hold the expectation that teachers will differentiate.

The new curriculum, Math in Focus, provides teachers with online access to math materials for all elementary grade levels through their website Think Central.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

- ❖ **Adoption of a new curriculum**
- ❖ Reading was the previous focus and now need to focus on math
 - ❖ An administrator commented, "I feel like we do spend a lot more time probably discussing literacy and reading than we do talking about math."



A couple of administrators shared that while they used to have more of a focus on reading, they are now intentionally dedicating more collaboration time for math.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Ability grouping**

❖ Individualize instruction for every child

- ❖ An administrator explained, "We have such a diverse population within every building, in every elementary. You have to really individualize instruction for every child. Not every child has an IEP (Individualized Education Plan), but they need a personalized instruction plan."



Teachers are expected to meet every student's individual needs.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ Ability grouping

❖ Administrators disagree about offering accelerated math classes

- ❖ "I'm not a real fan of accelerated programs in any subject area. The reason for that is I believe a lot of the skills that children gain are emergent, and some children may not test at a particular day or time and then they are left out of that loop for the remainder of their cycle. So, I don't know that there's really an advantage to it. I think we should be challenging every child like they're an accelerated student and taking them from where they are and challenging them to move them forward as much as possible."
- ❖ "We have enrichment groups because they already have the concepts. Those are the kids that sometimes seem to get left out because they've already got it, and you're working with the lower kids. Well, we need to excel those kids because their knowledge is higher than what we're offering. Then, that allows students to take higher level classes in high school, which then allows them to be prepared to take higher level classes in college."



Three of the five administrators interviewed support the continuation of accelerated math classes at the elementary level. Two administrators are opposed to offering accelerated math classes at the elementary level.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

❖ **Professional Learning Community (PLC) & Response to Intervention (RtI)**

❖ Teachers work together and find the best teaching method

- ❖ Discussing the professional learning community and the teachers in it, one administrator shared, "It changes everything because they talk about what concepts they're teaching and what skills worked, what types of teaching, what types of instruction worked for this particular concept, what are some strategies that they used. It really does provide an outlet for teachers to work together to talk to find the best teaching method for whatever concept it is. I've been doing this a long time, and when I first started teaching, we did a whole lot of teaching in isolation."



Administrators sang the praises of their professional learning community.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

- ❖ Professional Learning Community (PLC) & Response to Intervention (RtI)
- ❖ Teachers communicate and make decisions together
 - ❖ One administrator commented, "Our teachers really do work very well together. Why would we do these things independently when we can do them together?"



Teachers have an entire team to help make decisions about best practices.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

- ❖ **Professional Learning Community (PLC) & Response to Intervention (RtI)**
- ❖ RtI is data driven and serves the students in need of intervention
 - ❖ An administrator explained, "We have our meetings on a data cycle so, obviously, you plan, discuss, collaborate. Then you teach. Then you benchmark and you come back and share those results to decide where students are at. Then you progress monitor. Then you reteach, assess, and it's that continuous cycle."



A component of the professional learning community is Response to Intervention (RtI). Warrensburg R-VI School District utilizes RtI to meet students' individual needs and increase student learning.

RQ2: WHAT ARE THE ADMINISTRATORS' PERCEPTIONS OF THE ELEMENTARY MATH PROGRAM?

- ❖ Professional Learning Community (PLC) & Response to Intervention (RtI)
- ❖ Title Math is part of RtI at lower elementary schools
 - ❖ An administrator shared, "We have title one math, so that's another tier, another part of the RTI process for us. So, students that are having difficulty in math work with our Title I teacher. In Title I, it's generally like a 20 to 30 minute session during small group math time. It's based on their skill at that time and sometimes kids excel in one area, but they just struggle in another."



In the Warrensburg R-VI School District, Title Math is only available at the two lower elementary schools which serve grades PK-2. Title Math is not available for the upper elementary schools which serve grades 3-5.

RQ3: AT THE BEGINNING OF THE SCHOOL YEAR, WHAT WAS THE RANGE IN GRADE EQUIVALENTS AS DETERMINED BY STAR MATH FOR EACH ABILITY GROUPED FOURTH AND FIFTH GRADE MATH CLASS IN COMPARISON TO THE RANGE IN GRADE EQUIVALENTS HAD THE CLASSES NOT BEEN ABILITY GROUPED?

IN ADDITION, WHAT WAS THE DISTRIBUTION OF GRADE EQUIVALENTS FOR EACH SECOND THROUGH FIFTH GRADE MATH CLASS?

- ❖ A majority of the grade level math classes maintain a broad range of readiness levels even though the highest students are pulled out for accelerated math.
- ❖ Not all of the highest students are admitted into the accelerated math classes.



The tables which provide the data for research question three are located in the appendix.

RECOMMENDATIONS

❖ Teacher Recommendations

- Provide necessary resources
 - Materials to differentiate
 - Support during math stations
- Offer professional development opportunities
 - Bring in a professional development representative from Math in Focus
 - Teachers who are experiencing success could lead professional development
 - Provide professional development on differentiating instruction
 - Provide professional development on building solid math foundations for students



Multiple teachers expressed the need for additional resources to improve student achievement in their own classrooms. Several teachers mentioned that they do not have Smartboards which are needed to utilize the virtual manipulatives and lessons available through Think Central, Math in Focus' online resource. Several of the demonstration lessons teachers would like to utilize for instruction were specifically created for use with a Smartboard.

Other teachers expressed the need for more games and more entertaining math activities to supplement Math in Focus.

Due to overall behavior challenges and students in need of assistance when the teacher is holding small group instruction, a recommendation is to place available paraeducators or Title teachers in the room for support. Each school may need to be creative about how they would be able to provide each math teacher with an extra adult for perhaps 20 to 30 minutes so that teachers can focus on small group instruction rather than being interrupted by behavior issues and questions from other students not within the small group.

RECOMMENDATIONS

❖ Teacher Recommendations

- Allow more time for math instruction and collaboration about math
- Expand Title Math to upper elementary schools or offer a basic math class
- Expand accelerated math
 - Increase the number of students admitted
 - Provide another option such as advanced math in addition to accelerated math
 - Have opportunities for students from all math classes to problem solve together



Almost all third through fifth grade teachers expressed the need for Title Math services for their students.

RECOMMENDATIONS

❖ Administrator Recommendations

- Continuation of current improvements
 - Common curriculum
 - Fidelity and accountability for small math groups at lower elementary
- Ensure math is fun for students
 - Active learning
- Discontinue accelerated math classes – not all in agreement on this



Administrators expressed the belief that the district is heading in the right direction with the improvements that are currently being made for math, the greatest improvement being the implementation of a common curriculum resource at the elementary level.

One administrator discussed the need for ensuring fidelity with the work that students are doing at stations and holding those students accountable for their learning when the teacher is not working with them directly.

An administrator suggested an improvement for the elementary math program would be to incorporate more active learning.

Two of the administrators are opposed to continuation of accelerated math classes.

RECOMMENDATIONS

❖ Researcher Recommendations

- Provide necessary resources
 - Professional library – house complete sets of K-6 curriculum including manipulative kits
 - Professional library can also house other shared resources for math
 - Technology
 - Smartboards for teachers to utilize online lessons from curriculum
 - Teachers provide PD for online math resources for other teachers



As a variety of resources are needed to differentiate instruction, each school needs a common area where math resources can be housed and shared by all teachers.

RECOMMENDATIONS

❖ Researcher Recommendations

- Tailor professional development to fit teachers' needs and invite teachers from other buildings to attend
- Boost human resources
 - Title Math teachers, instructional coaches, other available adults
 - Create partnerships
- Adapt pacing guide to reflect essential learning



Professional development opportunities can be made available to any teacher and paraeducator. These opportunities can be extended to faculty and staff in all four of the elementary buildings.

A recommendation is to have administrators and teachers reach out to University of Central Missouri faculty to explore opportunities for university students majoring in math or math education to receive hands-on experiences by working with the elementary math students. Perhaps university students could spend a certain number of hours each semester assisting with hands-on learning in the elementary math classrooms which could benefit all parties involved.

A recommendation is to have the instructional coaches devote half of their time to reading and language arts and the other half of their time to math. Instructional coaches may also be able to provide professional development opportunities for teachers on math subjects.

A recommendation is to align the Missouri learning standards with the Math in Focus curriculum and then subsequently prioritize math units and concepts that are not Missouri learning standards.

RECOMMENDATIONS

❖ Researcher Recommendations

- Inform parents about math class options at the elementary level
 - Promote via the school district's website
 - Include information with registration materials
- Provide equity
 - Serve all students in Response to Intervention
 - Provide equal opportunity to accelerated classes



Teachers speculated that parents might be more likely to help their children at home with math or hold them more accountable for learning math at school if they knew students would have the opportunity to be in an advanced or accelerated math class. A recommendation would be to post information about the accelerated math classes and how students can qualify for them on the school district's website as well as place informational materials inside registration packets for both the lower and upper elementary students.

Through the study, it was apparent that each of the four elementary schools are using RtI in a different manner. A recommendation is to evaluate how schools and grade levels are utilizing Response to Intervention (RtI). Evaluate what each grade level team is doing for RtI and how the team is utilizing data to benefit all students.

Missouri Department of Elementary and Secondary Education (2019b) recommends using a universal screener to identify gifted students. While students in Warrensburg's accelerated math classes are not given the same universal screener employed by the district to identify gifted students, they are given a screener for the purpose of admittance into the accelerated classes. In an effort to provide students equal opportunity for admission into the accelerated classes, a recommendation is to use the accelerated math screener for all third graders.

CONCLUSIONS

❖ Themes

- An individualized approach is necessary
- Grouping students is crucial
- Accelerated classes are meeting the needs of the highest math students
- Collaboration is driving math instruction
- Opportunities for growth in the math program



Each of the five themes is essential to the continued effectiveness and improvement of Warrensburg R-VI's elementary math program. An individualized approach is necessary as it meets the specific needs of each student, taking into consideration the individual level of readiness and unique learner style. Grouping students is crucial as the district's student population is vastly diverse. Grouping students with similar needs and abilities provides students with instruction that meets their needs. Both administrators and teachers acknowledged the math program has room for improvement. Areas for growth were identified and can be utilized for making changes in order to bring about improvements in the elementary math program. Teacher collaboration is driving math instruction. Teachers explained their collaborative efforts are allowing them the opportunity to provide the best possible instruction for their students. Finally, accelerated math classes are meeting the needs of the highest math students. Accelerated students are being challenged and working at a pace commensurate to their needs to prepare them for future math studies.

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Section Five:
Contribution to Scholarship

Dear Dr. Kettler and Dr. Rinn, Senior Editors,

Please accept this article submission for review for future publication in the *Journal of Advanced Academics*. This study, A Study of the Elementary Math Program Utilized by a Mid-Missouri School District, is a fitting focus for your journal as it provides data on the use of student grouping and acceleration for elementary math instruction. As the purpose of this qualitative study was to explore how students learn when they are placed in various groupings for elementary math classes and to collect and analyze data regarding the perceptions of the teachers and the administrators relative to these student groupings for math instruction, this study addresses ways in which students are being served through accelerated math classes.

This article explains the type of grouping a Missouri school district uses for math instruction in grades four and five and discusses whether or not this type of grouping would be beneficial for lower grade levels. Analysis and corresponding discussion of the collected data may be beneficial to other school districts contemplating the best way to group students for math instruction to best meet students' needs and to maximize learning. It is possible that this study may present some ideas for practitioners in other schools about strategies they could try in order to promote academic achievement for all students. It is also possible that this study may highlight some areas of concern with student grouping or acceleration that other schools may not have identified that may negatively be affecting students' academic achievement.

Presently, I am an elementary teacher teaching fifth grade. I consider myself to be a teacher leader, and I aspire to serve as a school leader in the role of a principal. I have been teaching in Missouri for four years, and prior to this, I taught in the Keokuk School

District in Keokuk, Iowa for 17 years where I served as a Director of Family Resource, and as a teacher of both fourth and fifth grades. I also taught continuing education graduate level courses for K-12 teachers and administrators in Southeast Iowa for six years. My personal goal is to help other educators best serve students, to improve education for all students, and to ensure all students receive a high quality, equitable education.

Thank you for your time and for your consideration of my article.

Sincerely,

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Title

Utilization of Ability Grouping Including Acceleration
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Word Count

8,276 words

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Utilization of Ability Grouping Including Acceleration for Elementary Math Instruction

Abstract

This article provides an overview of a qualitative study designed to collect and analyze teachers' and administrators' perceptions regarding student learning and achievement when students are placed into ability groups for upper elementary math instruction. The groups utilized for instruction include students in grade level math classes and accelerated math classes. This study was analyzed using a constructivist framework and considers the theories of both Piaget and Vygotsky. Based on teachers' and administrators' perceptions, the accelerated math classes met the needs of the highest ability math students. Overall, according to teachers, the elementary math program did not meet the needs of the lowest students at the fourth and fifth grade levels where the accelerated math classes were being utilized.

Key Words

Ability grouping, acceleration, elementary, math

Utilization of Ability Grouping Including Acceleration for Elementary Math Instruction

United States politicians are notorious for a litany of public comments calling for educational reform. Much of the outcry has surrounded the nation's ability to be a competitive force in the global marketplace. Media portrays the United States educational system as not being as effective as the educational systems of other nations leading to a societal demand for improvements in science, technology, engineering, and math in the nation's public schools. For the United States to be competitive in the global market and to fill science, technology, engineering, and math (STEM) jobs with qualified employees, our nation's schools need to offer high-quality mathematics programs for students beginning at the start of their education.

Schools are responding to the demand by focusing on the increase of student achievement through a more rigorous curriculum and pushing skills that were once propriety of higher grade levels into the lower grades (Mullis, Martin, & Loveless, 2016). The response by schools for improvements in student achievement has not been successful. Standardized assessments still indicate the need for an increase in the number of students scoring at the proficient and advanced levels ("The Nation's Report Card: NAEP Mathematics Report Card," 2017). In fact, on the ACT, an assessment that is often used as an indicator of student college readiness, students' scores in math are at an all time low (Gewertz, 2018). Not only is an understanding of mathematical concepts necessary in order to function effectively in everyday life, such knowledge is also vital for the comprehension of STEM concepts (Katz, 2015). "Early math knowledge is one of the strongest predictors of math grades in high school, high school graduation, and

college entry” (Fuson, Clements, & Sarama, 2015, p. 64). “Young adolescents with profound talent in mathematical and verbal reasoning hold extraordinary potential for enriching society by contributing creative products and competing in global economies” (Kell, Lubinski, & Benbow, 2013, p. 658). Given the importance of STEM careers and the goods and services that come from them, it is imperative for American students to receive a high-quality education which includes an understanding of mathematical concepts and the ability to apply them (OECD, 2017).

Missouri’s students fared no better in public opinion of obtaining adequate success than the rest of the nation’s students on standardized math tests (Missouri Department of Elementary and Secondary Education, 2019). Only 30.5% of Missouri’s students preparing to enter their freshman year of high school scored either proficient or advanced on the state’s assessment, the Missouri Assessment Program (MAP) test (Missouri Department of Elementary and Secondary Education, 2019). At this point, it becomes nearly impossible for students to become college-ready by their high school graduation. Missouri educators, along with educators from across the nation, will need to critically examine the various ways by which they group students for instructional purposes.

One school Missouri school district, which will be referred to by the pseudonym Burke School District, is planning the reformation of its elementary math program in order to ensure the highest quality math education is made available to all students but also so every student can show an increase in achievement. In order to best meet the needs of all students, Burke’s School District’s administration and planning team will need to analyze the current math program noting what is working well for student

learning and what needs to be changed for improvement. Concerns need to be identified and well-thought plans need to be made to address them during the planning stage of the math program (Colangelo et al., 2004).

Park and Datnow (2017) explained “teachers, school leaders, and district administrators share overlapping spheres of influence on curriculum and instruction” (p. 303). It is imperative during the planning stage to understand the teachers’ perceptions regarding the current math program (Gentry, 2016). “Unfortunately, plans [for accelerated programming] often are implemented ad hoc, without knowledge or concern for later consequences. As a result, educators learn very little about the problems with acceleration that concern them the most” (Colangelo et al., 2004, p. 10). Many times in education, changes made in curriculum and instruction are impromptu and inadequately researched before implementation (Colangelo et al., 2004).

Statement of the Problem

As the Burke School District superintendent and administration contemplate restructuring the elementary math program to meet the needs of the students in order to achieve academic success, more information is needed to plan for potential change. When considering changes to accelerated programming, Colangelo, Assouline, and Gross (2004) advised “systematic plans to address concerns and potential consequences need to be developed prior to implementation” (p. 10). In accordance with this advice, Gentry (2016) emphasized the importance of knowing how grouping students for instruction affects “teachers’ ability to deliver curriculum, differentiate, accelerate, remediate, and meet individual students’ needs” (p. 127). Teachers can provide valuable insight about how grouping students for math instruction affects both their teaching and the students’

learning and achievement. While research supports the use of ability grouping for math instruction, the perceptions of teachers and administrators regarding Burke's math program at the elementary level is unknown. Therefore, the problem being addressed is the lack of understanding of the stakeholders' perceptions as they relate to the elementary math program.

Purpose

The purpose of this study was to acquire and understand the teachers' and administrators' perceptions of Burke's elementary math program for the intent of program improvement to benefit the learning of all students and to inform the Burke School District superintendent of the findings of this study. In addition to benefiting the Burke School District, the findings from this study can inform planning for other schools' math programs and potentially increase their student achievement.

Literature Review

Neihart (2007) stated "academic acceleration of high-ability youth is one of the most well-researched topics in education" (p. 331). Steenbergen-Hu, Makel, and Olszewski-Kubilius (2016) pointed out "ability grouping has been one of the most controversial practices for more than a century" (p. 852). While opponents to ability grouping exist, there is ample research supporting the use of acceleration. From their study which synthesized 100 years of research on the effects of ability grouping and acceleration, Steenbergen-Hu et al. (2016) noted the dominance of the research suggests ability grouping and acceleration "can greatly improve K-12 students' academic achievement" (p. 893). While this study contained a preponderance of research supporting ability grouping, opponents of ability grouping have provided numerous

reasons and supporting data indicating why ability grouping should not be used in schools.

The end of the twentieth century saw strong opposition to ability grouping and tracking, and organizations such as the National Governors Association, the NAACP Legal Defense Fund, and the Children's Defense Fund criticized the use of grouping students by ability (Loveless, 2013a). Buttaro and Catsambis (2019) stated "ability grouping fell out of favor in the late 1980s because many scholars and educational practitioners considered it an ineffective and unfair educational practice" (p. 32). Oakes (2005) claimed the use of tracking unfairly advantaged students whose parents had higher social and economic statuses, thereby perpetuating inequalities present in society. Neihart (2007) explained "the debate about ability grouping is often confounded by mixing of terms" (p. 333). Two terms that cause the most confusion in the debate are tracking and ability grouping.

Tracking, known in Europe as streaming, is a "form of ability grouping in secondary schools in which students are assigned on the basis of ability to a series of classes" (Neihart, 2007, p. 333). Neihart (2007) informed the most widely utilized forms of tracking are for college-prep, vocational, and special education. The author further explained "ability grouping includes tracking, but not all ability grouping is tracking" (Neihart, 2007, p. 334). Gentry (2016) and Loveless (2013b) also expressed concerns about the language used in debates on ability grouping, as the terminology being used is often not clearly understood. Collin and Gan (2013) and the National Education Association (2015) use the terms ability grouping and tracking interchangeably, as if there is no difference between the two. The National Education Association (2015)

equated ability grouping with tracking by stating “ability grouping, also known as tracking, is the practice of grouping children together according to their talents in the classroom” (para. 1). The movement to ban tracking in the United States was undertaken by Oakes (1985) in order to provide equitable learning for all students. There has been a substantial decrease in the use of tracking; however, most middle and high schools still use ability grouping to place students in classes (Loveless, 2013b).

Theoretical Framework

Constructivism

Constructivism is “a way of coming to know one’s world” (Brooks & Brooks, 1999, p. 23). According to constructivist theory, learners “build personal interpretations of the world based on individual experiences and interactions” (Ertmer & Newby, 2013, p. 55). The theory for this study is based on the work of two prominent constructivist theorists, Piaget and Vygotsky. While Piaget focused on the individual as being primarily responsible for the construction of knowledge, which is known as cognitive constructivism, Vygotsky concentrated on the essential impact others have on an individual’s learning, known as social constructivism (Öztürk, 2016). Both cognitive constructivism and social constructivism are learning theories that attempt to explain how students learn.

Piaget

Based on his theory of cognitive development, Piaget (1972) pointed out a child’s ability to think abstractly develops in stages: sensorimotor, pre-operational, concrete operational, and formal operational. Piaget (1972) further stated “the rate at which a child progresses through the developmental succession may vary” (p. 1). The author advocated

the view that when encountered with something new, children adapt their cognitive structures to allow for the new information. As not all students develop at the same rate, acceleration is a fitting option for students who develop at a faster rate.

Vygotsky

The use of acceleration in student learning can be thought of in terms of Vygotsky's (1978) work on learning and development. Vygotsky (1978) viewed learning as a social event and emphasized the learner should be challenged. According to Vygotsky (1978), the fastest learning happens when a child can do or figure something out with help when, otherwise, the child would not be able to do the same thing independently. To explain the difference between the point where the child needs help and the point where the child has acquired the new learning and is now independent, Vygotsky (1978) developed the Zone of Proximal Development. This zone is considered to be "just beyond what the learner/apprentice could accomplish by him or herself" (Merriam & Bierema, 2014, p. 119). Vygotsky (1978) indicated it is while in this zone that the learner experiences the most optimal learning.

Gambrell, Morrow, and Pressley (2007) explained teachers should first assess students' background knowledge and then build upon it by connecting it with "new ideas, skills, and competencies" (p. 22). High-ability learners thrive when teachers provide them with challenging work as "the students must work beyond their existing knowledge to experience new learning" (Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, 2015, p. 88). Vygotsky (1978) informed when learners are challenged, they are able to problem solve with the assistance of those who are more knowledgeable. Students placed in accelerated classes benefit from learning from their high-ability classmates.

Research Questions

This article will explore the answers to the following research questions:

1. What are the second, third, fourth, and fifth grade math teachers' perceptions of the elementary math program?
2. What are the administrators' perceptions of the elementary math program?

Design and Methodology

Data Collection

As the purpose of this study was to acquire and understand the teachers' and administrators' perceptions of Burke's elementary math program for the intent of program improvement to benefit the learning of all students, a qualitative methodology was most fitting for this study. Creswell (2014) informed "qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (p. 4). The researcher employed effective means of data collection for a qualitative study utilizing interviews (Creswell, 2014; Creswell, 2016; Seidman, 2013). Interviews were the primary means of data collection as this study focused on the perception of the participants. Analysis of the participants' perceptions involved "an inductive style, a focus on individual meaning, and the importance of rendering the complexity of a situation" (Creswell, 2014, p. 4). Institutional review board (IRB) approval was obtained prior to data collection. Through this study, the researcher conceptualized an understanding of the effectiveness of the elementary math program based on the data collected and made recommendations accordingly.

From the literature review on differentiated math instruction for groups of students within a grade, a set of interview questions was developed to provide the

information necessary to answer the research questions. Each teacher and administrator interview was approximately an hour in length. In addition to interviews, Star Math assessment data for each of the second through fifth grade math classes was collected for analysis.

Participants

Purposeful sampling, the selection of “a sample from which the most can be learned,” was utilized in this study in order to gain an understanding of the perceptions of the district’s stakeholders (Merriam & Tisdell, 2016, p. 96). Semi-structured, open-ended interviews were conducted with the administrators as well as with the teachers who agreed to participate in the individual interviews. The researcher conducted a total of 26 interviews, which included 21 interviews with second through fifth grade math teachers and interviews with five administrators. The administrators interviewed included the four elementary administrators and the district’s director of curriculum and assessment.

Burke School District’s Elementary Math Program

The math program designated by Burke School District is structured for elementary grades four and five such that each grade level includes multiple math classes of students working at grade level and one class of students working at an accelerated level. This structuring of classes uses ability grouping to determine which students are placed into the accelerated classes. Through the use of a screening process, teachers identify the students, usually no more than 25, who are working at the highest ability within their grade level. These top students are then placed in the accelerated math class for their grade level. Burke School District has been grouping fourth and fifth grade students in this manner for at least 31 years (J. Ritchhart, personal communication,

September 2019). The elementary math classes at the fourth and fifth grades are referred to as regular grade level math and alternately, accelerated math for the class containing the students who are determined to be working at the highest math ability.

While the accelerated math classes in this study share the same name as the Renaissance math program, Accelerated Math, which individualizes math practice and assessments for students, this study of math in the Burke School District does not include any use of Renaissance's Accelerated Math program (Renaissance, 2020). The math classes in the district are simply referred to as accelerated math as the students in them are working at an accelerated level compared to their same grade level peers. However, this study utilized Renaissance's Star Math assessment data to provide information about the range of ability levels present in each elementary class within Burke School District, which was analyzed for this study. Star Math, produced by Renaissance, is a comprehensive, computer adaptive assessment program which assesses K-12 math skills and provides extensive data about students' mastery of math concepts (Renaissance, 2019). While the district does not utilize Renaissance's Accelerated Math program, they do utilize Renaissance's Star Math assessments.

The class of accelerated math students uses the math curriculum for the grade above them; therefore, the accelerated students stay one grade level ahead of their current grade level peers in math. In order to identify which students will be in the accelerated math class and which students will be in the regular grade level math classes, students are grouped by ability based on multiple factors including standardized test scores, grades, and teacher recommendation. Burke School District is considering the addition of an accelerated math class for the third grade level at each of its two upper elementary

schools. This would necessitate the identification of third grade accelerated math students while they are in the second grade.

Findings

Accelerated Math Groups

An accelerated math class is offered for each of the fourth and fifth grade levels at both of the upper elementary schools in the Burke School District. An administrator shared, “We group students by ability at the fourth and fifth grade level. We have accelerated math. Students take a screening test, and then we use MAP data, Star data, and teacher recommendation to place students in an accelerated program.” The students who are deemed to be working at the highest ability in each grade level are removed from each of the grade level classrooms and placed into an accelerated class. Administrators and teachers indicated these classes are usually kept to around a maximum of 25 students.

Administrators commented about the positive effects of accelerated math classes for students. It was noted that accelerated students have an advantage over other students as far as being prepared for higher level math classes and eventually for college. Overall, administrators commented the accelerated classes ensure that the highest students are being challenged. Discussing the elementary math program, one administrator commented, “I believe that those students who can master those skills quickly benefit from being able to move along at a faster pace, and they can master those skills. And those other students who may be struggling with some of those skills aren't holding them back.” Another administrator explained, “Those students who are at a higher level can have the opportunity to learn more, go further faster, and learn at a higher level which will set them up down the road.”

Overall, the majority of teachers and administrators expressed the accelerated classes meet the needs of math students with the highest ability. For the most part, teachers and administrators agreed that the accelerated math classes both enrich and challenge higher level math students. An administrator shared, “I think the benefit with the accelerated math and the grouping is being able to meet students where they are and then take them to the highest level that they can achieve.” The administrator further commented, “And not have some students bored because they're waiting on these students to get there, or having some students totally lost because you're going further with higher level students.”

Talking about accelerated math, a fourth grade teacher commented, “At least those accelerated kids aren't sitting in my room bored. I have so many different levels in my class. It's always those high kids that kind of get left behind.” An accelerated math teacher explained the benefits of offering the accelerated class and what might happen to students if the accelerated classes are no longer offered. She explained:

It is very effective. I feel it prepares the students in accelerated math greatly for higher math in middle school, high school and beyond. If they didn't have accelerated math, if there was only one math class, I feel they would be bored. I feel there would be more opportunities for students that are gifted in math to get in trouble just because they would be bored and possibly acting out, possibly even not like math anymore, so just the whole apathy.

Several teachers commented that if there were no accelerated classes, those students who would have been in the classes would become bored in math class.

Not every teacher agrees with having accelerated classes at the elementary level; however, all teachers were able to describe benefits of having accelerated math classes. A fifth grade teacher who believes accelerated math should not be offered until middle school shared:

I have six students that go out for accelerated math, and I would be very sad for them if they were sitting around in here floundering while I'm trying to teach a small group of ten kids how to do third-grade skills. So, in that respect, I'm thankful for accelerated math. At this point in time, I think we have so many more children who need extra help that without the accelerated math program, it would be very, very difficult to meet all of the individual needs in one classroom setting.

Two accelerated math teachers conveyed an additional benefit of having accelerated math classes is that they decrease in the range of ability of the students in the grade level math classes.

One accelerated math teacher expressed the notion that accelerated math is important in fourth and fifth grade, specifically more important in fifth grade than it is in the younger grade levels because there is such a range in ability between the students by that point in their education. The accelerated teacher stated, "The higher level kids, the gifted kids are able to work at a faster pace and not feel like they're being left behind. It prepares them for the accelerated program in sixth grade over at the middle school." Talking about meeting the needs of the higher ability math students, a fourth grade teacher shared, "For the students that leave to go to accelerated, they need a little bit more a challenge, a faster pace. They can learn skills quicker and be challenged more than what they could in my class." An accelerated math teacher shared, "I think my

accelerated kids love the time and opportunity to go at a faster pace. I could see a lot of these students fizzling out if they weren't able to go faster or do more.”

All teachers agreed that the higher concepts taught at a fast pace challenge the accelerated math students. A fourth grade teacher explained, “The students that need that enrichment, you know, they need to be pushed as far as they can go.” A fifth grade teacher commented, “I think it's great for those students that pick up on math skills very quickly and are able to retain those very well. I think it's great to challenge them more.” In order to stay in the accelerated math class, students have to maintain a grade of 80% or higher.

All teachers agreed that students in the accelerated math classes will be prepared for future math courses. An accelerated math teacher explained, “Accelerated math sets students up to be able to take that extra honors level course in high school and even possibly earn dual credit for college courses in high school.” A fifth grade teacher noted, “Kids who are going to be on track to trig, honors trig, calculus, and higher math in high school are not going to be able to reach that level if they don't start now.” A different fifth grade teacher recollected her own education and commented, “The students who were in accelerated math went on to be something with engineering, statistics, actuarial science. They did something in the math field because they enjoyed it. So, it absolutely prepares you for your future education.”

Teachers pointed out the accelerated math students benefit from being around peers that are working at a similar academic level. A fifth grade teacher expressed, “I think it's good for them to have a different teacher and different peer group to be surrounded by, with peers that are intellectually on the same level as them.” One

accelerated math teacher shared, “Higher level students have an opportunity to communicate some higher level thoughts with other higher level students, and they also have the opportunity to be challenged.” The teacher further added, “I think a big advantage is that they're becoming more critical as students with their thinking and their reading and their reasoning and explanations because it's being kind of demanded on them with what we're doing.”

One administrator and one accelerated math teacher voiced concerns that parents may be misunderstanding the accelerated math program. Both individuals explained that students are not skipping an entire year of math. Rather, they are being held responsible for the grade level math for the grade they are in as well as being held responsible for learning the next year's math curriculum. An accelerated teacher shared, “I would say that one of the advantages that parents need to realize is both accelerated and what I would consider on grade level math, they're still having consistent exposure to grade-level content.” The teacher commented, “I think that a misconception of accelerated math is that kids get to skip a grade of math,” and explained, “they're not only getting on grade level content but they're applying on grade level content to what the next grade level would expect of them.” Students in both the grade level math classes and the accelerated math classes are using the same curriculum, Math in Focus.

How students are chosen for accelerated math. Teachers and administrators explained the various requirements for admittance into an accelerated math class. However not all teachers, even fourth and fifth grade teachers who teach the grades for which accelerated math is offered, could explain how students are identified and selected for accelerated math. A few teachers said they thought that perhaps Star Math and MAP

(Missouri Assessment Program) scores were used to identify which students would be accepted into accelerated math. Administrators explained MAP scores, Star Math progress monitoring, teacher recommendations, quarterly grades, and a screening which utilized a variety of tests are all included in the selection process of students for accelerated math.

How parents are informed about accelerated math. Administrators admitted that the accelerated math classes are not advertised in any manner. Therefore, parents do not know that accelerated math classes at the fourth and fifth grade levels are an option for their children. While discussing if parents know that accelerated math classes are offered, one administrator commented, “I feel like they kind of just know based on the community and just prior experiences.” The administrator added, “When students qualify, we send information to those families explaining the course and explaining the kind of requirements for the student to remain in that course, and our parents can decide if it's the best fit for their child.” Another administrator shared that a letter is sent to parents along with the placement letter for the student’s next grade level, and sometimes, if students are admitted to the accelerated class at fifth grade, the teacher will call the parents to inform them and seek permission for placement.

A lower elementary administrator commented, “I can see that some parents would probably want to know what the criteria is for getting in there. Some of our parents who aren't as informed may not even realize there is that option.” Several teachers indicated they would like for parents at all levels to be informed that accelerated math classes start in the district at the fourth grade level. Teachers expressed that perhaps parents might work at home more with their children on math if they thought their children might have

an advantage at the elementary level from being in those classes. A third grade teacher discussed sharing with parents at parent-teacher conferences the possibility of their children being in accelerated math class for fourth grade. She explained, “Once I’ve even planted that seed with parents, you can tell that that kid is getting pushed at home. Their parents are working with them because you’ve said this kid has the potential to really go farther.”

Whether or Not the Current Program Meets All Students’ Needs

When discussing whether or not the current elementary math program in Burke School District is meeting the needs of all students, a fifth grade teacher shared:

I like to just sit here and say, oh, in my classroom, all of their needs are met, but they’re not. The high kids get left behind doing practice on things that they already know, and lower kids are sitting there losing a lot of the time. And so, I don’t think that everybody’s having their needs met, but I don’t know what the answer is either because they don’t like the idea of sorting out the low-low kids. There are kids on each end of the spectrum getting left behind. I don’t know exactly what the answer is, but I don’t feel like the way we do math is meeting the needs of all the students.

Most teachers expressed similar sentiments, that not all students’ needs are being met with the current math program.

Concerning the math program, a fifth grade teacher shared, “It’s meeting the needs of those accelerated, those top students, but I don’t think it’s meeting the needs of the rest. I think we are only skimming the very top.” This teacher further explained, “I think we have too great of a range left in the regular grade level classes.” An accelerated

math teacher commented, “I feel it meets the needs on the accelerated or enrichment end, but I honestly don't feel it meets the needs on the lower end as far as students that need remediation.” An accelerated math teacher shared, “My students that might have been close to getting into accelerated math performance-wise are falling down. And again, that could be not understanding content. That could be lack of motivation, lack of relationship with a different adult, different things.” A fourth grade teacher shared:

Our series is really fast-paced so it feels like accelerated. It's like only teaching the kids that get it and then moving on sort of thing. I know there's some remediation, but I feel like I'm just kind of teaching to the middle of the road. So, it's not meeting the students' needs.

There were some teachers who expressed the current elementary math program is meeting the needs of all students. A second grade teacher shared, “It meets all of the students' needs because it's adaptable and allows the students to grow. The groups are fluid so students are able to move into and out of groups based on their readiness level.”

Need for a basic math class and expand Title. Multiple teachers expressed the desire for the district to also offer basic math classes to meet the students who lack a strong math foundation in addition to offering the accelerated classes. Almost all fourth and fifth grade teachers expressed the need for Title Math services for their students. An accelerated math teacher commented, “I almost wish there could be a class for our really low ones that really just need that one-on-one or a smaller, a consistent smaller group, or a title math program might even help that situation.”

Several teachers commented the school district has spent much of their resources on improving students' reading achievement, but the same emphasis has not been placed on improving students' math achievement. One administrator stated:

I think what has been important lately is that we are making math our focus. For the longest time, it seemed like we always focus on ELA [English Language Arts]. I think we focus on math equally now. I think we have to remember that math is just as equally important as ELA. I think that we're doing a better job.

A second grade teacher similarly shared, "I feel like our math program is lacking, honestly. I think we could do a lot better job. I feel like in our district, the focus has always been reading. I feel like math is really put on the back burner in this district."

Overall, teachers expressed the need for help with math instruction in order to meet the vastly diverse needs of their students

Proponents of Accelerated Math

The majority of participants in the study supported the use of the accelerated math classes and pointed out multiple benefits from having the ability grouped classes. These benefits include, but are not limited to, meeting the needs of the higher math students, reducing the range of readiness levels in the grade level classes, allowing the needs of all students to be better met, and reducing the amount of differentiated instruction for the teacher.

A fifth grade teacher commented, "Having both an accelerated math and a regular math class gives time for guiding towards specific needs of different children. I think it challenges them both in different ways." A fourth grade teacher noted one of the benefits of having accelerated math is that she is better able to meet the needs of the

students left in her classroom. She explained, “For the students in my class, I am able to determine which ones are getting it quicker. We can move on if it's the majority the class, or I can just work with a small group if needed.” A fourth grade teacher shared, “For the students that stay with me, I feel like they're there in a place where they're not going to feel overwhelmed. They're not going to be rushed.”

A fourth grade teacher commented, “I can tailor learning better because I feel like I have less of a huge gap between the high and the low without those accelerated ones in the mix. So maybe I can close that gap a little bit.” A different fourth grade teacher explained, “It would be great to have the accelerated kids in my classroom to help out because they would understand. But then again, that would still be holding them back, and we don't want to do that.” Another fourth grade teacher commented, “It would be nice for me if I had more high kids in my regular math class, but I feel like I would not be serving every student as well as I am.” An accelerated teacher commented, “I understand there are concerns that some of the teachers don't feel all the students have that higher role model, but I do feel like maybe the middle kids become the high kids and gain more confidence.”

Support at second and third grade. Some of the second and third grade teachers professed support for the current accelerated math classes and expressed the desire to offer accelerated math at their grade levels. After voicing support for accelerated math classes at the upper elementary, a second grade teacher explained, “We already group students by ability in our classrooms for concepts. We don't want to stifle their growth. The groups are flexible.” A different second grade teacher said she would like to have accelerated math at her grade level and explained, “I think the advantages would be you

could meet the needs of the kids better.” However, she cautioned, “I would just hate for a kid who's maybe borderline to get the idea that they're not good at math because they're not in the accelerated group.”

A third grade teacher voiced her opinion about accelerated math and explained why she believes it is needed at the third grade level. She shared:

I am for accelerated math. In a way, when you give so much of your time to those lower level kids, a lot of your time. You give some of your time to your average kids, and then your higher level kids. You assume they know it, and it's hard to push them forward in your own classroom. In a regular classroom setting it's very difficult to meet their needs. If we had accelerated math at third grade, those higher level kids would get what they need. They would get their needs better met.

A second grade teacher explained, “Having accelerated math at second grade, would give those kids that are ready for that challenge the opportunity to learn and grow at their potential. I feel like more than ever, I've got kids that want to learn.” This teacher additionally stated, “Unfortunately, I can't challenge kids all the time in the way that I want to. And, they need to be challenged. I hate that, but when you're a one-man band and you've got kids of all ranges.” The teacher concluded, “And, unfortunately the low ones are the ones that I feel like get the most attention. We're giving them first grade work, but are we giving our higher students 4th grade work? I mean, it's hard.”

When talking about at what point accelerated math should initially be offered, one administrator expressed the opinion accelerated math should not be offered below third grade. The administrator explained, “I don't think I would do it at the primary level just

because they're still learning so many basic concepts, and I don't think it would be as necessary. When asked about offering accelerated math at the third grade level, another administrator stated, "No. I just know they're younger. I would worry about that pigeonholing certain students, and I don't think that would be good for kids that age." Additionally, when discussing the possibility of accelerated math for third grade, another administrator explained, "I don't think kids are ready for it. It's such a huge transition from second to third grade, and they're just trying to figure out what their responsibilities are, and taking notes, and keeping their agendas together, and learning concepts."

When accelerated math should initially be offered. Each study participant was asked when accelerated math should initially be offered. The following table, Table 1, displays the responses given by each of the teachers and the administrators. Approximately 54% of respondents indicated they would like for accelerated math to initially start at fourth grade where it currently is offered. Approximately 15% of respondents indicated they would like for accelerated math classes to start at middle school in sixth or seventh grade. Approximately 12% of respondents indicated accelerated math should start at third grade. Approximately 8% of respondents indicated the desire to have accelerated math start at first or second grade, and another approximately 8% of respondents wish for accelerated math to start at kindergarten. One respondent, opposed to accelerated math, did not indicate a grade level for the start of accelerated math.

Table 1

Grade Level at which Participants Believe Accelerated Math Should Initially Be Offered

Participant's Role in the District	Grade Level Accelerated Math Should Initially Be Offered
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
5 th Grade Teacher	Middle School 6 th or 7 th Grade
5 th Grade Teacher	6 th Grade
5 th Grade Teacher	6 th Grade
5 th Grade Teacher	4 th Grade
5 th Grade Teacher	4 th Grade
5 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	3 rd Grade
4 th Grade Teacher	1 st or 2 nd Grade
3 rd Grade Teacher	3 rd Grade
3 rd Grade Teacher	2 nd Grade
3 rd Grade Teacher	Kindergarten
2 nd Grade Teacher	4 th Grade
2 nd Grade Teacher	4 th Grade
2 nd Grade Teacher	Kindergarten
Administrator	No grade level indicated
Administrator	6 th Grade
Administrator	4 th Grade
Administrator	4 th Grade
Administrator	Not below 3 rd Grade

Three of the fifth grade teachers interviewed preferred that accelerated math start at the middle school level. A fifth grade teacher commented, "I definitely think middle school, sixth grade or seventh grade, because we have a natural transition to a new building and a new expectation level." A fourth grade teacher explained accelerated math should initially start at fourth grade and not at third grade when students have just transitioned to a new building. She explained, "I think it's good to probably have their third grade year to kind of understand what's expected of you as a student in the new school." Another fourth grade teacher stated, "I think third grade because they're getting past basic concepts, and you can start seeing when they're going from the concrete to the abstract."

A third grade teacher remarked, "In thinking about all of my all my years of teaching, there's always been an enrichment part of the program. I think every grade level should be given the opportunity to advance students who are ready." A second grade teacher explained, "I have some kids in here that I think, they're ready to be challenged. I'm sure there are probably kids in first grade and probably kids in kindergarten that are probably ready for that."

The accelerated math teachers all agreed that fourth grade is the best place to initially offer accelerated math. One of the accelerated math teachers commented, "I just don't think first, second, and third are ready. They're just building that background in math." Another accelerated math teacher explained, "I really do I think in third they're doing so many important skills that need to be addressed to everyone that it might be difficult to do it before fourth grade." Yet another accelerated teacher offered, "I don't know if organizationally our students would be ready in third grade. I think third grade is

a good year for them to demonstrate leadership and also demonstrate ability to follow expectations.” This teacher also expressed concerns about third graders adjusting to a new building, a new routine, and new expectations. Therefore, she believed fourth grade is the most appropriate grade level for students to start accelerated math.

Opponents of Accelerated Math

Some teachers expressed that while accelerated math is important for older students, it is not necessarily a good fit for elementary students. Teachers discussed that while children learn math at different paces, they also learn all other subjects at different paces and not all subjects offer an accelerated class. A fifth grade teacher commented, “If we're going to differentiate for math on an accelerated level, it's almost it feels like it downplays all the other subjects and core content areas.”

One administrator expressed that the district should not move forward with offering accelerated math classes at the elementary level. The administrator believes that teachers can challenge students within their own classrooms and not have to switch students for accelerated math based on ability groups. The same administrator expressed concern that not all students are getting their needs met due to the fact that some students are removed for accelerated math. The administrator explained, “I feel like the students that are on grade level and below grade level maybe are not experiencing being challenged by the higher level kids if those kids were placed in the classroom with them.”

Some teachers and administrators expressed concerns about accelerated math damaging students' self-confidence. A second grade teacher cautioned, “You don't want to create any confidence issues in students. I think that you have to be really careful how

you handle pulling those students out and not necessarily call it accelerated math.”

Speaking about students who do not get into accelerated math, another second grade teacher commented, “The drawback is that they form the early idea that they're not good at math.” A fifth grade teacher shared, “I've had my students say before, ‘Well, we're not the math kids,’ meaning they are not as good at math as the accelerated kids. And that bothers me.” One administrator who is opposed to accelerated math explained, “If we're differentiating and we're challenging our students, then I think we should have them altogether, all abilities, all levels within the room.” Another administrator spoke out against accelerated math and also explained, “I think we should be challenging every child like they're an accelerated student and taking them from where they are and challenging them to move them forward as much as possible.”

Some teachers expressed concern about the amount of stress that the accelerated math classes causes students. A fifth grade teacher explained, “It can be a lot of stress for some students whether they are in the program or whether they wish to be in and aren't there.” Another fifth grade teacher commented, “I don't think they should be stressed about their homework. I think they're stressed.” Thinking about students in the accelerated math classes, a third grade teacher stated, “A disadvantage would be if I'm in here, and I can't make it, or if the pace is too much, or this is too stressful.”

If Accelerated Math Classes Were Not Offered

Fourth and fifth grade teachers expressed their math instruction and the structure of their math classes would change a lot if accelerated math classes were not offered. Several teachers were visibly worried at the thought of not having accelerated math classes for their grade level and others looked positively at the benefits that would result

from having the high ability math students in their mix with their grade level math classes.

A fifth grade teacher thoughtfully stated, “Well, we would just have more of a range, and maybe some of those kids that were skimmed off the top, maybe things would switch around because you're switching up the pond.” Teachers who were able to see any positive outcomes by not having accelerated classes were definitely in the minority.

Most teachers were horrified at the thought of not having accelerated math classes. Several teachers expressed concern about not having enough time as it is to meet the needs of all of the students in their math classes, and the thought of putting the highest level math students back into their math classes worried them. A fourth grade teacher shared, “It would be more work for me. I know that sounds selfish, but so then you've got even more ability levels in the classroom. So then, I would need to find more differentiated instruction that's at a higher level.”

Almost all of the fourth and fifth grade teachers worried about the lack of time due to the amount of time it takes to differentiate instruction for students in math. A fourth grade teacher shared:

I'd be trying to split my attention between enriching the advanced ones and working with the low ones, and then seeing which ones in the mid-range I can push and which ones need help. So, I think it would divide my attention a little bit more, and I would not have enough time. I don't have enough time now as it is.

A different fourth grade teacher worried that adding the accelerated students back into her math class could potentially be harmful to her lowest level students. She shared, “I'm seeing the level of thinking in my class, and I can't imagine taking my low level students

and putting them in the same classroom to learn. I feel like that would definitely harm them.” A majority of the grade level teachers indicated that most of their time in math is spent instructing the lowest level math students.

Some teachers expressed concern about their ability to meet the needs of the highest students. She shared, “I will admit that I'm not a good teacher at hitting those higher kids’ needs. I lean more towards the low kids or the average kids, and that's something that I've struggled with my whole career.” A fifth grade teacher also confided that she does not believe she can adequately meet the needs of the highest math students. She commented, “I need help differentiating. I don't have anyone who is going to help me do that.” A majority of teachers expressed the need for professional development on how to best utilize Math in Focus to meet the vast range of ability levels in their classrooms.

Teachers listed a number of negative effects that could potentially arise from the elimination of accelerated math classes. Administrators also expressed concerns for students and teachers if accelerated math classes were eliminated from the district's elementary math program. One administrator shared:

Unfortunately, I don't think that kids who need the enrichment would get all of the enrichment they needed just because it's so difficult for a classroom teacher to differentiate from special education all the way to gifted plus. When we are able to narrow that focus, then teachers are able to provide those opportunities for those special education kids, for those middle road kids, and then those accelerated teachers can really push that teaching way beyond the common expectations.

Another administrator commented, “Structurally, you would have that broader spectrum of learning abilities so it would be harder on the teacher to be able to meet the needs of all of those students in one classroom.”

Conclusion

As the United States competes in a global market dominated by ever-advancing STEM products and services, our school systems strive to provide an education for all students that will allow them to be capable of joining such a market. Presently, our schools are not producing enough capable students, as indicated by standardized assessments such as ACT and state-mandated tests. With only 30.5% of Missouri eighth grade students scoring proficient or advanced on the Missouri Assessment Program tests, there is need to examine all aspects of math instruction especially at the earliest points possible in the educational system (Missouri Department of Elementary and Secondary Education, 2019c). Such an examination would include how students are grouped for math instruction.

As school districts continually assess their math programs to ensure they are providing the highest quality education for all students, it is necessary to consult the teachers, the people who know the math programs best. Teachers can give first-hand input about whether or not a math program is meeting individual students’ needs. Teachers’ perceptions about math programs can reveal concerns and issues with certain aspects of a program that may not be apparent to those in the positions to enact reform.

While Burke School District teachers and administrators agree in large part that the accelerated math classes are meeting the needs of the highest ability math students, not all study participants support the continuation of the accelerated classes. Some

administrators believe that teachers can differentiate for all students, including the highest and the lowest, in the same math class. Teachers, however, reported too large of a range of abilities left in the classroom even with the highest math students removed. When asked for recommendations to improve the elementary program, teachers overwhelmingly expressed the need for more time for math instruction and for a plan of action to specifically meet the needs of the lowest students. As district administrators contemplate change, teachers will continue to strive to meet a diverse range of student needs in a limited amount of time.

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Section Six:
Scholarly Practitioner Reflection

Scholarly Practitioner Reflection

Through the process of completing my coursework, conducting research, and writing my dissertation, I have undergone a transformation as a leader. I now look at issues in education from a new perspective, not only from a single new perspective, but through multiple perspectives. While I believe that I have always responded to others' perspectives with respect, I now actively seek to learn more about others' perspectives, what shaped them and why others maintain different beliefs. My doctoral journey has influenced both my personal and my professional life in a number of positive ways. I have thoroughly enjoyed learning from my fellow cohort members at the University of Central Missouri, my cohort professor, Dr. Sandy Hutchinson, the numerous professors at the University of Missouri, and from my cohort members across the state.

Change as an Educational Leader

For much of the journey, I have been a part of a team which I am now fortunate enough to call my friends. To a great extent, on the last leg of the journey, the dissertation, I was flying solo. For the last part of this adventurous expedition, I got to put into practice everything I learned through my doctoral studies and team projects. Although I state that I was flying solo, in fact, my closest and dearest cohort members encouraged me and cheered me on. As I reflect on how the dissertation process has influenced my practice as an educational leader, I know undoubtedly that the entire process up to this point has caused me to be a better team member. I have learned that I can be a leader while still being a part of a team, and that others can also lead while still being members of a team.

Even though as leaders we have times where we must fly solo, I now know we need to remember where we came from, as Dr. Hutchinson so brilliantly taught me. I would not be who I am now or where I am now without all of the love and support from the teams from which I have been a part of throughout my life. So, as I completed my dissertation, I drew upon all of the strengths the members my doctoral team had previously shared with me. Combining what they taught me with my own strengths provided me with the knowledge and the perseverance to complete my dissertation.

As an educational leader, I not only will share my strengths with my fellow educators, but I will actively seek to help them identify and refine their own strengths, allowing them to achieve and become their best. As I interviewed other teachers as part of my study for the dissertation, I was given the opportunity to hear their perceptions about the triumphs and the struggles they face as elementary teachers. While I was familiar with some of their experiences based on my own teaching, my eyes were opened to some challenges that I did not know existed. This realization brought home an understanding of the importance of what it truly means to be a team, and if we as educators are going to profess that we are a part of a professional learning community, we need to know and genuinely understand what it means to be a part of a team. As both a teacher leader and an educational leader, I will strive to be the best team member that I can be and work diligently to foster the team dynamic in others, helping them understand how truly impactful being part of a team, a professional learning community, can be.

This study has heightened my awareness of the importance of understanding the perspectives of all stakeholders when considering program changes in educational settings. Perspectives of individuals working in the same setting can be quite different

depending on the person's role, experiences, and personal values. When change is going to affect teachers and students, it is vital to know the teachers' perceptions and have an understanding of the needs of the students before the change process begins.

Change as a Scholar

The dissertation process has influenced me as a scholar to analyze research related to problems of practice I encounter on a daily basis in education. I am now confident in my ability to locate relevant peer reviewed journal articles and analyze them for the purpose of obtaining ideas to help remedy problems of practice. I can read studies and understand the processes the researchers utilized which led them to their recommendations. I am now able to understand how theoretical and conceptual frameworks influence the ways researchers view their findings and discuss them. I know to look for bias in the work of others and to be aware of my own bias as I analyze problems of practice.

Through my doctoral coursework and the dissertation process, I have learned about the ethics involved in conducting studies. I understand the importance of institutional review boards and the necessity for researchers to get approval for the studies they conduct. I learned about the history of research prior to institutional review boards and how, with time, safeguards have been put into place to protect participants in studies, especially those participants who are members of protected classes. As a researcher, I was keenly aware of the ethical manner in which I needed to conduct my study.

Writing a dissertation has also allowed me to deepen my love for data and a desire to get to know people, finding out what makes all of us different. I now know that I enjoy

being a qualitative researcher. Before the doctoral program, I was not aware of everything involved in qualitative research, nor did I know that I would come to love the process of conducting a qualitative study. I sincerely enjoyed interviewing teachers and administrators and then analyzing how their perceptions were alike, as well as the ways in which they differed. As a scholar, I found it exciting to listen to people explain their various points of view and the unique experiences they have had. I enjoyed comparing the results of my study to other studies. As a leader in education, my scholarly abilities of being able to digest peer reviewed journal articles, create relevant research questions, and collect and organize data will enable me to evaluate educational practices and plan for change for improvement.

Appendix

Themes

Throughout the teacher and administrator interviews, as data were being collected and, subsequently, through the process of data analysis, five themes continually surfaced. The five consistently present themes are: an individualized approach is necessary, grouping students is crucial, the math program has room for improvement, collaboration is driving math instruction, and accelerated math classes are meeting the needs of the highest math students. Each of the five themes is integral to the overall effectiveness of Warrensburg R-VI's elementary math program.

An Individualized Approach is Necessary

During the interviews, both teachers and administrators reiterated the need to individualize math instruction for all students. All participants acknowledged a widespread range of readiness levels existed in each of the grade level math classes. Participants pointed out that students also differed in behavior, background knowledge, learning styles, and pace in understanding new concepts.

Widespread range of readiness levels. The Warrensburg R-VI School District has a diverse student population. One of the ways in which the students differ is in their range of readiness to learn new concepts and skills. Almost all grade level math teachers, second through fifth grade, described their math classes as having a wide range of readiness levels. As early as the second grade level, teachers observed a wide range in students' math abilities. A second grade teacher explained, "When I give the pretest, I've got kids that will miss all of them, and I've got some that will get all of them right. It depends on the topic with the math series we use." A different second grade teacher described the range of readiness in her room as, "All the way from not having any

foundational skills to already having them and beyond.” Although three grades higher, fifth grade teachers’ comments corresponded with the second grade teachers’ observations. Multiple fifth grade teachers mentioned that many students in the grade level math classes lack number sense and fact fluency. One fifth grade teacher explained, “The students that are lacking in their basic math operations and number sense tend to be below grade level across the board.” Teachers at all grade levels indicated students without strong mathematical foundations functioned below grade level. Vastly differing from the on grade level math teachers, both the fourth and fifth grade accelerated math teachers remarked they experienced a very limited range of readiness levels in their math classes.

Prior knowledge. Every single interview participant, including administrators and teachers, expressed the importance of assessing students’ prior knowledge for teaching new math concepts. One administrator advised, “I think absolutely you have to begin there because if, as teachers, you just teach a lesson and 90% of your class already has that background knowledge, then you're wasting their time. You're wasting your time.” A different administrator shared, “I feel it's very important to use the students’ prior knowledge at the very beginning of a new concept but then also throughout their learning process.” One administrator noted, “You have to bring in that prior knowledge to build up to that concept because math has so many building blocks to it.” All teachers, in addition to all administrators, expressed the importance of assessing students’ prior knowledge before math instruction.

Ways to assess prior knowledge. Both administrators and teachers identified a variety of ways in which students’ prior knowledge is assessed. One administrator stated,

“I encourage teachers to assess students’ knowledge by using assessments whether it’s a pre-assessment from the curriculum resource Math in Focus, using information from Star data, or using teacher judgment, or common formative assessments.” Yet another administrator acknowledged, “We give pretests to see what students know.” A fifth grade teacher noted, “You use students’ prior knowledge constantly. You’ve got to see where they’re at. I do that through pretest, but a lot verbally. You can figure out quickly where kids are at just by asking questions.” Teachers described a multitude of ways they assess students’ knowledge including the utilization of pre-assessments, asking questions, giving a few introductory problems, and analyzing historical data such as test scores and report cards.

Utilization of assessment data. All elementary teachers in Warrensburg R-VI School District administer the Star Math assessment to their math classes at the beginning of the school year. Several teachers talked about referring to the Star data as a source to gain information about their students to plan for instruction. A fourth grade teacher commented, “At the beginning of the year, we do the Star Math test, and I look at that to see where they are and where they need to be. That guides me and tells me where I need to go.” This teacher also indicated that she utilizes the data from the Star Math assessments to form small groups for instruction. A second grade teacher stated, “I look at Star data to see like where we are at. I also do a placement pretest before each unit, and so that gives me kind of a good indication of where we’re going to really start.” A fifth grade teacher shared, “I like to gauge their abilities so that I know my starting place, and I’m able to set and determine goals that are realistic for them.” The teacher further added, “I also use pretesting for checks for basic math operations, and then I look at performance

within the class in regards to effort and the timeliness they're able to complete tasks in comparison to their peers.” In addition to the utilization of Star Math assessments, multiple teachers discussed using the pre-assessments from the Math in Focus curriculum to assess students’ prior knowledge about math concepts.

Differentiation is a must. Warrensburg R-VI School District administrators all hold the expectation that teachers will differentiate. One administrator detailed her expectation by stating, “Trusting that the teachers know that when certain students are struggling that they would provide additional supports whether that would be the whole class using manipulatives, certain students, whether it's one-on-one feedback to a student or a small group.” Another administrator commented, “We have such a diverse population within every building, in every elementary. You have to really individualize instruction for every child. Not every child has an IEP (Individualized Education Plan), but they need a personalized instruction plan.”

Individual plan of action for every student. Each of the teachers interviewed explained that they modify class work and differentiate instruction for their math students. Teachers described various modifications they make for individual students and discussed how they differentiate instruction through the use of small groups. One of the administrators commented, “You have to have groups that are set up and established to allow students who need remediation receive it and students who need extension to receive. You know, just keep moving the line forward.” Another administrator explained, “We’re in an era when we have an individual plan of action for every student. We have to take students, especially at this age group, from where they are and stretch them as far as they can go.” Teachers explained that with Math in Focus, they teach a whole group

lesson first and then work with individual students or small groups of students which have different needs.

Different learner styles. Teachers explained that while their classes include a wide range of levels of readiness to learn new concepts, they are also comprised of a variety of different types of learners. A fourth grade teacher shared, “I feel like I'm all over the place in math because I know I've got visual learners. I've got the kids that have the tactile, that need to touch it. So, we learn different methods to do the problems.” An accelerated math teacher shared, “I try to use a combination of manipulatives and visual along with auditory, a little bit of lecture, a video, sometimes a song.” Teachers talked about knowing the different needs of their individual students and the necessary differentiated means they use to ensure success for each student.

Technology aids in differentiation. Some teachers have one-to-one technology in their classrooms, and those teachers shared their utilization of technology for a station or a math rotation for their students. One of the free online programs utilized at the lower elementary is Extra Math which is a fact fluency program. Another free program is Zearn. A second grade teacher shared that she utilizes Star Math data to customize what she has her students work on using Zearn. She explained, “I have kids that show on Star that they're working on fifth grade math level. And so, Zearn is a good way for me to be able to introduce information to them.” Most of the teachers who did not have one-to-one technology in their classrooms expressed the desire to have a part of a one-to-one technology classroom.

Expectations differ. All teachers differentiate learning for their students for math. With the differentiation comes different expectations. While the expectation for

math, as one administrator stated, “is that all students learn the standards,” teachers admitted they hold different expectations for different students in regard to math. A fifth grade teacher commented, “I would like to just say that my expectations are high for all students, but high for one student would be a different high for another student.” A second grade teacher confided, “There are certain kids that I don't expect for them to be meeting grade level expectations. I mean, that's just not going to happen because they're just so far behind for various reasons, but I want them to always be growing.” A third grade teacher admitted her expectations differed for her higher students compared to her lower students. She disclosed, “I know for our higher students, I expect them to think deeper, think beyond, problem solving a little deeper. My lower kids, I'm just probably just want them to feel more confident just basic problem solving.”

Some general expectations for all. Some teachers hold generalized expectations for all students. A second grade teacher stated, “I know that some students are learning at a different pace. Some students have learning disabilities, but I still have the expectation they will learn the content and do their best.” A fifth grade teacher explained, “My baseline expectation is that they all see that math has a purpose, and that they can all do it. It's just that their level of execution is different.” A third grade teacher shared, “My expectation for all kids is to be at the highest level that I feel like they can be at without getting frustrated. My expectations would be high for any kid, at their level, and take them as high as you could go.” An accelerated math teacher explained, “I think my expectations are more like try your best, be willing to listen, and also, be willing to participate. My overall expectations for them are to try their best and listen. Those things don't change.”

Ongoing assessment. Teachers indicated, in order to continually best help each student learn, assessment is always ongoing whether it is formal or summative. A second grade teacher commented, “I give lots of short pretests which help me put students into groups, and I provide instruction and practice at the level they are ready for.” In order to assess where her students’ learning is at, a fourth grade teacher shared, “I might just pull out just a few questions for some students to do if I see that they're struggling.” Teachers use a variety of modifications with the students who are struggling. A third grade teacher stated, “I've gone back grade levels to modify. I've shortened assignments, given them longer time, broke the lessons down into maybe two or three parts over two or three days.” A fifth grade teacher shared, “I use accommodations such as reading the questions aloud to them, providing a list of steps to solve the problems, or taking the standard down maybe a grade level or more.” This teacher explained, “I look at what prior knowledge is needed, what prerequisite skills are needed according to our math series, to be able to solve the problems.” After the teacher identifies the prerequisite skills, she teaches those skills to the students in her small groups.

Grouping Students is Crucial

Good fit instruction. Overall, teachers expressed the utilization of small groups is beneficial for a number of reasons. The greatest benefit teachers noted was that instruction could be tailored to meet the individual learner’s needs. A fifth grade teacher commented, “Small groups allow students to get the good fit instruction they need to close the gaps and build their knowledge.” A second grade teacher commented, “Small groups allow me to deliver instruction that's going to be most useful to students.”

Variety of with-in class groups. All teachers indicated that they use some form of grouping during their math classes. All teachers start their math class with a whole group lesson which comes from the appropriate grade level of the Math in Focus curriculum. After teaching the whole group lesson, several teachers indicated they separate students into groups based on their level of understanding of the math concept which is being taught. Most teachers indicated they spend their time for the remainder of the class period working with the lowest group. Other teachers utilize what they refer to as math stations, math rotations, or math workshop. In each of these options, the teacher meets with each group as they rotate through the stations.

Whole group, then small groups. The teachers shared that they first teach the math lesson of the day to the entire class, and then they pull small groups. A fourth grade teacher commented, “I do my whole group lesson, and then I will pull my lower kiddos back and work one-on-one with them in small group.” A second grade teacher explained that using groups for math helps her manage her instructional time. She explained that she uses her pretest data to ability group her students. She informed, “The reason I like to do it is because my kids that score lower usually need more time and more support, so I can give them more time. Whereas my higher kids can work through faster.” A fourth grade teacher commented she likes to utilize math workshop. In order to form her groups, she uses the latest Star Math data and adjusts groups as needed based on her observations. She utilizes three groups. The lowest group works first with the teacher on the lesson that has just been taught. The second group works at a partner station which is usually comprised of math games, and the third group works at a homework station to complete the day’s independent assignment.

A third grade teacher shared that she likes to have a low group, a medium group, and a high group. She explained, “I rotate them through different stations with myself being a station. I help them work at the level they're at. I can push my high kids, and I can pull my low kids up. Push my high kids to go deeper because they're working with each other at that higher level and challenging each other.” A fourth grade teacher explained that students are grouped by ability at tables in the classroom. The teacher explained, “So, I know this table. I almost always need to be around there to help them out.”

Administrator perceptions on grouping. When asked about grouping students for math, one administrator commented, “Within the classroom, I think you have to do some grouping because they are at such different levels. You have to be able to figure out where they are and teach to where they are.” Another administrator stated, “I just think it's critical.” The administrator shared that after the whole group lesson, sometimes the students work independently and sometimes they work at stations. The administrator further added, “And then teachers are working with a small group that might need some additional instruction or more foundational work.” Talking about small groups, one administrator expressed, “I used to call it a three-ring circus. You've got different groups going because they're all different, and you want what's best for them. And that's what's best for them is to meet them where they are and grow.”

Emphasis on lowest group. A fourth grade teacher's comments reflected what several teachers do after whole group instruction. The teacher shared, “I work with a small group every day, and usually it's the same group. They're lacking in all skills.” Some teachers revealed they facilitate each of their higher groups in order to start their

group work, and then they spend their time instructing the lowest group. A fifth grade teacher said she leaves out the answer key for her highest students to check their own work and proceed independently with the next assignment.

Behavior is an issue. Several teachers indicated their students are not able to work well in a small group without supervision. A third grade teacher confessed, “The way I teach it is whole group. I want to work together because I want to like control the whole situation, I guess you could say.” The teacher went on to explain, “Every now and then I do groups. I'd like to be stronger in group work. I feel like a lot of my kids, they're not as independent as I would like for them to be. They depend a lot on my assistance.” A fifth grade teacher explained that in past years, she often utilized small ability groups to differentiate math instruction. This year, however, because of behavior issues, it is not as easy to manage small groups. She explained, “With the range of behaviors, a lot of my lower kids are the ones that have behaviors in general, you can't necessarily sit them always together. They are the ones that literally just shouldn't be in the same space.” A second grade teacher explained about her students, “I group them initially based on their Star and looking where they're at. And then once you meet with them, you have to look at behaviors, how the kids behave with each other, and that's really big, honestly.”

A second grade teacher noted, “You can put more of your higher kids in a group because they're probably going to get things quicker. I hate to be a stereotypical, but sometimes you don't have as many behavior problems, not always but sometimes.” One administrator, when talking about utilizing small groups for math, shared, “One thing that we are working on right now is just the accountability of what they're doing at stations when the teacher is working with a small group and holding those students accountable

for their work that they're doing.” Overall, teachers are utilizing small groups in their classrooms during math while struggling with how to manage the behaviors.

Having another adult helps. The teachers utilizing math rotations or math workshop all agree that stations work better if there is another adult in the room whether that person is a paraeducator, a student teacher, or the Title Math teacher. A fourth grade teacher commented on her math workshops, “It does admittedly work better when I have a student teacher. Just based on the maturity and the behaviors of the kids that we have these days, I don't always trust them at a station that's not monitored.” Teachers shared that having another adult in the room during group work is extremely beneficial. The other person can help with questions at a homework station so the teacher is not interrupted during her group and can also monitor the partner station to ensure there are no conflicts. A fifth grade teacher shared, “I try pulling small groups, but it's difficult because of behavior. I feel like I'm not able to accurately help the students because I'm constantly putting out fires.” A third grade teacher described the utilization of math groups in her classroom. She declared, “It's kind of like a three-ring circus,” and added, “It takes a lot of time for lesson planning. I have to pull stuff from anywhere that I can get it.” A fifth grade teacher made a similar comment about her math class. She shared, “You almost feel like you're doing this circus thing every day, and I know that's part of being a teacher.” A majority of the teachers explained that they do not have assistance from another adult for math instruction, and only the two lower elementary schools have Title Math teachers.

Small groups are flexible. Teachers indicated the groups formed for small group math instruction are constantly changing based on the students' needs. An administrator

explained, “Within each grade level class, the students are all mixed together. So, if students are grouped, it would just be fluid groups based on what the teacher sees in the classroom and on current information.” A third grade teacher commented, “My groups change frequently based on the concept, the skill, on Star scores, and my observations.” A fourth grade teacher explained, “I form my groups using my Star report and then adjusting as needed.” A second grade teacher talked about her small math groups and explained, “If students are able to grasp concepts more quickly, I place them into larger groups with up to six in a group. For those who don’t grasp concepts as readily, there may be only two students in the group.” The teacher further added, “Sometimes students may be doing individual work, but typically they’re in groups. The groups are fluid and change as needed.” Teachers shared that they use classroom observations, daily work, and assessment scores to create small groups.

Peer teaching. For various reasons, teachers are utilizing a variety of configurations for small math groups. A fifth grade teacher talked about pairing her students so that one student could have a peer helper. The teacher explained, “The teacher is not necessarily always the right person to help a struggling student because the words aren't coming through. Another student, who will step into that place, is very beneficial.” The teacher explained, “That would benefit the student who's just grasping it by reteaching and help the other student.” The teacher shared that she likes to pair students who are similar in ability and added, “The ones who have it really well aren't always really patient to wait for the other child.” A fourth grade teacher also mentioned using peer helpers in her classroom. She explained, “They can hear it from me all day long, but sometimes it takes someone else that’s also listened to me to repeat it in kid terms. And

that way, they hear it a little bit different.” If you walk into each of the elementary classrooms during math instruction, the configuration of small groups will be different in each of them.

Students help other students. An administrator explained, “We do a lot of peer teaching because I believe that students learn best from one another. They get tired of hearing the teacher’s voice a lot. It’s that Charlie Brown one that they’re hearing. When kids teach it to one another, it’s powerful.” A fourth grade teacher noted, “I think that students really do, in some cases, explain it better to each other than whenever I explained it. They explain it in a way that they understand.” Another fourth grade teacher shared, “I think it does help them to work with each other. One student might struggle with one part of a problem, but another student might have that part and they can help.” Yet another fourth grade teacher shared, “I will have other kids who have gotten the assignment go to the other students and help them out. And, that gives them a purpose, and sometimes kids just need to hear from someone different like their peers.” An accelerated math teacher explained, “I just think that in a smaller group, they’re more likely to also pay attention to me, and learn not only from me, but learn from the others in that group as well.”

Promotes students’ confidence. A benefit teachers attributed to the utilization of small groups in math is that students are able to gain confidence from working in a setting that is nonthreatening for them. A second grade teacher shared, “I feel like they’re in an environment with kids around them that are about the same level with them. I feel like for their anxiety, it doesn’t stress them out as much. I love math groups.” Another second grade teacher stated, “I think to be with peers, they help each other learn, and they

feel confident in their abilities.” A fourth grade teacher explained, “For some of them, I think it helps build their confidence because they see that the other students are on their same level.” An accelerated math teacher commented, “I think that students are more willing to share what they're unsure of or ask more questions when they're in a smaller group, especially in a class with 25 bright math minded students.” A fifth grade teacher explained, “I think it benefits the students who get pulled aside for a little bit to work with the teacher. Then they don't feel threatened by the kids who've always got their hands up answering all of the questions.” An accelerated teacher stated, “I would say small groups are very effective. Students don't feel as intimidated as if I were to go up to them when they're working individually and say hey, I'm noticing you're making some errors.” And a fourth grade teacher summed up the perceived benefit by stating, “The effect is they're building confidence because they're finding that success.”

Teachers know students better. Overall, teachers expressed they were better able to get to know the individual needs of students while working with them in small groups for math. A second grade teacher shared, “I feel like I know my kids so much better. I feel like I really have a grasp on specifically what kids struggle with. If I was doing whole group, I probably wouldn't be that in tune.” A different second grade teacher explained, “I am able to understand where the students' learning is at a lot faster in small groups and catch mistakes.” A fifth grade teacher expressed, “I feel like I've been able to successfully help kids push their understanding when I've been able to work with them in a small group setting. Small group instruction allows me to get to know them better.” An administrator explained, “If we know enough about where they're at, we can extend their learning and take them forward.” Teachers indicated they are better able to pinpoint

where their students are at by working on specific concepts through the use of small group instruction for math.

Accelerated Classes Are Meeting the Needs of the Highest Math Students

Accelerated math groups. An accelerated math class is offered for each of the fourth and fifth grade levels at both of the upper elementary schools in the Warrensburg R-VI School District. An administrator shared, “We group students by ability at the fourth and fifth grade level. We have accelerated math. Students take a screening test, and then we use MAP data, Star data, and teacher recommendation to place students in an accelerated program.” The students who are deemed to be working at the highest ability in each grade level are removed from each of the grade level classrooms and placed into an accelerated class. Administrators and teachers indicated this class is usually kept to a maximum of around 25 students, although one administrator said that number sometimes is one to two students higher. Another administrator shared that during one year, two accelerated classes were offered due to an extremely high number of students showing high ability at grade level math. For most years, however, each accelerated class maintains about 25 students.

Administrator perceptions of accelerated classes. Administrators commented about the positive effects of accelerated math classes for students. It was noted that accelerated students have an advantage over other students as far as being prepared for higher level math classes and eventually for college. Talking about the accelerated math teacher, one administrator commented, “The teacher gains a deeper level of knowledge because they're looking at curriculum a whole grade level ahead, and hopefully that teacher can also contribute more to that collaboration. They become a curriculum expert

in a whole other grade level.” Overall, administrators commented that the accelerated classes ensure the highest students are being challenged. One administrator commented, “I believe that those students who can master those skills quickly benefit from being able to move along at a faster pace, and they can master those skills. And those other students who may be struggling with some of those skills aren't holding them back.” Another administrator explained, “Those students who are at a higher level can have the opportunity to learn more, go further faster, and learn at a higher level which will set them up down the road.”

Enrich and challenge. Overall, the majority of teachers and administrators expressed the accelerated classes meet the needs of the highest ability math students. For the most part, teachers and administrators agreed that the accelerated math classes both enrich and challenge higher level math students. An administrator shared, “I think the benefit with the accelerated math and the grouping is being able to meet students where they are and then take them to the highest level that they can achieve.” The administrator further commented, “And not have some students bored because they're waiting on these students to get there, or having some students totally lost because you're going further with higher level students.”

Highest students not bored. A fifth grade math teacher commented, “I personally like the difference between accelerated and regular math because I feel like if I was teaching my accelerated kids, they would be done in five minutes, and they would be bored.” Along the same lines, a fourth grade teacher expressed, “I like that there is that option for those kids to have the accelerated math program because if I had those kids in my classroom, they would be bored.” While talking about accelerated math, a different

fourth grade teacher commented, “At least those accelerated kids aren’t sitting in my room bored. I have so many different levels in my class. It’s always those high kids that kind of get left behind.” An accelerated math teacher explained, “If they didn’t have accelerated math, if there was only one math class, I feel they would be bored.”

All teachers note benefits. Not every teacher agrees with having accelerated classes at the elementary level, however, all teachers were able to describe benefits of having accelerated math classes. A fifth grade teacher shared:

Even though I don’t believe that accelerated math should be offered until sixth grade, I have six students that go out for accelerated math, and I would be very sad for them if they were sitting around in here floundering while I’m trying to teach a small group of ten kids how to do third-grade skills. So, in that respect, I’m thankful for accelerated math. At this point in time, I think we have so many more children who need extra help that without the accelerated math program, it would be very, very difficult to meet all of the individual needs in one classroom setting.

Two accelerated math teachers commented a benefit of having accelerated math classes is they decrease the range of ability of the students in the grade level math classes. One accelerated math teacher explained, “I think it helps the other teachers because then they don’t have such a wide range in their classroom.” A second teacher commented, “I think it’s a good program. I think it helps the other teachers to pull and not have such a wide range in their room.”

Faster pace provided. Speaking about accelerated math classes, an accelerated math teacher stated, “The higher level kids, the gifted kids are able to work at a faster

pace and not feel like they're being left behind. It prepares them for the accelerated program in sixth grade over at the middle school.” In meeting the needs of the higher ability math students, a fourth grade teacher shared, “For the students that leave to go to accelerated, they need a little bit more a challenge, a faster pace. They can learn skills quicker and be challenged more than what they could in my class.” An accelerated math teacher shared, “I think my accelerated kids love the time and opportunity to go at a faster pace. I could see a lot of these students fizzling out if they weren't able to go faster or do more.” A fourth grade teacher explained, “Those accelerated kids are able to be pushed to learn the harder concepts and they get to move at a faster pace.” All teachers agreed that the higher concepts taught at a fast pace challenge the accelerated math students.

Prepares students for future. All teachers agreed that students in the accelerated math classes will be prepared for future math courses. A fourth grade teacher shared, “They really are working on accelerated concepts, and I'm just really impressed with it. I think whenever they get to middle school, they're prepared.” A fifth grade teacher commented, “I know it does set them on a fast track for AP (advanced placement) courses in high school which is really hard for fifth graders or fourth graders to even grasp.” An accelerated math teacher explained, “Accelerated math sets students up to be able to take that extra honors level course in high school and even possibly earn dual credit for college courses in high school.” A fifth grade teacher noted, “Kids who are going to be on track to trig, honors trig, calculus, and higher math in high school are not going to be able to reach that level if they don't start now.” A different fifth grade teacher reflected on her own education and commented, “The students who were in accelerated

math went on to be something with engineering, statistics, actuarial science. They did something in the math field because they enjoyed it. So, it absolutely prepares you for your future education.”

Same level peers beneficial. Teachers pointed out the accelerated math students benefit from being around peers that are working at a similar academic level. A fifth grade teacher expressed, “I think it's good for them to have a different teacher and different peer group to be surrounded by, with peers that are intellectually on the same level as them.” One accelerated math teacher shared, “Higher level students have an opportunity to communicate some higher level thoughts with other higher level students, and they also have the opportunity to be challenged.” The teacher further added, “I think a big advantage is that they're becoming more critical as students with their thinking and their reading and their reasoning and explanations because it's being kind of demanded on them with what we're doing.” Another accelerated math teacher made a similar comment when she shared, “I think for the majority of my accelerated students, it has pushed them to be more critical and higher-level thinkers.”

Collaboration is Driving Math Instruction

Culture of collaboration. For the most part, teachers indicated positive outcomes from being members of a professional learning community. Several teachers commented that they are able to gain ideas to improve math instruction from their team members during collaboration meetings. Most teachers indicated they would like more time during collaborative meetings to discuss strategies for teaching math. Some teachers indicated that they do not get much time for grade level collaboration. Other teachers expressed that while they have collaboration time with their team, math is not always on the

meeting agenda. Overall, teachers are happy they have a team to collaborate with about their responsibilities as teachers in general.

Sharing benefits everyone. A fifth grade teacher's comments summarized the feelings most teachers expressed about their professional learning community. The teacher explained, "We share a lot of our ideas. We share a lot of our resources." The teacher explained that her team plays to one another's strengths. She further commented, "So, if your strength isn't math, there's someone there who can pull you out, or save you, or teach you how to teach it, or show you where the passion lies in something." A fourth grade teacher's comments also highlighted what a majority of teachers expressed. The teacher commented, "I can take ideas from our collaborative meetings if I'm having trouble with teaching a concept. I can get different ways to teach it and different ways to present it."

Administrator perceptions on collaboration. Administrators also sang the praises of their professional learning community. Talking about the professional learning community and the teachers in it, one administrator shared, "It changes everything because they talk about what concepts they're teaching and what skills worked, what types of teaching, what types of instruction worked for this particular concept, what are some strategies that they used." The administrator further commented, "I've been doing this a long time, and when I first started teaching, we did a whole lot of teaching in isolation." Along the same lines, when discussing teachers in a professional learning community, another administrator commented, "They're not just in a silo anymore where they're teaching their way and not really seeing others' way of teaching."

Collaboration benefits teaching. Noting the collaborative work of teachers, another administrator commented, “Our teachers really do work very well together. Why would we do these things independently when we can do them together? Every PLC meeting agenda includes time to collaborate about math.” A first year teacher explained her experience of being a member of a professional learning community. She communicated, “Oh, my goodness, they've helped so much! Just being able to bounce ideas off of other teachers.” The new teacher explained her team communicates what they have learned from their experience, shares the resources they have accumulated, and invites the new teachers to observe math lessons. A veteran accelerated math teacher commented, “I would say I have probably gotten more out of collaboration this year than I ever had in all my teaching.” The teacher explained that this year her team has dedicated time to discussing math instruction. She shared, “We've been allowed to schedule most of our agenda for our collaboration time on our own as teachers. We've just chosen to allot about an hour for each collaboration.” An accelerated math teacher stated, “I think it's been nice for that collaborative time to communicate and not feel like you're making the decisions on your own.” Both new and veteran teachers were able to explain how being a member of a professional learning community has benefited their teaching.

More collaboration time needed. Several teachers explained that conversations from within their professional learning community (PLC) meetings carry over into their personal time outside of work. Teachers expressed that there is not enough time during the meeting to discuss and collaborate about everything they would like to collaborate about. A fifth grade teacher commented, “If we have a problem with something, we talk

to each other about it. 'Oh, well, you could try this.' So, there's a lot of informal conversation that's not at a meeting. It's just outside of our PLC collaboration." An accelerated math teacher talked about her grade level team and the conversations they are having. She commented, "I definitely think we have to have these discussions beyond our regular grade level collaboration." The teacher explained having collaborative conversations outside of the set professional learning community team meetings is sometimes difficult because the teachers in her grade level do not all have the exact same lunch, planning, or recess times. This accelerated math teacher also shared that because of her professional learning community and their collaboration, she does not feel like she is on a lonely island. Two of the accelerated math teachers commented they would like to have some time to collaborate with the other accelerated math teachers. They expressed that they are not currently provided such time during the district's professional learning community meetings, and they believe it would be beneficial for their math instruction.

Concerns about collaboration. While teachers were positive about being members of a professional learning community, many expressed they had areas of concern about their collaboration time. For some of the teachers, the concern was a lack of time with their grade level team members to collaborate, and other teachers indicated their teams could make better use of their collaborative time together. A few teachers also commented that more time needs to be allocated to discussing math during collaboration, that the subject of reading usually take precedence. A fifth grade teacher explained, "when we are given a chance to work collaboratively during our collaboration time, it's usually with a very specific agenda that is created based on what our administrator wants, and it's been focusing all on reading, not math focused." An administrator commented, "I

feel like we do spend a lot more time probably discussing literacy and reading than we do talking about math.” A couple of administrators shared that while they used to have more of a focus on reading, they are now intentionally dedicating more collaboration time for math.

Same grade, different amounts of collaboration. A second grade teacher shared, “We always fit in a time to specifically talk about math. Share how it's going, share methods, share resources, and just an idea sharing time. It helps drive a lot of our instruction.” Other second grade teachers indicated they are not getting enough time to collaborate with their grade level teams during their weekly professional learning community meetings. One teacher commented, “Unfortunately, I feel like our collaboration time with our grade level this year has not been as frequent as it has in the past.” Another second grade teacher also noticed the reduced time for collaboration with her grade level team. She commented, “I feel like this year in particular we haven't had a lot of grade level time for collaboration.” The second grade teacher explained that while her team does not have much time for collaboration during meetings, they still find time to share ideas and it does help them to be better teachers.

New series is a learning curve. The new math series has proven to be quite a learning curve for teachers, students, and parents. Administrators and teachers acknowledged that while the new curriculum is beneficial it has increased the rigor of instruction and has introduced some new instructional strategies. An administrator explained, “We need kids to be thinkers because we need them to be able to do any job that they're going to be faced with. And in order for them to do that, we've got to teach them thinking skills.” Two teachers expressed similar sentiments. A fourth grade teacher

commented, “We are getting our children to think a different way versus what we grew up learning, which was memorization. We didn't understand how things worked. We just were told this is why it works.” The teacher emphasized, “As time goes on, we're needing our kids to understand the why behind everything because if they don't understand the why, they can't problem solve.” A fifth grade teacher shared, “I get so many parents who say that math is so different than it ever was before. Many of what they would call new ways to look at things really aren't. They're just taken apart a little bit differently.”

Parent concerns about math. One of the accelerated math teachers commented, “The number one parent concern that I hear is that they can't necessarily help their children like they used to be able to with more traditional math questions.” A fourth grade teacher shared similar parent concerns. She noted, “Our math program does math a little bit differently than what they've seen growing up, and I don't send their math home because I know a lot of parents have not seen math done this way.” While discussing parents' concerns about math, a second grade teacher commented, “I get a lot of questions about the wording of problems and what exactly they're asking.” A third grade teacher handled parents' confusion about math by teaching both the methods presented through Math in Focus and also the traditional procedural methods. “I teach my students this is the way the math book does it. Then I tell my students this is most likely how your parents learned it. So, if they're helping you with your homework, this is how they learned how to do it.” This same teacher went on to explain, “I let them pick what works for them. I feel like it should be okay to get to the answer using whatever strategy works for you. I try to teach my students multiple strategies. I don't care how you get

there.” Most teachers indicated they also taught multiple problem solving strategies and allowed students to choose the method that worked best for them.

Teachers supplement background knowledge. Most teachers indicated they often have to start instruction at a point where students understand and build background knowledge before moving forward with a lesson. A fifth grade teacher explained, “I try to be mindful of the verbiage in the text, and how it matches the assignment. I try to make sure that I speak the way that they're going to be asked to use to answer the questions.” Teachers indicated the material presented in the textbooks is often written in a way that requires some explanation for the students to be able to understand it. The fifth grade teacher further commented, “Sometimes you have to translate and just take maybe what's very academic in the text and bring it down to a kid level and give a real-life comparison or an analogy.” A second grade teacher described how Math in Focus introduces lessons for subtraction at a level beyond her students’ prior learning. She shared, “In second grade, in the first two months, we're teaching them triple digit subtraction with regrouping, the procedural algorithm. That's what Math in Focus teaches them, and they're not ready for that.”

Teachers still learning. Several teachers mentioned they are still learning the new math curriculum and the various strategies presented. A fifth grade teacher questioned solely teaching the strategies that Math in Focus introduces to students. She explained, “I try to follow what it [the teacher’s manual] says, but in some cases, I find that it's confusing to me. I have minor area of concentration in math, and I'm certified to teach middle school math.” She further added, “If I'm getting confused by the fifth grade math and trying to teach it, I'm afraid not only will I mess it up because I don't quite get it

myself, but is this really the best way?" The administrators indicated that the new curriculum presents problem solving strategies in ways that some teachers are not accustomed to teaching.

Second year is better. Several teachers, second grade through accelerated fifth grade, commented that teaching using the Math in Focus curriculum is going more smoothly this year than last year. The teachers credit this year being better than last year for two main reasons. The first reason is they are now more familiar with the new series, and the second reason is that the students have had a year of learning using the new materials, becoming familiar with the vocabulary and the problem solving methods. Most teachers implied the adoption of the new curriculum was overwhelming for both teachers and students. A second grade teacher explained, "Last year when we introduced it, I was like holy cow! My kids were like, 'I don't even know what this means.' And I'm like, well, I don't either. So, we were put in this boat together." Now halfway through the second year of implementation, for the most part, both teachers and students have adjusted to the new curriculum. Expressing some relief, the same second grade teacher stated, "This year is like, oh my gosh, so much better. So, I feel like I'm still seeing a wide variety of ability, but I feel like I'm seeing a lot more students that know a lot more than before." Multiple teachers expressed the sentiment that they believe students will become more successful with the new curriculum the longer they have been exposed to it.

Benefits of a common curriculum. Administrators shared the teachers' thoughts about students' exposure to the new curriculum. One administrator shared, "I think it's just going take time. I think that we finally have a curriculum that everyone is using, and so, I think we're going to see the benefits of common terminology, of common practices,

of using the same materials.” Prior to the implementation of Math in Focus, Warrensburg R-VI School District did not have one main resource from which to teach math at the elementary level. As one administrator stated, “Everyone was kind of doing their own thing. There was no consistency anywhere. There was no pacing guide, and you just kind of did what you wanted. So, I think we're really going to see the benefits of a common curriculum that everyone is using.” While most teachers indicated they either experienced some frustration with taking the time to learn the new instructional resource or the slower pace they have had to teach the same math concepts compared to years past based on how students are responding to it, teachers also indicated that they expect to see improvements over time.

Opportunities for Growth in the Math Program

Materials to differentiate. In order to provide differentiated instruction, teachers need access to a wide range of resources to meet students’ diverse learning needs. One administrator pointed out that, ideally, teachers should be “providing an enriching, engaging math classroom for all kids.” The administrator suggested that in order to meet the needs of all students, “You might go and pull a different grade level or lower grade level material.” The new curriculum, Math in Focus, provides teachers with online access to math materials for all elementary grade levels through their website Think Central.

Differentiation not always easy. While some teachers are able to utilize the online Math in Focus materials to differentiate for their struggling students, others are not. A fourth grade teacher expressed similar thoughts about Math in Focus being good for students who are performing at grade level, but she explained, “I think it's not great for the lower level students even whenever you go down to the first and second grade to

pull work for them because these students haven't had that.” Several teachers commented about the structure of the worksheets revealing that the materials provided expect problems to be worked out in a certain order. Therefore, there are several blanks within steps of equations throughout the worksheets reinforcing this order. Most upper elementary teachers indicated that another drawback of the worksheets is that lower math students are often low in reading, and they are unable to understand from the directions and written steps on the page how to fill in the blanks. One fourth grade teacher, talking about her lower math students, shared, “They're not strong readers and so they can't really read to figure that out. So, that's when I think math centers and the hands-on stuff would really come in handy.”

Teachers express frustrations. While Math in Focus provides access to materials that teachers can use to differentiate, some teachers expressed frustration with the resources available. Because of the specific fifth grade concepts a teacher was trying to teach, it was difficult to find lessons for those concepts at the lower grade levels. The teacher stated, “I honestly haven't found a great way to meet all of the students’ needs.” Third grade teachers expressed similar frustrations about finding appropriate differentiated material through the online component of Math in Focus to fit students’ needs. One of the teachers shared, “Sometimes, I feel like that is still either too hard, or it's not there with what I'm teaching. That's where I have to rely on my own creativity, my own teaching experience.” The other teacher confided, “I feel like the reteach stuff is not helpful, and it's not differentiated enough for low, medium, and high. And maybe I’m not using all the resources that are available to me.” Multiple teachers expressed difficulty finding materials to differentiate for their students. Some of the teachers

expressed the difficulty was a lack of time and others felt like they did not have enough knowledge about all of the resources available to them through Math in Focus and how to best utilize those resources.

Too many worksheets. A majority of the teachers explained that students are frustrated with doing so many worksheets. Math in Focus has both textbooks and corresponding workbooks available for students. Workbooks were purchased for the first year of implementation, and then the district switched to making paper copies of individual workbook pages. Therefore, students do complete several worksheets during math. A second grade teacher pointed out, “We had an instructional coach [who was providing professional development] tell us that first graders should be doing six worksheets a day.” When commenting about the ideal way for math to be taught, a fifth grade teacher stated, “Absolutely no worksheets. Well, every once in a while, you probably need a worksheet. I just think no worksheets, making it more real world, more creative and more fun is going to help the kids learn.”

Student behaviors hinder group work. In addition to noting positive benefits of small group instruction, teachers also shared some concerns they have encountered with small group instruction for math. One of the concerns teachers expressed with small groups was how students react with other students. Teachers commented that some students with behavior issues could not work well together in the same small group, while teachers also noticed that the opposite is true. Teachers reported that sometimes students who get along well also do not learn best in the same small group. A fourth grade teacher shared, “I think that sometimes when kids are on the same ability as their friends, they can get off task, and that can be a problem. So sometimes that is the obstacle

to the small group.” A fifth grade teacher stated, “It’s a fluid system, so you have to be willing to change it. Change the groups. You can’t put some kids together because they get along too well. It’s not just about who has knowledge and who doesn’t.”

Never enough time. Almost all teachers expressed that lack of time is an issue, and most of the teachers expressed the need for more time for math instruction. “We never have enough time, and it seems like a lot of our time is spent in IEP meetings and team meetings and tier two meetings and never enough time,” shared one exasperated teacher. An accelerated math teacher, in describing the ideal way to teach math, commented with a smile and laughter, “I would have all day long to teach math. That would be ideal. Oh, I wish I had more time. That would be the ideal way.” Almost every elementary math teacher interviewed stated in one way or another an identical point of view expressed by an accelerated math teacher who said, “I think we need more time for math.”

Only so much can do. Teachers relayed there is just not enough time to adequately serve all students and meet their individual needs in the amount of time they are allotted for math. A fifth grade teacher explained, “I feel like my biggest hurdle as a teacher is trying to help those kids that are in the very low range. Overcoming that takes more than one or two small group settings over the course of a week. You’re talking weeks and months of extra practice. There’s only so many hours in the day, and so many days in a unit.” A different fifth grade teacher commented, “The students that are truly the lowest performing are lacking number sense. They have really deep misconceptions that I think take a lot of time. Those are kids that it takes maybe years to make small gains.” The teacher further added, “They’re the students that struggle with the

foundational skills. Usually you will see behavior issues because they get frustrated, and they have avoidance behaviors.”

Adopted pacing guide. Warrensburg R-VI School District obtained a pacing guide from a nearby district which has been utilizing Math in Focus for approximately six years. Several teachers voiced their frustrations with the borrowed pacing guide. One third grade teacher commented, “Sometimes I feel like I'm not given a lot of freedom because I'm told that I have to be on certain chapters, certain pages at the same time as other people.” This teacher worried about moving on to the next chapter in order to stay on track with the pacing guide. She shared that even though it was time to go to the next chapter, she had students who were not ready for the next concept. She explained, “I feel like my kids are not going to be successful with division because they're still not really getting the concept of multiplication.”

Attempt to create own pacing guide. A second grade teacher expressed dissatisfaction with the pacing guide based on first-hand experience using it with her students. She shared, “The impression is that we are to follow the pacing guide and cover everything in the book.” She explained how last year, her second grade teacher team collaborated to create their own math pacing guide to use for the school year, one which they believed would meet the needs of their students. She shared, “Then three weeks later, we got told from our instructional coach, no, you cannot adjust the pacing guide. You have to go back to the original pacing guide.” The teacher indicated her frustration and stated she did not believe that the original pacing guide provided met the needs of her students.

Stay with the pacing guide. Although one administrator declared, “You can't go on unless they [the students] have mastered the current skill. If you just go on, then they're going to have bigger and bigger gaps.” A fourth grade teacher explained how not having enough time affects planning for math instruction. The teacher commented, “I try my best to follow it [the pacing guide], but if we're getting short on time, I never skip a skill, but I might shorten it.” This teacher expressed the desire to have more time to teach math and maybe even have a couple of different math times during the day to split the instruction so it's not so overwhelming for students. The teacher explained, “There's a lot of lessons and a lot of days they take up, and sometimes, I feel like I'm not always going to get to the end.”

Desire to adjust pacing. Several of the teachers expressed the need to adjust the pacing guide to meet the needs of their students. A fourth grade teacher stated, “We're all professionals, and we know what's best for our students. I feel like we should have some say in the pacing guide.” Teachers indicated when the majority of their kids are not understanding the concept, they should be allowed to dedicate more time to teaching that particular concept. One fourth grade teacher expressed, “We'll make up the time somewhere, but in good conscience, I can't move on. I know there's only so many days to the school year to squeeze everything in, but I feel like there needs to be some leeway.”

Prioritize standards. Commenting on the amount of time it takes to instruct small groups and the lack of time for math, a third grade teacher explained, “You try whatever to get in all of the standards you're supposed to teach for the entire year. It gets to be overwhelming. There are too many standards and not enough time. Sometimes things have to give. You prioritize.” Teachers shared that they are having to prioritize

which math concepts are the most important to teach their lowest students in the amount of time they have them for math.

Align with state standards. A few teachers addressed the fact that Math in Focus is not aligned with the Missouri learning standards and yet they are still required to get through the entire Math in Focus book by the end of the school year. These teachers suggested that perhaps the lessons that address the Missouri learning standards could be identified and a pacing guide could be created to ensure instruction of the state standards. This would allow teachers to have some flexibility with the pacing guide to better meet their students' learning needs. One teacher commented, "It's not that I'm opposed to teaching kids that things that aren't standards, but we don't have time to be teaching anything else that isn't a standard. And so, I think that is a problem." Teachers were not against teaching math concepts outside of the Missouri learning standards as they expressed that all math concepts are beneficial for students to learn.

Lack of professional development. In addition to being in agreement that time is a limited resource, teachers also unanimously agreed there is a lack of professional development for math. Two teachers, both new to the district, revealed their experience transitioning to Math in Focus to teach math. One of the teachers shared, "As a new teacher in this district, it was, 'Here's your manual. Go.' I didn't even know about the online component until I had been teaching it for at least a few weeks." The other new teacher, who teaches in a different building, reiterated the same feeling. She stated, "I don't feel like coming in as a new teacher I was prepared at all to use their curriculum very well because I feel like we needed a PD [professional development] on it, maybe an introduction into it."

Learn it on your own. One teacher's comments concisely captured how most of the teachers, who have been teaching in the district, have approached handling the Math in Focus curriculum. The teacher professed, "Honestly, I read over my teacher's manual, and then I just teach it however I understand it." A third grade teacher relayed, "I wish before we got our program, I wish we would have received better training on how it looks. I know that we've had a few trainings, but I've not gained any knowledge from that individual." A fifth grade teacher shared, "I feel like the support that has been given to us was very broad and not very specific, and so therefore, you're learning it on your own. You're doing what you can do."

Previous professional development. Teachers shared that the district provided some professional development on Math in Focus, as an instructional coach from a neighboring school district was brought in a couple of times to work with teachers. Multiple teachers expressed that while they appreciated receiving the professional development from the district, a couple of the sessions were almost identical so, therefore, they did not learn as much as they had hoped. Expressing disappointment with the duplication of professional development, one of the fourth grade teachers shared that the fourth grade team went to their instructional coach and explained they were getting ready to teach multiplication and division. The team requested the focus of the next professional development be on those topics. The teacher shared, "And so, that next one, she actually came to us and gave us some stuff on multiplication which was really helpful."

More professional development desired. While some teachers expressed the desire to have professional development through Math in Focus, other teachers pointed out that professional development provided by teachers within the district having success with Math in Focus would also be beneficial. A third grade teacher commented, “I would like more of an understanding on the series really, and I’m fine if that professional development comes from another teacher in my building, like somebody that’s understanding it and can help me understand it more.” Similarly, a fourth grade teacher shared, “I feel like we have a lot of knowledge in our own buildings, and that we need to pull those resources and even have those people teach a math lesson in Math in Focus.” Teachers commented that they are able to request time to observe fellow teachers, but they would specifically like to have their fellow grade level teachers, those who are having success teaching with the new series, present to them during a professional development opportunity. In that type of situation, teachers explained, they can ask questions during the presentation to gain a better understanding of the curriculum to benefit their own teaching.

Whether the professional development is provided by a representative from Math in Focus or by a fellow teacher within the district, teachers would like to have more training on how to best utilize all of the components of Math in Focus in order to best teach their students. An accelerated teacher said, “I think any professional development for teams to get additional exposure with our textbook series is always beneficial. It can be overwhelming, but I don’t think anyone leaves those opportunities feeling like they got nothing from it.”

Needs to be practical yet fun. When asked about the ideal way to teach math, one administrator said, “My ideal way is just all hands-on, real life situations.” One teacher fifth grade teacher stated, “We want students to develop a love of math.” While most teachers expressed a genuine desire to engage all students in learning math, a majority of the teachers admitted to having concerns about whether or not math is as fun as it used to be prior to the implementation of Math in Focus. Teachers expressed concerns with utilizing only the Math in Focus materials and neglecting other resources that would perhaps better appeal to and engage students. Teachers at each grade level noted the excessive number of worksheets they now are required to use along with the lengthy assessments. Another concern that was repeatedly mentioned was that Math in Focus seems to be too teacher centered and not necessarily student centered.

Needs to be student-centered. A fifth grade teacher discussed her dissatisfaction with the lack of fun and student engagement in math this year. She shared, “We need to learn some ways to make things more interactive between the teacher and the students, or student to student, so that the teaching isn't all me on the stage.” The teacher went on to explain that the curriculum is not written that way; however, she believes it does not foster enough student interaction. She went on to say, “I think we need something that, this sounds terrible, something that would make it a little less boring because that's how I feel with the workbook and all of those pages.” A first year teacher also noticed that Math in Focus seems to be teacher centered and commented “I feel like where I'm lacking, and maybe it's because I don't understand the curriculum, is I feel like there should be more interaction between the students. There is too much teacher focus rather than student focus.”

Relatable and fun. All teachers across different grade levels talked about trying to incorporate activities and games to help make math relatable and fun to learn. A third grade teacher pointed out the need to incorporate some things into her math lessons that are not a part of Math in Focus. She explained, “It is very hard for me to follow a teacher's manual knowing that I have other tricks of the trade to help a kid understand something.” She explained, “I have kids in the past who have come back and they're just like, I still remember those multiplication songs you taught me, and that's not in the teacher's manual.” Another third grade teacher commented, “You've got to help students try to relate to what goes on out there, real life, and it helps them become more excited about what they're learning.” A fourth grade teacher explained her students are not excited about math. She shared, “I think Math in Focus has a lot of really good aspects, but it lacks the games. It's just not engaging. I wish we could do center rotations and do more hands-on learning.” A fifth grade teacher mentioned, “Since we've gone to Math in Focus, I've been adding in fun things like Quizlets and games to go with it. Math in Focus does not include any games at all for fifth grade.”

Summary of the Themes

Each of the five themes is essential to the continued effectiveness and improvement of Warrensburg R-VI's elementary math program. An individualized approach is necessary as it meets the specific needs of each student, taking into consideration the individual level of readiness and unique learner style. Grouping students is crucial as the district's student population is vastly diverse. Grouping students with similar needs and abilities provides students with instruction that meets their needs. Both administrators and teachers acknowledged the math program has room for

improvement. Areas for growth were identified and can be utilized for making changes in order to bring about improvements in the elementary math program. Teacher collaboration is driving math instruction. Teachers explained their collaborative efforts are allowing them the opportunity to provide the best possible instruction for their students. Finally, accelerated math classes are meeting the needs of the highest math students. Accelerated students are being challenged and working at a pace commensurate to their needs to prepare them for future math studies.

Research Questions Answered

Participants of this study included 26 employees from Warrensburg R-VI School District. Of the 26 participants, five were administrators and 21 were elementary teachers of grades two through five. The composition of elementary teachers included three second grade teachers, three third grade teachers, five fourth grade teachers, six fifth grade teachers, and all four of the elementary accelerated math teachers, two each from fourth and fifth grades. The administrators included the district's four elementary principals and the director of curriculum and assessment.

RQ1: What are the second, third, fourth, and fifth grade math teachers' perceptions of the elementary math program?

Adoption of a New Math Curriculum

Desire to have implemented differently. When asked what recommendations they have for improvements to the elementary math program, several teachers responded that they wish the new math curriculum had been implemented differently. A third grade teacher expressed, "I wish the current program that we're using now would have been introduced a year or two at a time so we could have seen more of a slow spiral by introducing it at a lower level." Most of the teachers indicated they would have liked to have had Math in Focus implemented starting at kindergarten, perhaps at kindergarten and first grade, and then adding it in the next grade a year at a time. Teachers expressed that when the curriculum was implemented all at one time, upper elementary students were negatively affected. They did not have the prerequisite learning needed to be successful with the structure of the curriculum, the vocabulary, or the concepts. A fourth grade teacher commented, "It makes it very difficult for the students who are not

experienced on how to write out the steps to a certain problem a certain way.” She further added, “It would be easier for them if they had come through having initially started with Math in Focus rather than everybody starts at once, and then they have no background.”

Several teachers expressed difficulty with strictly following the lessons in the teacher’s manual which concerned them as they were instructed to use the new curriculum with fidelity. A fourth grade teacher remarked, “I don't agree with the way that we implemented this math program. It's really hard to strictly follow the teacher’s manual because they expect students to know these things that they do not know.” Most teachers agreed that a few years down the road, students would be more successful with Math in Focus after having experienced it for multiple years. A fifth grade teacher commented, “Right now, unless we're going to leave all these students behind, I have to adapt the lessons.”

No outside math resources allowed. Several of the teachers interviewed conveyed they were directed to use only the Math in Focus materials for math instruction and not to pull from or utilize any other resources. A majority of the teachers stated they were instructed by administrators to use the new math curriculum with fidelity. A fifth grade teacher shared, “I know they use that term fidelity, but it's been difficult because I feel like so many of the students don't have that prior knowledge so you have to adapt.” A fourth grade teacher commented, “I was told to strictly follow the teacher’s manual.” A third grade teacher offered, “An improvement that can be made is to allow teachers, at this point in the implementation of the Math in Focus, to have some leeway, some wiggle room in some use of their own professional discretion.” Most teachers commented that administrators are going to have to realize the need for supplementation to the newly

adopted curriculum. A fourth grade teacher noted, “We are just to follow the book. If you do that, then I cannot reach a kid working at a preschool level. I can't do that. So, I have to bring in my own knowledge, my professional judgment.”

A second grade teacher explained, “I use the teacher’s manual as my guide. I like to pull up the pages from the student book on my projector, and so they can kind of see them, especially when we're introducing a new concept.” A majority of the teachers explained they are sure to emphasize vocabulary when introducing new concepts. This same second grade teacher shared that when she introduces vocabulary, she projects the image from the text that goes along with the word. She further added, “But I also add in my own things. Just like with any series, there are things that they're really good at and there are things that I'm like hmm. So, I kind of do a little bit of both.” A different second grade teacher commented, “When I'm planning, I always intend to follow the lesson. I adapt more often having taught certain topics over and over and having learned from my students through the years what worked and what didn't work so well.” This teacher further commented, “A new teacher relies on a text more. I've been teaching a long time and adapt as most other teachers do,” insinuating that most teachers adapt the lessons in Math in Focus. While she suggested that a new teacher relies more on a text than a veteran teacher, one new teacher shared, “I adapt the lessons for the most part. I will follow the first two examples, and then, I usually use my own examples that are real-life problems. I think that is more applicable.”

Accelerated teachers use own discretion. Accelerated math teachers expressed the expectation to use Math in Focus, but they did not seem to think that it was the only resource they could use. One accelerated math teacher explained, “I've never felt that our

principal is on our back about following our textbook series. I think it's an understood expectation, but I don't feel like someone is breathing down my neck about it at any time." Another accelerated math teacher relayed, "I think we've got a pretty ideal situation as far as having the district purchase a series that's consistent, and then also having the ability to modify our strategies and techniques to what we know is effective." The same teacher noted, "As far as my method of teaching, I often will use manipulatives that the book doesn't necessarily recommend. I will often pull from just my own knowledge of effective techniques as well as what the book suggests." While the teachers were directed to implement the new curriculum with fidelity, most of the teachers interpreted this to mean use it as the main resource.

New series is a learning curve. The new math series has proven to be quite a learning curve for teachers, students, and parents. Two teachers expressed similar sentiments. A fourth grade teacher commented, "We are getting our children to think a different way versus what we grew up learning which was memorization. We didn't understand how things worked. We just were told this is why it works." The teacher emphasized, "As time goes on, we're needing our kids to understand the why behind everything because if they don't understand the why, they can't problem-solve." A fifth grade teacher shared, "I get so many parents who say that math is so different than it ever was before. Many of what they would call new ways to look at things really aren't. They're just taken apart a little bit differently."

One of the accelerated math teachers commented, "The number one parent concern that I hear is that they can't necessarily help their children like they used to be able to with more traditional math questions." A fourth grade teacher had similar parent

concerns. She noted, “Our math program does math a little bit differently than what they've seen growing up, and I don't send their math home because I know a lot of parents have not seen math done this way.”

While discussing parents' concerns about math, a second grade teacher commented, “I get a lot of questions about the wording of problems and what exactly they're asking.” A third grade teacher handled parents' confusion about math by teaching the methods from Math in Focus and teaching the traditional procedural methods. “I teach my students this is the way the math book does it. Then I tell my students this is most likely how your parents learned it. So, if they're helping you with your homework, this is how they learned how to do it.” This same teacher went on to explain, “I let them pick what works for them. I feel like it should be okay to get to the answer using whatever strategy works for you. I try to teach my students multiple strategies. I don't care how you get there.” Most teachers indicated they also taught multiple problem solving strategies and allowed students to choose the method that worked best for them.

A fourth grade teacher had parents inquire at parent-teacher conference about the way she was teaching multiplication, so she taught those parents the strategy. She stated, “The dad was fascinated because I guess he's terrible at math. He was like, this is phenomenal. I wish I had been taught this way. So, they were really positive about it.” In this particular situation, the Math in Focus strategy led to better understanding for the learner, but teachers shared that sometimes they have to teach alternative strategies because students are not successful utilizing only the methods presented in Math in Focus. A fifth grade teacher pointed out, “Sometimes it's let me show you the easier way

to do this because they're speaking a whole other language that you don't speak. Let's do this, and then you build, and then you can usually hop back into the curriculum.”

Most teachers indicated they often have to start from a place that students understand and build background knowledge before continuing forward with a lesson. A fifth grade teacher explained, “I try to be mindful of the verbiage in the text, and how it matches the assignment. I try to make sure that I speak the way that they're going to be asked to use to answer the questions.” Teachers indicated the material presented in the textbooks is often written in a way that requires some explanation for the students to be able to understand it. The fifth grade teacher further commented, “Sometimes you have to translate and just take maybe what's very academic in the text and bring it down to a kid level and give a real-life comparison or an analogy.” A second grade teacher described how Math in Focus introduces lessons for subtraction at a level beyond her students’ prior learning. She shared:

In second grade, in the first two months, we're teaching them triple digit subtraction with regrouping, the procedural algorithm. That's what Math in Focus teaches them, and they're not ready for that. Some kids can get the procedure down. You can teach the procedure, and they can memorize it, but they don't have a number sense to really understand what they're doing.

Several teachers mentioned they are still learning the new math curriculum and the various strategies presented. A fifth grade teacher questioned solely teaching the strategies that Math in Focus introduces to students. She explained, “I try to follow what it [the teacher’s manual] says, but in some cases, I find that it's confusing to me. I have a minor area of concentration in math, and I'm certified to teach middle school math.” She

further added, “If I'm getting confused by the fifth grade math and trying to teach it, I'm afraid not only will I mess it up because I don't quite get it myself, but is this really the best way?”

While most teachers indicated they have either experienced some frustration with taking the time to learn the new instructional resource or with the slower pace they have had to teach the same math concepts compared to years past based on how students are responding to it, teachers also indicated that they will see improvements over time.

Second year is better. Several teachers, second grade through accelerated fifth grade, commented that teaching with the Math in Focus curriculum is going more smoothly this year than last year. The teachers attribute this year being better than last year to two main reasons. The first reason is they are now more familiar with the new series, and the second reason is, the students have had a year of learning using the new materials so they are also familiar with the vocabulary and the problem solving methods. Most teachers implied the adoption of the new curriculum was overwhelming for both teachers and for students. A second grade teacher explained, “Last year when we introduced it, I was like holy cow! My kids we're like, ‘I don't even know what this means.’ And I'm like, ‘Well, I don't either.’ So, we were put in this boat together.” Now nearly halfway through the second year of implementation, both teachers and students, for the most part, have adjusted to the new curriculum. Expressing some relief, the same second grade teacher stated, “This year is like, oh my gosh, so much better. So, I feel like I'm still seeing a wide variety of ability, but I feel like I'm seeing a lot more students that know a lot more than before.” Multiple teachers expressed the sentiment that they believe

students will be successful with the more rigorous curriculum the longer they have been exposed to it.

Resources are Imperative

Materials to differentiate. In order to provide differentiated instruction, teachers need access to a wide range of resources to meet students' diverse learning needs. A second grade teacher noted the importance of ensuring that teachers are familiar with the various resources available for the curriculum. She shared, "A suggestion would be to make sure that all teachers are aware of all features, especially new teachers coming in. And make sure they are aware of the fact that there are many resources that you can pull from." A third grade teacher shared her thoughts about the Math in Focus materials meeting the needs of her students and explained how she uses the resources available. She shared, "The work meets the needs of the majority of my students, and then I have those lower ones that are still really struggling. It fits the needs of my students who are on grade level, but it is not a good fit for the students who are not yet at the third grade level." The teacher shared that she is, however, able to utilize the online Math in Focus materials to differentiate for her struggling students. She explained, "I get on Think Central, and I go into first and second grade math, and I print off those chapters."

A fourth grade teacher expressed similar thoughts about Math in Focus being good for students performing at grade level, but she explained, "I think it's not great for the lower level students even whenever you go down to the first and second grade to pull work for them because these students haven't had that." Several teachers commented about the structure of the worksheets revealing that the worksheets expect problems to be worked out in a certain order. Therefore, there are several blanks within steps of

equations throughout the worksheets reinforcing this order. Another fourth grade teacher, talking about students explained, “One question could take up half a page and they will have 15 blanks they have to fill in and they don't have a clue what any of that is.” Most upper elementary teachers indicated that another drawback of the worksheets is their lower math students are often low in reading as well, and they are unable to understand from the directions and written steps on the page how to fill in the blanks. One fourth grade teacher, talking about her lower math students, shared, “They're not strong readers and so they can't really read to figure that out. So, that's when I think math centers and the hands-on stuff would really come in handy.” Another fourth grade teacher expressed having problems with her students not having Math in Focus at the earliest grade levels. She noted, “I've tried going back to the Math in Focus curriculum and pulling lessons from grades below. I really have to search to figure it out so that takes extra time.” While some teachers reported experiencing success with utilizing the online resources, several teachers mentioned the extra amount of time needed to plan for math due to utilizing Math in Focus.

While Math in Focus provides access to materials that teachers can use to differentiate, some teachers expressed frustration with the resources available. A fifth grade teacher commented, “I do the best I can. I know that with the curriculum we're using now, you can go online to get work at different grade levels, which is kind of helpful but not really.” Due to the higher level concepts the teacher was trying to convey, it was difficult to find lessons for those concepts at the lower grade levels. She stated, “It doesn't quite match up to what I need. And so, I honestly haven't found a great way to meet all of the students' needs.” The teacher further added, “When you're tied to a

curriculum, I find it difficult. I still find extra resources out there, and I still will pull kids to just do basic facts because you can't leave them stranded.”

Two teachers at the third grade level expressed similar frustrations about finding appropriate differentiated material through the online component of Math in Focus to fit students’ needs. One of the teachers shared, “Sometimes, I feel like that is still either too hard, or it's not there with what I'm teaching. That's where I have to rely on my own creativity, my own teaching experience.” The other teacher confided, “I feel like the reteach stuff is not helpful, and it's not differentiated enough for low, medium, and high. And maybe I’m not using all the resources that are available to me. But I don't feel like they are easy to find even.” Multiple teachers expressed difficulty finding materials to differentiate for their students. Some of the teachers expressed the difficulty was a lack of time and others felt like they did not have enough knowledge about all of the resources available to them through Math in Focus and how to best utilize those resources.

A majority of the teachers explained that students are frustrated with doing numerous worksheets. Math in Focus has both textbooks and corresponding workbooks available for students. Workbooks were purchased for the first year of implementation, and then the district switched to making paper copies of individual workbook pages. Therefore, students do complete several worksheets during math. A second grade teacher pointed out, “We had an instructional coach [who was providing professional development] tell us that first graders should be doing six worksheets a day.” A third grade teacher shared:

I have one student right now who can't stand math, and it's very hard just knowing that I have to come up with something. I have to say something. I have to do

something to make this child know that math is okay, and math is fun. Well, when you take out a stack of worksheets and you staple them together because our goal is to get it finished by the end of the school year, that is overwhelming to a child. When they know that has to be completed, it's frustrating, overwhelming, shutdown. And that's when I start to see the behaviors. It's sad.

When commenting about the ideal way for math to be taught, a fifth grade teacher stated, "Absolutely no worksheets. Well, every once in a while, you probably need a worksheet. I just think no worksheets, making it more real world, more creative and more fun is going to help the kids learn."

All teachers relayed they received a manipulative kit with their Math in Focus curriculum. A number of teachers indicated that the manipulative kits did not contain enough different types of manipulatives for what they believe they need to teach. Teachers also indicated a lack of a variety of manipulatives for lower elementary students. A second grade teacher pointed out, "With Math in Focus, they always use the same kind of manipulative, and I feel like students need more." A third grade teacher detailed her frustration with what she believes are the restrictions placed on her for which resources she can use with her students in math. When asked about the ideal way to teach math, she expressed:

It's hard the way that we teach kids now. It's even hard to explain. I think sometimes it confuses your little guys on the many different ways or strategies to get to a certain number. Those little tricks of the trade that don't follow the teacher's manual, I still have to use those because it helps kids get it, get to that understanding and be able to remember it for life. It makes it more fun. They can

sit there, and they can sing the song. And you see them when they take a quiz or they do a Kahoot or they do something, you can see them singing the song. You're going to take whatever tricks you have in your toolbox to help them understand it, and when you have students who come back and say, 'I remember. I remember.' Then you know that somewhere along the line, you made that difference in how they're remembering those things.

Never enough time. Almost all teachers expressed that lack of time is an issue, and most of the teachers expressed the need for more time for math instruction. “We never have enough time, and it seems like a lot of our time is spent in IEP [individualized education plan] meetings and team meetings and tier two meetings and never enough time,” shared one exasperated teacher. An accelerated math teacher, in describing the ideal way to teach math commented with a smile and laughter, “I would have all day long to teach math. That would be ideal. Oh, I wish I had more time. That would be the ideal way.” Almost every elementary math teacher interviewed stated in one way or another an identical point of view expressed by one accelerated math teacher who said, “I think we need more time for math.”

Warrensburg R-VI School District obtained a pacing guide from a nearby district which had been utilizing Math in Focus for approximately six years. Several teachers voiced their frustrations with the borrowed pacing guide. One third grade teacher commented, “Sometimes I feel like I'm not given a lot of freedom because I'm told that I have to be on certain chapters, certain pages at the same time as other people.” This teacher worried about moving on to the next chapter in order to stay on track with the pacing guide. She shared that even though it was time to go to the next chapter, she had

students who were not ready for the next concept. She explained, “I feel like my kids are not going to be successful with division because they're still not really getting the concept of multiplication.”

A second grade teacher expressed dissatisfaction with the pacing guide based on her experience using it with her students. She shared, “The impression is that we are to follow the pacing guide and cover everything in the book.” She explained how last year, her second grade teacher team collaborated to create their own math pacing guide to use for the school year, one which they believed would meet the needs of their students. The teacher further added, “Then three weeks later, we got told from our instructional coach, ‘No, you cannot adjust the pacing guide. You have to go back to the original pacing guide.’” The teacher indicated her frustration and stated she did not believe that the original pacing guide met the needs of her students. She explained:

I'm here to teach and for kids to learn. If that means that I need to fall away from my pacing guide so my kids can leave my classroom knowing how to add and subtract, then I'm doing what's right for them.

The same teacher elaborated on what she believes her students are lacking. She shared, “I think one thing that our kids struggle with is just fact fluency and understanding doubles, and doubles plus one, and how to make ten, like whatever partners of ten like you should know.” Teachers at all grade levels expressed their lowest math students lack number sense and fact fluency.

Two fourth grade teachers explained how not having enough time affects their planning for math instruction. One teacher commented, “I try my best to follow it [the pacing guide], but if we're getting short on time, I never skip a skill, but I might shorten

it.” This teacher expressed the desire to have more time to teach math and maybe even have a couple of different math times during the day to split the instruction so it's not so overwhelming for students. The teacher explained, “There's a lot of lessons and a lot of days they take up, and sometimes, I feel like I'm not always going to get to the end.” The second teacher admitted:

I generally follow the book unless I'm really far behind. Then, I am using my discretion, looking at the lesson and saying, “Okay, this isn't really an essential standard, and I need to catch up with where everybody else is.” Then I may do some skipping.

For planning purposes, an upper elementary teacher stated she would like to utilize a feature of Star Math to aid in providing differentiated instruction to her students but she lacks the time to adequately utilize it. She explained, “I don't feel like I have enough time in my day. Of course, nobody has enough time in their day to do the stuff they really want to do.” The teacher explained there is an instructional planning component of Star Math that will group students based on the concepts they need to master. She explained, “It [Star Math] prints off saying this group of five kids need to be working on these concepts at a fifth grade level, or these three kids here need to be working on this kindergarten concept.” With exasperation, the teacher said:

There's just not enough time because it's hard for me to even find time to pull small groups. And it gets frustrating because I know there are kids who are on level who are needing a bit of help, but I'm so busy working with those lower kids that sometimes on the level or the enrichment kids, they don't get me, and it hurts. But at the same time, I've got to prioritize and see who needs my help the most.

Several of the teachers expressed the need to adjust the pacing guide to meet the needs of their students. A fourth grade teacher stated, “We're all professionals, and we know what's best for our students. I feel like we should have some say in the pacing guide.” Teachers indicated when the majority of their kids are not understanding the concept, they should be allowed to dedicate more time to teaching that particular concept. One fourth grade teacher expressed, “We'll make up the time somewhere, but in good conscience, I can't move on. I know there's only so many days to the school year to squeeze everything in, but I feel like there needs to be some leeway.” Even though instructing two grade levels lower, a second grade teacher felt the same way, that teachers should be able to provide input about the pacing guide. She commented:

I think it's frustrating that the people who are making decisions on what I'm supposed to teach are not in the classroom. They are not seeing what the reality is on the battlefield every day. We're being told by people that this is what you have to do, but those people, again, don't know the daily struggle.

While teachers may not have had input in the math pacing guide, teachers agreed they have autonomy in making other decisions for their math classes. An accelerated teacher noted, “I feel that if they're struggling with a skill or a concept, they still get one-on-one or small group time. So, I feel that that's a success for all of our kids.” The same teacher also expressed the desire for additional time for math instruction so that teachers don't feel like they are not meeting their students' needs. She stated, “I think with the push to go on to the next lesson or to go on to the next chapter regardless, we feel like we're leaving students behind.” She further added, “There's a lot of pressure for each individual teacher for all students to be in the same spot, and in reality, they're not. And

talking about the amount of time, there's not enough time to do that." A different accelerated math teacher desired more time for math and how she would like to see that time utilized. She explained, "I think some somehow even if you get additional time one day a week or something as a review time or a spiraling time or just mixing up students and letting them work in groups."

Overall, teachers indicated the need for more time for math instruction and the need to have input on the pacing guide. A second grade teacher's comments epitomized the teacher's perceptions about a lack of time, following a pacing guide, and doing what they believe is best for kids. The teacher stated:

I think it would just be great to be able to have some flexibility. I'm really passionate about doing what's right for kids, and I don't feel like pushing kids on to meet a pacing guideline when they don't know the material. That's not okay with me. I can do the best I can, but if a kid doesn't know something, then I can't justify going on.

A few teachers addressed the fact that Math in Focus is not aligned with the Missouri learning standards, yet they are still required to get through the entire Math in Focus book by the end of the school year. These teachers suggested that perhaps the lessons that address the Missouri learning standards could be identified and a pacing guide could be created to ensure instruction of those state standards. This would allow teachers to have some flexibility with the pacing guide to better meet their students' learning needs.

One teacher commented, "It's not that I'm opposed to teaching kids that things that aren't standards, but we don't have time to be teaching anything else that isn't a standard. And so, I think that is a problem." Teachers were not against teaching math concepts outside

of the Missouri learning standards as they expressed that all math concepts are beneficial for students to learn.

A fourth grade teacher struggled to follow the directive to follow the pacing guide and suggested the district seek the assistance of a Math in Focus representative to help with the issue of trying to achieve student understanding and success with math concepts while still following a pacing guide. She admitted, “I would like to see, from start to finish, what a math class looks like because I don't see how we're supposed to squeeze everything in if we follow the textbook exactly like we're supposed to.” A majority of the teachers, second through fifth grade, commented that they've been instructed to stay on track with the pacing guide. A fourth grade teacher explained:

We have specifically asked what do we do if the students don't understand? “Why, you move on.” Okay, but they don't understand. So, we just leave them behind? “Well, not everybody's going to get it.” Okay, but if the majority of your class isn't understanding it, how can I in my right mind, and good conscience? I can't do it. Personally, I cannot do that. If the majority of my class isn't getting it, then I've done something wrong, and we need to address this. So, I don't know, but just more PD [professional development] to help us, I guess. Just show us how we're supposed to do it in the time that we are allotted.

Lack of professional development. In addition to being in agreement that time is a resource that is lacking, teachers also unanimously agreed there is a lack of professional development for math. Two teachers, both new to the district, revealed their experience transitioning to Math in Focus to teach math. One of the teachers shared, “As a new teacher in this district, it was, ‘Here's your manual. Go.’ I didn't even know about the

online component until I had been teaching it for at least a few weeks.” The other new teacher, who teaches in a different building, reiterated the same feeling. She stated, “I don't feel like coming in as a new teacher I was prepared at all to use their curriculum very well because I feel like we needed a PD [professional development] on it, maybe an introduction into it.”

One teacher's comments concisely captured how most of the teachers, who had been teaching in the district for some time, approached learning the Math in Focus curriculum. The teacher professed, “Honestly, I read over my teacher's manual, and then I just teach it however I understand it.” A third grade teacher relayed, “I wish before we got our program, I wish we would have received better training on how it looks. I know that we've had a few trainings, but I've not gained any knowledge from that individual.” A fifth grade teacher shared, “I feel like the support that has been given to us was very broad and not very specific, and so therefore, you're learning it on your own. You're doing what you can do.”

Along the same train of thought, a fourth grade teacher acknowledged, “I try to go by the teacher's manual, but there are some times where I don't understand it. And I know if I don't understand that my kids don't understand it.” The same teacher shared, “I was told last year, you start from day one, and you make sure that the kids understand things before you move on. And then I was told this year, ‘Now, you're following the curriculum as is, day one.’” Knowing that not every student would be able to maintain the pacing, the teacher sadly asked, “And then what happens when they go to fifth grade?” She then added, “But here in like, after we've had it four or five years, it's going to be amazing, hopefully.”

Teachers informed that the district provided some professional development on Math in Focus, as an instructional coach from a neighboring school district was brought in a couple of times to work with teachers. Multiple teachers expressed that while they appreciated receiving the professional development, a couple of the sessions were almost identical, therefore, they did not learn as much as they had hoped. Expressing disappointment with the duplication of professional development, one of the fourth grade teachers shared that the fourth grade team went to their instructional coach and explained they were getting ready to teach multiplication and division. The team requested the focus of the next professional development be on those topics. The teacher further shared, “And so, that next one, she actually came to us and gave us some stuff on multiplication which was really helpful.”

Another fourth grade teacher commented about the professional development on multiplication and shared, “We learned some really good things that we could add to our lessons, different strategies for multiplication, but I would also like to get someone in that's actually from Math in Focus. I think that would be beneficial.” Another fourth grade teacher mentioned wanting training from a Math in Focus representative as well and shared:

I would honestly like to see a Math in Focus person and really get to know what they have to say versus another district who has done it. I want to know exactly how they believe Math in Focus should be run. I know sometimes with curriculum, they say, “This is what we have to offer.” But, in reality, teachers only have so much time to teach it, and we don't get to every little teeny, tiny detail or part that they have. So, I would like for somebody from Math in Focus to

come in and explain everything and show us what it looks like. Then we, as a team, decide, okay, I think our team or district or whatever, I think we need to utilize this part of the resource and so forth, so it's consistent throughout the district.

While some teachers expressed the desire to have professional development through Math in Focus, other teachers pointed out that professional development provided by teachers within the district who are having success with Math in Focus would also be beneficial. A third grade teacher commented, “I would like more of an understanding on the series really, and I’m fine if that professional development comes from another teacher in my building, like somebody that's understanding it and can help me understand it more.” Similarly, a fourth grade teacher shared, “I feel like we have a lot of knowledge in our own buildings, and that we need to pull those resources and even have those people teach a math lesson in Math in Focus.” Teachers commented that they are able to request time to observe fellow teachers, but they would specifically like to have their fellow grade level teachers, those who are having success teaching with the new series, present this during a professional development opportunity. In that type of situation, teachers explained, they can ask questions during the presentation to gain a better understanding of the curriculum to benefit their own teaching.

Whether the professional development is provided by a representative from Math in Focus or by a fellow teacher within the district, teachers would like to have more training on how to best utilize all of the components of Math in Focus in order to best teach their students. An accelerated teacher said, “I think any professional development for teams to get additional exposure with our textbook series is always beneficial. It can

be overwhelming, but I don't think anyone leaves those opportunities feeling like they got nothing from it.”

Needs to Be Practical Yet Fun

While most teachers expressed a genuine desire to engage all students in learning math, a majority of the teachers admitted to having concerns about whether or not math is as fun as it used to be prior to the implementation of Math in Focus. Teachers expressed concerns with utilizing only the Math in Focus materials and neglecting other resources that would perhaps better appeal to and engage students. Teachers at each grade level noted the excessive number of worksheets they now are required to use along with the lengthy assessments. Another concern that was repeatedly mentioned was that Math in Focus seems to be too teacher centered and not necessarily student centered.

A fifth grade teacher discussed her dissatisfaction with the lack of fun and student engagement in math this year. She shared, “We need to learn some ways to make things more interactive between the teacher and the students, or student to student, so that the teaching isn't all me on the stage.” The teacher went on to explain that although the curriculum is not written in that manner, she believes it does not foster enough student interaction. She went on to say, “I think we need something that, this sounds terrible, something that would make it a little less boring because that's how I feel with the workbook and all of those pages.” A first year teacher also noticed that Math in Focus seems to be teacher centered and commented “I feel like where I'm lacking, and maybe it's because I don't understand the curriculum, is I feel like there should be more interaction between the students. There is too much teacher focus rather than student focus.”

All teachers across different grade levels talked about trying to incorporate activities and games to help make math more relatable and fun to learn. A third grade teacher pointed out the need to incorporate some things into her math lessons that are not a part of Math in Focus. She explained, “It is very hard for me to follow a teacher's manual knowing that I have other tricks of the trade to help a kid understand something.” She explained, “I have kids in the past who have come back and they're just like, I still remember those multiplication songs you taught me, and that's not in the teacher's manual.” Another third grade teacher commented:

I help the kids relate to everyday things. Those everyday problems are not a part of a teaching manual. You've got to help students try to relate to what goes on out there, real life, and it helps them become more excited about what they're learning.

A fourth grade teacher explained that she loves having math centers where students can play games and do hands-on activities. She relayed, “I think Math in Focus has a lot of really good aspects, but it lacks the games. It's just not engaging. I wish we could do center rotations and do more hands-on learning.” A fifth grade teacher mentioned, “Since we've gone to Math in Focus, I've been adding in fun things like Quizlets and games to go with it. Math in Focus does not include any games at all for fifth grade.”

Not only did teachers mention the numerous worksheets that accompany the Math in Focus curriculum, they also suggested that the tests are too lengthy. A second grade teacher shared her thoughts about the Math in Focus assessments. She explained that the next assessment she would be administering her students would take two weeks to

complete. She stated, “It's way beyond what I feel like is developmentally appropriate for a second grader. My high kids can do it, but it's still going to take them a long time. But some of the struggling kids, there's no way they can do it.” The teacher explained that she is required to give all parts of the test. She added, “This isn't good. You want to develop their love of math, you know, ‘I'm so confident’, and we knowingly are giving them things that we know are not okay.”

Another second grade teacher talked about what math should look like for second graders. She shared, “In my opinion, first of all, make it very relatable. Make it very practical for them. We have a mantra in our classroom, ‘These are things you need to know for the rest of your life.’” The teacher went on to add, “I just try to make math very relatable which creates interest, and I think that it makes it more enjoyable.” In order to make math as enjoyable as possible for students, a fifth grade teacher expressed what she thinks students need. She emphasized:

Since math is such a huge subject, the ideal way to teach it is with passion because each chapter is different. Each manipulative that you need to show it is different. Every single aspect of math needs something different to execute it properly. You just need someone who loves what they're doing or the kids don't care. So, I think that's what you need is a passionate teacher.

Diverse Student Population

Range of readiness levels. The Warrensburg R-VI School District has a diverse student population. One of the ways in which the students differ is in their range of readiness to learn new concepts and skills. Teachers described their math classes as having a wide range of readiness levels. A second grade teacher explained, “When I give

the pretest, I've got kids that will miss all of them, and I've got some that will get all of them right. It depends on the topic with the math series we use." A different second grade teacher described the range of readiness in her room as, "All the way from not having any foundational skills to already having them and beyond." Another second grade teacher informed of her range, "For instance, some don't have their ten partners. They don't know that three plus seven equals ten. They are not fluent with their basic facts even up to ten. And then I have others that are able to do multiplication."

Third grade teachers also indicated they have a broad range of readiness levels. One teacher shared, "I have three students that struggle on first, second-grade math. I have a pretty big middle group that are where they need to be, third grade. And then I have about six or seven that are pushing higher on." Another teacher stated, "Right now, my lowest kids are probably functioning at a second grade level, and my highest students should be in accelerated math if we did that in third grade." She recalled, "Last year, I was trying to teach multiplication, and at the same time, I was pulling pages out of the kindergarten and first grade Math in Focus books for my lowest kids." Another third teacher shared that her range of student readiness levels is smaller this year. She explained, "Most years my range is PK [preschool] through fifth grade, so I'm dealing with a six year range of math abilities. This year, my students are mostly third, on grade level, and I have two special education students."

Wide-ranging readiness levels were present in fourth grade math classes as well. One teacher commented of the range in her class, "There are some that I had to go back into second grade, and then some of them are advanced." Another teacher described her range as, "Anywhere from like lower first, second grade up to probably fifth or sixth

grade.” The next teacher said of the range in her class, “I have as far back as first grade level, and I have those students who were right on the edge of meeting [the requirements to get into] accelerated math.”

Both of the fourth grade accelerated math teachers experienced a very limited range of readiness levels in their math classes. One of the teachers explained, “Teaching accelerated math, it's not too wide of a readiness range. Most of the time, it's just maybe not knowing a vocabulary term or not knowing where to start.” The teacher added, “I don't really have a lot of low kids because we screened with some things to make sure they're more prepared for challenging questions.” The other fourth grade accelerated math teacher shared, “For the most part, most of the students are within the same range according to the Star test that they take.” This teacher shared how she utilizes a report from Star Math that will group students based on mastery per standard. She explained, “Then I know who's going be stronger on the skill and who's below mastery right now, and then I can pair them together to help them grow at the same time.”

A fifth grade teacher noted what she has observed regarding the range of student readiness levels over time with her classes. She shared, “It seems like the longer I've been teaching, the greater their range. Not sure if that's in my head, but I feel like that's what's happening. And it's becoming more difficult to reach their needs.” She further mentioned, “I know we have accelerated math, but I really wish we had a basic math class because I feel sorry for the kids that are so low. They almost need a one-on-one which we rarely can have that.” A different fifth grade teacher, speaking about the range present in her class said, “Anywhere from second grade level, all the way up to kids who already get the concept, fifth grade and even above.” Another teacher described her fifth grade range by

stating, “I have kids that absolutely know it all and some people that have never even heard of a fraction.” She added, “I also have one that transferred out of accelerated math to my class. I have two that are borderline accelerated math.”

A couple of fifth grade teachers noted their students’ lack of number sense. One of the teachers commented, “I believe there's a lack of foundational skills, number sense understanding.” Describing the range of readiness levels she sees with her class, she stated, “There are only one or two students who are currently above a readiness level and there are several, almost half of my class, below that readiness level. I would say most of them are about a year below.” Another fifth grade teacher had a similar range. She shared, “My students tend to range from a third to sixth grade level depending on the unit of study.” She also commented on having students who are lacking in number sense and fact fluency. She explained, “The students that are lacking in their basic math operations and number sense tend to be below grade level across the board.”

Much like the fourth grade accelerated teachers, the fifth grade accelerated classes have a more limited range of readiness than the other grade level math classes. One of the fifth grade accelerated math teachers stated, “My range of readiness levels doesn't range too greatly. I would say maybe, at most, one grade level variation, but I would attribute that mostly to the fact that I teach accelerated. I know that's not typical.” The other fifth grade accelerated math teacher explained that her class has a bit of a range of readiness at the beginning of the school year. She explained:

With the accelerated kids, especially at the beginning of the year because their readiness levels are quite a bit different, because you have some kids that are coming from a regular fourth grade classroom and most of them will be coming

from an accelerated fourth grade classroom, I feel like I'm catching some kids up. By midyear, they're more on the same level, and so when we start a new chapter or a new unit, at that point, the difference in readiness is not because of background knowledge but because some of them just take a little longer to grasp something than others do.

Prior knowledge. Every teacher expressed the importance of assessing students' prior knowledge for teaching new math concepts. A fifth grade teacher described what the use of prior knowledge means to her in regard to her teaching. She shared, "You hope that you have a foundation so that you can continue to climb upwards, but sometimes you have to lay the foundation yourself. You need to assess what the prior knowledge is to know where you're starting." The teacher added, "But more importantly, if you understand their prior knowledge and why they like math or don't like math, you can fix it so they have a passion and they have a want to learn." Teachers shared that they are continuously assessing students' knowledge to aid in instruction. A different fifth grade teacher noted, "You use students' prior knowledge constantly. You've got to see where they're at. I do that through pretests, but a lot verbally. You can figure out quickly where kids are at just by asking questions." A second grade teacher also indicated her constant use of assessment. She shared, "Well, I think like every day when you're meeting with them, you have to use their prior knowledge to know kind of where to start if you're introducing a concept. So, I use it every day, every lesson." Teachers described a multitude of ways they assess students' knowledge including utilizing pre-assessments, asking questions, giving a few introductory problems, and analyzing historical data such

as test scores and report cards. A third grade teacher shared, “Sometimes if I see that there's a real issue. Then I might even go back and talk to their previous teacher.”

All elementary teachers in Warrensburg R-VI School District administer the Star Math assessment to their math classes at the beginning of the school year. Several teachers talked about referring to the Star data as a source of information about their students they utilize to plan for instruction. A fourth grade teacher commented, “At the beginning of the year, we do the Star Math test, and I look at that to see where they are and where they need to be. That guides me and tells me where I need to go.” This teacher also indicated that she utilizes the data from the Star Math assessments to form small groups for instruction. A second grade teacher stated, “I look at Star data to see like where we are at. I also do a placement pretest before each unit, and so that gives me kind of a good indication of where we're going to really start.” A fifth grade teacher shared, “I like to gauge their abilities so that I know my starting place, and I’m able to set and determine goals that are realistic for them.” The teacher further added, “I also use pretesting for checks for basic math operations, and then I look at performance within the class in regards to effort and the timeliness they're able to complete tasks in comparison to their peers.”

Multiple teachers discussed using the pre-assessments from Math in Focus to assess students’ prior knowledge about math concepts. A fifth grade teacher shared, “Our curriculum has pre-assessments for prior knowledge which give me an idea of where each student is on a variety of different skill levels just so I have an idea of where we're starting.” She further commented, “Conversations, I think are really important. I mean just talking with them and just watching them those first few days when I teach

something new is really key.” A fourth grade teacher shared, “We have a pre-assessment as a component of our math program, so I like to use that as a tool to help the students assess their prior knowledge.” The teacher talked about using the pre-assessment to help her students realize where they are in their learning and to indicate what she might need to review or teach before introducing a new concept. She also added, “Looking at their prior knowledge helps me to potentially make math groups for my workshop.” Other teachers detailed how they use students’ prior knowledge to more easily meet students’ needs. A fifth grade teacher explained, “I give a pretest to determine what students know and use the results of that to maybe form students into groups or pairs to work together so that their needs could be met more easily instead of just one-on-one.” A second grade teacher shared, “I use it [students’ prior knowledge] to know what students know and don’t know and to plan small groups.”

The accelerated math teachers also utilize a variety of means to assess students’ prior knowledge. One teacher explained, “If I’m starting a new chapter or unit, I’ll do an introductory day that gives students a chance to discuss and bring forth what they already know.” The teacher further added, “That way if I have to fill in some gaps first, then I can do that at that time.” Another teacher shared, “I start up with warm-up questions to assess prior knowledge. Our textbook provides a warm-up question and often brings in what they already know and touches a little bit on what they are going to learn.” A different accelerated math teacher talked about transitioning from one lesson to the next. She commented, “I base most of my lessons on either the prior lesson, how it went.” The accelerated math teachers explained that frequently the majority of their students are ready to transition to new concept often with the help of just a little review.

One accelerated math teacher's method of assessing students' prior knowledge was different from all other teachers in the study. She shared, "I use the program eSpark Learning, and they take a little pretest. And it'll give me a percentage of where they are, and it'll give me intervention for groups of kids who need to work on this skill." The teacher explained that students will use their classroom technology to take a pretest. The teacher can then view the score. The program then provides the student with a lesson that is appropriate for their readiness level. Students are able to watch an instructional video, complete a guided learning practice, and then play a game or do an activity on the concept. After that, the students take a post-test, and the teacher is able to view the score on the administrative side of the program. The accelerated math teacher explained, "I don't use the Math in Focus pretests because I have 31 chapters to teach."

Differentiate to meet students' needs. All teachers interviewed explained that they modify work and differentiate instruction for their math students. Teachers described various modifications they make for individual students and discussed how they differentiate instruction through the use of small groups. Teachers explained that with Math in Focus, they teach a whole group lesson first and then work with small groups of students which have different needs.

Teachers explained that while their classes include a wide range of readiness levels, they are also comprised of a variety of different types of learners. A fourth grade teacher shared, "I feel like I'm all over the place in math because I know I've got visual learners. I've got the kids that have the tactile, that need to touch it. So, we learn different methods to do the problems." A different fourth grade teacher described trying to meet the needs of students who were working at an abstract level, while still trying to teach

students working at a concrete level. She explained, “I am trying to try to get them caught up to where we need to be using manipulatives. I just really have to back up a couple of grade levels and break it down with the manipulatives.” An accelerated math teacher shared, “I try to use a combination of manipulatives and visual along with auditory, a little bit of lecture, a video, sometimes a song.” Teachers talked about knowing the different needs of their individual students and the necessary differentiated means they use to ensure success for each student.

Teachers indicated, in order to continually best help each student learn, assessment is always ongoing whether it is formal or summative. A second grade teacher commented, “I give lots of short pretests which help me put students into groups, and I provide instruction and practice at the level they are ready for.” In order to assess where her students’ learning is at, a fourth grade teacher shared, “I might just pull out just a few questions for some students to do if I see that they're struggling.” Teachers use a variety of modifications for those students who are struggling. A third grade teacher stated, “I've gone back grade levels to modify. I've shortened assignments, given them longer time, broke the lessons down into maybe two or three parts over two or three days.” A fifth grade teacher shared, “I use accommodations such as reading the questions aloud to them, providing a list of steps to solve the problems, or taking the standard down maybe a grade level or more.” This teacher explained, “I look at what prior knowledge is needed, what prerequisite skills are needed according to our math series, to be able to solve the problems.” After the teacher identifies the prerequisite skills, she teaches those skills to the students in her small groups.

The teachers shared that during math, they initially teach the lesson of the day to the entire class, and then they pull small groups. A fourth grade teacher commented, “I do my whole group lesson, and then I will pull my lower kiddos back and work one-on-one with them in small group.” A fifth grade teacher expressed concern that all students, no matter their level of readiness, have to be included in the whole group lesson. She explained, “I’m required by the district to teach all of them the lesson at the fifth grade level and knowing that when I’m doing that, some kids are sitting there like totally behind.” In order to reduce frustration and help students not feel overwhelmed, she has a private conversation with students before the whole class lesson. She explained, “If the student is kind of sensitive, I’ll talk to them earlier. I’ll say just stick with me through the mini lesson, and then I’ll work with you afterwards and give you some extra help.” The teacher said that this method normally works, however, this year is different. She stated, “This this year it seems like my small group or reteaching is larger than my group that’s ready to go. And that’s painful because they really can’t work on their own.” Several teachers commented how small groups, in other words those students who are lacking foundational skills, are no longer small.

A second grade teacher explained how she has her class divided into three groups for math. She utilized Star Math data and teacher observation to place students into the groups. She informed:

I take whatever we’re supposed to be teaching that day from our Math in Focus curriculum. For example, with double digit addition with the first group, we’re going to do manipulatives. For the next group, we’re going to do ten frames and build up basic facts fluency and maybe some subitizing, things like that. And

then our last group, we might even do triple digit addition and subtraction. So, I just kind of every day adjust to what the kids need, but the starting point is the curriculum.

A third grade teacher described:

I separate off the more capable students, get them started, and then I go meet with my lower ones, make sure that they are somewhat understanding. Then I go and work with my middle kids and make sure that they're understanding. So really, it's just me running around here and there.

She also added that sometimes she has a few of her more capable students join her lower students to provide peer assistance. She explained, "They can teach the lower kids and, in return, it helps them to get a deeper understanding."

A second grade teacher explained that using groups for math helps her manage her instructional time. She explained that she uses her pretest data to ability group her students. She informed, "The reason I like to do it is because my kids that score lower usually need more time and more support, so I can give them more time. Whereas my higher kids can work through faster." She further added, "I really try to give them as much time as they need and grouping that way, it allows me to do that." A fourth grade teacher commented that she likes to utilize math workshop. In order to form groups, she uses the latest Star Math data and adjust groups as needed based on her observations. She utilizes three groups. The lowest group works with the teacher first on the lesson that has just been taught. The second group works at a partner station which is usually math games, and the third group works at a homework station to complete the day's independent assignment.

Some teachers have one-to-one technology in their classrooms, and those teachers shared that they utilize technology for a station or a math rotation for their students. One of the free online programs utilized at the lower elementary is Extra Math which is a fact fluency program. Another free program is Zearn. A second grade teacher shared that she utilizes Star Math data to customize what she has her students work on in Zearn. She explained, “I have kids that show on Star that they're working on fifth grade math level. And so, Zearn is a good way for me to be able to introduce information to them.”

The teachers utilizing math rotations or math workshop all agree that these work better if there is another adult in the room regardless of if that person is a paraeducator, a student teacher, or the Title Math teacher. A fourth grade teacher commented on her math workshops, “It does admittedly work better when I have a student teacher. Just based on the maturity and the behaviors of the kids that we have these days, I don't always trust them at a station that's not monitored.” Teachers shared that having another adult in the room during group work is extremely beneficial. The other person can help with questions at a homework station so the teacher is not interrupted during her group and can monitor the partner station to ensure there are no conflicts. A fifth grade teacher shared, “I try pulling small groups, but it's difficult because of behavior. I feel like I'm not able to accurately help the students because I'm constantly putting out fires.” A third grade teacher described the utilization of math groups in her classroom. She declared, “It's kind of like a three-ring circus,” and added, “It takes a lot of time for lesson planning. I have to pull stuff from anywhere that I can get it.” A fifth grade teacher made a similar comment about her math class. She shared, “You almost feel like you're doing this circus thing every day, and I know that's part of being a teacher.” A majority of the

teachers explained that they do not have assistance from another adult for math instruction, and only the two lower elementary schools have Title Math teachers.

The accelerated math teachers communicated that they sometimes form small groups to help students learn various math concepts. One accelerated math teacher shared that she has the students display hand signals to indicate their level of understanding with a lesson. Sometimes the hand signal will be just a thumbs up or a thumbs down. Other times in order to protect students' privacy, she will use what she referred to as the hand on the chest signal. Students place one hand in front of their chest and hold up their fingers to indicate how comfortable they're feeling with the current lesson. The teacher explained:

Four being strong, being I feel awesome about this. I can teach someone else to do it. Three is like I think I can do this on my own, and two is I think I get it. I just need a little bit more practice. And number one is like you left me five minutes ago.

The teacher went on to explain, "I know many of those kids either come in thinking, 'I am so hot. I know everything.' Or, they come in looking around like, 'I'm so dumb. I don't know anything.'" The teacher explained that even though all of her students are in accelerated math, some of them are intimidated by the students around them. The teacher then assigns students to math groups based on the number of fingers they displayed. The students who displayed fours will be given independent work while the rest of the class will remain with the teacher for a few more problems. Then the teacher assesses the level of understanding and regroups the students as needed.

Expectations differ. Teachers indicated they held different expectations for students performing at different levels. A fifth grade teacher commented, “I would like to just say that my expectations are high for all students, but high for one student would be a different high for another student.” A second grade teacher stated, “I know that some students are learning at a different pace. Some students have learning disabilities, but I still have the expectation they will learn the content and do their best.” A fifth grade teacher shared, “I know for my kids, they're all maybe at different steps in the process. I try to be considerate and patient with that.” A fourth grade teacher stated, “I expect them all to accomplish what they can at their level. I work with them so that they find success, so that way they can build up confidence.” A fourth grade teacher pointed out, “I want to be fair, like consistent across the board, but I also want to be fair because we're not all coming from the same place. We don't all have the same abilities when it comes to math.”

Some teachers hold generalized expectations for all students. A fourth grade teacher commented, “I always kind of keep it in the back of my head that as long as they're being productive, I feel success with them. I try to be very patient, and I try to go down to their level so that they feel success at some level.” A fifth grade teacher explained, “My baseline expectation is that they all see that math has a purpose, and that they can all do it. It's just that their level of execution is different.” A third grade teacher shared, “My expectation for all kids is to be at the highest level that I feel like they can be at without getting frustrated. My expectations would be high for any kid, at their level, and take them as high as you could go.” An accelerated math teacher explained, “I think my expectations are more like try your best, be willing to listen, and also, be willing to

participate. My overall expectations for them are to try their best and listen. Those things don't change.”

A second grade teacher confided, “There are certain kids that I don't expect for them to be meeting grade level expectations. I mean, that's just not going to happen because they're just so far behind for various reasons, but I want them to always be growing.” A third grade teacher admitted her expectations differed for her higher students as compared to her lower students. She disclosed, “I know for our higher students, I expect them to think deeper, think beyond, problem-solve a little deeper. My lower kids, I probably just want them to feel more confident with just basic problem-solving.” An accelerated math teacher shared that she holds her accelerated students to a higher standard than her other students. She explained, “My expectations are higher than what I would expect from my homeroom class. I often even use that as a classroom management technique. I expect more, so you need to behave like you want to be in this classroom.” The overall impression the teachers gave is that they want every student to be able to achieve his or her best, and so they hold all students to high expectations.

Types of Student Groupings Being Utilized

With-in class groups. All teachers indicated that they use some form of grouping during their math classes. All teachers start their math class with a whole group lesson which comes from the appropriate grade level of the Math in Focus curriculum. After teaching the whole group lesson, several teachers indicated that they separate students into groups based on their level of understanding with the math concept which is being taught. Most teachers indicated their time for the remainder of the class period is spent working with the lowest group. Other teachers utilize what they refer to as math stations,

math rotations, or math workshop. In each of these options, the teacher meets with each group as they rotate through the stations. Teachers indicated that they do not always get to meet with each group due to time restraints.

A fourth grade teacher's comments mirrored what several teachers discussed doing after whole group instruction. The teacher shared, "I work with a small group every day, and usually it's the same group. They're lacking in all skills." Some teachers revealed they facilitate each of their higher groups with starting their group work, and then they spend their time instructing the lowest group. A fifth grade teacher said she leaves out the answer key for her highest students to check their own work and proceed independently with the next assignment. She shared, "and then that allows me to make sure that my middle group is on track, and then I can focus more attention to my lower group."

There were a few teachers who indicated they do more whole group instruction for math as opposed to small group instruction. An accelerated math teacher explained that she does more whole class instruction in her room and seldom utilizes small groups. If small groups are created, she bases the instruction on individual student needs according to those students who may need remediation. She shared, "I'll pull them and do remediation usually while the other group is working on enrichment after whole class instruction." Another accelerated math teacher shared that she utilizes partners in math more often than small groups. She explained:

If I want to partner them up, I will often look at their most recent Star scores, and I will try to pair maybe my highest with my mid high and then the next highest with the mid low so that there's not such a huge range in ability, and they can still learn from each other and help each other.

A different accelerated math teacher shared, “on most assignments, my students choose partners or small groups to work in.” While allowing students to choose partners for math may be working for this class, behavior issues are impeding small group and partner work for other classes.

Several teachers indicated that their students are not able to work well in a small group without supervision. A third grade teacher confessed, “The way I teach it is whole group. I want to work together because I want to control the whole situation, I guess you could say.” The teacher went on to explain, “Every now and then I do groups. I'd like to be stronger in group work. I feel like a lot of my kids, they're not as independent as I would like for them to be. They depend a lot on my assistance.” Another fifth grade teacher explained that in past years, she often utilized small ability groups to differentiate math instruction. This year, however, because of behavior issues, it is not as easy to manage small groups. She explained, “With the range of behaviors, a lot of my lower kids are the ones that have behaviors in general, you can't necessarily sit them always together. They are the ones that literally just shouldn't be in the same space.” A second grade teacher explained about her students, “I group them initially based on their Star and looking where they're at. And then once you meet with them, you have to look at behaviors, how the kids behave with each other, and that's really big, honestly.” Overall, teachers are utilizing small groups in their classrooms during math and struggling with how to control the behaviors.

Teachers indicated the groups formed for small group math instruction are constantly changing based on the students' needs. A third grade teacher commented, “My groups change frequently based on the concept, the skill, on Star scores, and my

observations.” A fourth grade teacher explained, “I form my groups using my Star report and then adjusting as needed.” A second grade teacher talked about her small math groups and explained, “If students are able to grasp concepts more quickly, I place them into larger groups with up to six in a group. For those who don’t grasp concepts as readily, there may be only two students in the group.” The teacher further added, “Sometimes students may be doing individual work, but typically they’re in groups. The groups are fluid and change as needed.” Teachers shared that they use a combination of classroom observations, daily work, and assessment scores to create small groups.

For various reasons, teachers are utilizing a variety of configurations for small math groups. A fifth grade teacher talked about pairing her students so that one student could have a peer helper. The teacher explained, “The teacher is not necessarily always the right person to help a struggling student because the words aren't coming through. Another student, who will step into that place, is very beneficial.” The teacher explained, “That would benefit the student who's just grasping it by reteaching and help the other student.” The teacher shared that she likes to pair students who are similar in ability and added, “The ones who have it really well aren't always really patient to wait for the other child.” A fourth grade teacher also mentioned using peer helpers in her classroom. She explained, “They can hear it from me all day long, but sometimes it takes someone else that’s also listened to me to repeat it in kid terms. And that way, they hear it a little bit different.”

A third grade teacher shared she likes to have a low group, a medium group, and a high group. She explained, “I rotate them through different stations with myself being a station. I help them work at the level they're at. I can push my high kids, and I can pull

my low kids up. Push my high kids to go deeper because they're working with each other at that higher level and challenging each other.” A fourth grade teacher explained that students are grouped by ability at tables in the classroom. The teacher explained, “So, I know this table. I almost always need to be around there to help them out.” If you walk into each of the elementary math classrooms during math instruction, the configuration of small groups will be different in each of them.

The effect of utilizing with-in class groups. Overall, teachers expressed the utilization of small groups is beneficial for a number of reasons. The greatest benefit teachers noted was that instruction could be tailored to meet the individual learner’s needs. A fifth grade teacher commented, “Small groups allow students to get the good fit instruction they need to close the gaps and build their knowledge.” A third grade teacher noted that the utilization of small groups benefits all students. She explained:

When I have used groups, I feel like my kids felt more confident because they were getting the help they needed at the level they were at. So, my high kids felt good because they were getting challenged. My kids that were on level felt good because they could do what was needed, and my low kids weren't feeling like failures because they couldn't do what we were doing every day.

A second grade teacher commented, “Small groups allow me to deliver instruction that's going to be most useful to students.

A second benefit teachers attributed to the utilization of small groups in math is how students are able to gain confidence from working in a setting that is nonthreatening for them. A second grade teacher shared, “I feel like they're in an environment with kids around them that are about the same level with them. I feel like for their anxiety, it

doesn't stress them out as much. I love math groups.” Another second grade teacher stated, “I think to be with peers, they help each other learn, and they feel confident in their abilities.” A fourth grade teacher explained, “For some of them, I think it helps build their confidence because they see that the other students are on their same level.” An accelerated math teacher commented, “I think that students are more willing to share what they're unsure of or ask more questions when they're in a smaller group, especially in a class with 25 bright math minded students. A fifth grade teacher explained, “I think it benefits the students who get pulled aside for a little bit to work with the teacher. Then they don't feel threatened by the kids who've always got their hands up answering all of the questions.” An accelerated teacher stated, “I would say small groups are very effective. Students don't feel as intimidated as if I were to go up to them when they're working individually and say hey, I'm noticing you're making some errors.” And a fourth grade teacher summed up the perceived benefit by stating, “The effect is they're building confidence because they're finding that success.”

A third benefit attributed to the use of small groups for math instruction is the benefit of peer teaching. A fourth grade teacher noted, “I think that students really do, in some cases, explain it better to each other than whenever I explained it. They explain it in a way that they understand.” Another fourth grade teacher shared, “I think it does help them to work with each other. One student might struggle with one part of a problem, but another student might have that part and they can help.” Yet another fourth grade teacher shared, “I will have other kids who have gotten the assignment go to the other students and help them out. And, that gives them a purpose, and sometimes kids just need to hear from someone different like their peers.” An accelerated math teacher explained, “I just

think that in a smaller group, they're more likely to also to pay attention to me, and learn not only from me, but learn from the others in that group as well.”

Overall, teachers expressed that they were better able to get to know the individual needs of students while working with them in small groups for math. A second grade teacher shared, “I feel like I know my kids so much better. I feel like I really have a grasp on specifically what kids struggle with. If I was doing whole group, I probably wouldn't be that in tune.” A different second grade teacher explained, “I am able to understand where the students’ learning is at a lot faster in small groups and catch mistakes.” A fifth grade teacher expressed, “I feel like I've been able to successfully help kids push their understanding when I've been able to work with them in a small group setting. Small group instruction allows me to get to know them better.” Teachers indicated they are better able to pinpoint where their students are at while working on specific concepts through the use of small group instruction for math.

In addition to noting positive benefits of small group instruction, teachers also shared some problems they have observed with small group instruction for math. One of the concerns teachers expressed with small groups was how students react with other students. Teachers commented that some students with behavior issues could not work well together in the same small group, while teachers also noticed that the opposite is true. Teachers reported that sometimes those students who get along well might not learn best in the same small group. A fourth grade teacher shared, “I think that sometimes when kids are on the same ability as their friends, they can get off task, and that can be a problem. So sometimes that is the obstacle to the small group.” A fifth grade teacher stated, “It's a fluid system, so you have to be willing to change it. Change the groups.

You can't put some kids together because they get along too well. It's not just about who has knowledge and who doesn't."

Teachers relayed that there is just not enough time to adequately serve all students and meet their individual needs in the amount of time they are allotted for math.

A fifth grade teacher explained, "I feel like my biggest hurdle as a teacher is trying to help those kids that are in the very low range. Overcoming that takes more than one or two small group settings over the course of a week. You're talking weeks and months of extra practice. There's only so many hours in the day, and so many days in a unit." A

different fifth grade teacher commented, "The students that are truly the lowest performing are lacking number sense. They have really deep misconceptions that I think it takes a lot of time. Those are kids that it takes maybe years to make small gains." The teacher further added, "They're the students that struggle with the foundational skills.

Usually you will see behavior issues because they get frustrated, and they have avoidance behaviors." Commenting on the amount of time it takes to instruct small groups and the lack of time for math, a third grade teacher explained, "You try whatever to get in all of the standards you're supposed to teach for the entire year. It gets to be overwhelming.

There are too many standards and not enough time. Sometimes things have to give. You prioritize." Teachers shared that they are having to prioritize which math concepts are the most important to teach to their lowest students in the amount of time they have for math instruction.

Accelerated math groups. Overall, teachers indicated the accelerated classes meet the needs of the highest ability math students. Teachers explained that the accelerated math classes provide enrichment and challenge for higher level math

students. A fourth grade teacher's comments captured the thoughts shared by a number of teachers. She shared:

I feel like for those kids, that's what they need. I know that they would be bored with how slow I have to take things because even if I look at the lesson and I think, okay, I'm going to have to slow this down a lot. Then I come up with that plan and even my slow down plan is way too fast for what they're ready for. Whereas those top 25 in their grade level, those kids are able and ready to go fast, and I think it would be a disservice to them even if I put them in my highest math group. I want those really math inclined kids to be challenged in a way that they enjoy, and knowing that they have to sign this contract, and knowing that they're getting into a rigorous math class, they're usually way into it.

Several teachers commented that if there were no accelerated classes, those students who would have been in the grade level classes would be bored with math.

A fifth grade math teacher commented, "I personally like the difference between accelerated and regular math because I feel like if I was teaching my accelerated kids, they would be done in five minutes, and they would be bored." Similarly, a fourth grade teacher expressed, "I like that there is that option for those kids to have the accelerated math program because if I had those kids in my classroom, they would be bored." Discussing accelerated math, a different fourth grade teacher commented, "At least those accelerated kids aren't sitting in my room bored. I have so many different levels in my class. It's always those high kids that kind of get left behind." An accelerated

math teacher spoke about the benefits of offering the accelerated class and what might happen to students if the accelerated classes are no longer offered. She explained:

It is very effective. I feel it prepares the students in accelerated math greatly for higher math in middle school, high school and beyond. If they didn't have accelerated math, if there was only one math class, I feel they would be bored. I feel there would be more opportunities for students that are gifted in math to get in trouble just because they would be bored and possibly acting out, possibly even not like math anymore, so just the whole apathy.

Not every teacher agrees with having accelerated classes at the elementary level; however, all teachers were able to describe benefits of having accelerated math classes. A fifth grade teacher who believes accelerated math should not be offered until middle school shared:

I have six students that go out for accelerated math, and I would be very sad for them if they were sitting around in here floundering while I'm trying to teach a small group of ten kids how to do third-grade skills. So, in that respect, I'm thankful for accelerated math. At this point in time, I think we have so many more children who need extra help that without the accelerated math program, it would be very, very difficult to meet all of the individual needs in one classroom setting.

Two accelerated math teachers conveyed an additional benefit of having accelerated math classes is that they decrease in the range of ability of the students in the grade level math classes. One accelerated teacher explained, "I think it helps the other teachers because then they don't have such a wide range in their classroom." The second teacher

commented, "I think it's a good program. I think it helps the other teachers to pull and not have such a wide range in their room."

One accelerated math teacher expressed the notion that accelerated math is important in fourth and fifth grade, specifically more important in fifth grade than it is in the younger grade levels because there is such a range in ability between the students at that point in their education. Speaking about accelerated math classes, the accelerated teacher stated, "The higher level kids, the gifted kids are able to work at a faster pace and not feel like they're being left behind. It prepares them for the accelerated program in sixth grade over at the middle school." Talking about meeting the needs of the higher ability math students, a fourth grade teacher shared, "For the students that leave to go to accelerated, they need a little bit more of a challenge, a faster pace. They can learn skills quicker and be challenged more than what they could in my class." An accelerated math teacher shared, "I think my accelerated kids love the time and opportunity to go at a faster pace. I could see a lot of these students fizzling out if they weren't able to go faster or do more."

All teachers agreed that the higher concepts taught at a fast pace challenge the accelerated math students. A fourth grade teacher explained, "Those accelerated kids are able to be pushed to learn the harder concepts and they get to move at a faster pace." A different fourth grade teacher shared, "Accelerated students are getting pushed a lot more, and they're going to be better prepared when they get to high school or even to the junior high level to excel at the math. I also think it's creating responsibility." Another fourth grade teacher explained, "The students that need that enrichment, you know, they need to be pushed as far as they can go." A fifth grade teacher commented, "I think it's great for

those students that pick up on math skills very quickly and are able to retain those very well. I think it's great to challenge them more.” Another fifth grade teacher shared, “I think one of the positives is it's going to challenge them because they have to keep an 80% to stay in the class.” In order to stay in the accelerated math class, students have to maintain a grade of 80% or higher.

All teachers agreed that students in the accelerated math classes will be prepared for future math courses. A fourth grade teacher shared, “They really are working on accelerated concepts, and I'm just really impressed with it. I think whenever they get to middle school, they're prepared.” A fifth grade teacher commented, “I know it does set them on a fast track for AP (advanced placement) courses in high school which is really hard for fifth graders or fourth graders to even grasp.” An accelerated math teacher explained, “Accelerated math sets students up to be able to take that extra honors level course in high school and even possibly earn dual credit for college courses in high school.” A fifth grade teacher noted, “Kids who are going to be on track to trig, honors trig, calculus, and higher math in high school are not going to be able to reach that level if they don't start now.” A different fifth grade teacher reflected on her own education and commented, “The students who were in accelerated math went on to be something with engineering, statistics, actuarial science. They did something in the math field because they enjoyed it. So, it absolutely prepares you for your future education.”

Teachers pointed out that the accelerated math students benefit from being around peers that are working at a similar academic level. A fifth grade teacher expressed, “I think it's good for them to have a different teacher and different peer group to be surrounded by, with peers that are intellectually on the same level as them.” One

accelerated math teacher shared, “Higher level students have an opportunity to communicate some higher level thoughts with other higher level students, and they also have the opportunity to be challenged.” The teacher further added, “I think a big advantage is that they're becoming more critical as students with their thinking and their reading and their reasoning and explanations because it's being kind of demanded on them with what we're doing.” Another accelerated math teacher made a similar comment when she shared, “I think for the majority of my accelerated students, it has pushed them to be more critical and higher-level thinkers.”

An accelerated math teacher voiced concerns that parents may be misunderstanding the accelerated math program and must be informed that students are not skipping an entire year of math. Rather, they are being held responsible for the level math at the grade they are in as well as being held responsible for learning the next year's math curriculum. An accelerated teacher shared, “I would say that one of the advantages that parents need to realize is both accelerated and what I would consider on grade level math, they're still having consistent exposure to grade-level content.” The teacher commented, “I think that a misconception of accelerated math is that kids get to skip a grade of math,” and explained, “they're not only getting on grade level content but they're applying on grade level content to what the next grade level would expect of them.” Students in both the grade level math classes and the accelerated math classes are using the same curriculum, Math in Focus.

All of the accelerated math teachers expressed they enjoy teaching the accelerated classes. One accelerated math teacher expressed, “As a teacher, I love it! Teaching accelerated math is definitely the peak of my day. It's exciting because I feel like all of

my students come ready to learn and willing to learn.” The teacher further added, “Now that may not look the same every day because I still have a lot of students from various backgrounds and some have trouble situations and things like that, but they're willing to try.” Another accelerated teacher shared, “It's fun for me to get students from other classrooms and build relationships with them. Getting to know more kids is always a good thing.” This teacher also commented on her students that leave her classroom to attend grade level math. She shared, “I think they enjoy going and becoming a part of someone else's homeroom and then just building a relationship with someone else as well. I think it makes them feel special.”

Concerns about accelerated students leaving. While the accelerated teachers generally agree that they are pleased with the students in their math classes, the teachers who teach the grade level math classes did not express the same satisfaction. A fifth grade teacher confided:

I feel like it's good to have other students come into the classroom from other classes. I mean, sometimes, I can say that. The students that leave for accelerated tend to be more responsible, excel academically, and are a little bit more drive oriented and successful in school. And the students they are coming to me in math, they struggle. There are behavior issues. The caliber of student, they're not same level that I would say an advanced, star student leaving the classroom to go to accelerated is at.

Another fifth grade teacher expressed her concerns with the students leaving for accelerated math and those coming in for grade level math. She explained:

I think sometimes you take out all the bright lights out of the room and there's nothing left to spark higher ideas. And then you get some kids from that class that are extremely low and now you've added that to the batch of kids that you already have in your class that struggle with every new concept, much less missing skills that go with the new concepts, and it really makes it hard.

A majority of the fourth and fifth grade teachers who do not teach accelerated math expressed dissatisfaction with having to teach the lowest students. There were a couple of teachers who expressed that they enjoy teaching the lower math students and being able to make gains with them. Several teachers, however, felt they were at a disadvantage teaching math without having students of the highest math ability remain in the classroom for grade level instruction.

While class size is limited for the accelerated math classes, teachers expressed that, at times, they believe there are students who would academically qualify for accelerated math, while behaviorally they do not. One fifth grade teacher shared:

This year was not the first year I've had students that didn't make it because of numbers, and it's frustrating. Based on what I've seen in terms of academics, in terms of behavior, in terms of effort in other areas, in terms of just knowing the student as a person, it's just sometimes shocking to me that some kids go through the accelerated path and other kids aren't given that opportunity when I think other kids could potentially be more successful.

A different fifth grade teacher commented, "I have some of those students that could have been in accelerated math for this current school year, but I think maybe it

was their behavior that kept them from getting into it.” Yet another fifth grade teacher shared:

I have a student this year that I'm watching very closely that that I know last year didn't get along with his teacher, and so I can see that she would have never recommended him for accelerated math. I'm not always happy with the way some students are excluded.

Several teachers noted the screening process could be more clearly defined for students, teachers, and parents, and if behavior is going to be a factor, that needs to be clearly stated.

How students are chosen for accelerated math. Teachers explained the various requirements for admittance into an accelerated math class. However, not all teachers, even those fourth and fifth grade teachers who teach the grades for which accelerated math is offered, could explain how students are identified and selected for accelerated math. A few teachers said they thought that perhaps Star Math and MAP (Missouri Assessment Program) scores were used to identify which students would be accepted into accelerated math.

A fifth grade teacher commented about the selection process for students to be selected for accelerated math. She shared:

I do think parent requests, parent pushing, borderline parent harassment sometimes, play into that because there is a perception that kids are going to be better off more if they are in accelerated math versus a general education class which is frustrating at this level because I mean it's still elementary.

A fourth grade teacher commented about the students are who chosen for the screening. She stated:

I believe the teachers just give a list of kids who it would be worth it to screen. There are some kids that based on their grades and their behaviors and stuff they know that they're not going to be accelerated math kids. So, they don't give them that test because it's a waste of everyone's time. If a parent requests their child take it, of course, they can take it, but we don't want to put some kids in a stressful situation.

Teachers indicated that parents often do not even know that the district offers accelerated math classes for fourth and fifth grade students.

How parents are informed about accelerated math. Several teachers indicated that they would like for parents at all levels to be informed that accelerated math classes begin in the district at the fourth grade level. Teachers expressed that perhaps parents might work at home more with their children on math if they thought their children might have an advantage at the elementary level from being in those classes. A third grade teacher discussed sharing with parents at parent-teacher conferences the possibility of their children being in accelerated math class for fourth grade. She explained, “Once I've even planted that seed with parents, you can tell that that kid is getting pushed at home. Their parents are working with them because you've said this kid has the potential to really go farther.”

Whether or Not the Current Program Meets All Students' Needs

When discussing whether or not the current elementary math program in Warrensburg R-VI School District is meeting the needs of all students, a fifth grade teacher shared:

I like to just sit here and say, oh, in my classroom, all of their needs are met, but they're not. The high kids get left behind doing practice on things that they already know, and lower kids are sitting there lost a good lot of the time. And so, I don't think that everybody's having their needs met, but I don't know what the answer is either because they don't like the idea of sorting out the low-low kids. There are kids on each end of the spectrum getting behind. I don't know exactly what the answer is, but I don't feel like the way we do math is meeting the needs of all the students.

Most teachers expressed similar sentiments, that not all students' needs are being met with the current math program.

Concerning the math program, a fifth grade teacher shared, "It's meeting the needs of those accelerated, those top students, but I don't think it's meeting the needs of the rest. I think we are only skimming the very top." This teacher further explained, "I think we have too great of a range left in the regular grade level classes." An accelerated math teacher commented, "I feel it meets the needs on the accelerated or enrichment end, but I honestly don't feel it meets the needs on the lower end as far as students that need remediation." An accelerated math teacher shared, "My students that might have been close to getting into accelerated math performance-wise are falling down. And again, that could be not understanding content. That could be a lack of motivation, lack of relationship with a different adult, different things." A fourth grade teacher shared:

Our series is really fast-paced so it feels like accelerated. It's like only teaching the kids that get it and then moving on sort of thing. I know there's some remediation, but I feel like I'm just kind of teaching to the middle of the road. So, it's not meeting the students' needs.

The grade level math teachers expressed concern that every year, one or two of the accelerated students drop out of the accelerated program because it's either too much pressure, too much homework, or some of them are not up for the challenge. Teachers expressed concern about these students having to repeat learning concepts they may have already learned in accelerated math.

There were some teachers who expressed the current elementary math program is meeting the needs of all students. A second grade teacher shared, "It meets all of the students' needs because it's adaptable and allows the students to grow. The groups are fluid so students are able to move into and out of groups based on their readiness level."

Talking about Math in Focus, a different second grade teacher commented:

I feel like this program really teaches kids to think on their own. I like that because I can give a problem and five kids can show their work in different ways, but they're all getting the same answer and it makes sense to them. I want them to pick strategies that allow them to think independently, and that's the one thing I really like about this program, that it really makes the kids think.

Need for a basic math class and expand Title. Multiple teachers expressed the desire for the district to also offer basic math classes to meet the needs of the students who lack a strong math foundation in addition to offering accelerated classes. Almost all fourth and fifth grade teachers expressed the need for Title Math services for their

students. An accelerated math teacher commented, “I almost wish there could be a class for our really low ones that really just need that one-on-one or a smaller, a consistent smaller group, or a title math program might even help that situation.” A fifth grade teacher shared:

I am really excited that our kids have the opportunity for accelerated math because I think they deserve that chance to fly. I wish that we also had a remedial, a Title Math, that we had something for our struggling kids because we’ve recognized reading is a life skill and that the lack of development in it becomes a hindrance to them through their whole life. We have Title Reading. Math is the same way. We should have Title Math.

Several teachers commented that the school district has spent much of their resources on improving students’ reading achievement, but the same emphasis has not been placed on improving students’ math achievement. A second grade teacher shared, “I feel like our math program is lacking, honestly. I think we could do a lot better job. I feel like in our district, the focus has always been reading. I feel like math is really put on the back burner in this district.” Several teachers commented that they would like to have more assistance with math, especially from the instructional coaches. One teacher shared, “I know we have what are called instructional coaches, but we all know they're really literacy coaches. Their focus is literacy, not math.” Overall, teachers expressed the need for help with math instruction in order to meet the vastly diverse needs of their students

Parents’ concerns about the math program. Teachers indicated that the majority of concerns or questions about the elementary math program deal with the accelerated math classes. A fifth grade teacher observed, “I really only get questions

about the math program in general from the parents of the students that tend to be strong in math.” She explained they usually ask about how to get their child into accelerated math. Most of the fourth grade teachers indicated they are frequently asked by parents why their child did not get into accelerated math.

A fifth grade teacher explained that she gets similar questions from parents about why their children were removed from accelerated math. She explained, “They were removed because they didn't do their homework. Not because they couldn't do their homework, but because they didn't follow the guidelines for the class.” The teacher explained then the parents question why the removal is upheld when the child is still able to do the math. Accelerated math students sign a contract agreeing to the terms of being allowed to stay in the class, one of which is the timely completion of homework.

Teachers expressed that sometimes parents will have a question about how to help their child at home, particularly when they do not understand how a concept is being taught at school. Some teachers explained that they do not get many questions or concerns from parents about math. Most teachers indicated they keep parents informed about what students are learning in math by emailing connection letters from Math in Focus.

Proponents of Accelerated Math

The majority of participants in the study were in support of accelerated math classes. Teachers pointed out multiple benefits from offering the accelerated classes. These benefits include, but are not limited to, meeting the needs of the higher level math students, reducing the range of readiness levels in the grade level classes, allowing the

needs of all students to be better met, and reducing the amount of differentiated instruction for the teacher.

A fifth grade teacher commented, “Having both an accelerated math and a regular math class gives time for guiding towards specific needs of different children. I think it challenges them both in different ways.” A fourth grade teacher noted one of the benefits of having accelerated math is that she is better able to meet the needs of the students remaining in her classroom. She explained, “For the students in my class, I am able to determine which ones are getting it quicker. We can move on if it's the majority the class, or I can just work with a small group if needed.” A fourth grade teacher shared, “For the students that stay with me, I feel like they're there in a place where they're not going to feel overwhelmed. They're not going to be rushed.”

A fourth grade teacher commented, “I can tailor learning better because I feel like I have less of a huge gap between the high and the low without those accelerated ones in the mix. So maybe I can close that gap a little bit.” A different fourth grade teacher explained, “It would be great to have the accelerated kids in my classroom to help out because they would understand. But then again, that would still be holding them back, and we don't want to do that.” Another fourth grade teacher commented, “It would be nice for me if I had more high kids in my regular math class, but I feel like I would not be serving every student as well as I am.” An accelerated teacher commented, “I understand there are concerns that some of the teachers don't feel all the students have that higher role model, but I do feel like maybe the middle kids become the high kids and gain more confidence.”

A fourth grade teacher explained, "If you take that need for enrichment out, then it lets you focus a little more on the other two groups." A different fourth grade teacher expressed, "Having those students gone for accelerated math lets me focus in a little bit more on the lower ones to try to get them caught up." Discussing the idea of no accelerated math classes, a fifth grade teacher shared, "I feel like I would be trying to teach five different math subjects in one class period. I think I would pull out my hair."

A fourth grade teacher explained, "I think the students at my grade level say, okay, if I keep working hard, then maybe I can get into this accelerated math class. So, I think that's a good motivation for some of them." The same teacher further added, "I think for my accelerated math kids, I think it's good for them to go to another teacher because some of them especially are having to step outside of their comfort zone, and I think that's good for them."

Support at second and third grade. Some of the second and third grade teachers professed support for the current accelerated math classes and expressed the desire to offer accelerated math at their grade levels. After voicing support for accelerated math classes at the upper elementary, a second grade teacher explained, "We already group students by ability in our classrooms for concepts. We don't want to stifle their growth. The groups are flexible." A different second grade teacher said she would like to have accelerated math at her grade level and explained, "I think the advantages would be you could meet the needs of the kids better." However, she cautioned, "I would just hate for a kid who's maybe borderline to get the idea that they're not good at math because they're not in the accelerated group."

A third grade teacher voiced her opinion about accelerated math and explained why she believes it is needed at the third grade level. She shared:

I am for accelerated math. In a way, when you give so much of your time to those lower level kids, a lot of your time. You give some of your time to your average kids, and then your higher level kids. You assume they know it, and it's hard to push them forward in your own classroom. In a regular classroom setting it's very difficult to meet their needs. If we had accelerated math at third grade, those higher level kids would get what they need. They would get their needs better met.

This teacher discussed tracking and said, "I've heard that word tracking being brought up. Some people don't think that's a good thing, that it would be stressful for students to work at an accelerated pace." The teacher further added:

Maybe they couldn't handle it, but then you have to think of the other hand. If you really want to push for something, and you really want this, you're going to work to that ability. You're going to push yourself to get there. For some kids who really would like to be in that math class, I think if they want to be in there, they're going to push themselves to be there.

A different third grade teacher also explained why she believes accelerated math classes at her grade level would benefit students. She shared:

Some of our kids can do that deeper problem solving, and they would feel less bored. In the regular classroom, they're having to wait. I feel sorry for them sometimes. They're having to wait on everybody else to get there, to get it figured out. So, it benefits your higher kids, and maybe your lower kids

would not feel the pressure from the higher kids. If sometimes your higher kids are doing the 'I got it. This is easy,' that kind of stuff, it really kind of kills the self-confidence of the poor little kid that's still trying his darnedest to try to figure the problem out. So, get the high kids out of there so the low kids can take more time to figure it out because they sometimes need it. But, the pressure of looking around and realizing I'm not getting it, and everybody else around me is, I think is defeating to some of them.

This same third grade teacher commented, "I think parents need to be told that you know if your child gets such and such average during these initial years in elementary school, that their child could potentially be placed in an accelerated math class."

A second grade teacher explained, "Having accelerated math at second grade, would give those kids that are ready for that challenge the opportunity to learn and grow at their potential. I feel like more than ever, I've got kids that want to learn." This same teacher stated, "Unfortunately, I can't challenge kids all the time in the way that I want to. And, they need to be challenged. I hate that, but when you're a one-man band and you've got kids of all ranges." The teacher concluded, "And, unfortunately the low ones are the ones that I feel like get the most attention. We're giving them first grade work, but are we giving our higher students 4th grade work? I mean, it's hard."

When accelerated math should initially be offered. Each study participant was asked when accelerated math should initially be offered. The following table, Table 1, displays the responses given by each of the teachers and the administrators.

Approximately 54% of respondents indicated they would like for accelerated math to start initially at fourth grade where it currently is offered. Approximately 15% of

respondents indicated they would like for accelerated math classes to start at middle school in sixth or seventh grade. Approximately 12% of respondents indicated accelerated math should start at third grade. Approximately 8% of respondents indicated the desire to have accelerated math start at first or second grade, and another approximately 8% of respondents suggested that accelerated math to start at kindergarten. One respondent did not indicate a grade level for the start of accelerated math.

Table 1

Grade Level Participants Believe Accelerated Math Should Initially Be Offered

Participant's Role in the District	Grade Level Accelerated Math Should Initially Be Offered
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
5 th Grade Teacher	Middle School 6 th or 7 th Grade
5 th Grade Teacher	6 th Grade
5 th Grade Teacher	6 th Grade
5 th Grade Teacher	4 th Grade
5 th Grade Teacher	4 th Grade
5 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	3 rd Grade
4 th Grade Teacher	1 st or 2 nd Grade
3 rd Grade Teacher	3 rd Grade
3 rd Grade Teacher	2 nd Grade
3 rd Grade Teacher	Kindergarten
2 nd Grade Teacher	4 th Grade
2 nd Grade Teacher	4 th Grade
2 nd Grade Teacher	Kindergarten
Administrator	Not a fan of accelerated programs
Administrator	6 th Grade
Administrator	4 th Grade
Administrator	4 th Grade
Administrator	Not below 3 rd Grade

Three of the fifth grade teachers interviewed suggested that accelerated math started at the middle school level. One of the fifth grade teachers commented, “I think if we knew that we're not going to accelerate students until they get into sixth grade, then we could do some different kinds of teaching and meeting students' needs. I don't know what that is right now.” Another fifth grade teacher commented, “I definitely think middle school, sixth grade or seventh grade, because we have a natural transition to a new building and a new expectation level.” The other fifth grade teacher desiring accelerated math begin at middle school commented:

I just don't think they're ready for some things that they're learning, but they've been put into accelerated, so they should know it. I'm like, ‘Are you understanding that? Are you just kind of doing patterns?’ I see a gap even with the accelerated kids. Maybe middle school is where we should start accelerated math. I think we're putting kids into groups too early.

The other fifth grade teachers commented that accelerated math should start at the fourth as it does currently.

A fourth grade teacher explained accelerated math should initially start at fourth grade and not at third grade when students have just transitioned to a new building. She explained, “I think it's good to probably have their third grade year to kind of understand what's expected of you as a student in the new school.” Another fourth grade teacher expressed similar thoughts and explained, “I don't think it would be wise to try to start accelerated math in third grade because they've got to get used to the upper elementary building.” The teacher further added, “I think it would be really challenging for those kids to suddenly have all these behavior expectations they haven't had before and a

harder curriculum. I think it would be too late to wait for fifth grade.” Another fourth grade teacher stated, “I think third grade because they’re getting past basic concepts, and you can start seeing when they’re going from the concrete to the abstract.”

Another fourth grade teacher shared her personal experience with teaching multilevel grades. She commented:

I honestly think there are some kids that would benefit having it in first and second grade, and maybe it's something where they could do a combined class. I taught combined first and second grade for 12 years, and so I saw the benefit of having those combined classes. It was great because if I had second graders that were behind, they could work with my first graders. If I had first graders that were ahead, they could work with my second graders in all subjects. So, I think that's a positive thing in a lot of ways.

A third grade teacher remarked, “In thinking about all of my all my years of teaching, there's always been an enrichment part of the program. I think every grade level should be given the opportunity to advance students who are ready.” A second grade teacher explained, “I have some kids in here that I think, they're ready to be challenged. I'm sure there are probably kids in first grade and probably kids in kindergarten that are probably ready for that.”

The accelerated math teachers all agreed that fourth grade is the best place to initially offer accelerated math. One of the accelerated math teachers commented, “I think maturity for one thing, not like fourth graders are super mature. I just don't think first, second, and third are ready. They're just building that background in math.” Another accelerated math teacher explained, “I think in third they're doing so

many important skills that need to be addressed to everyone that it might be difficult to do it before fourth grade.” Another accelerated teacher offered, “I don't know if organizationally our students would be ready in third grade. I think third grade is a good year for them to demonstrate leadership and also demonstrate ability to follow expectations.” This teacher also expressed concerns about third graders adjusting to a new building, a new routine, and new expectations. Therefore, she believed fourth grade is the most appropriate grade level for students to begin accelerated math.

Opponents of Accelerated Math

Some teachers expressed the opinion that while accelerated math is important for older students, it is not necessarily a good fit for elementary students. Teachers discussed that while children learn math at different paces, they also learn all other subjects at different paces and not all subjects offer an accelerated class. A fifth grade teacher commented, “If we're going to differentiate for math on an accelerated level, it's almost it feels like it downplays all the other subjects and core content areas.” The teacher further explained:

I think elementary school should be focused on building up the kids' knowledge, building up their background, building up their understanding of just building those social skills, those emotional skills to be able to then be able to be prepared for an accelerated course at the middle school or high school level because at that point they are cognitively, emotionally, and physically ready for those types of challenges. And at that point, they also get those AP courses in reading and different types of science levels, and they get those more differentiated courses because they are able to handle the stress of that. I think it's

counterintuitive sometimes to only offer accelerated math. So, I agree with having an accelerated program, I just don't necessarily agree with accelerated at the K (kindergarten) through five level.

Some teachers expressed concerns about accelerated math damaging students' self-confidence. A fifth grade teacher explained being in or not being in accelerated math might cause students to have a perception of themselves and explained, "It's like, 'Oh I'm in accelerated. I am awesome, and I got this.' Then, there's the perception, 'If you're in your gen ed (general education) class, then you're not as smart as me.'" The teacher further explained:

I think students feel lower about themselves when they're not given those opportunities. They're not given a chance to excel. In an ideal world, we would have small class sizes, and we would be able to truly individualize the curriculum. And then, we could challenge those kids, but it is sad when you see children that could be accelerated bound but because of circumstance it doesn't work.

A second grade teacher cautioned, "You don't want to create any confidence issues in students. I think that you have to be really careful how you handle pulling those students out and not necessarily call it accelerated math." Speaking about students who do not get into accelerated math another second grade teacher commented, "The drawback is that they form the early idea that they're not good at math." A fifth grade teacher shared, "I've had my students say before, 'Well, we're not the math kids,' meaning they are not as good at math as the accelerated kids. And that bothers me."

Some teachers expressed concern about the amount of stress that accelerated math class causes students. A fifth grade teacher explained, “It can be a lot of stress for some students whether they are in the program or whether they wish to be in and aren’t there.” Another fifth grade teacher commented, “I don't think they should be stressed about their homework. I think they're stressed.” Thinking about students in the accelerated math classes, a third grade teacher stated, “A disadvantage would be if I'm in here, and I can't make it, or if the pace is too much, or this is too stressful.”

An accelerated math teacher, while not opposed to accelerated math, shared some concerns she has about effects it causes. She explained:

I feel like higher level students aren't always exposed to students that don't understand, or they don't know how to communicate to someone that doesn't get something, so then they start to get frustrated. And the lower level students not having exposure to some higher-level thinking. I think my students that aren't in accelerated math that still may be on grade level or just below grade level, I feel like they're losing their stamina just by not having that exposure to working with the higher students, or feeling like they're not a part of accelerated and working with students at our higher level, or feeling they're excluded.

Thinking about her students that leave her classroom to go to a grade level math class, this teacher also explained, “Some of my kids this year just don't have the same relationship with their math teacher so they're not willing to try as hard.” The teacher expressed concern that her students are not giving the same best effort that they would demonstrate for her.

If Accelerated Math Was Not Offered

Fourth and fifth grade teachers expressed that their math instruction and the structure of their math classes would change a lot if accelerated math was not offered. Several teachers were visibly worried at the thought of not having accelerated math classes for their grade level and others looked positively at the benefits that would result from having those high ability math students in the mix with their grade level math classes. Seeing both the positives and the negatives of not having an accelerated math class, a fifth grade teacher commented:

I don't think it would be a negative for my class. It would be a negative for those two or three children from my class who no longer would be in accelerated math, but I don't think it would be a negative to the class.

Another fifth grade teacher thoughtfully stated, "Well, we would just have more of a range, and maybe some of those kids that were skimmed off the top, maybe things would switch around because you're switching up the pond." Another fifth grade teacher seeing only positives if there were no longer accelerated math classes shared:

I think it would be beneficial because you'd have more kids that are on that understanding to slightly challenged level, versus right now, I literally have one, maybe two borderline kids that fit in that mold out of my entire class. Then I might have four to five students on that level and fewer of the super low. So, instead of having like three or four children that are way below, I might only have two that are really below, and I might be able to work with them easier. And my kids that get it can work together with the kids that are on the border.

Teachers who were able to see the positive outcomes of not having an accelerated class were definitely in the minority.

Most teachers were horrified at the thought of not having accelerated math classes. One teacher immediately thought of college bound students and the future for society as a whole. This fifth grade teacher shared:

I think we would have a lot of our college bound students not challenged the way they need to be. I think that that would cycle over into society where you would see kids that were going to go into engineering and some really demanding mathematics fields that they wouldn't have the preparation. That would be another way to say, 'Oh, the Americans are not doing what the Chinese or the Japanese do.' We wouldn't be putting students in the place that they're capable of being in.

While this teacher thought of students' future prospects and about the impact on society, several teachers contemplated the impact the loss of accelerated math classes would have for them.

Several teachers expressed concern about not having enough time with the current arrangement to meet the needs of all of the students in their grade level math classes, and the thought of putting the highest level math students back into their math classes worried them. A fourth grade teacher shared:

It would be more work for me. I know that sounds selfish, but so then you've got even more ability levels in the classroom. So then, I would need to find more differentiated instruction that's at a higher level. I think those are the instances when kids are bored and then they become behavior issues, and you know, it sucks and I hate that. Even in first and second grade, I would have

enrichment activities, and you'd still have bored kids because they just finished so fast. And back to the time issue, there's just never enough time.

An accelerated math teacher voiced similar concerns. She commented:

It would mean more work for me to do. There would be more of a range. There might be have to be more smaller groups. You might not be able to get through a lesson in each day. It might take more than one day to work with each group, so some groups may not be served during the time that you have because of the time constraint. I think it's hard for a teacher if you have that much range in your class. It's hard to give attention to every single group.

A different accelerated math teacher also suggested she would have to utilize more small groups. She shared:

I would do a lot more small groups. In accelerated math, I do have to stick with a good chunk of time being whole group, and then my small group time tends to be when they're practicing a skill after I've taught it. I think if I was back to just grade level math, I would have to go back to teaching new skills in a little bit of a smaller group setting. I don't think they could handle as much of what I do now. Not because it wouldn't be appropriate for quite a few of them, but I think I would have to teach to the mid-range kids and catch a lot more of lower level or just below on grade level students in the small group time.

This accelerated teacher commented she would have to teach to the mid-range kids if she taught grade level math which, according to most of the teachers who are currently teaching the grade level math classes, they are doing now.

Almost all of the fourth and fifth grade teachers worried about the lack of time available due to the amount of time it takes to differentiate instruction for all students in math. A fourth grade teacher shared:

I'd be trying to split my attention between enriching the advanced ones and working with the low ones, and then seeing which ones in the mid-range I can push and which ones need help. So, I think it would divide my attention a little bit more, and I would not have enough time. I don't have enough time now as it is.

Another fourth grade teacher commented:

I think it would be a disservice to my lower kids. I think my attention would be more inclined to go to the kids that are with me, on the highest level of thinking. They say like those kids that don't need a teacher. That's not why we're here. We're here for the kids that need a teacher. But, if those higher kids are processing what's going on, it's going to incline you to enrich your lessons more and get excited about the kids who are with you. I think I would have less time and attention to give to the kids with a real need as far as small group instruction.

A different fourth grade teacher worried that adding the accelerated students back into her math class could potentially be harmful to her lowest level students. She shared, "I'm seeing the level of thinking in my class, and I can't imagine taking my low level students and putting them in the same classroom to learn. I feel like that would definitely harm them." A majority of the grade level teachers indicated that most of their time in math is spent instructing the lowest level math students.

A fourth grade teacher expressed concern about the lowest level math students being prepared for middle school. She admitted that she spends the majority of her time intentionally working with her lowest math students. She confided:

I feel like I probably spend too much time on the really low kids to be pushing the high kids. What it boils down to is I know the ones that are getting it and excelling. I know the ones that are low in fourth grade. I know the ones that leave third grade already behind. Every year that they're behind, it gets worse and worse. I want to give them a fighting chance once they get over to middle school. If you can do something now, it's the best time to intervene.

A fifth grade teacher also commented that she spends most of her time working with her lowest level math students. Thinking about meeting the needs of both the lowest and the highest performing students, she stated, "I feel like I would have to teach two different lessons to two different groups basically every day."

Some teachers expressed concern about their ability to meet the needs of the highest level students. She shared, "I will admit that I'm not a good teacher at hitting those higher kids' needs. I lean more towards the low kids or the average kids, and that's something that I've struggled with my whole career." A fifth grade teacher also confided that she does not believe she can adequately meet the needs of the highest level math students. She commented, "I need help differentiating. I don't have anyone who is going to help me do that." Another fifth grade teacher expressed the need for help with differentiating. She shared:

This year my range is more middle-of-the-road, but I have had the lowest [students] on the Star scores and the highest [students] on Star scores. So, I've

asked for help on how to differentiate instruction, and I've never really gotten a clear feel for it. So, I really had to muddle through it myself.

A majority of teachers expressed the need for professional development on how to modify Math in Focus to meet the vast range of ability levels in their classrooms.

More than a few teachers indicated they already have difficulty differentiating for the highest level math students in their math classes, and they usually just have those students take out a book and read when they finish their assignments. A fourth grade teacher commented, "They're sitting in my class during math reading all the time whenever they're finished with their work." A fifth grade teacher shared, "They do a little bit of extra practice, and then they can read a book." An accelerated math teacher worried about the accelerated students' needs being met if there were not accelerated math classes. She expressed, "I think those are often the students that would just get out a book when they're finished or do more practice problems instead of finding a way to challenge them."

Teachers commented that the lack of time and resources to differentiate causes them stress. A fourth grade teacher shared:

I think it would be definitely more difficult for me to challenge those students that are higher. I think that's really the hardest part. It would probably be a little bit more stressful for me to find things for them to do that weren't just like a waste of time for them but actually had some learning value to them. I know our book has our has like an extra practice piece and stuff like that. I think that's where I would have to start, but, if they already have that skill, then it would be kind of difficult for me to find stuff for them to do.

Teachers listed a number of negative effects that would potentially arise from the elimination of accelerated math classes.

Professional Learning Community

Culture of collaboration. For the most part, teachers indicated positive outcomes from being members of a professional learning community. Several teachers commented that they are able to gain ideas to improve math instruction from their team members during collaboration meetings. Most teachers indicated that they would like more time during collaborative meetings to discuss strategies for teaching math. Some teachers indicated that they do not get much time for grade level collaboration. Other teachers expressed that while they have collaboration time with their team, math is not always on the meeting agenda. Overall, teachers are happy to have a team to collaborate with regarding their responsibilities as teachers.

A fifth grade teacher's comments summarized the feelings most teachers expressed about their professional learning community. The teacher explained:

We share a lot of our ideas. We share a lot of our resources. We have a very positive collaborative team in fifth grade. We all bring our own strengths. So, if your strength isn't math, there's someone there who can who can pull you out, or save you, or teach you how to teach it, or show you where the passion lies in something.

A fourth grade teacher's comments also highlighted what a lot of teachers expressed. The teacher commented, "I can take ideas from our collaborative meetings if I'm having trouble with teaching a concept. I can get different ways to teach it and different ways to present it."

A first year teacher explained her experience of being a member of a professional learning community. She communicated:

Oh, my goodness, they've helped so much! Just being able to bounce ideas off of other teachers. Especially being fifth grade, like my team, they have probably 60 years plus combined of teaching, and I have half a year. I'm just like half a teacher. Still I think that I can bounce ideas off of them, and they can get new ideas for me. I'm still learning how to deliver my math instruction and figure out the different ways to solve math problems. I know that I can just walk up to one of my fifth grade teachers, and they have like, 'Well, this is what I'm doing here. Here's an example. You can come watch me teach.' And I think they are really open, like 'Hey, you can observe me and see if what I do helps you. If not, maybe you can like tweak it a little bit.'

While the previous comment was from a first year teacher, a veteran accelerated math teacher commented, "I would say I have probably gotten more out of collaboration this year than I ever had in all my teaching." The teacher explained that this year her team has a dedicated amount of time for discussing math instruction. She shared:

We've actually had some time to do some real collaboration on strategies for everything from fractions to decimals to the struggles we're all having. We share strategies so that really has given all of us, as a team, multiple ideas. I think we've really benefited and used those in the classroom. We've been allowed to schedule most of our agenda for our collaboration time on our own as teachers. We've just chosen to allot about an hour for each collaboration. It just depends, but

typically 45 minutes to an hour on sharing strategies, and it's really wonderful.

But it's not every time. Sometimes we'll have full trainings but not very often.

Both new and veteran teachers were able to explain how being a member of a professional learning community has benefited their teaching.

Several teachers explained that their conversations from their professional learning community (PLC) meetings carry over into their personal time outside of work. Teachers expressed that there is not enough time during the meeting to discuss everything they would like to collaborate about. A fifth grade teacher commented, "If we have a problem with something, we talk to each other about it. 'Oh, well, you could try this.' So, there's a lot of informal conversation that's not at a meeting. It's just outside of our PLC collaboration." An accelerated math teacher talked about her grade level team and the conversations they are having. She explained:

I think as grade level teams, we're holding each other more accountable because we're also willing to say this really isn't going well with fractions right now. 'Can we talk about it together, or can you offer me some assistance?' Or, 'What do I need to change to improve?' I think the accountability and openness with each other has increased all of us being on the same track. I definitely think we have to have these discussions beyond our regular grade level collaboration which is sometimes difficult because in my grade level, we don't have any overlapping lunch time altogether and our specials times and our recess times are different.

This same accelerated math teacher also shared that because of her professional learning community and their collaboration, she does not feel like she is on a lonely island. Two

of the accelerated math teachers commented that they would like to have some time to collaborate with the other accelerated math teachers. They expressed that they are not currently provided that time during the district's professional learning community meetings, and they believe it would be beneficial to their math instruction.

Room for improvement. While teachers were positive about being members of a professional learning community, many expressed that they had concerns regarding their collaboration time. For some of the teachers, the concern was a lack of time with their grade level team members to collaborate, while other teachers indicated their teams could make better use of their collaborative time together. A few teachers also commented that more time needs to be allocated for discussing math during collaboration. The teachers further stated that reading usually take precedence over any other subject. A fifth grade teacher explained, "When we are given a chance to work collaboratively during our collaboration time, it's usually with very specific agenda that is created based on what our administrator wants, and it's been focusing all on reading, not math focused." Realizing the time is dedicated during PLC to discuss math, a second grade teacher shared, "We always fit in a time to specifically talk about math. Share how it's going, share methods, share resources, and just an idea sharing time. It helps drive a lot of our instruction."

Multiple teachers expressed that their administrators are too focused on the pacing of math rather than allowing teachers to discuss teaching strategies. A fourth grade teacher explained:

I think most of the time in our PLC community we really focus on our pacing and how we're doing there, and I wish we could focus a little bit more on the actual

lesson piece of what we're teaching the students instead of how are we going to get through this the quickest way.

A third grade teacher expressed:

I feel like I'm told what chapter I have to be on. I feel like the pacing guide is told to me. I feel like we sit down and at collaboration and say, 'What chapter are you on?' Or, 'What page are you on?' I don't feel like I've gotten the autonomy to be where my kids need to be. It's supposed to be a professional learning community. My professionalism isn't respected. I'm dictated and told what page I need to be on. If you're just going to give me the pacing guide, and tell me I need to be on chapter eight in January, I guess that's what I'll do whether my kids are there or not. But is that right? No. I don't agree totally with what we're doing.

The teachers who felt too much emphasis is being placed on pacing expressed the desire to share teaching strategies instead of the current focus on pacing.

A couple of second grade teachers indicated they are not getting enough time to collaborate with their grade level teams during their weekly professional learning community meetings. One teacher commented, "Unfortunately, I feel like our collaboration time with our grade level this year has not been as frequent as it has in the past." The teacher further explained:

When we can look at assessments like our benchmark, really looking at those questions, and talk about, okay, everybody else's class missed 10, but your class missed three. That's beneficial. What do you do to teach that? You know, just looking at teaching strategies, or how do you do math in your room? Do you do math groups? How do you teach math? Just, you know, what does

instruction look like in your classroom? We can be our best PD [professional development] with each other. We all are doing such great things, and I think just taking the time to talk about it and see or even observe what we are each doing. Another second grade teacher also noticed the reduced time for collaboration with her grade level team. She commented, “I feel like this year in particular we haven't had a lot of grade level time for collaboration.”

The second grade teacher explained that while her team does not have much time for collaboration during meetings, they still find time to share ideas and overall, it helps them to be better teachers. However, she shared:

But I still feel like there's work to be done on that. I feel like we all kind of have our own opinions and ways, speaking for myself too. And we're kind of stuck in those opinions, in those ways. I don't know if this is an issue for everybody, but for me, like at one point in time, we talked about like different people teaching different groups for math. And I thought, I don't want to give up my kids and have somebody else teach them that. But what the issue is, I really don't trust somebody else to teach them math. I think that's probably a common feeling, although, you know, we don't really verbalize that. It's not that we're saying they're bad teachers. I think there's work to be done.

Response to Intervention

A component of the professional learning community is Response to Intervention (RtI). Warrensburg R-VI School District utilizes RtI to meet students' individual needs and increase student learning. A majority of the teachers indicated that instructional time

during the school day is set aside for RtI time. Each of the schools in the district are utilizing the RtI time in different ways to meet the needs of their students.

An accelerated teacher described how Response to Intervention is utilized in her building. She explained:

We have 30 minutes twice a week in the morning when we have math PALS, Peer Assisted Learning Strategies, and that is grouped on ability based on the Star scores that we have received most recently. We'll usually change those groupings three times a year. The accelerated kids also participate in that, and typically, based on their Star scores, they will end up in an enrichment PALS group. Right now, there's two enrichment PALS teachers for math.

Commenting on this RtI, a fifth grade teacher stated, "It works for the really high kids. For the rest of the kids, I'm not impressed with the program." The teacher explained that for RtI, the majority of the students are completing basic math operation problems. She shared, "They're doing drills, and for me, it's about passion. And it's hard to be passionate about drills."

A third grade teacher explained how her grade level manages RtI. She explained that all of the students start by completing a folder filled with addition problems for PALS. When students pass addition, they go on to subtraction. After subtraction, they solve subtraction with zeros. Eventually, students progress to multiplication, division, and fractions. The teacher explained:

Each kid has a partner and so if we were partners, we would either both be on subtraction or both be on multiplication. Basically, at the beginning, everybody's starting where they are, and then as the year goes by, they differ

based on if they're passing those folders or if they're not. The only different group besides math PALS that third grade has is we've pulled a basic facts group. That teacher takes a group of about 8 to 10 kids, and she just works on basic facts of two plus eight is 10 and that kind of stuff so that they're getting more fluent with their facts.

Another third grade teacher commented on this format for Response to Intervention and expressed, "What I don't like about it is we have kids that have been on the subtraction one folder since October, and they're still doing the same folder every day." The teachers explained that PALS, Peer Assisted Learning Strategies, takes place twice a week with 30 minutes for each session.

Discussing a different approach being utilized for Response to Intervention, one administrator shared:

Teachers utilize data. They are very transparent teams looking at data because they have a trust built. They look at each other's data up on the screen. They're looking at, 'Okay, these kids struggle. They haven't improved after instruction.' Or they notice they still have a group of students or population that did not master whatever standard they had assessed. So, then our teachers are looking at those students and dividing them up, and saying, 'Okay, I will take these students.' And they talk about what those interventions are going to look like and how and much time they are going to give an intervention.

Describing this same process, a fifth grade teacher explained:

We pretest and then we break into intervention groups. And then after that intervention, will take another summative to just kind of see after that cycle where

we're at. It tends to be the same students in every intervention group. And during this time, our higher students usually read or do an independent task on their own. Teachers commented that while the math standard changes for each RTI session, they usually are serving the same students each time.

A fifth grade teacher shared that she believes not enough students are getting their needs met during this process. She explained:

The small groups are usually no greater than three students, so then even the low students are not really getting the help that they need. We are taking the lowest of the low, so only a very small percentage actually benefit. So, say, I had three in my goal group but I have ten or possibly twelve in my class that struggle with that concept, that's just one-fourth of the kids that had that need. And then we're told by administration, well, those are Tier one. And so, we just keep on trying, but it's a big group of kids rather than just that tiny little group of kids who actually need extra support.

Another fifth grade teacher expressed a concern. She shared:

We're not talking about the skills, the techniques, the strategies, the examples to teach those kids during RTI time. We just identify a skill that is lacking, and say, here's three kids. Now reteach it. We're not talking about how to better our teaching. It seems idiotic, but if I didn't teach it well to my 22 students, then how in the world am I supposed to teach it to my three new students just because they come from a different teacher. I don't know. I think we need to spend time on the strategies and the skills of us teaching it and look at resources to help us better identify ways to teach it for those kids that are lacking.

Discussing RtI, another fifth grade teacher stated, “It just helps students that don't get enough practice or just maybe need a different teacher in order for it to click.”

A fourth grade teacher described what RtI looks like for her grade level. She shared:

Usually we do a quick check on a certain concept to see where the students are, and we enter the data into an Excel spreadsheet. Then, using a proficiency scale, we put them into groups. Those who scored zero or one are our top concerns, and so we put those kids in groups first. We just take a concept that we saw most of the kids struggled with for whatever chapter we were just on.

Speaking about her students, an accelerated math teacher commented, “We still use pre-assessments or some form of common assessment to go back and look at what students are still lacking or need additional focused instruction to work on during that intervention time with them.”

A third grade teacher described what her grade level does for RtI. She explained: We use our goal time to divide into smaller groups. We might spend four weeks during our goal time where I will have a small group of maybe four kids, and we may have to start rock bottom. At rock bottom, we don't understand at all what is taking place, so then we would get manipulatives out and do some hands-on things to help them understand. Maybe they're not getting it from me. ‘Maybe if you go see another teacher, they can give it to you in a different way for you to understand it.’ And it's funny because I've had some kids come back and they'll say, ‘Oh, did you know?’ And then they show me how they worked it out, and I laugh because it's something that I've already shown them. You have to laugh at

that because at some point in time you were that Charlie Brown teacher and all they heard was wah, wah, wah, and they go to somebody else, and they get it. It just is funny.

While teachers expressed some benefits of utilizing RtI in this manner, they also noted their concerns.

When asked about RtI, a second grade teacher commented, “We shared students last year, but we don’t have student sharing anymore.” Another second grade teacher explained:

We used to have what's called PALS, and we would look at their Star data. There were six of us [teachers], and so each one of us, two times a week would have different classes. So, one group might be working on fractions. We differentiated that way, but really in my opinion, that's not really RTI with respect to math data in our grade level. Now for math, it's like everybody's going to get the title teacher for 20 minutes and really that's it. There are certainly kids I feel like need more help than what they're getting.

A different second grade teacher also explained PALS was utilized during the previous school year. She explained:

We used our data mostly to guide that. I felt like our high kids were really getting enrichment. We had 11 groups where our kids were going because we pulled in all of our special teachers, all of our Title teachers, and we had the grade level teachers. That was really great because your groups were very small, and you could really focus in on those needs.

The same second grade teacher commented on what her grade level is doing now for RTI which involves sharing the Title Math teacher. She explained:

I think for what we are doing now, the thought process originally was that we could create our own groups and then the Title math teacher could rotate between those groups. We do our groups, but we still are not able to have eleven groups. I feel like I can't teach 11 different concepts like we were before.

The teacher further explained that the second grade classrooms are spread out across the span of the building. Ideally, she would like the classrooms to be grouped closer together so the grade level teachers can work together for RTI. She shared:

I felt like we were really doing a lot more RTI, and I feel like the trend is to move to RTI. The school I came from, I went to so much training on RTI. And then I come here, and we're getting rid of it. Honestly, the only benefit not having it is I feel like we haven't so many things to do. You can't fit everything in a day. So, it's like, 'Okay, well, that's great. That's 25 more minutes I have my kids in my classroom.'

The Ideal Way to Teach Math

Teachers agreed the ideal way to teach math would be both engaging, so students are interested in learning math, and hands-on, to allowing students time for their own exploration. After imagining if she could have anything she wanted for her ideal math instruction, a fourth grade teacher commented, "I think really the ideal way to teach math is having unlimited amount of time all day, every day, forever, and no pacing guide." Another fourth grade teacher expressed similarly, "I think maybe an ideal way would be to maybe not necessarily split it up by lesson but split up by standards. Move students

along by their needs and at their pace.” And a second grade teacher shared, “I think the ideal way to teach math would be where kids could have more time to explore and kind of come up with their own strategies and things like that and really building up number sense.” Overall, at every grade level, teachers expressed the need for students to have more time to explore with manipulatives in order to better develop understanding of mathematical concepts and to aid in the transition from problem solving at the concrete level to problem solving at the abstract level.

Several teachers expressed the desire to make the learning of math fun and engaging. Several teachers expressed comments about the way Math in Focus has changed the dynamic in their classrooms from student centered, where students were active playing games and rotating through stations, to now. Teachers shared that they think math is currently too teacher centered and students are having to sit and listen without enough interaction with their peers. Teachers explained that the math workshop model allows time for instruction as well as time for students to have individualized exploration. Teachers at each grade level commented they preferred the math workshop approach where the students rotate through different stations for hands-on, small group practice of math concepts after the whole class instruction is completed. A third grade teacher explained:

I really like doing like the math workshop approach where I have my kids doing an independent thing or playing a game. They're getting some personal instruction. They're doing some independent work. I like rotating them through and doing that kind of thing where they're getting a little bit of everything. And then I know for sure that I'm touching base with everybody. I've missed that.

Since we've moved to the new book, I have not been able to incorporate that workshop approach as much because I feel like I'm too busy trying to learn the new book.

Other teachers explained that they do not utilize math workshop as much as they had in previous years due to student behavior and the inability to manage multiple stations while working with students at a single station.

In her description of the ideal way to teach math, a fifth grade teacher expressed the need for greater consistency between teachers across all grade levels in the vocabulary and the strategies being taught for math. She shared:

The ideal way would be if these were my math students for several years, and then we would do things a lot differently than when you gather a class together that came from five or six different teachers. They've all kind of gotten little ingrained things that they've already learned, and they don't want to try to see why something works, really is true, because they already know the algorithm. And so, it's very difficult. But I think conceptual understanding is so important that I would probably strictly do that if I could have students for multiple years. I say the same teacher because I know no matter what we do, it's not going to be the same. We try to use the same language, and then there's a teacher who decides, but 'I made a decision that I know something better', and 'I want to put it in the curriculum.' Then they've made a decision that they know something better, and from my perspective, it really wasn't better.

While many teachers noted the benefits of using a common math curriculum, with one of the benefits being increased consistency amongst teachers, multiple teachers also noted

that, ideally, teachers would be given more autonomy to make instructional decisions that would benefit students. Several teachers explained the implementation of a common curriculum, Math in Focus, is increasing the consistency of instruction not only at their own grade level, but also vertically through all grade levels.

Recommendations for Improvements

Teachers' primary recommendations for improvements to the elementary math program include adding Title Math to the upper elementary schools, providing more ability grouping for math instruction at the fourth and fifth grade level in addition to accelerated math, ensuring emphasis is placed on students building strong math foundations, equipping all teachers with the resources necessary to utilize the components of the Math in Focus curriculum, and giving teachers more time to collaborate about math instruction.

Title Math. Almost all third through fifth grade teachers expressed the need for Title Math for students in their grade levels. An accelerated math teacher explained:

I think every school needs to have Title Math. I don't understand just having it at the first and second grade level. They think if we can catch them this young, they'll be fine. But we've got kids that are coming from all over the place. We have what you would call a revolving door district. We get kids even that go between Martin Warren and Sterling, and there are differences even though we use the same resource.

A third grade teacher pointed out, "We need title math and it needs to be during my math time. I really would like for my students to have more help because I can't make it around everybody." A fourth grade teacher shared:

We need different ways for the students that are more concrete learners, for the students that are falling behind, to learn math. We need to have an extra math program to bring in the lowest students and work in those small groups so that you can focus in on the struggling students. You know when they start struggling, they're never going to get caught up because we're already at a crisis point if they're struggling in fourth grade. I know we have the accelerated math for the high ones. Maybe we need to look into what we can do for the lower ones.

Multiple upper elementary teachers suggested that if Title Math is not an option for the upper elementary grades, then perhaps a lower level math class should be implemented.

The case for more leveling. A majority of the third grade, fourth grade, fifth grade, and accelerated math teachers expressed the desire to have more ability groups for math instruction. Fourth and fifth grade teachers explained that just pulling the top 20 to 25 students from the fourth and fifth grade for accelerated math is still leaving behind a broad range of ability levels to teach to in the grade level math classes. Several teachers across all grade levels pointed out that a number of students are lacking a strong foundation in the understanding of basic math concepts including number sense.

A fifth grade teacher commented, “I get the perception the quality of students’ understanding is dropping year after year. I question whether or not that's because we're not spending enough time in our primary and our intermediate grade levels focusing on those foundational skills.” A different fifth grade teacher shared:

I think we need a remediation level for our kids that are lacking what is vital, basic math operations and number sense. You can't go on to those higher

level concepts and questions if you don't understand basic addition, subtraction, multiplication, and division. And you know those are life skills.

A third grade teacher commented, “We definitely need more help pulling the lower level stuff. So many students come to third grade lacking basic math skills.” Teachers explained that the students’ lack of strong mathematical foundations is contributing to their overall lack of achievement and ability to be successful.

An accelerated math teacher shared her thoughts on why the district should utilize more ability grouping other than accelerated math for math instruction. She explained:

I really do think we need more leveling. I don't like to call it tracking, but I know that's what the naysayers like to call it. I really think leveling, appropriate skill-based grouping, would be more beneficial to students of all levels instead of just having accelerated and regular math now. For the enrichment grouping, it's so that those kids can be challenged to their fullest potential without slowing down for the remedial levels or the lower end. It's so that teachers can actually focus on the types of strategies they use with students who actually need more hands-on or maybe at a slower pace but still trying to get them on grade level where we all want them to be. Time would be saved exponentially if we had multiple levels because teachers could actually use the time on the level that they have in their classroom and not have to teach a span of three to four different grade levels like they are now. I really think we would benefit from having multiple levels, not just low, medium, high, but maybe even more than that based on assessment data or even Star data.

A different accelerated math teacher commented, “I almost wish there could be a class for our really low ones that really just need that one-on-one or a smaller a consistent smaller group or a title math program might even help that situation.”

Fourth and fifth grade teachers suggested that more students be allowed into the accelerated math classes or the development of other advanced classes to meet the needs of the students that are not in those accelerated math classes. A fifth grade teacher shared:

Let’s think about if you had an accelerated program that didn't just take the 25 top kids and then find out that you don't really have the 25 top kids. Suppose you had an accelerated class formed by the information that's gained from the testing, and then you had a class that didn't quite make it. They could be considered advanced, and then the accelerated class could really, truly take only the accelerated kids. I know that I've heard accelerated teachers say this class really isn't all that accelerated. A lot of times we see that in the data that we gather, the grade level data. There are a lot of medium level kids who just need great instruction, solid fifth grade instruction. You wouldn’t have to worry about not challenging kids, and you could give the students who are ready, solid fifth grade instruction.

Other teachers expressed similar ideas regarding what to do with the higher ability math students and explained their reasoning.

A fourth grade teacher shared:

I've thought about this for years, and the thought that I've had a few times is maybe we need to have one accelerated class and then a second accelerated but not quite to the same extent accelerated. I think if you took out the next batch of high kids, then you could pretty much teach them Math in Focus according to

their grade level. Then everybody else would naturally be in a situation where they were able to slow it down to their level because that's a little less than half that are getting quote-unquote accelerated.

A fifth grade teacher similarly commented, "I do think that maybe we need not just an accelerated class, but maybe also an advanced class." A different fifth grade math teacher explained:

Accelerated math does help those top students get what they need, but I still think there's a top that need more. They're in every class, I guarantee you. Ask every fifth grade teacher, and they are saying the same thing. I have a feeling that they've got those top students, and they need something for those high kids that are in the grade level math classes and haven't for some reason reached that accelerated level. I have one who's ready to do junior high algebra, and then one that you're saying, 'Eight times eight,' and they're staring at you like you're crazy. You can't. We're not miracle people.

Overall, fourth and fifth grade teachers explained that they have higher level students whose needs are not being met in the grade level math classes.

One accelerated math teacher suggested that the district could increase the size of the accelerated math classes and have two teachers instruct the larger class. She explained:

I think you definitely wouldn't want more than 25 students with one teacher, but it'd be really nice if you could have a little bit larger than what would be one regular class but have two teachers in the class. It would allow more students to have the accelerated experience but also give them more opportunity to work in

small groups and things like that as well. I think anytime you have students working with more than one way of saying things, more than one example, I think it's really helpful and beneficial to them as well. With having two teachers, there would have to be the knowledge and understanding that they could break down and be in separate learning spaces, but I wouldn't have them teach separately from one another because I think it could easily turn into, 'This is the higher of the two accelerated classes.'

While teachers offered suggestions on how to improve the elementary math program, they were also realistic about the overall lack of resources available from within the district to make these ideas to come to fruition.

Provision for necessary resources. Multiple teachers expressed the need for additional resources to improve student achievement in their own classrooms. Several teachers mentioned that they do not have Smartboards which are needed to utilize the virtual manipulatives and lessons available through Think Central, Math in Focus' online resource. Several of the demonstration lessons teachers would like to utilize for instruction were specifically created for use with a Smartboard. A fourth grade teacher shared:

What's frustrating is that I can't use the online resources with Think Central. They have a lot of stuff, but we lack technology in our classrooms. I do not like the Mimio boards, and that is what I have. I don't believe the Promethean Board would work because all of the interactive lessons are Smartboard based. I would love to have a Smartboard and be able to use all that stuff.

Other teachers expressed the need for more games and more entertaining math activities to supplement Math in Focus. When asked what improvements could be made to the elementary math program, a fifth grade teacher commented, “I would say make it more fun. I know math is probably the least favorite subject. Make it more fun and maybe more real-life, what fifth graders would experience.” A fourth grade teacher shared, “I think we need to have more games and engaging activities.”

More math collaboration. Several teachers recommended that an improvement to the elementary math program would be to allow teachers more time to collaborate about math. A fifth grade teacher’s comments captured the sentiments of many of the other teachers regarding the need for more collaboration time specifically designated for math. She commented:

I wish as a staff we had more actual, not class time, but work time to collaborate, whether that is during our collaboration time or not. It's frustrating that we have to constantly use our personal time outside of the classroom or our lunch time which is hard to collaborate on strategies that are working or ways to teach math. Math is so crucial. I don't feel like it's given enough collaboration time.

Many teachers are feeling alone in the challenge of learning the new math curriculum, Math in Focus, and multiple teachers confided that they do not understand how to teach many of the lessons.

Professional Development Desired

When asked what professional development would be needed to increase student math achievement, teachers almost unanimously responded that they would like to learn

more about differentiating instruction, working with small groups, and teaching students who lack basic foundational math skills. A second grade teacher commented:

I always think it's good if teachers can go to a conference, or if we can bring someone in. And we can always do our own research. It's important to get new ideas and take in fresh ways to do something. It's always good to stay current.

A fifth grade teacher thought it would be great if teachers could attend any of the conferences sponsored by the National Council of Teachers of Mathematics.

A fourth grade teacher explained her experience with a Greg Tang conference and the desire to attend another one of his conferences. She explained:

I went to Greg Tang math a couple summers ago, and it was really a special experience for me. I'd love to go back. I wouldn't say it's a need, but it's a want as far as getting my math teaching excitement level up. I left it feeling excited last time. Not that I don't feel excited, but our curriculum is really in line with a lot of his thinking. I went to it before we used this curriculum. Now that I am using this curriculum, I think it would be valuable to go back and hear some of these worldwide math people and get excited again.

Several teachers commented that while Warrensburg R-VI School District offers professional development sessions within the district itself, it is exciting and motivating to attend a large conference and have discussions with teachers from outside the district.

Reflecting on her teaching experience and what could improve students' math achievement, an accelerated math teacher shared, "Thinking of all the years I have taught, I could probably do with a little more on how to help the lowest students." A fifth grade teacher reflected and shared:

I think for me personally, it's helping those kids who don't get it and analyzing why they don't get it. I need more help understanding why they don't get it. I have a hard time sometimes understanding why they don't understand it. I don't even know if that professional development even exists. I don't think our methodology courses in teaching classes ever talked about that. We talked about different strategies, but we didn't talk about how to analyze students' errors. I think that should be something that is a higher priority in our teacher methodology classes because that's really at the heart of learning. That's essentially the learning piece. What are you going to do to teach those students that don't get it?

A first year teacher struggled with identifying what might help her the most as far as professional development as she noted that she still has a lot to learn. She eventually responded:

I would really like to see, and I think this is just being the new teacher in me. I want to see a first-year teacher, a second year teacher, maybe a fifth year teacher, and then a teacher that has had 20 years under their belt because I want to see the difference in progression. It's only my first semester. I really am not failing. I just want to see how it progresses. A goal I have, I guess, is to see that eventually it'll get better, and it'll be smoother, and I'll know the different techniques and the different tricks.

The teacher smiled and rolled her eyes upward when she said, "I really am not failing."

After some thought, an accelerated math teacher shared her need for professional development. She explained, "I would say above all, professional development on grouping, successful grouping. How to do small group instruction. How to

differentiate lessons for ability and skill. That's what I would say. That more than anything.” A different accelerated math teacher shared:

I'd like to see more professional development that is focused on the manipulatives that are in our kits that we have right now. Unfortunately, a lot of times, people come in and they say and do the same things over and over again. Like, I've seen this, and I've heard it already. I know this. So, more focused on the fifth grade manipulatives. This is how you would use it with this chapter. This is how you'd use it with this lesson. I don't know about the other fifth grade teachers, but as an accelerated math teacher, when they come in and show me a first-grade lesson, that helps me understand where my kids are coming from, or where they should have come from, it doesn't help me know how to use the many manipulatives in my kit with the concepts that I'm supposed to be teaching.

Multiple second through fifth grade teachers expressed the desire to receive professional development on creating strong mathematical foundations for students to build upon. A second grade teacher explained:

We need more training on developing number sense and fact fluency. And, one other thing, I feel like we need better assessments that really give us information and tell us what the kids need. I think we need to do a better job of addressing what they need. I would say that my grade level would benefit from some training on creating short common formative assessments, or we need to find out what's out there that is available already.

While most teachers were able to identify professional development that they believed would positively impact students' math achievement, there were a couple of teachers who did not believe they needed any professional development for math instruction.

RQ2: What are the administrators' perceptions of the elementary math program?

Adoption of a New Math Curriculum

No outside math resources allowed. Several of the teachers interviewed conveyed that they were directed to use only the Math in Focus materials for math instruction and not to pull from or utilize any other resources. An administrator shared, "I feel like with the new curriculum we haven't been able to be as flexible and not that it's like a heavy mandate. I believe we needed to get used to the new curriculum." The administrator also commented, "I feel like we're a little more flexible, and I'm sure that'll just continue as we get a feel for it." While this administrator's comments implied some flexibility with the resources used for math, a number of teachers' comments in the interviews suggested they did not believe they were able to utilize any other resources beyond Math in Focus. One of the administrators commented, "I would be interested to know truly how many teachers are honestly using the curriculum with fidelity. I know they are here, only because it's the expectation, but I wonder if it's the same expectation at every building."

New series is a learning curve. The new math series has proven to be quite a learning curve for teachers, students, and parents. One administrator expressed:

I giggle because I've had more questions this year from parents. 'I just don't understand the way they do this new math. I don't understand what it means to do this or do this. I just learned to add, subtract, multiply, and divide. Why

don't you just teach those skills?' Here's my response to parents. I learned the exact same way you did, and sometimes I get so confused from students who are teaching me a concept that they're learning. But here's what I need you to know. The jobs that your children will have may not have even been invented yet, so we are not trying to teach rote memorization. We're trying to teach kids to be thinkers, and in order for us to do that, they're going to have to learn some of these new concepts. Are they going to get the same answer that you do? Yes, they probably are, but they're going to get it their way because they're thinking about parts of a whole. And when you were in school, you just needed that answer, and you didn't have to show work. You just put down the answer, and you had to roll on. But we need kids to be thinkers because we need them to be able to do any job that they're going to be faced with. And in order for them to do that, we've got to teach them thinking skills. So, I have that conversation frequently with parents. One administrator talked about the increase in conceptual learning compared to procedural learning. She explained:

We've actually talked a lot about this the last few years because when Common Core came out, they're those standards that really require much more of a conceptual learning for students. And, we've just for decades really taught the procedures. This is how you do it, don't ask me why. So, I think especially with elementary teachers because we aren't specifically trained in math like secondary teachers are, you know, we're trained in all areas. I think it's harder for elementary teachers to understand a lot of that conceptual. So, I think we've had to provide more of that the last several years so that elementary teachers can get to that point

of being able to teach that conceptual understanding and not just the procedure of, you know, well, we invert and multiply and that's just the way it's done. You've got to be able to explain that because kids do understand it better if they understand why, and not just, oh well, that's a formula you have to memorize or something like that.

Administrators agreed that the new curriculum resource takes into account the higher rigor at the lower grade levels in addition to teaching more conceptually than procedurally.

Second year is better. Administrators noted that the second year of implementation of the new curriculum was better than the first year. One administrator shared, "I think it's just going to take time. I think that we finally have a curriculum that everyone is using, and so, I think we're going to see the benefits of common terminology, of common practices, of using the same materials." Prior to the implementation of Math in Focus, Warrensburg R-VI School District did not have a common resource from which to teach math at the elementary level. As one administrator stated, "Everyone was kind of doing their own thing. There was no consistency anywhere. There was no pacing guide, and you just kind of did what you wanted. So, I think we're really going to see the benefits of a common curriculum that everyone is using." A different administrator expressed, "I feel like Math in Focus is a higher level thinking program, and I think it's going to help the longer we use it." The administrator went on to explain, "This year, I think we're noticing differences in each grade level because the children have experienced it. They've experienced the vocabulary. They know what to expect a little more going into it."

Lower elementary administrators noted improvement in the second grade from last year's instruction with Math in Focus compared to this year. One lower elementary administrator commented, "We're going to see what needs and standards are being met, and if they're not, we will differentiate our instruction or do a reteach week to try to reach those kids with the missing skills." Both lower elementary administrators expressed the importance of ensuring that all students are mastering the standards for second grade. One administrator explained, "If we keep sending them on and moving them on when they're missing those skills, then they're just going to have a huge hole by the time they get to third grade." This administrator touched on exactly what the teachers are trying to do in their classrooms which is ensure that each child is as successful as possible with math before being moved on to the next grade level. In order to ensure that every child is able to achieve success, all of the teachers and administrators agreed that differentiated instruction is necessary.

While several teachers indicated that they were told to just move ahead in order to stay on track with a pacing guide, one lower elementary administrator spoke out against just moving on. She explained:

I think the higher level of thinking we provide is great for kids, and we want them all to get there. But for the kids who are not there yet, it can be a real struggle when they're still working on number sense and the early basic foundational pieces. And when we're working with such young kids, you have to start there with just building number sense. So, I think that higher level of thinking can be really hard until they're ready for it. So, it's exactly what they need, and we need to keep working in that direction. Keep modeling it, whether they're ready to do it

on their own or not, and getting teachers to understand even for those lower students that they have to have that foundation. They can't just move on. They just need to slow down and take the time they need to make those strong foundations.

Another administrator declared, "You can't go on unless they [the students] have mastered the current skill. If you just go on, then they're going to have bigger and bigger gaps."

Resources are Imperative

Materials to differentiate. In order to provide differentiated instruction, teachers need access to a wide range of resources to meet students' diverse learning needs. One administrator pointed out that, ideally, teachers should be "providing an enriching, engaging math classroom for all kids." The administrator suggested in order to meet the needs of all students, "You might go and pull a different grade level or lower grade level material." The new curriculum, Math in Focus, provides teachers with online access to math materials for all elementary grade levels through their website Think Central.

Lack of professional development. Administrators acknowledged the need for more professional development for teachers on math, especially professional development on the new math curriculum. One administrator commented:

I don't feel at this time we provide enough [professional development] and whether it's people from the actual textbook company which are probably not the most ideal professional development presenters. I know we've brought in an instructional coach that's just math focused. It's hard because I would love for teachers that we have the time to even pull them to work with teams, to

review units, to look at the content. Because the content is heavy, and we need to understand it. We need to understand the math as the adult before we can just deliver it to the students. And you hear that all the time. I mean, you hear that from the adults. We really need to have that time because I think some of our teachers really understand the math, what it's asking students to do, and others don't understand it. And so, when they deliver it, their expectations are different. So ongoing, continued. Just more time. We dedicate a lot of time and days to technology. I'd love to see some of that focus go to math. I mean it's needed. It's critical. Our scores for years across the district have shown that. And I think that goes back to developing your teachers. If we want better math scores, we need to support, develop, and provide resources to teachers. And a critical resource would be the time.

Range of Readiness Levels

Prior knowledge. All administrators expressed the importance of assessing students' prior knowledge for teaching new math concepts. One administrator advised, "I think absolutely you have to begin there because if, as teachers, you just teach a lesson and 90% of your class already has that background knowledge, then you're wasting their time. You're wasting your time." Another administrator explained, "I think that it's 100% a part of math instruction. It's a stairstep skill so we need to make sure we assess and understand what students know before we start teaching." One administrator listed multiple ways in which teachers can assess students' prior knowledge. The administrator stated, "I encourage teachers to assess students' knowledge by using assessments whether it's a pre-assessment from the curriculum resource Math in Focus, using information from

Star data, or using teacher judgment, or common formative assessments.” Yet another administrator acknowledged, “We give pretests to see what students know.” Another administrator talked about the importance of initial assessment and then ongoing assessment throughout the learning and explained, “I feel it's very important to use the students’ prior knowledge at the very beginning of a new concept but then also throughout their learning process.” One administrator noted, “You have to bring in that prior knowledge to build up to that concept because math has so many building blocks to it.”

Differentiate to meet students’ needs. Warrensburg R-VI School District administrators all hold the expectation that teachers will differentiate. One administrator detailed an expectation by stating, “Trusting that the teachers know that when certain students are struggling that they would provide additional supports whether that would be the whole class using manipulatives, certain students, whether it's one-on-one feedback to a student or a small group.” Another administrator commented, “We have such a diverse population within every building, in every elementary. You have to really individualize instruction for every child. Not every child has an IEP (Individualized Education Plan), but they need a personalized instruction plan.” Along the same line of thinking, an administrator shared:

I think you absolutely have to modify and differentiate. You have a class full of students that are at every different level under the sun, and you have to figure out where they are in the beginning so that then you can move from there and move them at their pace. And that's the hard thing about being a teacher is that you do have students at all different levels, and you can't just teach to the middle

and hope they fall into place because that's not what works best for kids. You've really got to figure out where they are and do more of an individualized approach. Another administrator explained, "We're in an era when we have an individual plan of action for every student. We have to take students, especially at this age group, from where they are and stretch them as far as they can go."

Expectations differ. While the expectation for math, as one administrator stated, "is that all students learn the standards," teachers admitted they hold different expectations for different students in regard to math. An administrator commented, "I've always had high expectations for students. However, I'm also very cognizant of the fact that students excel in different things and also excel at different levels."

Types of Student Groupings Being Utilized

With-in class groups. All administrators shared that their teachers utilize a variety of small groups for instruction. When asked about grouping students for math, one administrator commented, "Within the classroom, I think you have to do some grouping because they are at such different levels. You have to be able to figure out where they are and teach to where they are." Another administrator stated, "I just think it's critical." The administrator shared that after the whole group lesson, sometimes the students work independently and sometimes they work at stations. The administrator further added, "And then teachers are working with a small group that might need some additional instruction or more foundational work." Yet another administrator commented, "You have to have groups that are set up and established to allow students who need remediation receive it and students who need extension to receive. You know, just keep moving the line forward." The administrator further explained, "If we know enough

about where they're at, we can extend their learning and take them forward." All administrators indicated the use of small groups is important for differentiating to meet students' needs.

One administrator, when talking about utilizing small groups for math, shared, "One thing that we are working on right now is just the accountability of what they're doing at stations when the teacher is working with a small group and holding those students accountable for their work that they're doing." Another administrator explained, "Within each grade level class, the students are all mixed together. So, if students are grouped, it would just be fluid groups based on what the teacher sees in the classroom and on current information." Talking about small groups, one administrator expressed, "I used to call it a three-ring circus. You've got different groups going because they're all different, and you want what's best for them. And that's what's best for them is to meet them where they are and grow."

Accelerated math groups. An accelerated math class is offered for each of the fourth and fifth grade levels at both of the upper elementary schools in the Warrensburg R-VI School District. An administrator shared, "We group students by ability at the fourth and fifth grade level. We have accelerated math. Students take a screening test, and then we use MAP data, Star data, and teacher recommendation to place students in an accelerated program." The students who are deemed to be working at the highest ability in each grade level are removed from each of the grade level classrooms and placed into an accelerated class. Administrators and teachers indicated this class is usually kept to a maximum of around 25 students although one administrator said that number occasionally is one to two students higher. Another administrator shared that one

year two accelerated classes were offered due to an extremely high number of students showing high ability at grade level math. For most years, however, each accelerated class maintains about 25 students.

Administrators commented about the positive effects of accelerated math classes for students. It was noted that accelerated students have an advantage over other students as far as being prepared for higher level math classes and eventually, for college.

Referencing the accelerated math teacher, one administrator commented, "The teacher gains a deeper level of knowledge because they're looking at curriculum a whole grade level ahead, and hopefully that teacher can also contribute more to that collaboration.

They become a curriculum expert in a whole other grade level." Overall, administrators expressed that the accelerated classes ensure that the highest students are being challenged.

One administrator commented, "I believe that those students who can master those skills quickly benefit from being able to move along at a faster pace, and they can master those skills. And those other students who may be struggling with some of those skills aren't holding them back." Another administrator explained, "Those students who are at a higher level can have the opportunity to learn more, go further faster, and learn at a higher level which will set them up down the road."

While discussing the accelerated classes at the upper elementary, a lower elementary administrator shared:

We have enrichment groups because they already have the concepts. Those are the kids that sometimes seem to get left out because they've already got it, and you're working with the lower kids. Well, we need to excel those kids because

their knowledge is higher than what we're offering. Then, that allows students to take higher level classes in high school, which then allows them to be prepared to take higher level classes in college.

Overall, the majority of administrators expressed the accelerated classes meet the needs of those math students of the highest ability. For the most part, administrators agreed that the accelerated math classes both enrich and challenge higher level math students. An administrator shared, "I think the benefit with the accelerated math and the grouping is being able to meet students where they are and then take them to the highest level that they can achieve." The administrator further commented, "And not have some students bored because they're waiting on these students to get there, or having some students totally lost because you're going further with higher level students."

While administrators agreed that they like to keep the accelerated math classes to 25 students, one administrator commented, "If you were taking a group of students that are accelerated, you can handle a larger class size. You are not having to provide the supports individually as you would as a teacher with the students that are struggling."

How students are chosen for accelerated math. Administrators explained MAP scores, Star Math progress monitoring, teacher recommendations, quarterly grades, and a screening which utilized a variety of tests are all included in the selection process of those students for accelerated math.

How parents are informed about accelerated math. Administrators admitted that the accelerated math classes are not promoted in any way. Therefore, parents do not know that accelerated math classes at the fourth and fifth grade levels are an option for their children. While discussing whether or not parents know that accelerated math

classes are offered, one administrator commented, “I feel like they kind of just know based on the community and just prior experiences.” The administrator added, “When students qualify, we send information to those families explaining the course and explaining the kind of requirements for the student to remain in that course, and our parents can decide if it's the best fit for their child.” Another administrator shared that a letter is sent to parents along with the placement letter for the student’s next grade level, and sometimes, if students are admitted to the accelerated class at fifth grade, the teacher will call the parents to inform them and seek permission for placement. A lower elementary administrator commented, “I can see that some parents would probably want to know what the criteria is for getting in there. Some of our parents who aren't as informed may not even realize there is that option.”

Parents’ concerns about the math program. Teachers indicated that the majority of concerns or questions about the elementary math program deal with the accelerated math classes. One administrator commented, “Every year I have questions as to why a child doesn't make it into accelerated math, and I explain our process, and sometimes that's hard for parents because they see their child as accelerated.”

Proponents of Accelerated Math

When talking about when accelerated math should initially be offered, one administrator expressed the opinion that accelerated math should not be offered below the third grade. The administrator explained, “I don't think I would do it at the primary level just because they're still learning so many basic concepts, and I don't think it would be as necessary.” When asked about offering accelerated math at the third grade level, another administrator stated, “No. I just know they're younger. I would worry about

that pigeonholing certain students, and I don't think that would be good for kids that age.” Additionally, when discussing the possibility of offering accelerated math for third grade, another administrator explained, “I don't think kids are ready for it. It's such a huge transition from second to third grade, and they're just trying to figure out what their responsibilities are, and taking notes, and keeping their agendas together, and learning concepts.”

When accelerated math should initially be offered. Each study participant was asked when accelerated math should initially be offered. The following table, Table 1, displays the responses given by each of the teachers and the administrators. Approximately 54% of respondents indicated they would like for accelerated math to initially start at fourth grade where it currently is offered. Approximately 15% of respondents indicated they would prefer accelerated math classes to start at middle school in sixth or seventh grade. Approximately 12% of respondents indicated accelerated math should start at the third grade. Approximately 8% of respondents indicated the desire to have accelerated math start at first or second grade, and another approximately 8% of respondents suggested that accelerated math to start at kindergarten. One respondent did not indicate a grade level for the start of accelerated math.

Table 1

Grade Level at which Participants Believe Accelerated Math Should Initially Be Offered

Participant's Role in the District	Grade Level Accelerated Math Should Initially Be Offered
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
Accelerated Math Teacher	4 th Grade
5 th Grade Teacher	Middle School 6 th or 7 th Grade
5 th Grade Teacher	6 th Grade
5 th Grade Teacher	6 th Grade
5 th Grade Teacher	4 th Grade
5 th Grade Teacher	4 th Grade
5 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	4 th Grade
4 th Grade Teacher	3 rd Grade
4 th Grade Teacher	1 st or 2 nd Grade
3 rd Grade Teacher	3 rd Grade
3 rd Grade Teacher	2 nd Grade
3 rd Grade Teacher	Kindergarten
2 nd Grade Teacher	4 th Grade
2 nd Grade Teacher	4 th Grade
2 nd Grade Teacher	Kindergarten
Administrator	Not a fan of accelerated programs
Administrator	6 th Grade
Administrator	4 th Grade
Administrator	4 th Grade
Administrator	Not below 3 rd Grade

Opponents of Accelerated Math

One administrator expressed that the district should not move forward with offering Accelerated math classes at the elementary level. The administrator believes that teachers can challenge students within their own classrooms and not switch students for accelerated math based on ability groups. The administrator explained:

I feel like we have, especially with online components, that we have the resources to challenge our students in the classroom. I feel like, as a teacher, if you're going to have this kid is excelling, you can provide that for them in your room now. Whereas, even before, you still could do that. I mean, it's the same thing as when we are providing for a student that is below grade level.

The same administrator expressed concern that not all students are getting their needs met due to the fact that some students are removed for accelerated math. The administrator explained, "I feel like the students that are on grade level and below grade level maybe are not experiencing being challenged by the higher level kids if those kids were placed in the classroom with them."

An administrator commented on how accelerated math perhaps affects the self-confidence of students who do not get accepted into the class. This administrator explained how students might feel and commented:

'Okay, now I know I didn't get into accelerated. I know all the smart kids are leaving, but I'm in here.' So, what does that do to your self-esteem? Or, 'Do I have the ability to do math? Well I guess not, because I wasn't chosen to go to this room to go get math with a different teacher.' I think with accelerated, when some kids are plucked from rooms in elementary, it is damaging. But, when it's middle

school or high school, there's a difference because that's your course and you're mixed up. And it's not like certain kids, I mean literally, they're sitting in their room, and they're like okay there go the four smart kids.

The administrator further explained, “If we're differentiating and we're challenging our students, then I think we should have them altogether, all abilities, all levels within the room.” She pondered, “I know there are benefits, but I'm wondering if the benefits are just for a small group versus the whole group.”

Another administrator spoke out against accelerated math and explained:

I'm not a real fan of accelerated programs in any subject area. The reason for that is I believe a lot of the skills that children gain are emergent, and some children may not test at a particular day or time and then they are left out of that loop for the remainder of their cycle. So, I don't know that there's really an advantage to it. I think we should be challenging every child like they're an accelerated student and taking them from where they are and challenging them to move them forward as much as possible.

A different administrator also expressed that not all students who are qualified for accelerated math get into the accelerated classes and stated, “Then there's the piece, that equity piece. Representation of student population and demographics in those classes. I just wonder about that. It's not a perfect science. That's for sure.”

If Accelerated Math Was Not Offered

Administrators expressed concerns for students and teachers if accelerated math classes were eliminated from the district's elementary math program. One administrator shared:

Unfortunately, I don't think that kids who need the enrichment would get all of the enrichment they needed just because it's so difficult for a classroom teacher to differentiate from special education all the way to gifted plus. When we are able to narrow that focus, then teachers are able to provide those opportunities for those special education kids, for those middle road kids, and then those accelerated teachers can really push that teaching way beyond the common expectations.

Another administrator commented, "Structurally, you would have that broader spectrum of learning abilities so it would be harder on the teacher to be able to meet the needs of all of those students in one classroom."

Professional Learning Community

Culture of collaboration. Administrators also sang the praises of their professional learning community. Discussing the professional learning community and the teachers in it, one administrator shared:

It changes everything because they talk about what concepts they're teaching and what skills worked, what types of teaching, what types of instruction worked for this particular concept, what are some strategies that they used. It really does provide an outlet for teachers to work together to talk to find the best teaching method for whatever concept it is. I've been doing this a long time, and when I first started teaching, we did a whole lot of teaching in isolation.

Speaking about collaboration in a professional learning community, another administrator commented, “They're not just in a silo anymore where they're teaching their way and not really seeing others’ way of teaching.” An accelerated math teacher stated, “, I think it's been nice for that collaborative time to communicate and not feel like you're making the decisions on your own.”

Noting the collaborative work of teachers, another administrator commented, “Our teachers really do work very well together. Why would we do these things independently when we can do them together? Every PLC meeting agenda includes time to collaborate about math.”

One administrator commented on the degree of trust that it takes for a team to really benefit from the professional learning community model. The administrator commented, “And that trust, I mean, it takes a while to get it going correctly because of the trust, but it's beneficial in the end because you really can get teachers to start talking instructionally and getting ideas.”

Response to Intervention

A component of the professional learning community is Response to Intervention (RtI). Warrensburg R-VI School District utilizes RtI to meet students’ individual needs and increase student learning. An administrator commented, “I feel like we do spend a lot more time probably discussing literacy and reading than we do talking about math.” A couple of administrators shared that while they used to have more of a focus on reading, they are now intentionally dedicating more collaboration time for math.

One administrator commented that teachers’ collaborative work directly affects how they teach math. The administrator explained:

We have our meetings on a data cycle so, obviously, you plan, discuss, collaborate. Then you teach. Then you benchmark and you come back and share those results to decide where students are at. Then you progress monitor. Then you reteach, assess, and it's that continuous cycle.

Another administrator shared, "When we originally set up collaboration years ago, we provided data team training for all of the administrators and instructional coaches in order to be able to have those discussions around math or reading or whatever it is." The administrator further commented, "I think looking at the data sparks those conversations with teachers of how did you teach that? Your kids did better on those. How?" All teachers and administrators noted that their Response to Intervention is data driven.

One administrator pointed out that teachers form groups based on data referencing students' math skills. The administrator commented, "It's based on whether they need enrichment or whether they need some type of intervention if they're missing basic skills." Not every school or grade level addresses both the students in need of enrichment and the students in need of intervention during their RtI time. Another administrator shared, "The majority of our progress monitoring is based on the standard or the strands, skill sets, that they're lacking." Most of the administrators and teachers indicated they are only serving the students in need of intervention during RtI. Talking about Response to Intervention, one administrator shared:

RTI is really not, the scope I would say, is not really isolated in math. I think RtI is more about identification of Tier 1, what are we doing in the classroom? Tier 2, what supports do we have through care team or tutoring or Title? Tier 3 students, how are we coordinating and working with our case managers to ensure that

there's a partnership with the person who's responsible for the IEP goals so the collaboration between the classroom teacher and the special services teacher can help the child make progress?

Expressing a similar means of RtI, a different administrator shared, “We have title one math, so that's another tier, another part of the RTI process for us. So, students that are having difficulty in math work with our Title one teacher.” The administrator further explained, “In Title I, it's generally like a 20 to 30 minute session during small group math time. It's based on their skill at that time and sometimes kids excel in one area, but they just struggle in another.” The administrator pointed out, “Sometimes new students come to us with gaps, and she [the Title teacher] can help fill in those gaps, you know, lay that some of foundational work that they may have missed just because they came from a different program.”

The Ideal Way to Teach Math

Administrators indicated the ideal way to teach math would be to have students engaged in hands-on learning. When asked about the ideal way to teach math, one administrator said, “My ideal way is just all hands-on, real life situations.” One teacher at the fifth grade level stated, “We want students to develop a love of math.” With consideration of the autonomy for teachers instructing math, an administrator shared:

I think the ideal way is what teachers are comfortable with and the way they can present the concepts that the students will understand. So, do I want them to stick with a curriculum that is provided? Yes, I do, but I can't go in and say, ‘Here is your script. Read from the script exactly what it says. Do not deviate.’ Because that may not be what they're comfortable with, and I need them to be comfortable

with the skills that they're teaching. So do your thing. You are a seasoned, educated person, and I can't tell you how to do it.

While this administrator indicated teachers are given autonomy, not all of the teachers interviewed believed that they were provided the discretion to make such decisions in regard to math instruction.

One administrator commented:

The ideal way to teach math would resemble a three-ring circus. You would definitely have students in small groups. It would definitely be a lot of hands-on, project-based learning. Seeing the students actually doing the work and not the teacher at the front of the classroom doing the work. The teacher of course is interacting and leading things, but the students really should be the ones who are actually learning for themselves and the teacher facilitating that.

While discussing the ideal way to teach math, one administrator thoughtfully commented, "I'm hoping we're making it fun for kids." In describing the ideal way to teach math, another administrator mentioned the need for wanting kids to enjoy math. The administrator explained:

Ultimately, what you want to see is an opener that captures the children's attention, whether it's an activity or a game that gets them engaged in a concept. And then you want to watch them tie that concept to a more concrete learning situation. And then the last piece would be allowing students to teach or share with other students what they know about math and what they know about that specific concept because if they're able to teach it to someone else, they're probably more likely going to be able to retain that information.

Recommendations for Improvements

Continuation of current improvements. Administrators shared some thoughts and recommendations for improvements to the elementary math program. Two administrators expressed the belief that the district is heading in the right direction with the improvements that are currently being made for math with the greatest improvement being the implementation of a common curriculum resource at the elementary level. One administrator discussed the need for ensuring fidelity with the work that students are doing at stations and holding those students accountable for their learning when the teacher is not working with them directly. The administrator explained:

I really like how we do it, starting with whole group and then embracing the small groups. They just do the whole group lesson, and then they work with kids individually and in groups. There is one thing I want to make sure that we're following though, and that is that the kids at the stations are doing their work with fidelity and they're being held accountable for what they're doing. So, that's something I'm working with the teachers on is to make sure those kids are being held accountable that are in stations. There are many things that we need to do to make sure stations are keeping our kids engaged. And, is it the correct kind of engagement? We don't just want compliance. We have a sharing out period after the station time. 'What did you do today? What did you learn today? What did you find out? What do you recommend for next time?' Just all of those discussions so they feel very active and then giving them choice about what they're doing and where they go from there.

The second administrator, in commenting on the improvements already in place for math, shared:

Really, it's just what we've been working on, aligning instructional strategies with the content that we now have to teach at lower levels and the way we have to teach it, you know, more conceptually. I think we just continue to work on that. Continue to use our secondary teachers to work with elementary teachers. We started doing that several years ago because they are the content experts really. I mean, that's their whole degree, math. So being able to kind of see the vertical part of it and understanding what they're teaching. I mean it's really an understanding for both levels. Secondary can understand how you're teaching the things that are leading up to what they're teaching, and then elementary can understand, 'Oh, that's why I teach this, because it's there.' So just that vertical part of it too.

One administrator stated:

I think what has been important lately is that we are making math our focus. For the longest time, it seemed like we always focus on ELA [English Language Arts]. I think we focus on math equally now. I think we have to remember that math is just as equally important as ELA. I think that we're doing a better job.

Active learning. Another administrator suggested an improvement for the elementary math program would be to incorporate more active learning. The administrator commented:

I would say that there's a lot of research out there right now about active learning and students who need movement. So, one of the things I would suggest is that

we incorporate movement in math. I don't have any research to show that it's viable, but I've read a lot of articles recently about active classrooms, and I see a lot of classrooms where students are sitting and getting. I don't think that's the most productive way to keep their minds moving.

RQ3: At the beginning of the school year, what was the range in grade equivalents as determined by Star Math for each ability grouped fourth and fifth grade math class in comparison to the range in grade equivalents had the classes not been ability grouped? In addition, what was the distribution of grade equivalents for each second through fifth grade math class?

Grade equivalent (GE) scores are norm-referenced scores ranging from 1 to 12.9+. Since Star Math norms do not go lower than first grade, a GE score below 1.0 would be reported as < 1 (Renaissance, 2019b). Grade equivalent scores allow for national comparison of students' assessment performance. As an example, a fourth grade student with a GE of 5.4 indicates that student performed as well as the average fifth grader at the fourth month in the school year. The grade equivalents reported for Star Math data can be capped at each grade level so that rather than a grade level and month reported, the GE reported is only listed greater than the maximum grade set for reporting purposes.

Warrensburg R-VI School District administrators set Star Math data to report a maximum grade equivalent of > 8 for fifth grade students and a maximum of > 7 for fourth grade students rather than report GE scores up to 12.9+.

The following table, Table 2, indicates the range in grade equivalents present in each of the fifth grade classes ability grouped for math as compared to the grade equivalent distribution had the students not been ability grouped for math.

Table 2

Range in Grade Equivalents for 5th Grade Math Classes at the Beginning of the School Year and the Comparative Range Had the Classes Not Been Ability Grouped

5 th Grade Math Class	Range in Grade Equivalents When Ability Grouped	Range in Grade Equivalents if Had Not Been Ability Grouped
5 th Grade Class A	3.2 – > 8	3.2 – > 8
5 th Grade Class B	2.4 – 6.9	2.4 – 6.9
5 th Grade Class C	3.5 – 6.7	3.6 – > 8
5 th Grade Class D	2.6 – 7.2	3.7 – > 8
5 th Grade Class E	3.6 – > 8	3.6 – > 8
5 th Grade Class F	2.7 – 6.9	2.7 – > 8
5 th Grade Class G	3.3 – > 8	3.3 – > 8
5 th Grade Class H	2.7 – 6.9	2.7 – > 8
5 th Grade Class I	2.1 – 6.6	2.1 – > 8
5 th Grade Class J	3.1 – > 8	3.3 – > 8
5 th Grade Class K	2.7 – 7.1	2.7 – > 8
5 th Grade Accelerated Class L	5.7 – > 8	2.6 – > 8
5 th Grade Accelerated Class M	6.2 – > 8	3.1 – > 8

The following tables show the comparison between grade equivalent distribution for the fourth and fifth grade classes ability grouped for math as compared to the grade equivalent distribution had the students not been ability grouped for math at the beginning of the year.

Table 3

Fifth Grade Math Class A Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	3	15.0
4.0 - 4.9	3	15.0
5.0 - 5.9	8	40.0
6.0 - 6.9	3	15.0
7.0 - 7.9	2	10.0
8.0 - 8.9	1	5.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	3	15.8
4.0 - 4.9	2	10.5
5.0 - 5.9	8	42.1
6.0 - 6.9	3	15.8
7.0 - 7.9	2	10.5
8.0 - 8.9	1	5.3
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 3 shows the grade equivalent (GE) distribution for Class A fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalents at the beginning of the year for the math class was 3.2 to greater than eighth grade. If students had not been ability grouped for math, the range would have still been 3.2 to greater than eighth grade.

Table 4

Fifth Grade Math Class B Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.9
3.0 - 3.9	0	0.0
4.0 - 4.9	5	29.4
5.0 - 5.9	8	47.1
6.0 - 6.9	3	17.6
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.9
3.0 - 3.9	0	0.0
4.0 - 4.9	5	29.4
5.0 - 5.9	8	47.1
6.0 - 6.9	3	17.6
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 4 shows the grade equivalent distribution for Class B fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data.

The range in grade equivalent at the beginning of the year for the math class was 2.4 to 6.9. If students had not been ability grouped for math, the range would have still been 2.4 to 6.9.

Table 5

Fifth Grade Math Class C Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	7	41.2
4.0 - 4.9	3	17.6
5.0 - 5.9	5	29.4
6.0 - 6.9	2	11.8
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	6	30.0
4.0 - 4.9	3	15.0
5.0 - 5.9	4	20.0
6.0 - 6.9	3	15.0
7.0 - 7.9	0	0.0
8.0 - 8.9	4	20.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 5 shows the grade equivalent distribution for Class C fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 3.5 to 6.7. If students had not been ability grouped for math, the range would have been 3.6 to greater than eighth grade.

Table 6

Fifth Grade Math Class D Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.9
3.0 - 3.9	0	0.0
4.0 - 4.9	5	29.4
5.0 - 5.9	2	11.8
6.0 - 6.9	7	41.2
7.0 - 7.9	2	11.8
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	0	0.0
4.0 - 4.9	4	23.5
5.0 - 5.9	1	5.9
6.0 - 6.9	5	29.4
7.0 - 7.9	4	23.5
8.0 - 8.9	3	17.6
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 6 shows the grade equivalent distribution for Class D fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.6 to 7.2. If students had not been ability grouped for math, the range would have been 3.7 to greater than eighth grade.

Table 7

Fifth Grade Math Class E Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	1	5.3
4.0 - 4.9	4	21.1
5.0 - 5.9	6	31.6
6.0 - 6.9	4	21.1
7.0 - 7.9	3	15.8
8.0 - 8.9	1	5.3
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	1	4.8
4.0 - 4.9	3	14.3
5.0 - 5.9	6	28.6
6.0 - 6.9	3	14.3
7.0 - 7.9	4	19.0
8.0 - 8.9	4	19.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 7 shows the grade equivalent distribution for Class E fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 3.6 to greater than eighth grade. If students had not been ability grouped for math, the range would have still been 3.6 to greater than eighth grade.

Table 8

Fifth Grade Math Class F Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	4.8
3.0 - 3.9	3	14.3
4.0 - 4.9	10	47.6
5.0 - 5.9	4	19.0
6.0 - 6.9	3	14.3
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	4.5
3.0 - 3.9	2	9.1
4.0 - 4.9	10	45.5
5.0 - 5.9	3	13.6
6.0 - 6.9	3	13.6
7.0 - 7.9	1	4.5
8.0 - 8.9	2	9.1
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 8 shows the grade equivalent distribution for Class F fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.7 to 6.9. If students had not been ability grouped for math, the range would have been 2.7 to greater than eighth grade.

Table 9

Fifth Grade Math Class G Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	1	4.5
4.0 - 4.9	8	36.4
5.0 - 5.9	7	31.8
6.0 - 6.9	3	13.6
7.0 - 7.9	2	9.1
8.0 - 8.9	1	4.5
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	1	4.5
4.0 - 4.9	6	27.3
5.0 - 5.9	6	27.3
6.0 - 6.9	4	18.2
7.0 - 7.9	2	9.1
8.0 - 8.9	3	13.6
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 9 shows the grade equivalent distribution for Class G fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 3.3 to greater than eighth grade. If students had not been ability grouped for math, the range would have still been 3.3 to greater than eighth grade.

Table 10

Fifth Grade Math Class H Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	2	8.7
3.0 - 3.9	5	21.7
4.0 - 4.9	4	17.4
5.0 - 5.9	8	34.8
6.0 - 6.9	4	17.4
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	2	8.7
3.0 - 3.9	4	17.4
4.0 - 4.9	3	13.0
5.0 - 5.9	8	34.8
6.0 - 6.9	4	17.4
7.0 - 7.9	0	0.0
8.0 - 8.9	2	8.7
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 10 shows the grade equivalent distribution for Class H fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.7 to 6.9. If students had not been ability grouped for math, the range would have been 2.7 to greater than eighth grade.

Table 11

Fifth Grade Math Class I Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	2	9.5
3.0 - 3.9	1	4.8
4.0 - 4.9	10	47.6
5.0 - 5.9	4	19.0
6.0 - 6.9	4	19.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	2	9.5
3.0 - 3.9	1	4.8
4.0 - 4.9	10	47.6
5.0 - 5.9	4	19.0
6.0 - 6.9	2	9.5
7.0 - 7.9	1	4.8
8.0 - 8.9	1	4.8
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 11 shows the grade equivalent distribution for Class I fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.1 to 6.6. If students had not been ability grouped for math, the range would have been 2.1 to greater than eighth grade.

Table 12

Fifth Grade Math Class J Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	5	22.7
4.0 - 4.9	6	27.3
5.0 - 5.9	4	18.2
6.0 - 6.9	5	22.7
7.0 - 7.9	0	0.0
8.0 - 8.9	2	9.1
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	4	17.4
4.0 - 4.9	5	21.7
5.0 - 5.9	3	13.0
6.0 - 6.9	7	30.4
7.0 - 7.9	2	8.7
8.0 - 8.9	2	8.7
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 12 shows the grade equivalent distribution for Class J fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 3.1 to greater than eighth grade. If students had not been ability grouped for math, the range would have been 3.3 to greater than eighth grade.

Table 13

Fifth Grade Math Class K Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.6
3.0 - 3.9	4	22.2
4.0 - 4.9	5	27.8
5.0 - 5.9	4	22.2
6.0 - 6.9	3	16.7
7.0 - 7.9	1	5.6
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.6
3.0 - 3.9	3	16.7
4.0 - 4.9	4	22.2
5.0 - 5.9	4	22.2
6.0 - 6.9	2	11.1
7.0 - 7.9	0	0.0
8.0 - 8.9	4	22.2
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 13 shows the grade equivalent distribution for Class K fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.7 to 7.1. If students had not been ability grouped for math, the range would have still been 2.7 to greater than eighth grade.

Table 14

Fifth Grade Accelerated Math Class L Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	0	0.0
4.0 - 4.9	0	0.0
5.0 - 5.9	1	4.8
6.0 - 6.9	3	14.3
7.0 - 7.9	5	23.8
8.0 - 8.9	12	57.1
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.9
3.0 - 3.9	1	5.9
4.0 - 4.9	4	23.5
5.0 - 5.9	3	17.6
6.0 - 6.9	4	23.5
7.0 - 7.9	2	11.8
8.0 - 8.9	2	11.8
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 14 shows the grade equivalent distribution for Class L fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 5.7 to greater than eighth grade. If students had not been ability grouped for math, the range would have been 2.6 to greater than eighth grade.

Table 15

Fifth Grade Accelerated Math Class M Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	0	0.0
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	3	13.0
7.0 - 7.9	5	21.7
8.0 - 8.9	15	65.2
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	4	19.0
4.0 - 4.9	5	23.8
5.0 - 5.9	3	14.3
6.0 - 6.9	3	14.3
7.0 - 7.9	2	9.5
8.0 - 8.9	4	19.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 15 shows the grade equivalent distribution for Class M fifth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 6.2 to greater than eighth grade. If students had not been ability grouped for math, the range would have been 3.1 to greater than eighth grade.

The following table, Table 16, indicates the range in grade equivalents present in each of the fourth grade classes ability grouped for math as compared to the grade equivalent distribution had the students not been ability grouped for math.

Table 16

Range in Grade Equivalents for 4th Grade Math Classes at the Beginning of the School Year and the Comparative Range Had the Classes Not Been Ability Grouped

4 th Grade Math Class	Range in Grade Equivalents When Ability Grouped	Range in Grade Equivalents if Had Not Been Ability Grouped
4 th Grade Class N	1.4 – 5.4	1.4 – > 7
4 th Grade Class O	2.0 – 6.0	2.0 – 6.0
4 th Grade Class P	1.8 – 5.2	1.8 – 5.8
4 th Grade Class Q	2.3 – 6.7	2.3 – > 7
4 th Grade Class R	2.1 – 5.6	2.1 – 6.8
4 th Grade Class S	1.7 – 5.6	1.7 – 5.6
4 th Grade Class T	1.7 – 5.5	1.7 – 6.9
4 th Grade Class U	2.1 – 7.0	2.1 – > 7
4 th Grade Class V	2.8 – 5.9	2.8 – 6.4
4 th Grade Class W	1.9 – 4.9	1.9 – 6.3
4 th Grade Accelerated Class X	4.0 – > 7	2.7 – 5.9
4 th Grade Accelerated Class Y	4.9 – > 7	3.6 – 6.6

Table 17

Fourth Grade Math Class N Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	4	20.0
2.0 - 2.9	3	15.0
3.0 - 3.9	3	15.0
4.0 - 4.9	8	40.0
5.0 - 5.9	2	10.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	4	19.0
2.0 - 2.9	3	14.3
3.0 - 3.9	2	9.5
4.0 - 4.9	7	33.3
5.0 - 5.9	4	19.0
6.0 - 6.9	0	0.0
7.0 - 7.9	1	4.8
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 17 shows the grade equivalent distribution for Class N fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 1.4 to 5.4. If students had not been ability grouped for math, the range would have been 1.4 to greater than seventh grade.

Table 18

Fourth Grade Math Class O Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	4	18.2
3.0 - 3.9	4	18.2
4.0 - 4.9	8	36.4
5.0 - 5.9	5	22.7
6.0 - 6.9	1	4.5
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	4	18.2
3.0 - 3.9	4	18.2
4.0 - 4.9	7	31.8
5.0 - 5.9	6	27.3
6.0 - 6.9	1	4.5
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 18 shows the grade equivalent distribution for Class O fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.0 to 6.0. If students had not been ability grouped for math, the range would have still been 2.0 to 6.0.

Table 19

Fourth Grade Math Class P Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	1	5.9
2.0 - 2.9	1	5.9
3.0 - 3.9	6	35.3
4.0 - 4.9	7	41.2
5.0 - 5.9	2	11.8
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	1	5.9
2.0 - 2.9	1	5.9
3.0 - 3.9	5	29.4
4.0 - 4.9	7	41.2
5.0 - 5.9	3	17.6
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 19 shows the grade equivalent distribution for Class P fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 1.8 to 5.2. If students had not been ability grouped for math, the range would have been 1.8 to 5.8.

Table 20

Fourth Grade Math Class Q Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.3
3.0 - 3.9	6	31.6
4.0 - 4.9	10	52.6
5.0 - 5.9	1	5.3
6.0 - 6.9	1	5.3
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.3
3.0 - 3.9	5	26.3
4.0 - 4.9	9	47.4
5.0 - 5.9	2	10.5
6.0 - 6.9	1	5.3
7.0 - 7.9	1	5.3
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 20 shows the grade equivalent distribution for Class Q fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.3 to 6.7. If students had not been ability grouped for math, the range would have been 2.3 to greater than seventh grade.

Table 21

Fourth Grade Math Class R Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	4.8
3.0 - 3.9	8	38.1
4.0 - 4.9	9	42.9
5.0 - 5.9	3	14.3
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.0
3.0 - 3.9	8	40.0
4.0 - 4.9	7	35.0
5.0 - 5.9	3	15.0
6.0 - 6.9	1	5.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 21 shows the grade equivalent distribution for Class R fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.1 to 5.6. If students had not been ability grouped for math, the range would have still been 2.1 to 6.8.

Table 22

Fourth Grade Math Class S Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	1	5.3
2.0 - 2.9	1	5.3
3.0 - 3.9	2	10.5
4.0 - 4.9	11	57.9
5.0 - 5.9	4	21.1
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.0
3.0 - 3.9	6	30.0
4.0 - 4.9	5	25.0
5.0 - 5.9	5	25.0
6.0 - 6.9	1	5.0
7.0 - 7.9	2	10.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 22 shows the grade equivalent distribution for Class S fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 1.7 to 5.6. If students had not been ability grouped for math, the range would have still been 1.7 to 5.6.

Table 23

Fourth Grade Math Class T Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	2	10.0
2.0 - 2.9	5	25.0
3.0 - 3.9	5	25.0
4.0 - 4.9	6	30.0
5.0 - 5.9	2	10.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	2	9.5
2.0 - 2.9	4	19.0
3.0 - 3.9	4	19.0
4.0 - 4.9	5	23.8
5.0 - 5.9	3	14.3
6.0 - 6.9	3	14.3
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 23 shows the grade equivalent distribution for Class T fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 1.7 to 5.5. If students had not been ability grouped for math, the range would have still been 1.7 to 6.9.

Table 24

Fourth Grade Math Class U Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.0
3.0 - 3.9	7	35.0
4.0 - 4.9	6	30.0
5.0 - 5.9	5	25.0
6.0 - 6.9	0	0.0
7.0 - 7.9	1	5.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.0
3.0 - 3.9	6	30.0
4.0 - 4.9	5	25.0
5.0 - 5.9	5	25.0
6.0 - 6.9	1	5.0
7.0 - 7.9	2	10.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 24 shows the grade equivalent distribution for Class U fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.1 to 7.0. If students had not been ability grouped for math, the range would have still 2.1 to greater than seventh grade.

Table 25

Fourth Grade Math Class V Grade Equivalent Distribution

With Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.3
3.0 - 3.9	5	26.3
4.0 - 4.9	8	42.1
5.0 - 5.9	5	26.3
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.0
3.0 - 3.9	2	10.0
4.0 - 4.9	8	40.0
5.0 - 5.9	7	35.0
6.0 - 6.9	2	10.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 25 shows the grade equivalent distribution for Class V fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 2.8 to 5.9. If students had not been ability grouped for math, the range would have been 2.8 to 6.4.

Table 26

Fourth Grade Math Class W Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	1	5.0
2.0 - 2.9	2	10.0
3.0 - 3.9	10	50.0
4.0 - 4.9	7	35.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	1	4.8
2.0 - 2.9	2	9.5
3.0 - 3.9	9	42.9
4.0 - 4.9	6	28.6
5.0 - 5.9	2	9.5
6.0 - 6.9	1	4.8
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 26 shows the grade equivalent distribution for Class W fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 1.9 to 4.9. If students had not been ability grouped for math, the range would have still 1.9 to 6.3.

Table 27

Fourth Grade Accelerated Math Class X Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	0	0.0
4.0 - 4.9	1	4.3
5.0 - 5.9	18	78.3
6.0 - 6.9	2	8.7
7.0 - 7.9	2	8.7
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	3	13.0
4.0 - 4.9	6	26.1
5.0 - 5.9	13	56.5
6.0 - 6.9	1	4.3
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 27 shows the grade equivalent distribution for Class X fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 4.9 to greater than seventh grade. If students had not been ability grouped for math, the range would have been 3.6 to 6.6.

Table 28

Fourth Grade Accelerated Math Class Y Grade Equivalent Distribution

With Ability Grouping

Without Ability Grouping

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	0	0.0
4.0 - 4.9	6	26.1
5.0 - 5.9	9	39.1
6.0 - 6.9	7	30.4
7.0 - 7.9	1	4.3
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	1	5.3
3.0 - 3.9	6	31.6
4.0 - 4.9	8	42.1
5.0 - 5.9	4	21.1
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 28 shows the grade equivalent distribution for Class Y fourth grade students at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The range in grade equivalent at the beginning of the year for the math class was 4.0 to greater than seventh grade. If students had not been ability grouped for math, the range would have been 2.7 to 5.9.

Third grade does not ability group students for math. At this time, accelerated math classes are not offered for the third grade. The range in grade equivalents for each third grade class is provided in this study to demonstrate the broad range present at this grade level. Warrensburg R-VI School District administrators set Star Math data to report a maximum grade equivalent of > 6 for third grade students rather than report GE scores up to 12.9+.

Table 29

Range in Grade Equivalents for 3rd Grade Math Classes at the Beginning of the School Year

3 rd Grade Math Class	Range in Grade Equivalents
3 rd Grade Class AA	3.2 – 5.0
3 rd Grade Class BB	1.3 – 4.9
3 rd Grade Class CC	2.6 – 5.2
3 rd Grade Class DD	1.2 – > 5.9
3 rd Grade Class EE	2.2 – 5.8
3 rd Grade Class FF	2.1 – >6
3 rd Grade Class GG	2.0 – 5.3
3 rd Grade Class HH	< 1 – 4.8
3 rd Grade Class II	1.8 – 4.9
3 rd Grade Class JJ	2.1 – 4.9
3 rd Grade Class KK	< 1 – 4.1
3 rd Grade Class LL	2.3 – 4.9

Second grade does not ability group students for math. At this time, accelerated math classes are not offered for the second grade. The range in grade equivalents for each second grade class is provided in this study to demonstrate the broad range present at this grade level. Warrensburg R-VI School District administrators set Star Math data to report a maximum grade equivalent of > 5 for third grade students rather than report GE scores up to 12.9+.

Table 30

Range in Grade Equivalents for 2nd Grade Math Classes at the Beginning of the School Year

2 nd Grade Math Class	Range in Grade Equivalents
2 nd Grade Class MM	< 1 – 4.6
2 nd Grade Class NN	1.2 – 3.9
2 nd Grade Class OO	< 1 – 3.9
2 nd Grade Class PP	< 1 – 4.0
2 nd Grade Class QQ	< 1 – 3.1
2 nd Grade Class RR	1.1 – 4.6
2 nd Grade Class SS	1.2 – 3.8
2 nd Grade Class TT	1.3 – 3.9
2 nd Grade Class UU	< 1 – 3.6
2 nd Grade Class VV	< 1 – 3.9
2 nd Grade Class WW	1.5 – 3.8
2 nd Grade Class XX	1.0 – 4.4

The following tables report the grade equivalent distribution for Warrensburg R-VI School District's 12 third grade classes at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The tables are included to display the grade equivalent distribution in each of the third grade math classes in the district.

Table 31

Third Grade Math Class AA Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	0	0.0
3.0 - 3.9	11	55.0
4.0 - 4.9	8	40.0
5.0 - 5.9	1	5.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 32

Third Grade Math Class BB Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	1	5.6
2.0 - 2.9	7	38.9
3.0 - 3.9	7	38.9
4.0 - 4.9	3	16.7
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 33

Third Grade Math Class CC Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	3	16.7
3.0 - 3.9	5	27.8
4.0 - 4.9	8	44.4
5.0 - 5.9	2	11.1
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 34

Third Grade Math Class DD Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	3	15.8
2.0 - 2.9	7	36.8
3.0 - 3.9	7	36.8
4.0 - 4.9	0	0.0
5.0 - 5.9	2	10.5
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 35

Third Grade Math Class EE Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	3	17.6
3.0 - 3.9	6	35.3
4.0 - 4.9	6	35.3
5.0 - 5.9	2	11.8
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 36

Third Grade Math Class FF Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	5	29.4
3.0 - 3.9	10	58.8
4.0 - 4.9	1	5.9
5.0 - 5.9	0	0.0
6.0 - 6.9	1	5.9
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 37

Third Grade Math Class GG Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	5	25.0
3.0 - 3.9	10	50.0
4.0 - 4.9	4	20.0
5.0 - 5.9	1	5.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 38

Third Grade Math Class HH Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	1	5.0
1.0 - 1.9	1	5.0
2.0 - 2.9	6	30.0
3.0 - 3.9	2	10.0
4.0 - 4.9	10	50.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 39

Third Grade Math Class II Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	1	4.3
2.0 - 2.9	6	26.1
3.0 - 3.9	13	56.5
4.0 - 4.9	3	13.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 40

Third Grade Math Class JJ Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	8	36.4
3.0 - 3.9	8	36.4
4.0 - 4.9	6	27.3
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 41

Third Grade Math Class KK Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	1	4.5
1.0 - 1.9	2	9.1
2.0 - 2.9	5	22.7
3.0 - 3.9	11	50.0
4.0 - 4.9	3	13.6
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 42

Third Grade Math Class LL Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	0	0.0
2.0 - 2.9	3	13.6
3.0 - 3.9	14	63.6
4.0 - 4.9	5	22.7
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

The following tables report the grade equivalent distribution for Warrensburg R-VI School District's 12 second grade classes at the beginning of the 2019 – 2020 school year according to Star Math assessment data. The tables are included to display the grade equivalent distribution in each of the second grade math classes in the district.

Table 43

Second Grade Math Class MM Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	4	20.0
1.0 - 1.9	5	25.0
2.0 - 2.9	5	25.0
3.0 - 3.9	5	25.0
4.0 - 4.9	1	5.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 44

Second Grade Math Class NN Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	6	31.6
2.0 - 2.9	10	52.6
3.0 - 3.9	3	15.8
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 45

Second Grade Math Class OO Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	1	5.9
1.0 - 1.9	6	35.3
2.0 - 2.9	6	35.3
3.0 - 3.9	3	17.6
4.0 - 4.9	1	5.9
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 46

Second Grade Math Class PP Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	1	5.3
1.0 - 1.9	4	21.1
2.0 - 2.9	6	31.6
3.0 - 3.9	7	36.8
4.0 - 4.9	1	5.3
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 47

Second Grade Math Class QQ Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	2	11.8
1.0 - 1.9	5	29.4
2.0 - 2.9	8	47.1
3.0 - 3.9	2	11.8
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 48

Second Grade Math Class RR Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	2	10.5
1.0 - 1.9	5	26.3
2.0 - 2.9	6	31.6
3.0 - 3.9	5	26.3
4.0 - 4.9	1	5.3
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 49

Second Grade Math Class SS Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	6	26.1
2.0 - 2.9	13	56.5
3.0 - 3.9	4	17.4
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 50

Second Grade Math Class TT Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	3	14.3
2.0 - 2.9	12	57.1
3.0 - 3.9	6	28.6
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 51

Second Grade Math Class UU Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	2	8.3
1.0 - 1.9	3	12.5
2.0 - 2.9	14	58.3
3.0 - 3.9	5	20.8
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 52

Second Grade Math Class VV Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	1	4.2
1.0 - 1.9	10	41.7
2.0 - 2.9	6	25.0
3.0 - 3.9	7	29.2
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 53

Second Grade Math Class WW Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	10	43.5
2.0 - 2.9	10	43.5
3.0 - 3.9	3	13.0
4.0 - 4.9	0	0.0
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Table 54

Second Grade Math Class XX Grade Equivalent Distribution

GE Distribution		
GE	Students	Percent
0.0 - 0.9	0	0.0
1.0 - 1.9	7	30.4
2.0 - 2.9	10	43.5
3.0 - 3.9	5	21.7
4.0 - 4.9	1	4.3
5.0 - 5.9	0	0.0
6.0 - 6.9	0	0.0
7.0 - 7.9	0	0.0
8.0 - 8.9	0	0.0
9.0 - 9.9	0	0.0
10.0 - 10.9	0	0.0
11.0 - 11.9	0	0.0
12.0 - 12.9+	0	0.0

Discussion

As schools focus on increasing rigor in the areas of science, technology, engineering, and math (STEM) to meet the needs of an ever advancing STEM filled society as well as future, yet to be created, employment opportunities, Warrensburg R-VI School District evaluates its elementary math program to identify areas for improvement and provide high-quality education for all students. Warrensburg R-VI School District has increased rigor in math for elementary students through the adoption of a new curriculum, Math in Focus. The district uses ability grouping by providing accelerated math classes for students at the fourth and fifth grade levels. Teachers of the grade level math classes commented that they utilize flexible small groups on almost a daily basis for math instruction. Data collection in the form of one on one interviews indicated that both administrators and teachers agreed that the accelerated math classes are meeting the needs of the highest ability math students. The data also revealed improvements which teachers believe would be beneficial for increasing student learning at and below grade level.

“Given the multiple contexts of school reform and the various social actors involved, decisions about differentiating instruction and ability grouping likely occur at multiple levels of the school system, often simultaneously” (Park & Datnow, 2017, p. 287). Interviews of administrators and teachers revealed that while decisions are made at all levels in the district, Warrensburg teachers have a significant amount of autonomy in utilizing various grouping practices within their classrooms. Every participant in the study noted regular use of ability grouping and differentiated instruction within the school, and teachers indicated the two are often utilized together. Third, fourth, and fifth

grade level teachers mentioned that they not only use ability grouping and differentiated instruction within their classrooms but also across their grade levels, providing instruction to students from different homerooms within the grade level for Response to Intervention.

“District-level decisions set the conditions for school- and teacher-level decisions, and school- and teacher-level decisions shape what happens in the classroom” (Park & Datnow, 2017, p. 287). Warrensburg R-V School District has practiced ability grouping in the form of accelerated math classes for fourth and fifth grade students for over three decades. Findings from interview data indicate a few of the participants are not in favor of the district continuing to offer the accelerated math classes. A couple of administrators expressed the belief that all students should be challenged and held to high expectations and that teachers are able to differentiate math instruction to provide for both the higher ability as well as the lower ability math students. Overall, teachers expressed that due to the broad range of readiness levels already present in their math classes, they would not be able to meet the needs of all students if there were no longer accelerated classes being offered.

A majority of the teachers interviewed indicated they are not able to meet the diverse range of needs in their math classes even with the higher level students pulled out of the mix for the accelerated classes. Several teachers explained that due to time constraints, behavior issues, and the vast range of ability levels, they spend the majority of their time outside of the whole group lesson focusing on their lowest level students. “Because teachers focus on low-ability students or preparation for national exams, high ability students are often left to work by themselves on activities that they have already

mastered or on activities they cannot tackle without their teacher's support" (Dimitriadis, 2016). Teachers explained that the higher level students, those performing at grade level and above, are able to work independently. According to constructivist theorist Vygotsky (1978), learning is created through the interdependence of the self and others, and learners can have success with challenging material with the assistance of those who are more knowledgeable. With this in mind, students who are left to work independently are at a disadvantage. These students may not reach their fullest learning potential without assistance from the teacher or higher level peers who are not available to give assistance as they are in the accelerated classes.

Piaget (1972) emphasized that not all children learn at the same rate and their developmental stages vary. Vygotsky's (1978) Zone of Proximal Development (ZPD) informs that students are able to succeed in solving problems or accomplishing tasks which are just outside of their independent grasp with the assistance of a more able peer or adult. Based on the work of these two theorists, ability grouping, especially mixed-ability grouping, is beneficial to students' learning. Teachers indicated some use of mixed-ability grouping in order to have higher level students assist as peer teachers to support the learning of lower level students.

"Ability grouping policies and practices affect students' experiences in school, including the courses they take, the curricula they receive, the peers with whom they learn, and the teachers who provide instruction" (Steenbergen-Hu, Makel, and Olszewski-Kubilius, 2016, p. 852). All students are entitled to an equitable education and because students are grouped in various ways for instruction, it can be argued that not all students receive the same education. While administrators and teachers were able to

detail the benefits from ability grouping, they were also able to identify ways in which ability grouping can sometimes be harmful to students. Both administrators and teachers considered the possible harm done to students' self-esteem by being in what would be considered a low group or even not getting admitted into an accelerated class. Devine and McGillicuddy (2016) explained "pedagogy is central to the translation of wider values and principles in practice, framing children's identities and how 'childhood' is constructed and experienced" (p. 440). Educators will have to carefully consider grouping practices to not only ensure equitable education for all students but also to ensure the welfare of students' self-conceptions.

"Pedagogic practicing is deeply embedded in social justice, whether this is explicitly stated or implicitly enacted" (Devine & McGillicuddy, 2016, p. 440). While this study did not focus on the social justice aspect of ability grouping, it is inherently a part of the discussion when considering an equitable education for all students. One administrator and multiple teachers expressed concern that not all of the students that they believed should be in the accelerated math classes were, in fact, admitted to the classes. Some teachers noted that this may be due to the limited number of students eligible for those classes, while others felt that teacher judgement played too large of a role in the admittance process. Missouri Department of Elementary and Secondary Education (2019b) informed "one of the most significant barriers to identification of low-income, high-ability learners and the development of their abilities and talents is inaccurate perceptions held by teachers and school administrators about the capabilities of these students" (p. 8). As Warrensburg R-VI School District moves forward with possible change for improvement to the elementary math program, they will need to

carefully assess whether or not all grouping practices do lead to equitable education for all students.

Recommendations

Planning for the future math program with consideration of the articulated perspectives of the stakeholders involved is “crucial, because failure to address issues that are implicitly associated with the variety of accelerative options will diminish the efficacy of accelerative programs” (Colangelo et al., 2004, p. 11). As the purpose of this qualitative study was to explore how students learn when they are placed in various groupings for elementary math classes by collecting and analyzing data regarding the perceptions of the Warrensburg R-VI School District teachers and administrators regarding the current math program for possible program improvement, a list of recommendations is provided. The recommendations are based on both teachers’ suggestions and the needs of the program as indicated by both teachers and administrators.

Provide Necessary Resources

Materials. While the district recently purchased a common curriculum for K-5 math classes, teachers consistently addressed the need for material resources. While some of the materials are to aid in whole class instruction, others are needed for differentiating instruction.

Math in Focus. All teachers indicated that they differentiate instruction for their math students. A majority of teachers expressed that this is not an easy task with the new curriculum. Teachers at all grade levels are having to utilize Math in Focus resources from both above and below the grade levels they teach. While Math in Focus has a

website, Think Central, through which teachers can access the K-6 math materials, teachers who mentioned using the website, unanimously indicated that the resource was not easy to navigate and those materials found often did not align with their students' needs. Teachers noted that the immense amount of time it takes to find materials on the website for differentiating instruction. A recommendation is to house complete sets of Math in Focus materials for each grade level, K-6, in every elementary building's library, designated professional development area, or in the instructional coaches' offices for teachers' reference and to check out as needed. Teachers can easily thumb through the various materials for each grade level in these printed resources and then more easily access them through Think Central.

Manipulatives. Although Math in Focus manipulatives were purchased for each grade level math class, teachers indicated the need for a variety of other manipulatives for differentiating instruction. A recommendation, in addition to the availability of grade level sets of Math in Focus, a manipulative kit for each grade level could also be housed for teachers to check out assorted manipulatives as needed. Teachers expressed difficulty with borrowing manipulatives from other teachers as the same manipulatives were needed for instruction by all teachers. An alternative recommendation is to maintain a collection of a variety of math manipulatives and store them in a common area for teachers to check out. Teachers may want to donate or loan manipulatives to this collection and utilize them as shared resources.

Technology. Ideally, every classroom would be equipped with one-to-one technology for students. But realistically, that is a financial difficulty. Teachers without one-to-one technology classrooms expressed the desire to have access to online math

learning options for math rotations or math workshop. Specifically, teachers would like to access online educational sites which allow teachers to differentiate learning for each student. A few of the teachers in the study indicated that they have utilized online programs to aid in differentiating learning for students. A recommendation is to have those teachers share these programs, specifically those they are having students access for math instruction, during a professional learning community meeting. Another recommendation is to ensure that teachers without one-to-one technology classrooms can have access to technology for math classes either through checking out the building's shared technology or borrowing technology from a partner teacher.

A couple of teachers indicated they are not able to utilize the Smartboard activities found on Think Central as they do not have Smartboards in their classrooms. A recommendation is to install Smartboards in the classroom of every teacher who would like to utilize the online Math in Focus Smartboard lessons.

Other math resources. Several teachers stated that they would like to have math games for students to play during math rotations or upon completion of individual math assignments. A recommendation is to store an assortment of math games in a common area in the building for teachers to check out. Teachers may donate or loan personal math games for any teacher to check out, or games can be purchased for each grade level and housed in a common area so that grade level teachers can check them out. Fifth grade teachers stated that Math in Focus did not have games for their grade level, yet games were provided with the curriculum for all of the other elementary grade levels.

Offer Professional Development

Tailor to fit needs. Missouri Department of Elementary and Secondary Education (2019b) advised “provide training in advanced content in areas in which teachers lack a strong background” (p. 10). Several teachers requested to have more professional development on the new curriculum, Math in Focus, specific to differentiating learning for students, especially on how to best meet the needs of the lowest level math students, and on developing number sense and strong mathematical foundations. Teachers would like for professional development to be tailored to meet their needs and suggested that lower and upper elementary teachers participate in such professional development geared toward their specific grades. A recommendation is to gather teacher input for professional development from each grade level, as well as building wide, and tailor the professional development to meet the desired need. Teachers from other schools could be invited to participate if the training would benefit them as well.

Math in Focus. Teachers indicated frustration with the lack of professional development on the new math curriculum. A recommendation is to have those math teachers within the district who are experiencing success host mini professional development sessions in their classrooms and share a lesson or strategies they utilize. Another recommendation is to have a professional development instructor from Math in Focus lead training on teaching with Math in Focus. A third recommendation for Math in Focus training is to have professional development specifically on utilizing the Smartboard lessons on Think Central. Most teachers indicated that they do not use them due to a lack of time and knowledge about them. A fourth recommendation is to create an

overview video of teaching with Math in Focus to share with new teachers. This could be something that a mentor teacher then discusses with the new teacher after the new teacher has viewed it. Other sample lessons demonstrated by teachers within the district could also be made available to all math teachers to provide on demand professional development.

Differentiated instruction. A majority of teachers at all grade levels requested professional development on differentiating instruction for their students. Teachers are faced with teaching classes of students with a wide range of readiness levels. As teachers try to meet the needs of all students, they are utilizing different methods of instruction including math rotations, math stations, math workshop, and online programs. Multiple teachers indicated a desire to learn more about differentiated instruction through the use of what they referred to as math workshop. A recommendation is to provide teachers with professional development options for differentiated instruction in the form of presentations by fellow teachers, hiring a professional instructor to provide professional development, or possibly reach out to the local university and inquire about resources they may be able to provide to the school district.

Boost Human Resources

Title Math teachers. A majority of the third through fifth grade teachers expressed the need for Title Math in the upper elementary buildings. Teachers realize this might not be a possibility due to finances and budget constraints. A recommendation is to analyze the feasibility of having Title Math teachers in the upper elementary buildings and share the findings from the analysis with the teachers. If this is not a possibility,

teams of administrators and teachers can work together to brainstorm alternative options for meeting the needs of the students who may qualify for such services.

Instructional coaches. Several teachers at the upper elementary level indicated it would be nice if the building's instructional coach assisted with math as well as reading and writing. A recommendation is to have the instructional coaches devote half of their time to reading and language arts and the other half of their time to math. Instructional coaches may also be able to provide professional development opportunities for teachers on math subjects.

All available adults. Due to overall behavior challenges and students in need of assistance when the teacher is holding small group instruction, a recommendation is to place available paraeducators or Title teachers in the room for support. Each school may need to be creative about how they would be able to provide each math teacher with an extra adult for perhaps 20 to 30 minutes so that teachers can focus on small group instruction rather than being interrupted by behavior issues and questions from other students not within the small group.

Parents and guardians. Teachers expressed that they would like for parents to be informed about the option of accelerated math at the fourth and fifth grades. Both lower and upper elementary teachers speculated that parents might be more likely to help their children at home with math or hold them more accountable for learning math at school if they knew students would have the opportunity to be in an advanced or accelerated math class. A recommendation would be to post information about the accelerated math classes and how students can qualify for them on the school district's website as well as place

informational materials inside registration packets for both the lower and upper elementary students.

Create partnerships. Missouri Department of Elementary and Secondary Education (2019b) advises K-12 educators to “create partnerships with local institutions of higher education or community organizations in order to provide more comprehensive services such as internships and mentorships to students and augment students’ social networks with supportive adults and peers” (p. 10). A recommendation is to have administrators and teachers reach out to University of Central Missouri faculty to explore opportunities for university students majoring in math or math education to receive hands-on experiences by working with the elementary math students. Perhaps university students could spend a certain number of hours each semester assisting with hands-on learning in the elementary math classrooms which could benefit all parties involved.

Optimize Time

Maximize time for math instruction. When asked about the ideal way to teach math or about improvements that could be made to the elementary math program, a majority of teachers expressed the need for more time in math instruction. Teachers suggested that there could perhaps be time in the day currently allotted for math instruction and an additional, shorter time in the day to focus again specifically on math. While teachers noted that this is marginally addressed during Response to Intervention, that block of time is not meeting the needs of their students. A recommendation is to analyze the current daily class schedule to see if more time could be allotted for math instruction.

Ensure time for collaboration about math. “Collaborating with other teachers helps break down barriers to effective instruction” (Helgeson, 2017, p. 44). While some teachers and administrators indicated that time is allotted for discussion about math during professional learning community meetings, not all teachers echoed the same experience. Several teachers asked for time to be set aside on the professional learning community meeting agendas for teachers to share strategies and help one another with math instruction concerns. A recommendation is to have teachers sign up to share instructional strategies for math at each collaborative meeting. Another recommendation is to share vertically across the grade level, via Google Drive or other means, various resources from the curriculum that have been adapted for purposes of differentiation. Teachers can also share outside resources they used to supplement resources needed for differentiation that were not available in the curriculum. While the school district has two separate lower and two separate upper elementary buildings, teachers can still share resources to benefit math learning for all students. Teachers can also share resources that make math more engaging and entertaining such as songs, apps, and games.

Adapt pacing guide to reflect essential learning. Multiple teachers expressed concern about teaching the Math in Focus curricula in its entirety. Teachers commented that some of the units and concepts they are teaching in the new curriculum are not Missouri learning standards. Teachers explained that while they are happy to teach concepts that are not Missouri learning standards for their grade level, it is difficult to get through the book in the given amount of time for math instruction during the school year. Therefore, a recommendation is to align the Missouri learning standards with the Math in Focus curriculum and then subsequently prioritize math units and concepts that are not

Missouri learning standards. If teachers are able to get to those concepts before the end of the school year, they will know which ones to begin with and consistency can be maintained across the grade levels regarding what the students have learned. Another recommendation is once the curriculum and standards have been aligned and prioritized for each grade, have select math teachers from K-5 come together to analyze the vertical alignment of all standards being taught to ensure there are no gaps in essential learning.

Provide Equity

Serve all students. “A paradigm shift refers to a dramatic change in methodology, practice, thinking, and planning” (Seedorf, 2014, p. 251). Several teachers expressed concern with how Response to Intervention (RtI) is being implemented or with the lack of Response to Intervention in their building. Multiple teachers indicated that only the very lowest level math students are being served through Response to Intervention. “With reference to RtI, a paradigm shift is needed to change the current methodology of teachers in implementing the model as a deficit-based model into a needs-based model” (Seedorf, 2014, p. 251). Teachers indicated that they view RtI as a way to close the gaps in student learning and not something that all students need.

Through the study, it was apparent that each of the four elementary schools are using RtI in a different manner. A recommendation is to evaluate how schools and grade levels are utilizing Response to Intervention (RtI). Evaluate what each grade level team is doing for RtI and how the team is utilizing data to benefit all students.

Provide equal opportunity. Missouri Department of Elementary and Secondary Education (2019b) recommends using a universal screener to identify gifted students. While students in Warrensburg’s accelerated math classes are not given the same

universal screener employed by the district to identify gifted students, they are given a screener for the purpose of admittance into the accelerated classes. In an effort to provide students equal opportunity for admission into the accelerated classes, a recommendation is to give the accelerated math screener to all third graders. The entire third grade team can help score the screeners. “A universal screener does not need to be used just for identifying gifted students. Data collected through a universal screener should provide the district information to support instructional planning for all students” (Missouri Department of Elementary and Secondary Education, 2019b, p. 4). The data from the accelerated math screeners would provide all teachers with more information about what students know and have yet to learn.

Summary

The perceptions of the elementary math teachers and administrators, made known in the interviews for this study, lent themselves to the identification of a lengthy, yet attainable list of recommendations for improvements to the district’s elementary math program. Provision for necessary resources and professional development desired, along with the optimization of time and human resources and an awareness of equity for all students, improves the likelihood that all Warrensburg R-VI students will be best prepared for future success.

Appendix A:



University of Missouri

CONSENT FORM TO PARTICIPATE IN A RESEARCH STUDY

Researcher's Name: Lisa J. Barabas

Project Number: 2018822

Project Title: A Study of the Elementary Math Program Utilized by a Mid-Missouri School District

STUDY SUMMARY:

You are being asked to participate in a research study. This research is being conducted to acquire and understand the teachers' and administrators' perceptions of Warrensburg R-VI School District's elementary math program for the intent of program improvement to benefit the learning of all students. You have the right to know what you will be asked to do so that you can decide whether or not you would like to participate. Your participation is voluntary. If you decide not to participate, you will not be penalized in any way. You can also decide to stop at any time without penalty. If you do not wish to answer any of the questions, you may simply not answer them.

PURPOSE OF THE STUDY:

The purpose of this study is to acquire and understand the teachers' and administrators' perceptions of Warrensburg's elementary math program for the intent of program improvement to benefit the learning of all students.

REQUEST FOR PARTICIPATION:

I am inviting you to participate in a study on Warrensburg R-VI School District's elementary math program. You are being asked to complete an interview.

QUESTIONS, CONCERNS, OR COMPLAINTS:

Please contact Dr. Sandy Hutchinson, Dissertation Chair, hutchinson@ucmo.edu, if you have questions about the research. Additionally, you may ask questions, voice concerns, or register complaints to the researcher, Lisa J. Barabas, lbarabas@warrensburgr6.org. There is also IRB which is a group of people who review research studies to make sure the rights of participants are protected. Their phone number is 573-882-3181 or email irb@missouri.edu.

Appendix B:

Email Requesting Participation in Study



University of Missouri

Hello!

My name is Lisa Barabas, and I am a doctoral candidate with the University of Missouri. I am inviting you to participate in a research study I am conducting.

A Study of the Elementary Math Program Utilized by a Mid-Missouri School District

The purpose of this study is to acquire and understand the teachers' and administrators' perceptions of Warrensburg R-VI School District's elementary math program for the intent of program improvement to benefit the learning of all students.

If you agree to participate in this study, you will be asked to participate in one interview which will be kept under one hour. The interview will focus on your experiences with Warrensburg's elementary math program. All of the information I collect will be confidential. Care will be taken in regard to your responses to protect your anonymity.

Participation in this study is completely voluntary, and there are no consequences should you choose not to participate.

Your participation in this study will be greatly appreciated! You can indicate your willingness to participate by replying to this email by (date noted here).

Thank you so much,
Lisa J. Barabas

Appendix C:

Interview Protocol for Fourth and Fifth Grade Teachers

- What grade level do you teach?
- Do you teach regular or accelerated math?
- How long have you been teaching math?
- How do you use students' prior knowledge to teach math?
- What does the range of readiness levels look like in your classroom as you begin to teach a new math concept?
- How do you modify your teaching methods or differentiate to meet students' readiness levels?
- How do your expectations differ for different students in regard to math?
- In what ways, if any, do you group students for math?
- In your experience, what has been the effect of grouping students for math?
- When planning a lesson for math, how strictly do you follow the lessons in the teacher's manual? Or do you adapt the lesson, and if so, how?
- Think about the ideal way to teach math. What would that look like?
- What concerns or questions do you get from parents about the elementary math program?
- How do you feel the current elementary math program meets the needs of all of your students?
- What recommendations do you have for improvements to the elementary math program?
- What procedures are used to identify students for accelerated math?

- What are your thoughts about accelerated math?
- What do you see as advantages of having an accelerated math class for your grade level?
- What do you see as disadvantages of having an accelerated math class for your grade level?
- If you were asked to share with parents about the benefits of the elementary math program which utilizes both regular and accelerated math classes, what would you say?
- How does having an accelerated math class at your grade level impact your students, both the students in the grade level math and the accelerated students?
- At what grade level do you believe accelerated math should initially be offered?
- In what ways do you think your math class would change if the district did not offer accelerated math?
- In what ways, if any, do the collaborative efforts in your professional learning community meetings affect how you teach math?
- Please explain how the teachers in your grade level use Response to Intervention (RtI) for math.
- What, if any, professional development do you believe you need to help you increase student math achievement?
- Is there anything that I have not asked you about your experience with teaching math in this district that you believe would be beneficial for my study?

Appendix D:

Interview Protocol for Second and Third Grade Teachers

- What grade level do you teach?
- How long have you been teaching math?
- How do you use students' prior knowledge to teach math?
- What does the range of readiness levels look like in your classroom as you begin to teach a new math concept?
- How do you modify your teaching methods or differentiate to meet students' readiness levels?
- How do your expectations differ for different students in regard to math?
- In what ways, if any, do you group students for math?
- In your experience, what has been the effect of grouping students for math?
- When planning a lesson for math, how strictly do you follow the lessons in the teacher's manual? Or do you adapt the lesson, and if so, how?
- What concerns or questions do you get from parents about the elementary math program?
- How do you feel the current elementary math program meets the needs of all of your students?
- Think about the ideal way to teach math. What would that look like?
- What recommendations do you have for improvements to the elementary math program?
- What are your thoughts about accelerated math?

- What do you believe the advantages would be of having an accelerated math class for your grade level?
- What do you believe the disadvantages would be of having an accelerated math class for your grade level?
- How would having an accelerated math class at your grade level impact your students, both the students in the grade level math and the accelerated students?
- If you were asked to share with parents about the benefits of the elementary math program which utilizes both regular and accelerated math classes, what would you say?
- At what grade level do you believe accelerated math should initially be offered?
- In what ways, if any, do the collaborative efforts in your professional learning community meetings affect how you teach math?
- Please explain how the teachers in your grade level use Response to Intervention (RtI) for math.
- What, if any, professional development do you believe you need to help you increase student math achievement?
- Is there anything that I have not asked you about your experience with teaching math in this district that you believe would be beneficial for my study?

Appendix E:

Interview Protocol for Administrators

- What is your role in the district?
- In what ways, if any, do you encourage teachers to use students' prior knowledge to teach math?
- How do your expectations differ for different students in regard to math?
- In what ways, if any, do you encourage teachers to modify their teaching methods or differentiate to meet students' readiness levels?
- In what ways, if any, do your teachers group students for math?
- In your experience, what has been the effect of grouping students for math?
- In what ways, if any, do the collaborative efforts in your professional learning community meetings affect how your teachers teach math?
- Please explain how your teachers use Response to Intervention (RtI) for math. How is this intervention benefiting your students?
- Do all parents understand that accelerated math classes are offered? If yes, how are they informed?
- What procedures are used to identify students for accelerated math?
- How do you notify students and their parents about acceptance into accelerated math?
- What do you see as advantages of having accelerated math classes?
- What do you see as disadvantages of having accelerated math classes?
- If you were asked to share with parents about the benefits of the elementary math program which utilizes both regular and accelerated math classes, what would you say?

- What, if any, professional development do you believe your teachers need to be able to increase student math achievement?
- How does having an accelerated math classes at the elementary level impact your students, both the students in the grade level math and the accelerated students?
- What concerns or questions do you get from parents about the elementary math program?
- How do you feel the current elementary math program meets the needs of all of your students?
- What recommendations do you have for improvements to the elementary math program?
- What are your thoughts about having an accelerated math class at the third grade level?
- At what grade level do you believe accelerated math should initially be offered?
- Think about the ideal way you would like your teachers to teach math. What would that look like?
- In what ways do you think your math classes in your building would change if the district did not offer accelerated math?
- Is there anything that I have not asked you about the elementary math program in this district that you believe would be beneficial for my study?

Appendix F:

Research Questions and Corresponding Interview Questions

Research question #1: What are the second, third, fourth, and fifth grade math teachers' perceptions of the elementary math program?
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Corresponding interview questions:

- How do you use students' prior knowledge to teach math?
- What does the range of readiness levels look like in your classroom as you begin to teach a new math concept?
- How do you modify your teaching methods or differentiate to meet students' readiness levels?
- How do your expectations differ for different students in regard to math?
- In what ways, if any, do you group students for math?
- In your experience, what has been the effect of grouping students for math?
- When planning a lesson for math, how strictly do you follow the lessons in the teacher's manual? Or do you adapt the lesson, and if so, how?
- Think about the ideal way to teach math. What would that look like?
- What concerns or questions do you get from parents about the elementary math program?
- How do you feel the current elementary math program meet the needs of all of your students?
- What recommendations do you have for improvements to the elementary math program?
- What procedures are used to identify students for accelerated math?
- What are your thoughts about accelerated math?
- At what grade level do you believe accelerated math should initially be offered?
- What do you see as advantages of having an accelerated math class for your grade level?
- What do you see as disadvantages of having an accelerated math class for your grade level?
- If you were asked to share with parents about the benefits of the elementary math program which utilizes both regular and accelerated math classes, what would you say?
- How does having an accelerated math class at your grade level impact your students, both the students in the grade level math and the accelerated students?

- What do you believe the advantages would be of having an accelerated math class for your grade level?
- What do you believe the disadvantages would be of having an accelerated math class for your grade level?
- How would having an accelerated math class at your grade level impact your students, both the students in the grade level math and the accelerated students?
- In what ways do you think your math class would change if the district did not offer accelerated math?
- In what ways, if any, do the collaborative efforts in your professional learning community meetings affect how you teach math?
- Please explain how the teachers in your grade level use Response to Intervention (RtI) for math?
- What, if any, professional development do you believe you need to help you increase student math achievement?
- Is there anything that I have not asked you about the elementary math program in this district that you believe would be beneficial for my study?

Research question #2: What are the administrators' perceptions of the elementary math program?
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Corresponding interview questions:

- What is your role in the district?
- In what ways, if any, do you encourage teachers to use students' prior knowledge to teach math?
- How do your expectations differ for different students in regard to math?
- In what ways, if any, do you encourage teachers to modify their teaching methods or differentiate to meet students' readiness levels?
- In what ways, if any, do your teachers group students for math?
- In your experience, what has been the effect of grouping students for math?
- In what ways, if any, do the collaborative efforts in your professional learning community meetings affect how your teachers teach math?
- Please explain how your teachers use Response to Intervention (RtI) for math? How is this intervention benefiting your students?
- Do all parents understand that accelerated math classes are offered? If yes, how are they informed?
- What procedures are used to identify students for accelerated math?

- How do you notify students and their parents about acceptance into accelerated math?
- What do you see as advantages of having accelerated math classes?
- What do you see as disadvantages of having accelerated math classes?
- If you were asked to share with parents about the benefits of the elementary math program which utilizes both regular and accelerated math classes, what would you say?
- What, if any, professional development do you believe your teachers need to be able to increase student math achievement?
- How does having an accelerated math classes at the elementary level impact your students, both the students in the grade level math and the accelerated students?
- What concerns or questions do you get from parents about the elementary math program?
- How do you feel the current elementary math program meet the needs of all of your students?
- What recommendations do you have for improvements to the elementary math program?
- What are your thoughts about having an accelerated math class at the third grade level?
- At what grade level do you believe accelerated math should initially be offered?
- Think about the ideal way you would like your teachers to teach math. What would that look like?
- In what ways do you think your math classes in your building would change if the district did not offer accelerated math?
- Is there anything that I have not asked you about the elementary math program in this district that you believe would be beneficial for my study?

Research question #3: At the beginning of the school year, what was the range in grade equivalents as determined by Star Math for each ability grouped fourth and fifth grade math class in comparison to the range in grade equivalents had the classes not been ability grouped? In addition, what was the distribution of grade equivalents for each second through fifth grade math class?

This research question will be answered using quantitative data from Star Math reports.

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VITA

Lisa J. Barabas has been an educator for the past twenty-five years. For most of her career, she taught elementary school, primarily fourth and fifth grades. In addition to this experience, Lisa also taught early childhood as well as continuing education graduate courses for K-12 teachers. Lisa served in several leadership roles throughout her career in education. Being a life-long learner herself, Lisa's passion has always been, and continues to be, to help others learn, achieve their best, and accomplish their goals.