

INCREASING STUDENT LEARNING THROUGH THE USE OF DIFFERENTIATED INSTRUCTIONAL PRACTICES IN MIDDLE GRADES MATHEMATICS

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ABSTRACT

This Dissertation in Practice examined the effect of differentiated instructional practices on student proficiency, engagement, and teacher perceptions of student learning in middle grades mathematics classrooms. The study was guided by three inquiry questions: (a) What is the effect of differentiated instruction on student proficiency in middle grades mathematics classrooms? (b) How does the use of differentiated instruction impact teachers' perceptions of student learning? and (c) How does implementing differentiated instruction influence student engagement in middle grades mathematics classrooms?

Using an improvement science framework with a convergent mixed-methods design, the inquiry was implemented across three Plan-Do-Study-Act cycles. Quantitative data sources included End-of-Grade assessments, benchmark assessments, and diagnostic measures used to examine changes in student proficiency and growth. Qualitative data sources included teacher and student surveys, focus groups, classroom observations, and walkthrough data, which were used to examine instructional practices, engagement, and teacher perceptions. Data was collected and analyzed concurrently to provide a comprehensive understanding of the impact of differentiated instruction.

Findings indicated that the implementation of differentiated instructional practices was associated with increased student engagement and improvements in student proficiency, particularly among students previously performing below grade level. Teachers reported increased awareness of student readiness, greater instructional flexibility, and improved confidence in addressing diverse learning needs. Qualitative findings further suggested that differentiated instruction fostered more inclusive learning environments and promoted higher levels of student participation and ownership of learning.

The results of this inquiry support differentiated instruction as an effective approach for addressing persistent achievement gaps in middle grades mathematics. Implications for practice highlight the importance of sustained professional learning, instructional coaching, and system-level support to ensure consistent and effective implementation. Recommendations for future research include expanding the inquiry to additional sites and examining the long-term impact of differentiated instructional practices on student achievement and instructional equity.

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DEDICATION

This dissertation represents a journey shaped by perseverance, responsibility, and faith. Balancing the roles of mother, wife, daughter, and scholar required more than discipline; it required trust, resilience, and the willingness to continue forward even when the path felt heavy. Throughout this process, faith provided steadiness and purpose, reminding me that growth often happens quietly, through commitment and resolve.

My children are my greatest motivation and constant reminder of why this work matters. Every late night and early morning carried the hope that my persistence would model courage, determination, and belief in what is possible. I pray that you always know you are capable of pursuing your dreams with confidence and faith, even when the journey is challenging.

My husband has been a steady source of strength throughout this process. His patience, encouragement, and unwavering belief in me made it possible to keep moving forward when doubt crept in. This work reflects the partnership, sacrifice, and support that are foundational to our family.

The foundation laid by my parents shaped both my character and my faith. Through example, sacrifice, and steadfast belief, I learned the value of ambition and perseverance, a foundation that carried me through this season of growth and challenge.

This dissertation is ultimately a reflection of resilience, faith, and the belief that women do not have to choose between their callings and their goals. It stands as a reminder that strength and grace can coexist, that leadership can be grounded in love, and that faith can anchor even the most demanding journeys. This work honors the roles I hold, the people who shaped me, and the belief that purpose unfolds through commitment, courage, and trust.

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The participants who contributed their time and perspectives played an essential role in grounding this research in practice. The encouragement and understanding of family members sustained this effort throughout its duration. Their support was instrumental in navigating the demands of this academic pursuit and in bringing this work to completion.

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CHAPTER 1: INTRODUCTION

Research suggests that there is a direct relationship between differentiated instructional practices and student understanding (Wilken, 2023). Differentiated instruction (DI) is an adaptive method of instruction where teachers provide multiple avenues for learning based on student readiness, interest, and backgrounds (Wilken, 2023). Differentiating instruction builds relationships between students and teachers, helping teachers to better understand the learners in their classrooms. It also assists in meeting unique learning needs, closing potential gaps between students' abilities and school performance, and identifying students who are at-risk for dropping out of school in later years (Aguhayon et al., 2023).

Differentiated instructional practices provide an opportunity to promote empathy, equity, social justice, and a supportive learning community within our schools; however, many schools are using a one-size-fits-all approach to classroom instruction. While differentiated instructional practices are often seen in elementary schools, these strategies typically cease upon entering middle school (Fazal & Bryant, 2019). Continuing these practices in middle school equips students with mastering foundational skills that are essential for high school success, a necessary objective for enrolling, enlisting, or becoming employed post high school graduation (Fazal & Bryant, 2019).

Differentiated instruction assists teachers in catering to the specific learning needs of students and ensures a successful learning environment for all learners (Pozas et al., 2020). It encompasses tiered assignments, intentional composition of student working groups, tutoring systems within learning groups, staggered non-verbal learning aids, master learning, and the granting of autonomy to students (Klepsch & Seufert, 2020). Teachers who utilize differentiated instructional practices differentiate content, process, product, and the learning environment

(Weselby, 2014).

This inquiry will examine the relationship between the implementation of differentiated instructional practices and its influence on student success in middle school mathematics classrooms at Westhaven Middle School and Royal Ridge Middle School within the Mary Beth School District, all pseudonyms. Factors examined throughout this inquiry include individual and classroom learning goals, the learning environment at large, effective strategies for reaching students, individual readiness, interest, and learning profiles. Successful implementation of differentiated instruction requires training, assessment, and regular monitoring and encompasses content, process, assessment, and the learning environment (Taylor, 2017). All of these factors will be considered and examined throughout this inquiry, which begins with an analysis of Mary Beth County Schools district-wide data. The analysis of district-wide data was a necessary first step in this inquiry, as it was a prerequisite in determining this focus of practice and its implementation sites, Westhaven Middle School and Royal Ridge Middle School.

Background of Inquiry

End of grade test scores tend to decrease as students' grade levels increase (Von Hippel & Hamrock, 2018). Students who are identified proficient in lower grades struggle to remain proficient in middle grades. Within Mary Beth County Schools some elementary schools are designated high performing, yet students who previously attended high-performing elementary schools are now a part of the population in lower performing middle and high schools, and these same students are not as proficient on end of grade and end of course tests (see Table 1). When looking at the differences between feeder elementary schools and the middle and high schools that those same students are now attending, one of the biggest differences noticed by building and district administrators is the lack of differentiated instructional practices being utilized in

Table 1

Feeder Schools and School Grades: Mary Beth County Schools (2023-24 School Year)

Elementary	School Grade	Middle/High School	School Grade
School 1 (K-4)	A	School 2 (5-8)	C
School 3 (K-8)	B	School 4 (9-12)	C

those classrooms. These findings have been discovered by school and district-level administrators when conducting classroom observations and walkthroughs as well as during instructional coaching meetings and individual conferences between teachers and administrators. Students who have received necessary foundational skills at the elementary level should be able to apply those skills in middle and high school and continue proficiency in later years (Taylor & Francis, 2019). Mary Beth County Schools data does not reflect such instructional practices, and there is a great need to increase student proficiency in middle grades. This need for change resulted in this focus of practice on differentiating instruction at the middle school level.

Low performing districts and schools in North Carolina are based on school performance grades and growth and are defined by the North Carolina General Assembly. According to this legislation, low-performing schools are public schools that do not meet expected growth and receive a school performance grade of D or F. North Carolina declares districts low performing when greater than 50% of the schools within the district are considered low performing. (NCDPI, 2023).

Mary Beth County Schools recently transitioned out of low performing district status following the 2023-24 EOG and EOC tests. As seen in Tables 2 and 3, five of the district's 13 schools are still considered low performing schools. Additionally, schools that are not performing low are making minimal growth if any growth at all. Mathematics achievement scores in schools with grade spans 3-8 are low, with a district average of 50.37%.

Teachers have consistently struggled over time to identify best instructional strategies that will result in student proficiency, especially in mathematics classrooms (Aguhayon et al., 2023). Since the beginning of public education, teachers have been expected to meet the diverse needs of students within the classroom, which often equates to decreased student achievement

Table 2

Mary Beth County Schools Proficiency Scores for 2023-24 (All Schools)

School Name	Grade Span	Letter Grade	EVAAS Growth Status	Growth Index
School 1	05-08	C	Not Met	-4.73
School 2	PK-4	A	Exceeded	+2.68
School 3	02-03	D	Met	-0.18
School 4	04-05	D	Not Met	-2.83
School 5	K-08	D	Met	+0.9
School 6	06-08	D	Met	-1.35
School 7	PK-08	C	Met	+1.71
School 8	09-12	D	Not Met	-12.66
School 9	K-08	B	Met	-0.08
School 10	09-12	C	Met	-1.43
School 11	09-12	C	Met	+0.37
School 12	09-12	A	Exceeded	+5.9
School 13	PK-1	N/A	N/A	N/A

Table 3

2023-24 NC School Performance Grades for Mathematics: Grades 3-8 in Mary Beth County Schools

School Name	Mathematics Letter Grade	Mathematics Achievement Score
School 1	B	77.18
School 2	C	49.72
School 3	A	95.47
School 4	D	46.29
School 5	D	41.12
School 6	C	45.70
School 7	D	36.51
School 8	D	31.01

(Ainscow, 2020).

Offering students alternatives to the one-size-fits-all approach seen in a typical classroom setting remains difficult for classroom teachers. Differentiation is an instructional strategy that marries expert instruction and student learning needs and interests. Expert instruction is driven by active and positive teacher responses as well as pedagogical practices that allow for academic diversity (Goddard et al., 2019). Differentiation is most effective when teachers consider content, processes, and products based on pre-and-post assessment results (Tomlinson, 2014). This provides teachers with an opportunity to tailor instruction to meet individual needs, resulting in greater student success (Tomlinson, 2014).

Current instructional practices do not result in end of grade proficiency for a large number of middle school mathematics students within the district; therefore, instructional practices will be evaluated to determine what changes should occur to assist with greater levels of student success. Following the analysis of district-wide data, it was determined that there was a great need for instructional support and the implementation of best instructional practices, specifically at Westhaven Middle School and Royal Ridge Middle School. Utilizing classroom experts, instructional coaches, and district-level leaders, differentiated instruction will be incorporated in middle school mathematics classrooms in these two schools within the district.

To increase student achievement levels, school administrators have agreed to partner with me as the scholarly practitioner leading this inquiry to implement this focus of practice at Westhaven and Royal Ridge Middle Schools, where I will work with 11 classroom teachers and one instructional coach. As the Director of Curriculum and Instruction for Mary Beth County Schools, I will work with classroom teachers, instructional coaches, instructional support specialists, and the Chief Academic Officer to implement differentiated practices throughout this inquiry.

Context of Inquiry

Mary Beth County, North Carolina is the 57th largest county in North Carolina and includes 11 towns and incorporated places. The population of the county was 47,759 in 2010 and has decreased to 44,652 according to the 2020 US Census. The projected population for 2024 is 44,570. The population is 65.7% White, 23.1% Black, and 8.4% Hispanic. The average age in Mary Beth County is 46.9. The population is comprised of 52.29% females and 47.715% males. The rate of home ownership is 72.0%, and the average family size is 2.96. Within the county, only 12.94% of individuals have attained a bachelor's degree, and only 7.62% have earned a graduate degree. The average annual salary is \$36,154. 92.69% of Mary Beth County residents speak only English; 7.31% speak other languages. The overall poverty rate in Mary Beth County is 18.7%.

School-aged residents of Mary Beth County are served by the Mary Beth County School District. Mary Beth County Schools is a rural school district in eastern North Carolina that currently serves approximately 5,500 students. The district is comprised of thirteen diversely populated schools: one PK-1, one 2-3, one 4-5, one PK-4, one 5-8, three K-8, one 6-8, three 9-12, and an early college high school. Demographic details of the district can be seen in Table 4. Five of the schools are identified low performing, and nine of the schools are Title I schools. Title I schools are schools that receive federal funding to provide supplemental educational opportunities for students. Title I schools serve disadvantaged children who are most at risk of failing to meet academic standards (NCDPI, 2024). The special education population in the district is 893. There are approximately 700 staff members including 13 principals, and 15 assistant principals serving math students in the district's 13 schools. The number of students with limited English proficiency within the district is 459.

Table 4

Demographics by Subgroup for Mary Beth County Schools for 2023-24

Demographics by Subgroup	Number of Males	Number of Females	Total Students
American Indian	5	5	10
Asian	17	10	27
Hispanic	562	509	1071
Black	883	910	1793
Two or More	181	181	362
Pacific Islander	4	1	5
White	1170	1252	2422

Mary Beth County Schools is no longer a low performing district, but five of its 13 schools are still designated low performing, with five schools designated as low performing according to the North Carolina End of Grade (EOG) and End of Course (EOC) test results. The North Carolina EOG tests measure student performance on goals, grade-level competencies, and objectives specified in the North Carolina Standard Course of Study (NCDPI, 2024). Analysis of data indicated that Mary Beth County Schools are underperforming in math, especially in Grades 4-8, as seen in Tables 5-10. Proficiency rates tend to decrease as students increase in grade level, and there is a significant decrease in proficiency between 7th and 8th grade.

Throughout the county's 13 schools, there are five schools who serve middle school students. Within those middle schools, there are 24 classroom teachers, seven exceptional children's teachers, and five instructional coaches who work with math students daily. These teachers will serve approximately 1,400 math students in the 2023-24 school year. This inquiry will occur at Westhaven Middle School, where approximately 700 math students are served daily, and at Royal Ridge Middle School, where approximately 400 math students are served daily. The mathematics department faculty at Westhaven is comprised of 9 classroom teachers teaching core instruction, three exceptional children's teachers, one instructional coach, two assistant principals, and one principal. Westhaven has been designated a recurring low-performing school with consistently underperforming subgroups in need of additional targeted support. During the 2023-24 school year, 36.51% of math students in Grades 6-8 were proficient on the NC EOG test. Math 1 students were 98.1% proficient on the NC EOC test.

The middle school mathematics faculty at Royal Ridge is comprised of 8 classroom teachers teaching core mathematics instruction, one exceptional children's teacher, one

Table 5

Mary Beth County Schools Grade 3 Math End-of-Grade Scores for 2023-2024

	Percentage of Students Proficient	Number of Students Proficient	Number of Students Tested
District	66.56	225	338
School 1	95.83	46	48
School 2	93.67	74	79
School 3	46.29	75	162
School 4	62.06	18	29
School 5	60.00	12	20

Table 6

Mary Beth County Schools Grade 4 Math End-of-Grade Scores for 2023-2024

	Percentage of Students Proficient	Number of Students Proficient	Number of Students Tested
District	55.78	217	389
School 1	92.15	47	51
School 2	97.26	71	73
School 3	37.55	80	213
School 4	39.47	15	38
School 5	28.57	4	14

Table 7

Mary Beth County Schools Grade 5 Math End-of-Grade Scores for 2023-2024

	Percentage of Students Proficient	Number of Students Proficient	Number of Students Tested
District	55.10	210	381
School 1	82.35	42	51
School 2	68.00	68	100
School 3	44.68	84	188
School 4	50.00	14	28
School 5	14.29	2	14

Table 8

Mary Beth County Schools Grade 6 Math End-of-Grade Scores for 2023-2024

	<u>Percentage of Students Proficient</u>	<u>Number of Students Proficient</u>	<u>Number of Students Tested</u>
District	55.01	236	429
School 1	79.37	50	63
School 2	60.43	55	91
School 3	48.71	19	39
School 4	47.67	107	224
School 5	41.66	5	12

Table 9

Mary Beth County Schools Grade 7 Math End-of-Grade Scores for 2023-2024

	Percentage of Students Proficient	Number of Students Proficient	Number of Students Tested
District	51.52	236	453
School 1	81.25	52	64
School 2	49.46	46	93
School 3	48.97	24	49
School 4	46.95	108	230
School 5	35.29	6	17

Table 10

Mary Beth County Schools Grade 8 Math End-of-Grade Scores for 2023-2024

	Percentage of Students Proficient	Number of Students Proficient	Number of Students Tested
District	18.21	53	291
School 1	32.14	9	28
School 2	20.97	13	62
School 3	25.00	6	24
School 4	14.91	24	161
School 5	6.25	1	16

instructional coach, one assistant principal, and one principal. Royal Ridge has also been designated a recurring low-performing school with consistently underperforming subgroups in Grades 5-8 were proficient on the NC EOG test. 100% of students were proficient on the Math 1 need of additional targeted support. During the 2023-24 school year, 49.72% of math students in EOC test.

This inquiry began by examining mathematics proficiency data throughout Mary Beth County Schools and identifying the need to increase student proficiency in middle grades as well as decrease the achievement gap in middle grades as compared to elementary grades. After surveying and observing teachers, it was determined that a one-size-fits-all approach was occurring in the majority of middle grades mathematics classrooms throughout the district, but significantly so at Westhaven Middle School and Royal Ridge Middle School. Implementing differentiated instructional practices increases student engagement resulting in higher levels of student understanding. For this reason and with increasing student proficiency being a main goal of the District Improvement Plan, the implementation of differentiated instruction and its relationship to student proficiency seemed a suitable inquiry for me to examine at Westhaven Middle School and Royal Ridge Middle School.

After analyzing the mathematics proficiency data for the district and granularly at Westhaven Middle School and Royal Ridge Middle School, several areas of concern will be addressed throughout this inquiry. District-wide data as well as survey results indicate the need to evaluate current instructional practices and utilize best instructional practices within the classroom to improve student learning and assist students with greater proficiency and growth in mathematics. This inquiry specifically charges two schools, Westhaven Middle School and Mary Beth Middle School, to implement differentiated instructional practices within mathematics

classrooms to extend interactions within the learning culture. Differentiated instructional practices promote creativity, innovation, and collaboration. In addition, differentiated instruction promotes progress monitoring and problem solving to meet the needs of individual learners, all of which are potential factors of increasing student proficiency. With a school grade of D and an EVAAS growth index of -1.35, Westhaven Middle School is in need of instructional interventions in order to increase proficiency.

Additionally, Royal Ridge Middle School is in need of instructional interventions as their school report card reflects a school grade of C and an EVAAS growth index of -4.73. EVAAS, Education Value-Added Assessment System, is a customized K-12 software system required to be used in all North Carolina public school districts. It provides educators with a variety of tools to improve student learning and reflect and improve on effectiveness. Specifically, EVAAS provides the following tools to educators: value-added reports that assess the effectiveness of teachers, schools, and districts; projection reports that predict how students will perform in the future; diagnostic reports that provide data-drive support to help students reach their potential; teacher reports that help administrators identify the strength of effective teachers and help struggling teachers improve; and customized reports that predict student success, show the effects of schooling, and reveal patterns in subgroup performance (NCDPI, 2024). In an effort to increase proficiency, the primary focus of this inquiry will be the implementation of differentiated instructional practices and its relationship to proficiency at Westhaven Middle School and Royal Ridge Middle School.

Statement of the Problem of Practice

The focus of this inquiry is to incorporate differentiated instructional practices in middle school mathematics classrooms at Westhaven Middle School and Royal Ridge Middle School.

Elementary teaching practices such as differentiated learning have been extensively researched, and the effects of that instructional strategy are positive (Wilken, 2023). While differentiated learning is seen throughout Mary Beth County in elementary classrooms, there is a lack of differentiated instructional practices occurring in middle school mathematics classrooms within the district, and specifically at Westhaven Middle School and Royal Ridge Middle School. Classrooms are becoming increasingly diverse in the areas of race, ethnicity, language, religion, sexual orientation, and socioeconomic status, and learning needs are at an all-time high (Theoharis & Scanlan, 2020).

To assist in incorporating differentiation in middle school mathematics classrooms, a re-implementation of the adopted math curriculum, enVision, was launched in August of 2023. The enVision math curriculum was implemented in the fall of 2022, however, teachers did not receive adequate professional learning and, therefore, did not implement the curriculum with fidelity. Maneuvering the Middle, an education blog that includes valuable tips for lesson planning, classroom technology, and math concepts in the middle school math classroom, was also incorporated throughout the district as an intervention and differentiation tool and is being used in middle school mathematics classrooms across the county. In observing and surveying middle school instructional coaches, district-level leaders, teachers, and school administrators during the 2023-24 school year, it was determined that the majority of middle school math instruction was taught using a one-size-fits-all approach.

Class periods of 80-90 minutes in middle schools allow for intervention and differentiation during instructional class periods; however, neither of those practices typically occur within the regular instructional block. Middle schools have an intervention time and administrators report that small successes occur during intervention periods, but, according to

site-based instructional coaches and school administrators, those practices do not carry over into the regular instructional block.

Math teachers and coaches have reported that they need additional math curriculum training, that the adopted curriculum is only being used in part, and that they could benefit from professional learning on what an 80–90-minute math block should look like. Administrators have also asked to receive professional learning on the “look-fors” regarding best instructional practices, the implementation of the math curriculum, and how to best support math teachers. Teachers need guidance in the implementation of differentiated instructional practices (Smale-Jacobse et al., 2019). When differentiating instruction, teachers must consider the content, the process, the product, and the learning environment (Magableh & Abduilah, 2020).

Inquiry Guiding Questions

This inquiry is guided by the following questions:

1. What is the effect of differentiated instruction on student proficiency in middle grades mathematics classrooms?
2. How does the use of differentiated instruction impact teachers’ perceptions of student learning for middle school mathematics?
3. How does implementing differentiated instruction impact student engagement in middle school mathematics classrooms?

Implementing differentiated instruction and subsequently answering these questions will help determine if differentiated instructional strategies in middle school classrooms have a direct impact on student proficiency. The inquiry questions support the focus of this inquiry by addressing the effect that differentiated instruction has on student proficiency, the influence that differentiation has on teachers perceptions of student learning, and the correlation between’

perceptions of student learning, and the correlation between differentiated instruction, student engagement, and student learning.

Overview of Inquiry

To answer the questions guiding this inquiry, I, the scholarly practitioner, will use an improvement science method with a convergent, mixed methods design. Throughout this inquiry, I will concurrently collect and analyze quantitative and qualitative data related to differentiated instruction, student learning and engagement, teacher perceptions of learning and engagement when differentiating instruction, and the connection between student engagement and student learning when utilizing a differentiated instructional approach.

Utilizing research on differentiated instructional practices, action steps will be implemented to study the relationship between student engagement and success and the implementation of differentiation within middle school math classrooms. To start, site-based instructional coaches and classroom teachers will receive professional development on differentiated instruction, what it encompasses, and how it is best implemented within the middle school classroom. Teachers in two middle schools, Westhaven Middle School and Royal Ridge Middle School, will implement differentiated instructional practices into their mathematics classrooms as part of this study. Additionally, some teachers will continue teaching utilizing traditional, non-differentiated instructional methods. Classroom data will be studied and compared throughout the inquiry to determine the relationship between student learning and engagement in differentiated classrooms and non-differentiated classrooms.

In order to organize the inquiry, I will utilize three phases of the Plan-Do-Study-Act (PDSA) model, which includes cycles of testing, learning, and application (Hinnant-Crawford, 2018). Phase One of this PDSA cycle will involve examining existing proficiency data to

determine growth and achievement needs for students. Gathering this data will provide a baseline analysis of student proficiency, achievement gaps, and needed instructional practice changes in an effort to increase student proficiency. Phase One of this inquiry will involve the examination of quantitative data such as End of Grade test results, district Common Formative Assessment proficiency, i-Ready, and NC Check-Ins to establish baseline data of student proficiency, achievement gaps, and needed instructional changes. In addition, the analysis of this data will be used to determine student growth and achievement needs for individual students. During Phase One, an initial focus group will be conducted as well as teacher surveys and student surveys in an effort to gather additional baseline data such as teacher mindset, current instructional practices, and teacher buy-in. Based on focus group, teacher survey, and student survey results, a tailored, professional learning plan will be created for teachers who are participating in the study.

Phase Two will include developing an implementation plan for the execution of differentiated instructional practices within middle grades mathematics classrooms. These practices will be primarily based on differentiating core instruction through the use of small groups, however, student choice to demonstrate understanding and mastery will also be incorporated within this study. Professional learning will be conducted according to the plan that was formulated during Phase One. Quantitative and qualitative data will be examined at regular intervals (each grading period of nine weeks) throughout the inquiry. Following the delivery of professional learning on differentiated instructional practices will be implemented in the classrooms of teachers who are participating in the study. During the implementation process, I will assist teachers with the planning, execution, and revision of classroom practices as needed.

Phase Three will begin by examining all proficiency data (EOGs, NC Check-Ins, Common Formative Assessments, and school-based diagnostic assessment results such as i-

Ready and IXL) to determine if improvement or change has occurred. A final focus group as well as end-of-study teacher and student surveys will be conducted and analyzed to establish outcome data. Upon determining the relationship between differentiated instructional practices, student engagement, and student proficiency, all findings will be shared with collaborative partners and stakeholders. In each phase of this inquiry, collaborative partners will be key equity partners in ensuring that the inquiry follows the conceptual framework of Gardner's Theory of Multiple Intelligences and the Multi-Tiered System of Supports.

Collaborative Inquiry Partners

It is difficult to organize and monitor instruction when utilizing an individualized student approach, and professional learning in these areas is a necessity (Smale-Jacobse et al., 2019). To complete this dissertation of practice within Mary Beth County Schools, I will collaborate with school administrators, instructional coaches, instructional support specialists, the Chief Academic Officer, and the district superintendent to provide professional learning on differentiated instructional practices to middle school mathematics teachers.

Professional learning on differentiated instructional practices will be administered to study participants at the beginning of the inquiry, as needed throughout the inquiry, and upon participant request. Additionally, I will provide professional learning to instructional coaches, who are also collaborative partners, during bi-monthly instructional coaching meetings. In turn, instructional coaches will offer and conduct additional professional learning opportunities to classroom teachers who are participating in the study. Collaborative inquiry partners and I will also conduct walkthroughs in middle schools, provide feedback to teachers, model differentiated practices as needed, and collaborate with teachers to design a mathematics schedule that incorporates differentiated instructional practices within the regular math block. The

instructional support staff will assist me with the implementation, teacher support, and classroom walkthroughs, and remain visible on the school campus as often as possible. I will keep participation logs and records of professional learning sessions as well as school and classroom visits. Collaborative inquiry partners will also conduct classroom walkthroughs and observations, and we will analyze findings together throughout this inquiry.

Theoretical and Conceptual Framework

Gardner's Theory of Multiple Intelligences provides a theoretical framework for this inquiry. As seen in Figure 1, Gardner's theory of multiple intelligences suggests that there are eight intelligences defined as: logical-mathematical, linguistic, spatial, musical, bodily-kinesthetic, personal, and naturalist. In his theory, Gardner suggests that the eight intelligences operate interdependently and complement each other as individuals develop skills and solve problems (Brualdi, 1996). The theory also suggests that teachers must think of all intelligences as equally important and should structure material in a way that engages most or all of the intelligences or allows students opportunities to show learning through the use of multiple intelligences. This theory supports differentiation as it deviates from the traditional one-size-fits-all approach to learning that is seen in traditional classrooms. All students come to the classroom with their own unique strengths and weaknesses, and many learning styles and intelligences can be found within one classroom (Brualdi, 1996). Therefore, teachers must allow students opportunities to use their own developed intelligence to assist in the understanding of instructional content.

In addition to Gardner's Theory of Multiple Intelligences, the Multi-Tiered System of Supports (MTSS) provides a conceptual framework for this inquiry on the incorporation of differentiated instructional strategies within the classroom. MTSS explains the need for a multi-

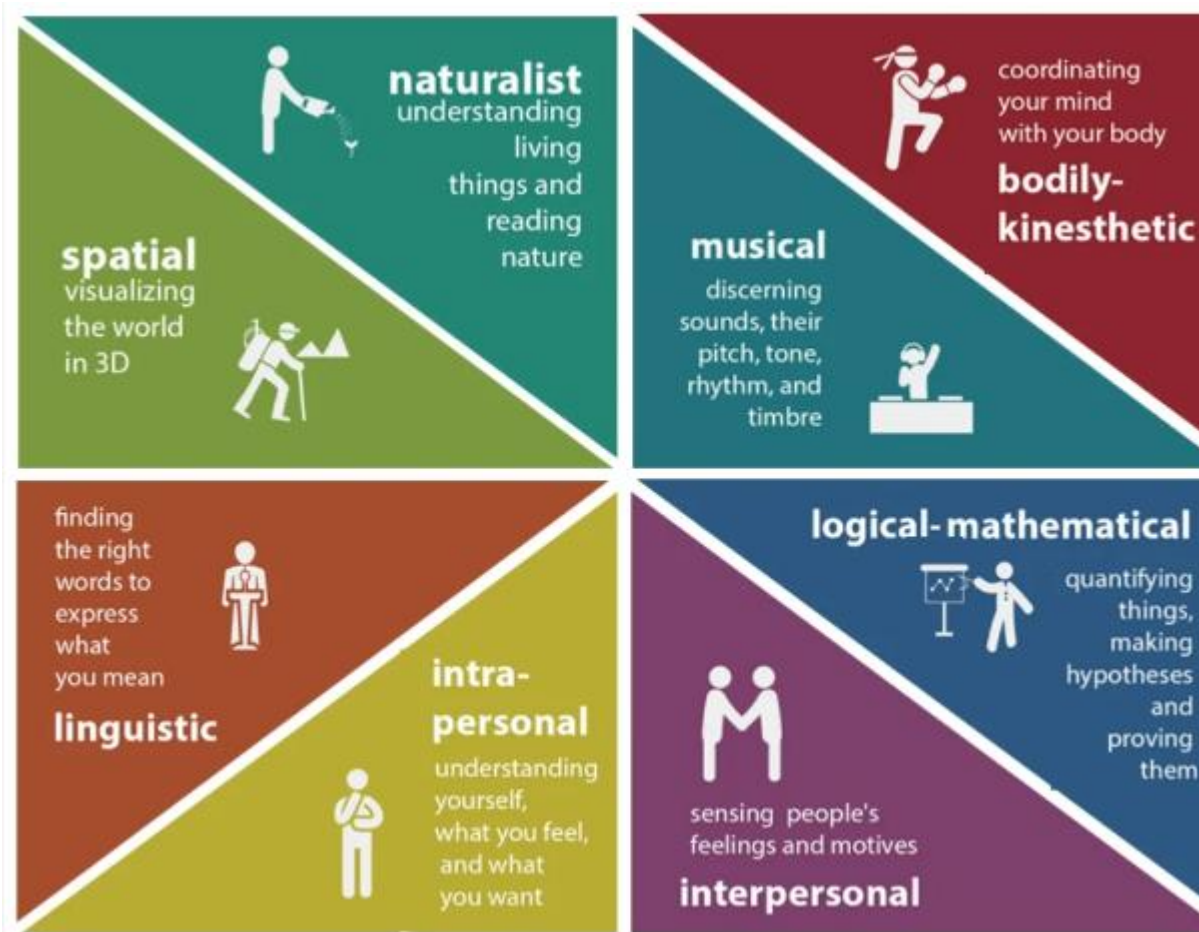


Figure 1. Gardner's Theory of Multiple Intelligences.

tier approach to differentiating core instruction as seen in Figure 2. While its focus is often on tiers 2 and 3, where students require supplemental or intensive instructional interventions, a main component of MTSS is Tier 1, the core curriculum that is delivered to all students. When implementing Tier 1 instruction effectively, the curriculum is differentiated in a manner that assists all students in learning and achievement (Averill & Rinaldi, 2011). Throughout this inquiry, differentiated instructional practices will be implemented in middle grades mathematics classrooms to increase engagement and provide an inclusive atmosphere in which all students can learn. The implementation of differentiated practices will require teachers to design lessons that respond to the needs of all students by eliminating the one-size-fits all approach to instruction. By incorporating differentiated practices, teachers will focus on the specific needs of all students and create student-centered environments that will potentially increase student engagement and proficiency.

Definition of Key Terms

Several key terms are used throughout this inquiry and are defined as follows:

Blended Learning – any formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace (Fazal and Bryant, 2019).

Cognitive Load Theory – a theory of instruction based on human cognitive architecture that assumes that secondary knowledge is generally acquired through interactions with others and requires conscious processing of information in working memory and alignment with information already encoded and stored in long-term memory (Evans et al., 2023).

Common Assessment – an assessment typically created collaboratively by a team of teachers responsible for the same level or course (DuFour et al., 2008).

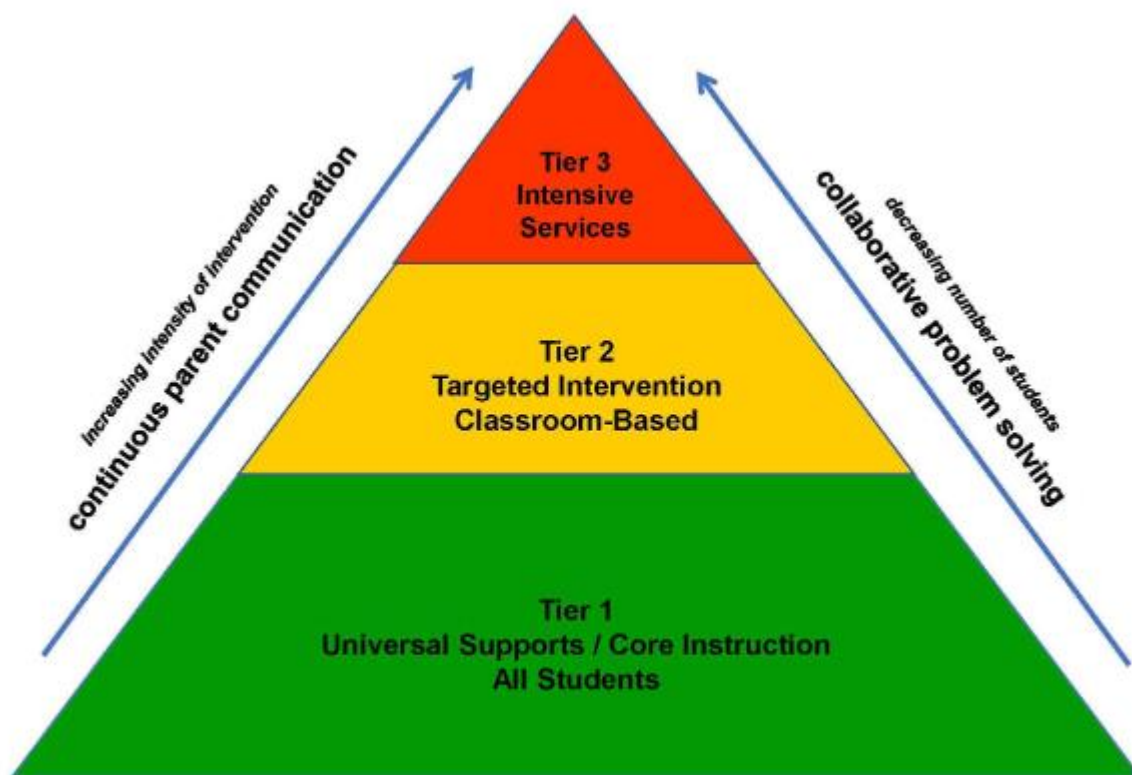


Figure 2. Multi-Tiered Systems of Support.

Differentiated Instruction - an instructional strategy that assists teachers in meeting the diverse needs of all learners; personalized learning because it customizes instruction to meet the individual needs of students (Jacobse, 2019). When differentiating instruction, teachers move from the common practice of instructing all students as a large group using the same material and tasks to ensuring that each individual student receives the instruction, materials, and tasks they need to maximize their own individual learning (Eidson, 2007).

Education Value-Added Assessment System (EVAAS) - a customized software system available to all North Carolina school districts that provides educators with tools to improve student learning and to reflect and improve on their own effectiveness (North Carolina Department of Public Instruction, 2024).

Every Student Succeeds Act (ESSA) - a federal law which allowed states to have greater latitude in determining when and how standardized testing would occur and allowed states to include other measures of student and school performance as long as they adhered to federal guidelines (US Department of Education, 2024).

Flexible Grouping - the practice of varying grouping strategies for instruction. Flexible Grouping includes configuring students in small groups, partners, individually or whole group based on the needs and interests of students (Hoffman, 2002).

Flipped Classroom - a pedagogical approach that inverts what is typically completed inside the classroom with what is typically completed outside of the classroom (Malik, 2019).

Individuals with Disabilities Education Act (IDEA) - a federal law that was passed in 1975 ensuring that children with disabilities had equal and fair access to public education (US Department of Education, 2024).

Instructional Design - the process by which instruction is designed (Klepsch, 2019).

i-Ready- an online reading and mathematics program that helps teachers determine student needs, personalize their learning, and monitor progress throughout the school year (Curriculum Associates, 2024).

IXL- an online learning platform that provides students with personalized support in math, language arts, and science (IXL, 2024).

Multi-Tiered System of Supports (MTSS) - a proactive and preventative framework that integrates data and instruction to maximize student achievement and support students social, emotional, and behavior needs from a strengths-based perspective (American Institutes for Research, 2024).

No Child Left Behind (NCLB) - a federal law that sought to close the achievement gap between minority students and their more advantaged peers and required states to rethink their existing strategies for how they measured student performance (US Department of Education, 2024).

Professional Learning - an internal process in which individuals create professional knowledge through interactions with information in a way that challenges previous assumptions and creates new meanings (Timperley, 2011).

School Turnaround - a dramatic and comprehensive intervention in a low-performing school that produces significant gains in achievement within two years and readies the school for the longer process of transformation into a high-performance organization (Kutash et. al, 2010).

Assumptions

One of the greatest misunderstandings of differentiation is that rigor is lessened throughout the process (Bondie, 2019). Through the process of differentiation, instruction is tailored to meet the diverse learning needs of all students while maintaining rigor and increasing

clarity, access, and relevance for all students (Bondie, 2019). For the purpose of this inquiry, it is assumed that teachers will be receptive to and attend professional development opportunities surrounding differentiated instructional practices so that these practices may be implemented with fidelity within the classroom. It is also assumed that teachers will implement these practices into their classrooms, monitor students' progress, and ensure student engagement on a daily basis throughout the school year. It is assumed that support staff and school administrators will remain supportive of the implementation for the entirety of the school year and that students will actively participate in classroom activities. Finally, it is assumed that teachers who are participating in the inquiry will remain employed by Mary Beth County Schools at Westhaven Middle School and Royal Ridge Middle School throughout the entirety of the inquiry and implementation of Differentiated Instruction.

Scope and Delimitations

This inquiry was designed to determine the impact that differentiated instructional practices have on student proficiency in 6th, 7th, 8th, and Math 1 middle school mathematics classrooms at Westhaven Middle School and Royal Ridge Middle School. This inquiry engages the reader with insight into the challenges and benefits of differentiated instruction with a specific focus on its relationship to engagement and student learning. The school locations were determined based upon need and the school administrators' willingness to participate in this inquiry. The inquiry locations are specific to Westhaven Middle School and Royal Ridge Middle School. Therefore, the scope of this inquiry will be limited to teachers who provide formal consent to participate in the implementation of differentiated instructional practices in their classrooms.

Westhaven Middle School and Royal Ridge Middle School have historically been

deemed low-performing and encompass consistently underperforming subgroups in need of additional targeted support. This inquiry, specific to Westhaven and Royal Ridge, will examine the implementation of differentiated instructional practices and its correlation to engagement and proficiency in the mathematics classroom. A formal consent to examine and track student data was obtained prior to the beginning of this inquiry.

Limitations

This inquiry, and data collected therein, will be conducted at Westhaven Middle School and Royal Ridge Middle School. It is important to note that there is a high rate of teacher and student turnover within the county which may result in difficulty tracking and analyzing data throughout this inquiry. The district teacher turnover rate following the 2022-23 school year was 17.4%.

The significance of this inquiry may be limited due to time constraints for teachers, as the implementation of differentiated instruction requires additional planning and monitoring of student progress. Differentiated instruction can be more difficult to effectively implement in classrooms with higher student numbers, therefore class size may be a potential limitation to this inquiry. Another potential limitation is the ability of teachers to understand differentiated instruction in its entirety, as it is easy to lessen rigor when attempting to differentiate, which is not a component of differentiated instruction.

Significance of Inquiry

Our nation's students are underperforming mathematically (Wilken, 2023). That fact is reflected throughout the Mary Beth County Schools district. In 2022-23, the district was a low-performing district with seven of its schools designated low performing. In 2023-24, two of those schools moved out of low performing status resulting in the Mary Beth County schools no longer

being a low performing district, however, there is a significant need to increase math proficiency at Westhaven Middle School and Royal Ridge Middle School. Literature indicates that students are more likely to become proficient in math standards when exposed to flexible grouping, a component of differentiated instruction (Wilken, 2023). Flexible grouping is the practice of varying grouping strategies for instruction and includes configuring students in small groups, partners, individually or whole group based on the needs and interests of students (Hoffman, 2002). Teachers agree that differentiated instruction is essential to meeting diverse learning needs, but they are intimidated by the concept. Engagement is a crucial component at the adolescent level, and it is essential that teachers find ways to motivate students while also promoting a positive mindset (Wilken, 2023).

Implementing differentiated instruction and providing additional support to struggling students addresses learning gaps (Aguhayon et al., 2023). The incorporation of differentiated instructional practices within middle school mathematics classrooms could be a vital strategy in decreasing the achievement gap at Westhaven Middle School and Royal Ridge Middle school.

Literature suggests that mathematics learning gaps are wider than reading gaps and that learning gaps increase as students increase in grade level (Hansen et al., 2018). Due to large learning gaps and a lack of understanding in foundational mathematics skills, it is difficult for students to attain mastery in higher-level mathematics courses as well as become college and career ready by the end of high school. Because math is a progression of foundational concepts, students are reluctant to even attempt grade-level mathematics concepts when there are gaps in foundational understanding. Because differentiated practices tailor instruction to meet the needs of all students, there is a greater chance that foundational gaps will be minimized when using this approach. Closing foundational gaps results in greater student achievement, which could

potentially result in school turnaround (Hackenburg et al., 2021).

Advancing Equity and Social Justice

“Differentiation is a philosophy of teaching rooted in deep respect for students, acknowledgment of their differences, and the drive to help all students thrive” (Smale-Jacobse et al., 2019, p. 1). In order to equitably serve all students, educators should consider differentiating instruction for students through small group and individualized instruction. Doing so not only improves outcomes and increases engagement but promotes inclusivity, a social-emotional need that is at an all-time high for all students (Wilken, 2023).

When mathematics teaching is differentiated, it boosts academic achievement and engagement, all while fostering an inclusive culture that values each individual learner (Aguhayon et al., 2023). Positivity and inclusivity are an essential part of social justice and equity. Differentiating instruction allows classrooms the opportunity to become more heterogeneous and accommodates for cultural and educational differences, which results in the opportunity for a fair educational system (Smale-Jacobse et al., 2019).

To be equitable, teachers must ensure that all students have access to the tools needed to be successful. Many educators agree that equity is a right for all students, however, many student needs are often overlooked within the classroom (Wilken, 2023). A one-size-fits-all classroom approach does not ensure equitable learning. Teachers must find ways to instruct and support student learning in a way that fosters academic success and growth in all students.

Differentiated learning promotes equity and improves students’ confidence levels (Aguhayon et al., 2020). It is a way to raise achievement for all, regardless of background, culture, interest, readiness, preference, or need. (Magableh & Abduilah, 2020). If differentiated instructional practices are not occurring within our schools, a social justice framework is not

being implemented within our school systems. Differentiating instruction is essential in the inclusive classroom, therefore differentiation is a moral obligation (Tomlinson, 2016).

Advances in Practices

This inquiry builds upon the idea that low academic proficiency in middle grades mathematics classrooms is, in part, a direct result of using a one-size-fits all teaching approach within the classroom. This inquiry seeks to determine whether differentiated instructional practices have a positive impact on student learning, engagement, and proficiency. Additionally, it seeks to determine how differentiated instructional practices affect student engagement and if differentiated instructional practices in combination with increased student engagement does, in turn, result in higher proficiency levels within the middle school mathematics classroom. Throughout this inquiry, the use of a one-size-fits all approach in middle school mathematics classrooms will be challenged and the incorporation of differentiated, individualized instruction will be promoted.

It is anticipated that this inquiry will provide evidence in favor of implementing differentiated instructional strategies within the classroom. As a result of this inquiry, it is anticipated that teachers may have a greater understanding of differentiated instructional strategies, incorporate such strategies within their classrooms, and that teacher and student engagement will, as a result, increase leading to higher levels of standards mastery and proficiency within the mathematics classroom.

Summary

Differentiated instructional practices aim to support the academic, social, and emotional needs of all students. While teachers are responsible for providing students equal access to learning, they often struggle to meet the professional demand of adapting instruction to meet the

needs of all learners. In order to differentiate effectively, teachers must adapt the content, process, product, and effect of the curriculum to meet individual students' learning needs. Additionally, they must consider student diversity, teaching strategies, learning activities, individual student needs, and optimal learning outcomes.

With school performance on the decline, teachers are forced to utilize additional instructional strategies in order to meet the needs of all students. Differentiated instructional practices are often described as strategies that enable teachers to customize instruction for the purpose of fostering student understanding. This inquiry aims to determine the relationship between differentiated instructional practices, student engagement, and student proficiency.

Chapter 2 will expand on the literature behind the theoretical and conceptual frameworks supporting this inquiry. The chapter will explore literature associated with differentiated instructional practices and focus on the history, complexity, challenges, and benefits of differentiation. Additionally, legislation such as The Individuals with Disabilities Education Act, No Child Left Behind, and the Every Student Succeeds Act will be reviewed. Chapter 3 will explore the techniques used in this investigation, including each phase of the improvement science process.

CHAPTER 2: LITERATURE REVIEW

The purpose of this study is to examine the effectiveness of differentiated instructional strategies in middle grades mathematics classrooms. Reviewing literature as well as theoretical and conceptual concepts provides context for this study. This literature review addresses differentiated instruction as well as its instructional practices and the decision-making process involved in planning differentiated instruction. In a differentiated classroom, content, process, and product are strategically individualized to meet the diverse learning needs of students. Building relationships, understanding students' learning profiles, and considering cultural backgrounds are crucial to effective differentiated instruction and are also examined during this study.

The Individuals with Disabilities Education Act, No Child Left Behind, and the Every Student Succeeds Act are critical topics of this literature review. The importance of rigor and knowledge as well as Gardner's Theory of Multiple Intelligences and the Multi-Tiered System of Supports are also thoroughly reviewed in this study as they provide theoretical and conceptual framework for this inquiry. In addition, this review includes an analysis of the types of differentiated practices such as blended learning and flipped classrooms.

This literature review consists of references obtained from scholarly articles, books, websites, and peer-reviewed journals. References used in this study date from 2006 to 2024, as literature from nearly twenty years ago is used to provide context surrounding its core definition. While differentiated instruction has evolved over the years, its history dates back to the 1600s. Major topics include differentiated instruction defined, the history of differentiated instruction, the benefits of differentiated instructional practices, the challenges of implementing differentiation in the classroom, and supporting differentiation in the classroom.

Theoretical and Conceptual Framework

Both theoretical and conceptual framework provide a guideline for the research in this inquiry. The MTSS, Multi-Tier System of Supports, theory is a theoretical, proactive framework that uses data and instruction to help students achieve success and receive high quality educational opportunities regardless of learning style or need (Howley et. al, 2023). It is specifically defined as a “proactive and preventative framework that integrates data and instruction to maximize student achievement and support students’ social, emotional, and behavior needs from a strengths-based perspective” (Center on Multi-Tiered Systems of Support, 2024, p. 1). As seen in Figure 2, the framework uses a three-tier model of instruction with each tier addressing specific academic needs.

Tier 1 includes core classroom instruction that all students receive. Within this tier, teachers utilize a research-based curriculum to provide students with high-quality instruction. Academic, social, emotional, and behavioral supports are offered to all students. Students receive instruction on schoolwide expectations and norms to assist with social, emotional, and behavioral needs. Teaching and learning objectives are articulated, and instruction is differentiated for students on, above, and below grade level Data is used to address student needs, and instruction is constantly modified based on data analysis. This tier also includes enrichment for students exceeding benchmark goals (Center on Multi-Tiered System of Supports, 2024).

Tier 2 incorporates small group instruction to meet the academic, social, emotional, and behavioral needs of all students. Unlike Tier 1, Tier 2 incorporates the use of validated intervention programs. Delivery of instruction is consistent and standardized, incorporating evidence-based intervention practices. Tier 2 instruction is prioritized for 15-20% of the student population and occurs in addition to Tier 1 instruction. Small group sizes range from a minimum

of 3 to a maximum of 7 students. Progress monitoring is an essential component of Tier 2, occurring at least every 2 weeks but no longer than once a month. Frequency, duration, and length of interventions are determined by the intervention coordinator. Increased family communication and feedback on targeted skills increases within this tier (Center on Multi-Tiered System of Supports, 2024).

Tier 3 includes individualized, intensive interventions and is designed to assist students with severe academic, social, emotional, and/or behavioral needs, including students with disabilities and Individualized Education Plans (IEPs). This tier involves a data-driven process that aims to provide increased intensity and individualization to students. 3-5% of the student population are served within this tier as students who are identified most at-risk. Interventions are individualized and adapted to address student needs based on data. Group sizes of 3-5 are optimal but vary based on age and student need. It is essential that adequately trained staff provide interventions during this tier. Progress monitoring and re-grouping occurs weekly throughout this tier (Center on Multi-Tiered System of Supports, 2024).

The goal of MTSS is to customize instructional practices in a manner that provides equitable educational experiences for all students while overcoming academic learning challenges. Incorporating MTSS strategies within schools reduces the overlooking of students with complex needs, especially those with significant cognitive disabilities (Howley et.al, 2023). The framework has proven to improve academic understanding as well as social, emotional, and behavioral challenges. Additionally, it increases teacher effectiveness (Whalen, 2023.)

MTSS is data-driven and prevention-based. When utilizing MTSS, educators provide a wide range of supports that address individual student needs, which is also seen when differentiating instruction. When using the MTSS model, differentiated instructional support is

available to all students (Massengale, 2020). MTSS directly supports the integration of differentiated instruction at the Tier 1 level, supporting that implementing differentiated instruction in Tier 1 reduces the amount of students needing support in Tiers 2 and 3 (Thomas, 2023).

Howard Gardner's Theory of Multiple Intelligences provides a conceptual framework for this study. Intelligence is "the ability to perceive information and retain it as knowledge for applying to itself or other instances of knowledge or information, thereby creating referable understanding" (Tamilselvi, p.1, 2015). Howard Gardner's Multiple Intelligences Theory (MI) suggests that there are eight or more autonomous intelligences, that individuals use these intelligences collaboratively and individually, and that individuals are not born with all of the intelligence that they are capable of encompassing. The eight intelligences include linguistic, logical-mathematical, spatial, musical, naturalist, bodily-kinesthetic, interpersonal, and intrapersonal. (Davis et. al, 2011).

Linguistic intelligence is intelligence related to spoken and written language. It includes the ability to learn different languages as well as the ability to use one's predominant language to accomplish oral and written goals such as public speaking or writing books. Logical-mathematical intelligence includes an individual's ability to analyze, compute, reason, or investigate scientific or mathematical problems. Individuals with logical-mathematical intelligence are critical thinkers. Spatial intelligence includes one's ability to perceive visual information accurately. Individuals with spatial intellect are typically excellent drawers and puzzle builders. Additionally, they have a good sense of direction. Those with bodily-kinesthetic intelligence have balance, physical coordination, and flexibility. They are able to use their bodies to perform skills or solve problems through mind-body coordination. Musical intelligence

includes the ability to compose, perform, appreciate, and express music. Individuals with high musical intelligence recognize pitch, rhythm, and tone. An individual with interpersonal intelligence has the capacity to understand and interact effectively with others. Interpersonal intelligence includes the ability to sense the temperament, intentions, and frustrations of those around them. Intrapersonal intelligence includes the ability to understand oneself. Those with intrapersonal intelligence are self-aware and able to articulate emotions, fears, and desires. Naturalist intelligence involves sensitivity to the environment around oneself. Individuals with naturalist intelligence recognize the natural world and differentiate among living things. (Morgan, 2021).

The implications of the MI theory for educators include the promotion of content delivery and skill development. The MI theory includes the belief that learners do not retain knowledge unless they have taken an active, personal role in their own learning. This includes asking questions, making predictions, conducting experiments, analyzing data, participating in hands-on activities, and transforming information as needed (Morgan, 2021). Some intelligences operate on specific content, while others are used to make sense of specific information. Because individuals use several different intelligences while learning, it is essential that educators offer opportunities for students to utilize multiple intelligences (Davis, 2011). Utilizing multiple intelligences in the classroom creates opportunities for students to develop skills and understanding (Angorro, 2024).

Multiple intelligences are incorporated in the classroom through differentiated instructional practices (Angorro, 2024). Students learn better when they actively participate in instruction, and differentiated instruction based on multiple intelligences provides motivation for students and increases engagement (Gomaa, 2014). Gardner's theory of MI suggests that schools

should provide students with differentiated instructional opportunities that deliver content and assess student knowledge based on multiple intelligences (Tafti, 2014).

Differentiated Instruction

Student populations across America are increasing in diversity, and teachers are tasked with appropriately addressing a variety of learning needs every day (Pozas, 2020). In public school classrooms, student abilities can span as many as five grade levels (Bondie, 2019). Cultural backgrounds, learning styles, student interest, and motivation or lack thereof contribute to the diversity of classrooms (Pozas, 2020). Differentiated instruction is an instructional strategy that assists teachers in meeting the diverse needs of all learners (Jacobse, 2019), and research suggests that there is a direct correlation between differentiated instructional practices and student understanding (Wilken, 2023). When differentiating instruction, teachers move from the common practice of instructing all students using the same material and tasks to ensuring that each individual student receives the instruction, materials, and tasks they need to maximize their own individual learning (Eidson, 2007). Differentiating instruction builds relationships between students and teachers, helping teachers to better understand the learners in their classroom. It also assists in meeting unique learning needs, closing potential gaps between students' abilities and school performance, and identifying students who are at-risk for dropping out of school in later years (Aguhayon et al., 2023).

Many teachers utilize a one-size-fits-all approach to teaching (Bondie, 2019), however students come to school with different skills, talents, and interests (Eidson, 2007). Differentiated Instruction is a suggested practice for effectively meeting diverse learning needs in public school classrooms, and it requires teachers to use a three-part decision-making process when planning instruction (Bondie, 2019). To begin the differentiation process, teachers must first examine the

academic diversity within their classroom. Secondly, they must analyze changes that must occur to increase clarity, access, rigor, and relevance for students. Thirdly, they must tailor their instruction to increase clarity, access, rigor, and relevance for all students. This process repeats itself as student learning needs change and students' progress. When planning instruction, this process is referred to as a CARR Check and is described in Table 11 (Bondie, 2019).

In differentiated classrooms, teachers determine student skills and talents early in the year, continuously assess growth, and provide students with learning tasks that improve individual skills and talents (Eidson, 2007). To implement this instructional model, teachers must take proactive steps. In a differentiated classroom, teachers are aware of learning styles and interests and design curriculum and instruction that provides success and challenges for all students regardless of academic ability (Eidson, 2007). Teachers must also determine what will provide the highest level of engagement to students. This means that instruction must be presented in a variety of ways: small groups, paired learning activities, whole group, and individual tasks. The teacher must also determine how students who have already mastered specific standards can assist other students in furthering their understanding of material (Eidson, 2007).

Every portion of instruction including content, process, and product can be differentiated (Taylor & Francis, 2019). In a differentiated classroom, the teacher modifies content, process, and product as described in Figure 3 in order to improve learning for all students. Teachers can differentiate what students learn by formatting instruction to address learning objectives specific to student needs. In regard to content, all standards can be mastered via diverse instructional avenues, which allows students an opportunity to make sense of an objective and develop that skill using their own individual learning style.

Table 11

CARR Check: Question for Teacher Reflection

CARR	Reflection Prompt
Clarity	Is the task clear to ALL students? Are the words understandable by all students? Are students expected to understand vocabulary that may be vague, have multiple meanings, or are in unfamiliar contexts?
Access	Could ALL students complete the task independently and feel capable?
Rigor	How much effort is required of different students? What would students find complex?
Relevance	Would ALL students find this task important, interesting, valuable, and/or useful?

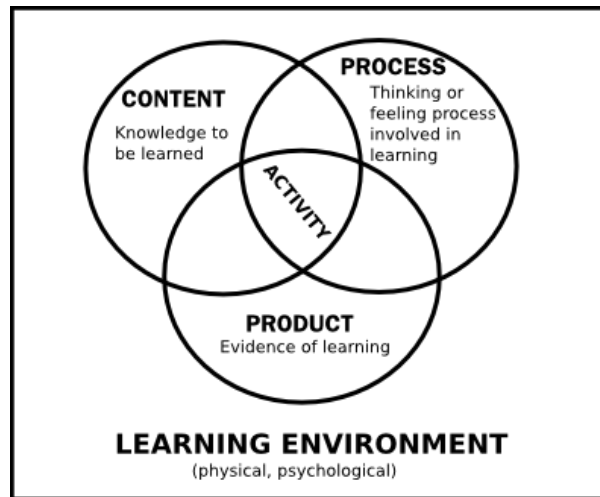


Figure 3. Modifications in the differentiated classroom.

The final process in differentiating instruction is providing multiple ways that students can demonstrate their learning. (Taylor & Francis, 2019). For example, students who love public speaking may choose to demonstrate their learning by completing a presentation, while students who are more timid may choose to write an essay instead (Taylor & Francis, 2019). In addition to content, process, and product, teachers must also consider a fourth area, affect, when planning instruction which encompasses how students feel about their learning (Taylor and Francis, 2019).

Decisions about what and how to differentiate are based on student readiness, interest, and learning profile as seen in Table 12. The readiness level of each student is the most important aspect of differentiation. In order to move students to higher levels of learning, teachers must be aware of each student's level of knowledge and understanding. This occurs by using pre-tests at the beginning of units and more formative assessments such as observations, interviews, conferences, and metacognitive assessments throughout the duration of instructional units (Taylor & Francis, 2019). Interest is another important aspect when differentiating instruction. Students should be given opportunities to connect their learning to their own interests or be grouped with students of similar interest for learning activities. Completing interest inventories at the beginning of the year can clarify student interests and preferred ways of learning. It is also essential to remember that culture plays an important role in a student's learning profile.

For teachers to be able to differentiate well, they must understand the cultures within their classrooms. It is imperative for teachers to be aware of their assumptions regarding avenues, which allows students an opportunity to make sense of an objective and develop that cultural groups within their school, where those impressions come from, and how they treat students based on those impressions (Taylor & Francis, 2019). Cultural backgrounds affect

Table 12

Basis for Modification

<i>Vary by</i>	<i>Description</i>
Readiness	Does not represent ability, rather is a changing state of skill level
Interest	Areas of interest for a student
Learning Profile	Preferred ways of learning, which include learning styles, multiple intelligences, gender, and culture

whether students enjoy tactile learning, cooperative grouping, art, music, dance, and written and oral instruction (Schwarzenenthal, 2019). Culture also affects behavior in a variety of ways. For example, sociologists draw a distinction between high and low context societies (Taylor & Francis, 2019). In high context societies, there are many rules and people tend to speak up less. Low context societies are more verbal. This may be a factor in whether some students will speak up during a class discussion. Tracking time can also be a distinct cultural difference (Taylor & Francis, 2023). Some cultures are monochronic and others are polychronic. Culture can also shape the kind of gestures that are considered acceptable or how much personal space one needs to feel comfortable. Most importantly, teachers need to remember that personal interaction including how students view cooperation, competition, and discipline can be cultural and should be considered when grouping students (Bumpus et al, 2024). Cultural sensitivity is essential in a differentiated classroom environment.

One of the most important components of differentiation is rigor. Rigor in combination with expectations is woven throughout the differentiation process to ensure the mastery of goals and objectives (Taylor & Francis, 2019). The best way to ensure rigor is embedded in instruction is by utilizing The Task Cycle as seen in Figure 4. When utilizing The Task Cycle to plan instruction, the teacher should start with the purpose (rationale) and product (desired result) and then determine the process or resources needed. This aligns with differentiation because it ensures high quality, more rigorous instruction of goals and objectives. (Taylor & Francis, 2019). In this model, learning targets guide instruction and are written from the student's point of view. When writing learning targets from a student's point of view, standards, objectives, and learning targets will include different types of instruction and assessments that meet the diverse learning needs of each student, resulting in differentiated instruction (Taylor & Francis, 2019).



Figure 6. The task cycle.

Differentiating instruction is essential in today's diverse learning classrooms. To differentiate instruction, teachers must start with rigorous goals, standards, objectives, and learning targets. They should then ensure that students are able to successfully master those learning objectives through differentiated instructional practices that are culturally relevant.

The History of Differentiated Instruction

The history of differentiated instruction can be traced all the way back to the pioneer days and the one-room schoolhouse. In this model, one teacher had students of all ages in one classroom, and the teacher individualized instruction to meet the learning needs of all students (Apps-Bodilly, 2013). Teachers prepared as many as forty lesson plans each day for thirty or more students, and students were grouped by their level of academic achievement (Bial, 1999).

As America's educational system transitioned to grading schools, the assumption was made that students of similar age learned similarly. It was not until achievement tests were introduced in 1912 that educators began to recognize the major gaps in student ability within grade levels (Weselby, 2014).

The Individuals with Disabilities Education Act (IDEA) was passed in 1975, ensuring that children with disabilities had equal and fair access to public education. It was at this time that educators began to further differentiate and tailor instruction to meet individual learning targets (Lipkin, 2015). With the passing of this law, teachers were required to individualize instruction, ensure students were placed in the least restrictive environment, and involve parents and students in shared decision-making regarding their child's education. Although this law was based on students with disabilities, it was at this time that teachers began individualizing instruction to ensure successful learning (Chard, n.d.). While there were good intentions behind IDEA and students with disabilities were receiving instruction designed to address their

academic weaknesses, this law failed to help reduce the gap between students with and without disabilities.

The passing of No Child Left Behind (NCLB) occurred in 2000, which further encouraged differentiated instructional strategies (Weselby, 2014). This law required states to rethink their existing strategies for how they measured student performance (Klein, 2015). NCLB sought to close the achievement gap between minority students and their more advantaged peers (Klein, 2015). NCLB had an impact on teaching, learning, and school improvement during that time. It required school systems to administer yearly tests of reading and mathematics skills and to demonstrate proficiency within schools. As standards were raised for teachers and schools, instructional design became increasingly more intentional, resulting in greater differentiated learning practices within the classroom (Weselby, 2014).

In 2015, President Barrack Obama signed the Every Student Succeeds Act (ESSA), which allowed states to have greater latitude in determining when and how standardized testing would occur. States were also allowed to include other measures of student and school performance as long as they adhered to federal guidelines. During this time, states were highly encouraged to develop their own teacher-evaluation systems, and school systems were permitted to design their own strategic plans for improving poorly performing schools (Hess & Eden, 2021).

The Benefits of Differentiated Instructional Practices

“New evidence emerges regularly to support the premise that not all children learn in the same way” (Subban, 2006, p. 2). The greatest advantage of using differentiated instructional practices is that it customizes instruction to meet the individual learning needs of diverse learners (Santangelo, 2009). When differentiating instruction, learning experiences are adapted to meet

student needs, resulting in greater understanding of standards and success within the classroom (Santangelo, 2009).

Differentiated instruction considers that all learners are essentially different and frees them from labels while offering opportunities for students to perform at their individual best (Subban, 2006). This promotes an atmosphere of inclusion, where individual differences are respected and valued. The differentiated classroom is inclusive of students with disabilities, students who are multilingual learners, students with emotional differences, students identified as gifted, and values cultural differences (Pozas, 2021). Research suggests that differentiated instruction is highly effective for high-ability students and students with disabilities (Weselby, 2014).

Differentiated instruction creates an engaging environment for students and positively affects student motivation levels (Subban, 2006). In the differentiated classroom, instruction is designed to engage students in an effort to make meaningful connections to learning (Subban, 2006). When differentiation occurs, the focus is taken off the teacher (as it is in traditional lecture-style classrooms) and placed on the student (Taylor, 2017). Research suggests that lecture is the least effective instructional strategy as only 5 to 10 % of knowledge attained from listening to a lecture is retained after 24 hours. Classroom discussion, hands-on experiences, and teaching others are greater ways to ensure retention of knowledge (Weselby, 2014).

Differentiated instruction provides students with an opportunity to take responsibility for their own learning (Weselby, 2014). Differentiated instruction is student-centered and qualitative. In this instructional model, students complete the same amount of work, however the quality of the work varies according to content knowledge, ability, or interest. Factors such as how students learn, what students learn, and how students are assessed assists in evaluating

student mastery and gauging teacher effectiveness. Differentiating instruction provides a more engaging atmosphere and results in fewer discipline problems than non-differentiated classrooms (Weselby, 2014).

Effective differentiated instruction is proactive and rooted in assessment (Shareefa, 2019). When using this model, teachers do not wait for students to fall behind before implementing new learning strategies. Because differentiated instruction includes continuous assessment, teachers are more aware of learning needs within the classroom. When using a differentiated instructional approach, teachers constantly assess students through observation, formal and informal assessments, and one-on-one conversations (Shareefa, 2019). When differentiation is implemented effectively, teachers modify instruction in ways that make sense to students, and, as a result, students can demonstrate ideas and skills more effectively within the learning environment (Shareefa, 2019). In addition, it helps teachers develop stronger relationships with students. Knowing students well assists in determining student strengths and weaknesses, a primary objective for individualizing instruction (Subban, 2006).

The Challenges of Implementing Differentiation in the Classroom

Class size, fair grading of assessments, and lack of sufficient planning time are some of the greatest challenges when differentiating instruction. In addition, weak administrative and parental support are often challenges. Teachers also lack understanding or knowledge about differentiated instructional practices, making the instructional strategy extremely difficult to implement within the classroom (Shareefa, 2019).

Differentiation is a controversial topic among educators due to inconsistent definitions, implementation methods, misunderstanding, and criticism (Taylor, 2017). Teacher beliefs are critical variables when differentiating instruction (Pozas, 2019). Teachers often agree that

differentiated instruction plays a vital role in meeting the diverse learning needs of students but feel that it requires a great amount of practice and planning, which increases the workload for already overworked teachers. In addition, some teachers are reluctant or not equipped to differentiate instruction (Taylor, 2017).

Teachers often misunderstand the technique of differentiation and mistake it as a form of scaffolding for weaker learners (Taylor, 2017). They often have little or no training regarding differentiated instructional practices and, as a result, lack confidence in their ability to differentiate (Kupers, 2023). Experience and skill is required to adapt lessons and successfully implement differentiated instructional strategies (Taylor, 2017). The misunderstanding of differentiation can result in a lack of rigor for more accelerated students. It is essential for schools to provide professional development, opportunities for observation, quality feedback, and time to collaborate on differentiated instructional practices. Some teachers are reluctant or not equipped to differentiate instruction due to lack of knowledge or support (Taylor, 2017).

Classroom management challenges make it difficult to differentiate instruction (Taylor, 2017). Traditional classrooms include more structured instructional practices, especially in subjects such as mathematics (Pozas, 2019). Physical changes to the classroom environment are often essential when differentiating instruction, and teachers are hesitant to change the physical environment of their classroom (Pozas, 2019). This hesitation often results in an unwillingness of teachers to vary instructional practices and incorporate differentiation into their daily classroom practices.

Supporting Differentiation in the Classroom

An important key component of differentiation is instructional design, which encompasses the optimization of the learning process (Klepsch, 2019). According to Cognitive

Load Theory, there are three aspects which must be considered in instructional design: the learning task itself, the design of the learning material, and the activation of the learner's cognitive processes during learning (Klepsch, 2019). Instructional design focuses on the following question: "What needs to be presented and how should it be presented to the learner to reach these goals?" (Klepsch, 2019, p. 4).

Deciding on the content and the task itself is the first step in instructional design. Once that step is completed, teachers must identify prior knowledge that is needed to understand the content and complexity of the task to be completed. In lieu of adjusting task complexity, instructors should enhance each learner's prior knowledge by providing learners with information that will make it easier for students to process the lesson (Klepsch, 2019). This includes familiarizing learners with vocabulary and key components of content. Another technique involved in instructional design is reducing complexity, however, this technique does not align with differentiated instructional practices (Eidson, 2007).

The preparation of learning material is a key element in instructional design. When designing instructional material, it is essential to consider elements that will provide enhanced learning outcomes. For example, adding images or auditory formats to texts provides an improved learning experience over presenting text alone (Klepsch, 2019). The activation of a learner's cognitive processes during learning can be accomplished by ensuring that cognitive processes are relevant for learning. This includes using cognitive or metacognitive prompts to steer the learner in the right direction or give the learner cues regarding learning content.

Blended learning can help teachers customize student learning and differentiate instruction for students (Fazal & Bryant, 2019). Differentiation is a challenge in today's diverse classrooms, and teachers are struggling to meet the diverse learning needs of all students. This is

exceptionally difficult for those who require accelerated growth in core areas (2019). Blended learning can be defined as “any formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace” (Horn & Staker, 2014, p. 34). The option of blended learning provides teachers the opportunity to combine instruction via online learning content to give students greater learning opportunities that can lead to growth.

Blended learning is often referred to as personalized learning because it customizes instruction to meet the individual needs of students, a key component of differentiated instruction (Fazal & Bryant, 2019). Digital content is adaptable within an online platform, making it possible for content to be adjusted in real-time based on a student’s performance and understanding of material. This is where the power of technology can be vital for differentiation (Simsek & Can, 2020). When students differ in content knowledge and have contrasting learning targets, it is especially important to differentiate instruction. Blended learning options adapt student topics based on learning needs and differentiate instruction at a high level. Blended learning is not a complete solution to differentiating instruction, but it can be used in conjunction with teacher-based differentiated practices to maximize learning in the classroom (Fazal & Bryant, 2019).

Flipped classrooms are another way to support differentiated instructional practices. The flipped classroom is a pedagogical approach that inverts what is typically completed inside the classroom with what is typically completed outside of the classroom (Malik, 2019). Instead of students listening to a lecture in class and then going home to complete an assignment that demonstrates mastery of that objective, students watch videos or listen to lectures outside of the classroom and then participate in teacher-guided problem solving, analysis, projects, or

discussions in class that support topics addressed in videos or lectures that were watched outside of the classroom (Malik, 2019). There are many advantages to this model, including allowing students to learn at their own pace, encouraging students to actively engage with material, and freeing class time for creative and active learning opportunities. In addition, teachers have additional opportunities to interact with and assess student learning (Nouri, 2016).

Flipped classrooms provide flexible, effective, active and student-centered teaching strategies that are not seen in traditional classrooms (Nouri, 2016). A large majority of students have positive attitudes regarding flipped classrooms, and flipped classrooms increase motivation, engagement, and learning (Nouri, 2016). The active learning involved in flipped classrooms support differentiated instructional practices.

Small group instruction is a component of differentiated instruction which moves instruction from a teaching to learning paradigm. While teachers may feel as if they are unable to cover as much material during a small group lesson as opposed to a whole-group lecture, research suggests that student gains during small group instruction are greater than those during whole-group instruction (Cooper et al., 2000). Flexible Grouping is the most common form of small group instruction and allows teachers to create learning groups based on student interest and needs, recognizing that grouping arrangements change as student needs change (Bates, 2013). Flexible Grouping includes an A Model and a B Model. In Model A, as seen in Figure 5, students of similar instructional levels are grouped together, and the students rotate through a variety of learning station. One of those stations will include small group instruction by the teacher. In Model B, as seen in Figure 6, the students are grouped according to interest and are not homogenous academically. In Model B, the teacher is not included in the rotation and has the ability to rotate between each learning station as he/she deems necessary. Differentiating

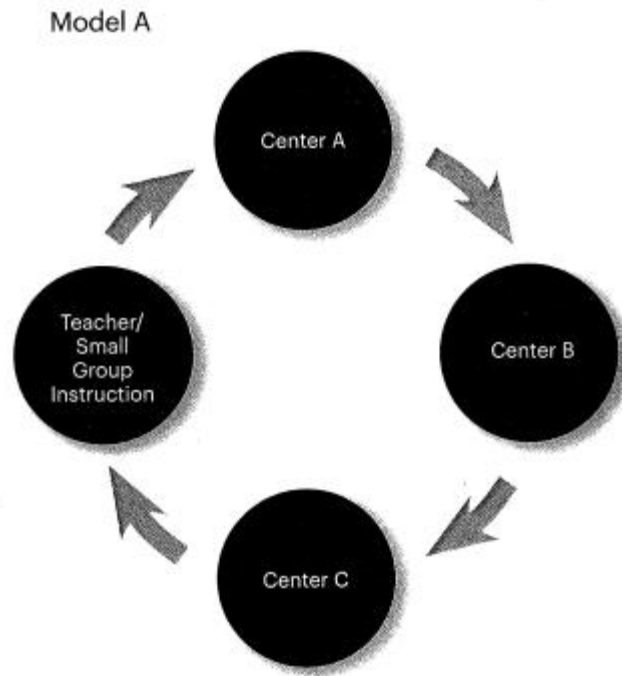


Figure 5. Flexible grouping: Model A.

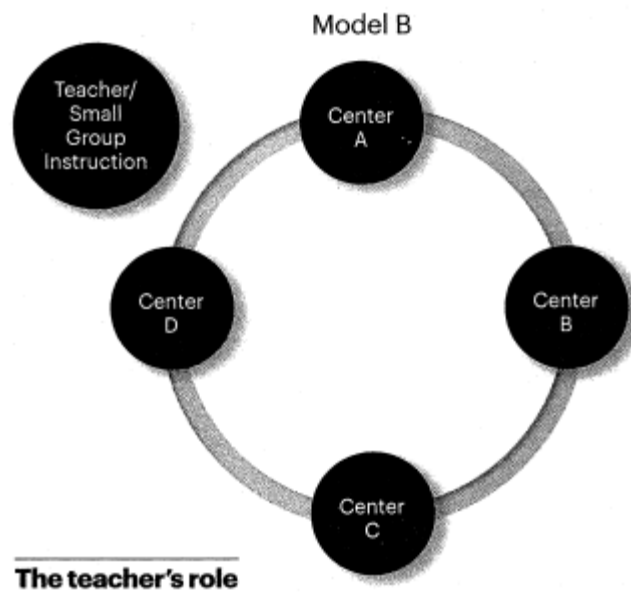


Figure 6. Flexible grouping: Model B

mathematics instruction is challenging at all levels but particularly so at the foundational level (Padmore, 2024). The knowledge, skills, and cognitive capabilities of students differ greatly in the mathematics classroom, yet teachers struggle to consider individual differences when delivering mathematics content (Awofala, 2020). Teaching mathematics in a differentiated manner is essential for increasing achievement and understanding of abstract concepts (Awofala, 2020). Additionally, differentiated instruction is essential for students to develop conceptual understanding, an essential component of developing number sense (Kurnila, 2024).

The understanding of fundamental mathematics concepts is critical for students to understand mathematics concepts in later years. Students must be able to relate mathematics to real life in order to translate mathematical problems (Hidayati, 2020). One of the most challenging aspects of teaching mathematics is that teaching models are commonly based on mechanical repetition that follows step-by step methods and uses predefined algorithms (Johnsson, 2020). These teaching methods do incorporate differentiated instructional practices and prevent students from developing mathematical struggle, gain conceptual understanding, and investigate solution methods (Johnsson, 2020). Using manipulatives, observing demonstrations, creating math sketches and solving complex problems in a team are methods commonly used to differentiate math instruction.

Summary

The review of this literature supports that differentiating instruction is a complex topic that requires strategic instructional planning of content, process, and product. In addition, research suggests that individualizing instruction to meet the diverse needs of students has many benefits but is overwhelmingly challenging to many teachers due to lack of understanding, resources, and time. When implementing differentiation in the classroom, culture, rigor, and

students' learning profiles must be considered. The Individuals with Disabilities Education Act, No Child Left Behind, and the Every Student Succeeds Act were critical components in the initiation of the implementation of differentiation and continue to influence differentiated instructional practices in America's classrooms. As studied throughout this review, ways to differentiate learning such as utilizing blended learning and flipped classrooms should be considered when planning instruction. This literature review outlined the major topics of differentiation including its definitions, history, benefits, challenges, and needed supports during implementation.

Chapter three will examine methods of inquiry including guiding questions, inquiry design and rationale as well as Phases I, II, and III of inquiry procedures, rigor, delimitations, limitations, and assumptions.

CHAPTER 3: METHODS OF INQUIRY

The purpose of this mixed-methods, convergent inquiry is to determine the effectiveness of differentiated instruction including how it impacts student learning as well as teacher perceptions of learning and engagement. The focus of this inquiry is to incorporate differentiated instructional practices in middle school mathematics classrooms. This inquiry will examine the relationship between the implementation of differentiated instructional practices and its influence on student proficiency in middle school mathematics classrooms at both inquiry sites.

Throughout this chapter, I will examine methods of inquiry including guiding questions, inquiry design and rationale as well as Phases I, II, and III of inquiry procedures, rigor, delimitations, limitations, and assumptions, and the role of the scholarly practitioner throughout the inquiry.

Inquiry Guiding Questions

This inquiry is guided by the following questions:

1. What is the effect of differentiated instruction on student proficiency in middle grades mathematics classrooms?
2. How does the use of differentiated instruction impact teachers' perceptions of student learning for middle school mathematics students?
3. How does implementing differentiated instruction impact student engagement in middle school mathematics classrooms?

These questions will assist me, the scholarly practitioner, in collecting data related to the influence and impact of differentiated instructional practices in middle grades mathematics classrooms. These questions support the focus of this inquiry by also addressing the influence that differentiated instructional practices have on teacher perceptions of student engagement and individual learning.

Inquiry Design and Rationale

The focus of this inquiry is to determine whether implementing differentiated instructional practices in middle grades mathematics classrooms directly affects student proficiency. To answer the questions guiding this inquiry, I will use improvement science methodology with a convergent, mixed methods design. This design will allow me, the scholarly practitioner, to determine the relationship between differentiated instructional practices and student proficiency. In addition, this inquiry will assist in determining whether student engagement is increased as instruction is differentiated and whether that engagement contributes to increased student proficiency. This mixed methods approach will allow an opportunity to concurrently collect and analyze quantitative and qualitative data related to the implementation of differentiated instructional practices.

Unlike traditional evaluations, impact studies, or educational research, improvement science encompasses and guides researchers to strategic improvement (Hinnant-Crawford, 2018). Educational research in isolation has yet to result in the improvement or changes needed within our educational system, and practitioners are still attacking challenges dating back half a century (Hinnant-Crawford, 2018). By understanding that the goal of an improvement science method is to identify interventions that may result in positive outcomes and, in turn, develop a theory of improvement, the scholarly practitioner has a greater chance of producing quality outcomes for all students (LeMahieu et al, 2017).

For the purposes of this study, a convergent, mixed methods design will be used as this inquiry will include both quantitative and qualitative data collection at various times throughout the inquiry. Upon initial implementation, this inquiry will examine quantitative data such as End of Grade test results, district Common Formative Assessment proficiency, school-based

diagnostic assessment results gathered from IXL or i-Ready, and NC Check-Ins to establish baseline data of student proficiency. This inquiry will also include qualitative data such as teacher and student surveys and focus group data that incorporates the thoughts and opinions of participants involved in this inquiry. Surveys and focus groups will include questions that assist in determining instructional methods that are currently being utilized in middle grades mathematics classrooms. Throughout the implementation process, professional development on differentiated instructional practices will occur, and quantitative and qualitative data will be examined at regular intervals, specifically each quarterly grading period, throughout the inquiry.

I, as the scholarly practitioner, will utilize three phases of the Plan-Do-Study-Act (PDSA) model, which includes cycles of testing, learning, and application (Hinnant-Crawford, 2018). Phase One of this PDSA cycle will involve examining baseline data to determine growth and proficiency needs for students, conducting focus groups, teacher surveys, and student surveys, and planning professional learning based on qualitative and quantitative data findings. Phase Two will include developing an implementation plan for differentiated instructional practices within the mathematics classroom, conducting professional learning sessions, collecting data through classroom observations, examining quantitative and qualitative data during each grading period, and implementing and revising differentiated instructional practices. Phase Three will include examining proficiency data to determine if improvement or change has occurred, conducting final surveys and focus groups to establish outcome data, developing an outcome data plan, and sharing inquiry findings with collaborative partners as well as stakeholders.

Context of the Inquiry

With a diverse student count of approximately 700 (see Table 12), Westhaven Middle School serves the largest population of sixth through eighth graders in Mary Beth County.

Westhaven is the district's only middle school within the city limits and serves a large number of students. As seen in Table 13, 195 students are served in 6th grade math, 225 students are served in 7th grade math, 178 students are served in 8th grade math, and 53 students are served in Math 1. Westhaven Middle School is considered a low performing school and currently holds a school letter grade of D.

Royal Ridge Middle School serves nearly 400 students in middle grades mathematics classrooms (see Table 14). 72 students are served in 5th grade math, 105 students are served in 6th grade math, 88 students are served in 7th grade math, 40 students are served in 8th grade math, and 58 students are served in Math 1 classrooms, as seen in Table 15. Royal Ridge recently transitioned from a school letter grade of D to a letter grade of C, moving out of low performing status.

While math proficiency data suggests a slight upward trend (see Tables 16 and 17) in certain grade levels at both schools, analysis of end of grade and end of course proficiency data indicates that students are still struggling with mathematical understanding at all grade levels. Additionally, student proficiency either decreases as students increase in grade level or remain constant with minimal growth, with the exception of Math 1, as seen in Tables 18 and 19. It is important to note that Math 1 students are typically honors students who are also proficient on other subject area tests. EOG proficiency trends for 2021-2022, 2022-2023, and 2023-2024 have been examined as part of this inquiry.

This inquiry began by examining mathematics proficiency data throughout Mary Beth County Schools and identifying the need to increase student proficiency as well as decrease the achievement gap in middle grades mathematics classrooms. After analyzing data as well as surveying and observing teachers, it was determined that a one-size-fits-all approach was

Table 13

Demographics by Subgroup at Westhaven Middle School

Demographics by Subgroup	Total Students
American Indian	1
Asian	2
Hispanic	166
Black	266
Two or More	31
Pacific Islander	0
White	193

Table 14

Total Students Enrolled in Math Courses at Westhaven Middle School

Grade Level	Students per Course
6 th Grade Math	195
7 th Grade Math	225
8 th Grade Math	178
Math 1	53

Table 15

Demographics by Subgroup at Royal Ridge Middle School

Demographics by Subgroup	Total Students
American Indian	3
Asian	4
Hispanic	50
Black	91
Two or More	36
Pacific Islander	2
White	180

Table 16

Total Students Enrolled in Math Courses at Royal Ridge Middle School

Grade Level	Students per Course
5 th Grade Math	72
6 th Grade Math	105
7 th Grade Math	88
8 th Grade Math	40
Math 1	58

Table 17

Proficiency Trends at Westhaven Middle School

Course	% Proficient (2021-2022)	% Proficient (2022-2023)	% Proficient (2023-2024)
6 th Grade Math	41.90	39.55	47.67
7 th Grade Math	46.60	39.80	46.95
8 th Grade Math	8.79	13.69	14.91
Math 1	85.71	85.75	98.31

Table 18

Proficiency Trends at Royal Ridge Middle School

<u>Course</u>	<u>% Proficient (2021-2022)</u>	<u>% Proficient (2022-2023)</u>	<u>% Proficient (2023-2024)</u>
5 th Grade Math	57.00	44.94	68.00
6 th Grade Math	53.90	44.94	60.43
7 th Grade Math	55.10	43.820	49.46
8 th Grade Math	13.64	18.75	20.97
Math 1	100.00	100.00	100.00

Table 19

Detailed Student Proficiency on 2023-24 EOG/EOC Courses at Westhaven Middle School

Course	% Proficient	# Proficient	# Tested
6 th Grade Math	47.67	107	224
7 th Grade Math	46.95	108	230
8 th Grade Math	4.91	24	161
Math 1	98.31	58	59

Table 20

Detailed Student Proficiency on 2023-24 EOG/EOC Courses at Royal Ridge Middle School

Course	% Proficient	# Proficient	# Tested
5 th Grade Math	68.00	68	100
6 th Grade Math	60.43	55	91
7 th Grade Math	49.46	46	93
8 th Grade Math	20.97	13	62
Math 1	100.00	27	27

occurring in the majority of middle grades mathematics classrooms throughout the district, specifically at Westhaven Middle School and Royal Ridge Middle School. This inquiry will incorporate the implementation of differentiated instructional practices at Westhaven Middle School and Royal Ridge Middle School in an effort to increase student learning, engagement, and proficiency for middle grades mathematics students.

Collaborative Inquiry Partners

Inquiry-based approaches enable practitioners to advance their practice and learning (Schnellert & Butler, 2014). To complete this inquiry, collaboration will occur between district and school-level administrators as this dissertation of practice is implemented within Westhaven Middle School and Royal Ridge Middle School. This collaboration will occur between the scholarly practitioner, who serves as the Director of K-12 Curriculum, the Chief Academic Officer, the School Principals and Assistant Principals, school-based Instructional Coaches, and the district's Instructional Support Specialist.

Collaborative inquiry partners will work together to lead professional learning sessions, complete walkthroughs and observations, assist with classroom scheduling and lesson planning, complete participation logs and observation forms, and analyze student proficiency data, as seen in Table 20. The scholarly practitioner will administer surveys, lead focus groups, and analyze survey and focus group data. Additionally, feedback will be provided to participants, informal conversations with teachers and students will occur, and differentiated instructional practices will be modeled as needed throughout the inquiry. The scholarly practitioner will implement this inquiry and provide instructional planning, and data analysis support as needed.

Ethical Considerations

East Carolina University requires that all researchers complete the Collaborative

Table 21

Collaborative Inquiry Partners

Level	Collaborative Partner	Role in the Inquiry
District	Director of K-12 Curriculum, Scholarly Practitioner	• Conduct focus group • Administer staff & student surveys • Analyze student proficiency data • Analyze teacher & student survey data • Analyze focus group data • Conduct professional learning • Assist with classroom scheduling and lesson planning
	Chief Academic Officer	• Review PDSA cycles and implementation plan (to ensure ethical practices) • Assist scholarly practitioner in student proficiency data analysis
	Instructional Support Specialist	• Provide professional development • Conduct walkthrough observations • Assist scholarly practitioner with student proficiency data analysis • Conduct professional learning • Assist with classroom scheduling and lesson planning
School	School Principals	• Assist scholarly practitioner in student proficiency data analysis • Conduct walkthroughs and observations
	Assistant Principals	• Assist scholarly practitioner in analysis of student proficiency data • Conduct walkthroughs and observations
	Instructional Coaches	• Assist scholarly practitioner in student proficiency data analysis • Conduct walkthroughs and observations • Assist with classroom scheduling and lesson planning • Complete participation logs and observation forms

Institutional Training Initiative (CITI) courses before the Institutional Review Board (IRB) grants approval for a research study. The CITI is a web-based educational course that provides instruction in research, ethics, and responsible conduct to scholarly practitioners participating in research-based studies. The course ensures that scholarly practitioners who collect, access, and analyze data understand the ethical considerations associated with scholarly research studies. As required by East Carolina University, I have completed the CITI training course.

The Mary Beth County School Board encourages individuals to conduct research on issues related to student achievement and the effective operation of the school system as explained in Board Policy. As required by the Mary Beth County School district, I have attained consent from the district superintendent to conduct this inquiry as it meets the requirements of the research potentially benefitting students and teachers within the school system, the project's purpose being compatible with the goals and objectives of the school system, and the project not disrupting instructional time.

This inquiry will encompass the relationship between differentiated instruction, student learning, and student engagement. All surveys will meet the requirements of Board Policies pertaining to Student Records, Surveys of Students, and Confidentiality of Personal Identifying Information for Mary Beth County Schools. Additionally, I will submit a formal request to East Carolina University's IRB for permission to conduct this research inquiry as found in Appendix A.

Upon all necessary research requests being approved, I will send an informative email to middle school mathematics teachers requesting their participation in this inquiry. For those teachers who agree to participate, I will obtain informed consent notifying them of voluntary participation guidelines, the use of the Qualtrics survey platform, confidentiality procedures, and

the option to withdraw from the inquiry at any time as seen in Appendix B. School administrators, as collaborative inquiry partners, will also receive an informative email including the details of the research project as well as the names of teachers who will be participating in the inquiry. Additionally, data collected during this inquiry will be stored for five years on a password protected laptop. The identity of all participants will remain anonymous, and pseudonyms will ensure confidentiality.

Inquiry Procedures

This inquiry will implement differentiated instructional practices in middle grades mathematics classrooms at Westhaven Middle School and Royal Ridge Middle School in the Mary Beth County School district. The inquiry will aim to increase student proficiency and strengthen student engagement within middle school mathematics classrooms. It will employ both quantitative and qualitative data to measure the impact differentiated instructional practices have on student engagement, learning, and proficiency within middle grades mathematics classrooms. All qualitative data as well as quantitative data that is not published by the North Carolina Department of Instruction (NC Check-Ins, district Common Formative Assessments, and school-based diagnostic assessment results such as IXL or i-Ready diagnostic data) collected throughout the inquiry will remain confidential and anonymous, and the inquiry will not contribute to the evaluation of any participants. I, the scholarly practitioner, will serve in a district-level leadership role (as the Director of K-12 Curriculum & Instruction) throughout this inquiry. While I am not the direct supervisor of any participants or collaborative partners, I am often viewed as such. Therefore, this has been identified as a potential limitation.

In order support this inquiry, the school administrative team and instructional coaches, as collaborative partners, will receive professional learning on differentiated instruction.

Additionally, an analysis of the 2023-2024 student proficiency data as well as an overview of the inquiry will be shared with all collaborative partners. This initial step has been approved by the district superintendent as well as the Chief Academic Officer, who is also a collaborative partner of this inquiry. Throughout this inquiry, professional learning and student proficiency data analysis will occur with the instructional coaches at monthly instructional coaching meetings. This professional learning and data analysis will also be shared with participants throughout the inquiry. It should be noted that instructional coaches often provide support and feedback to the participants and lead weekly Professional Learning Communities where student data is regularly analyzed as a part of daily responsibilities.

The inquiry will be conducted using improvement science with a convergent, mixed-methods design and will occur in three Plan-Do-Study-Act (PDSA) cycles (see Table 20). Each cycle will build upon the previous cycle. The inquiry will include data analysis, focus groups, teacher surveys, student surveys, informal conversations, observations, and field notes. Informed Consent for collaborative partners as well as inquiry participants will be obtained prior to beginning Phase One of the inquiry.

Pilot Study

The focus of this inquiry is to determine the effect of differentiated instruction on student learning and engagement as well as how its implementation impacts student proficiency for middle grades mathematics students. As part of this inquiry, a pilot study was conducted in June of 2024 to assess and ensure the validity of the teacher and student survey and focus group instrumentation. Participants in the pilot study included two district-level curriculum experts and a fifth-grade teacher., none of whom will be actual participants in the inquiry. These participants were selected to participate in the study because of their knowledge and experience with

Table 22

Inquiry Phases One through Three

Phase One	
Plan	Inform Collaborative Inquiry Partners of the Inquiry Plan / Meet with Collaborative Inquiry Partners to analyze data and determine student proficiency needs
Do	Conduct focus groups, teacher surveys, and student surveys with participants
Study	Analyze baseline data with Collaborative Inquiry Partners to determine teacher and student needs
Act	Plan professional learning based on qualitative data findings
Phase Two	
Plan	Develop an implementation plan for the execution of differentiated instructional practices within middle grades mathematics classrooms
Do	Conduct professional learning and collect data through classroom observations
Study	Examine quantitative and qualitative data at regular intervals (each grading period)
Act	Implement differentiated instruction and revise differentiated instructional practices within the classrooms as needed
Phase Three	
Plan	Examine proficiency data and develop an outcome data plan
Do	Conduct final surveys and focus groups to establish outcome data
Study	Analyze outcome data
Act	Share inquiry findings with collaborative partners and stakeholders

differentiated instruction and best instructional practices.

To begin the pilot study, the scholarly practitioner informed the participants of the purpose of the inquiry in an effort to provide context. Participants were then given the student and teacher surveys, which consisted of three questions regarding participant demographics and seven questions applicable to the inquiry. Upon completion of the surveys, the scholarly practitioner led a focus group with the same three participants that included 5 inquiry-designed questions.

Upon completion of the surveys and focus group, the participants provided feedback to the scholarly practitioner. Participants were instrumental in the modification of student and teacher survey questions as well as focus group questions. As a result of the pilot study, the survey and focus group questions were modified to ensure measurable outcomes. Final teacher and student surveys include 3 demographic questions and 8 appropriate inquiry questions. The focus group instrument was modified to include a focus group protocol, the elimination of 1 question, and the addition of two new questions. Specific feedback regarding student surveys is seen in Table 23. Feedback regarding teacher surveys is seen in Table 24, and focus group details are seen in Table 25.

Additionally, and as part of the pilot study, the teacher walkthrough form was developed with the support of pilot study participants. Using the *Teachers Teaching Teachers Differentiated Classroom Observation Form* as a guide, the scholarly practitioner and pilot study participants created a unique walkthrough form to utilize during the inquiry. The walkthrough tool is aligned to the inquiry guiding questions and complements questions that will be asked in teacher surveys, student surveys, and during focus groups. The walkthrough tool will be piloted in September of 2024 prior to beginning the inquiry and will be modified at that time by the

Table 23

Pilot Study Feedback and Results from Student Survey

Instrument	Feedback	Results
Student Survey Q1	Provide grade level choices	Added 6, 7, 8
Student Survey Q3	Provide demographic choices	Added American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, Hispanic or Latino
Student Survey Qs4-6	Remove “I feel like”	I feel like was removed from each question.
Student Survey Q5	Edit wording as students may not understand what “content” means	Question edited to “I am able to understand what is being taught.”
Student Survey Q6	Replace “customized” with “designed”	Question edited to “Teaching is designed to meet my needs as a learner.”
Student Survey Q8	Must be measurable	Question edit to “My teacher teaches using small group instruction at least twice a week.”
Student Survey Q9	Students may not understand what is being asked	Question edited to “My teacher allows me to use the strategy of my choice when problem solving.
Student Survey Q10	Eliminate as question is irrelevant.	Question was eliminated.
Student Survey	Add question regarding problem solving strategies.	Question added: “My teacher teaches multiple strategies to solve math problems.”
Student Survey	Add question regarding varying assignments	Question added: “My classmates and I have varying assignments based on our learning needs.”

Table 24

Pilot Study Feedback and Results from Teacher Survey

Instrument	Feedback	Results
Teacher Survey Q1	Provide grade level choices	Added 6, 7, 8
Teacher Survey Q3	Provide demographic choices	Added American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, Hispanic or Latino
Teacher Survey Qs4-6	Remove “I feel like”	“I feel like” was removed from each question.
Teacher Survey Q4	Replace “engaged” with “active participants	Question edited to “My students are active participants during math class.”
Teacher Survey Q5	Must be measurable	Question edited to “When assessing standards, 80% of my students are proficient.”
Teacher Survey Q6	Reword	Question edited to “I differentiate instruction based on the needs of the learners in my classroom.
Teacher Survey Q8	Must be measurable	Question edited to “I teach using small group rotations at least twice a week.”
Teacher Survey Q9	Edit question to provide clarity for participants.	Question was edited to “I allow my students to use the strategy of their choice when problem solving.”
Teacher Survey	Add question regarding the teaching of multiple strategies.	Question added: “I teach my students multiple strategies to use when problem solving.”
Student Survey	Add question regarding varying assignments.	Question added: “I offer my students varying assignments based on their learning needs.”

Table 25

Pilot Study Feedback and Results from Focus Group

Instrument	Feedback	Results
Focus Group Q4	Edit Question 4	Question 4 was edited to: “What professional learning do you need in order to differentiate instruction in your classroom?” and reordered as the final focus group question.
Focus Group	Add question regarding student grouping.	Question added: “What drives your decision making when grouping students for instruction?”
Focus Group	Add question regarding teaching multiple strategies.	Question added: “How do you ensure students are exposed to multiple strategies for problem solving?”
Focus Group	Add question regarding how students demonstrate learning	Question added: “In what ways do you allow students to demonstrate their learning in your classroom?”

scholarly practitioner and the collaborative inquiry partners.

Description of Participants and Recruitment Strategies

Following approval from the Mary Beth County School district and the Instructional Review Board (IRB), potential participants (6th, 7th, and 8th grade mathematics teachers at Westhaven Middle School and 5th, 6th, 7th, 8th, and Math 1 teachers at Royal Ridge Middle School) and collaborative inquiry partners will be informed of the inquiry via an emailed letter to invite them to participate in the inquiry. Once participants and collaborative inquiry partners have agreed to participate in the inquiry, I will meet with participants and collaborative inquiry partners to explain the minimal risk associated with the inquiry.

Instrumentation

The focus of this inquiry is to incorporate differentiated instructional practices in middle school mathematics classrooms within Mary Beth County Schools, with a specific focus on implementation at Westhaven Middle School and Royal Ridge Middle School. Throughout this inquiry, data will be collected through the use of the following instruments: teacher surveys, student surveys, classroom observations, informal conversations, focus groups and professional learning sessions. The inquiry guiding questions will be answered through the use of teacher surveys, student surveys, classroom observations, informal conversations, focus groups, and professional development sessions.

To answer the first question of: “What is the effect of differentiated instructional practices on student proficiency for middle school students?”, quantitative data such as EOG scores will be analyzed. Check-in data, common formative assessments, NC Check-In and school-based diagnostic assessment results such as IXL and i-Ready data will also be examined to determine if students are making progress and showing growth throughout the school year

with the implementation of differentiated instructional strategies in mathematics classrooms. Teachers will receive professional learning on differentiated practices, and I, as the scholarly practitioner, will assist in the implementation of differentiated instructional practices within middle school mathematics classrooms. Informal conversations will occur during professional development, and I will journal observations using anecdotal notes.

To answer the second question of: “How does the use of differentiated instruction impact teachers’ perceptions of student learning for middle school mathematics students?”, teachers will participate in a focus group at the beginning and end of the inquiry. In the interim (every grading period), informal conversations will occur to determine teacher perception. Focus group questions will be open-ended, and the analysis of focus group data will be based on frequency and theme coding. Survey participants will be asked to respond to statements on a Likert-type continuum scale of one to five with one being the lowest and five being the highest. Surveys and Focus Groups will help me, the scholarly practitioner, identify teachers’ general understanding of differentiated instruction as well as the practices that are utilized within the classroom to customize learning for students. Beginning and ending this portion of the inquiry with a focus group and completing surveys in the interim will help me identify how teacher perception and implementation changes throughout the course of the inquiry.

To answer the third question: “How does implementing differentiated instruction impact student engagement in middle school mathematics classrooms?”, informal conversations will occur with students during classroom observations. In addition, students will be asked to complete a survey at the beginning and end of the inquiry. Completing these surveys along with journaling and documenting findings from informal conversations as well as classroom

observations will help me, the scholarly practitioner, determine how students feel about engagement prior to, during, and following the implementation of differentiated instructional practices within the mathematics classroom.

Quantitative data incorporating student proficiency results (i-Ready, IXL, NC Check-ins, and district Common Formative Assessments) will be statistically analyzed, using central tendency and descriptive statistics, throughout this inquiry. Data analysis will be triangular, using multiple methods, strategies, and sources to verify consistency. Informal conversations, classroom observations, surveys, and observations and conversations during professional learning sessions will be inductively analyzed throughout this inquiry to determine the effectiveness of differentiated instructional practices and its relationship to student engagement. Coding will be used to analyze focus group data in an effort to look for trends and commonalities throughout the inquiry. Focus group questions will be open-ended to allow opportunities for follow-up questions and clarification as needed. Focus groups will be recorded and transcribed via Microsoft Teams. Journal entries and anecdotal notes will be completed during informal conversations. A classroom observation tool specific to differentiated practices will be used during classroom walkthroughs.

Phase I

Plan

Phase One of this inquiry will begin with the examination of existing student proficiency data with collaborative partners as part of the planning process. This data analysis will be used to determine growth and proficiency needs for students as well as allow the scholarly practitioner and collaborative partners to identify achievement gaps, needed instructional practice changes, and student learning needs. Quantitative data will be analyzed convergently throughout this

inquiry. The 2023-24 End of Grade Test results will provide baseline quantitative data, and 2024-25 End of Grade Test results will provide outcome quantitative data. Additionally, district Common Formative Assessment data, i-Ready and IXL diagnostic data, and NC Check-In data will be analyzed during each grading period.

Do

Teacher and student surveys will be conducted at the beginning of and following implementation. In an effort to maintain confidentiality and keep inquiry findings secure, all survey instruments for teachers and students will be developed and conducted using Qualtrics. Following data analysis, a Qualtrics teacher survey will be sent to teacher participants to determine teacher mindset and capacity regarding differentiated instruction. Student surveys will also be conducted, and student questions will provide input on student mindset of engagement, standard understanding, learning customization, and classroom instructional approaches. An initial focus group will be conducted during this phase as well with focus group questions centered around teaching methods, student engagement, understanding of differentiated instruction, and professional learning needs. Focus group questions will be open-ended and semi-structured but will allow for clarifying questions if needed. Focus group participants will be informed of the confidential nature of the group, and the focus group will be recorded using Microsoft Teams.

Study

The analysis of teacher and student survey questions and focus group data will allow the scholarly practitioner to determine professional learning needs as well as teacher and student mindset regarding student engagement, understanding of standards, and current instructional approaches. Informal conversations, as they are part of communication and often provide

naturalistic data, will occur as part of qualitative research throughout this inquiry. Field notes will be taken as informal conversations occur. Classroom observations will be conducted at regular intervals throughout the inquiry by the scholarly practitioner as well as collaborative partners. Observations will be documented using a specific observation tool that was created for this inquiry (see Appendix H), and all data will be analyzed by the scholarly practitioner as it is collected.

Act

Upon the completion of focus groups, teacher surveys, and student surveys, the scholarly practitioner will analyze baseline qualitative data to determine teacher and student needs for professional learning and implementation of differentiated instructional practices within the classroom. Once baseline qualitative data has been analyzed, a professional learning plan for differentiated instruction will be developed. Differentiated instructional practices will be re-evaluated throughout the inquiry as quantitative data is analyzed throughout each grading period. During data analysis, proficiency trends including increases and decreases, will be examined for each grade level. A detailed description of Phase 1 can be seen in Figure 9.

Phase II

Plan

Phase Two will begin with the development of an implementation plan for the execution of differentiated instructional practices within middle grades mathematics classrooms. The development of this plan will take into account all inquiry findings from Phase One, including teacher and student mindset as well as current instructional practices. A plan for professional learning was developed in Phase One and will be implemented in Phase Two.

Do

Table 26

PDSA Phase One

Plan	Inform Collaborative Inquiry Partners of the Inquiry Plan / Meet with Collaborative Inquiry Partners to analyze data and determine student proficiency needs
Do	Conduct focus groups, teacher surveys, and student surveys with participants
Study	Analyze baseline data with Collaborative Inquiry Partners to determine teacher and student needs
Act	Plan professional learning based on qualitative data findings

Professional learning on differentiated practices will occur during this phase. This learning will take place during professional learning communities as well as instructional coaching meetings. A wide range of data will be collected during this phase. Classroom observations will occur at regular intervals using a classroom observation tool, specific to differentiated instructional practices, that was developed by the scholarly practitioner (see Appendix H). Informal conversations will occur during classroom observations and walkthroughs, and collaborative partners as well as the scholarly practitioner will take field notes during informal conversations.

Study

Qualitative and quantitative data will be analyzed at regular intervals, the beginning and ending of each grading period. Qualitative data will be analyzed inductively. Inductive reasoning involves the development of broad, general conclusions from observations of events and experiences (Mertler, 2022). The inductive analysis will include data from classroom observations and informal conversations. Analysis of quantitative data will include results from NC Check-Ins, IXL, i-Ready, and district Common Formative Assessments. North Carolina End-of-Grade (NC EOG) test data will be included in quantitative data analysis during Phase Three.

Act

Differentiated Instructional practices will be implemented during this phase, and teachers will be observed bi-weekly and provided support by the scholarly practitioner as well as collaborative inquiry partners throughout this phase. Support will include assistance with lesson planning, student small group formation, and assessment opportunities based on student preference and intelligence. Implementation will be revised throughout Phase Two as observations occur and qualitative and quantitative data is analyzed. Additionally, informal

conversations will continue to occur with teachers and students to re-evaluate professional learning needs. A detailed description of Phase 2 can be seen in Table 27.

Phase III

Plan

Phase Three will be the final phase of this inquiry and will begin by examining student proficiency data from the 2024-25 NC EOG test. The analysis of this data will include the use of descriptive statistics. Analyzing data using descriptive statistics allows researchers to summarize, organize, and simplify data and often includes calculations such as mean, median, mode, range, standard deviation, correlations, and standardized scores (Mertler, 2022). Upon examination of this quantitative data, a plan will be developed to collect quantitative outcome data.

Do

Upon completion of the outcome data plan, final surveys for teachers and students as well as a final focus group will be conducted. Surveys will be conducted using Qualtrics software and the focus group will be recorded via Microsoft Teams. Teacher survey questions will be centered around mindset changes, instructional challenges, student engagement, and beliefs regarding the impact differentiated instruction had on student proficiency throughout the inquiry. Student survey questions will incorporate student feelings on the impact of differentiated instruction, engagement, and understanding throughout the inquiry. Final focus group questions will once again be open-ended and will allow for collection of data incorporating teaching methods, measuring student engagement, understanding of differentiated instruction, perception changes throughout the inquiry, and mindset regarding the implementation of differentiated instruction.

Study

Upon completion of focus groups, teacher surveys, and student surveys, qualitative and

Table 27

PDSA Phase Two

Plan	Develop an implementation plan for the execution of differentiated instructional practices within middle grades mathematics classrooms
Do	Conduct professional learning and collect data through classroom observations
Study	Examine quantitative and qualitative data at regular intervals (each grading period)
Act	Implement differentiated instruction and revise differentiated instructional practices within the classrooms as needed

quantitative data will be analyzed to determine final outcome data. Qualitative data will be analyzed using inductive reasoning, and quantitative data will be analyzed using descriptive statistics. This will include an analysis of differentiated instruction methods used throughout the inquiry, a comparison of 2023-24 and 2024-25 EOG data, and a comparison of baseline and outcome data for teacher surveys, student surveys, and focus groups. All collaborative inquiry partners will be a part of the outcome data analysis.

Act

Following data analysis, inquiry findings will be shared with collaborative inquiry partners, instructional coaches, school and district stakeholders, and Board of Education members via secure documents. Face-to-face delivery of data will also occur at instructional coaching meetings, principal meetings, and during professional learning communities. As the district works toward increasing mathematics proficiency at the secondary level, the findings of this study will provide valuable information that will assist teachers, administrators, and district leaders as they create strategic plans to close foundational mathematics gaps that will result in greater student proficiency and engagement in mathematics classrooms. A detailed description of Phase 3 can be seen in Table 28.

Inquiry Design Rigor

Validity, reliability, accuracy, dependability, and credibility must be measured through the research process. The measuring of such concepts in conjunction with the standard of quality is referred to as rigor (Alele & Malau-Aduli, 2023). Validity and reliability are often measured in quantitative research, and accuracy, credibility, and dependability are often measured when conducting qualitative research (Mertler, 2022). Both quantitative and qualitative research will be encompassed throughout this inquiry. Quantitative research throughout this inquiry will include teacher surveys, student surveys, i-Ready and IXL diagnostic data, NC Check-In data,

Table 28

PDSA Phase Three

Plan	Examine proficiency data and develop an outcome data plan
Do	Conduct final surveys and focus groups to establish outcome data
Study	Analyze outcome data
Act	Share inquiry findings with collaborative partners and stakeholders

District Common Formative Assessment data, and NC EOG data. The content validity and reliability of these assessments can be confirmed because the standards measured on these assessments directly aligns with North Carolina Standard Course of Study objectives for middle school students and will be given throughout the inquiry.

Qualitative research throughout this inquiry will include focus groups, observations, informal conversations, and field notes. Using a convergent, mixed-methods approach will allow the scholarly practitioner to repeat action research cycles throughout the inquiry, an essential part of developing adequate rigor (Mertler, 2022). All qualitative measures will be repeated throughout the inquiry. Focus groups will be held at the beginning and end of the inquiry. Observations will occur during each grading period. Teacher and student surveys will occur four times throughout the inquiry.

Prolonged engagement and persistent observation will occur throughout the inquiry. Observations will be conducted using a quality evaluation instrument developed by the scholarly practitioner (see Appendix H). Additionally, field notes, including observer's comments, will be recorded during classroom observations and walkthroughs. In an effort to allow for participant insight, debriefing will occur through informal conversations with inquiry participants. The trustworthiness of the data collected throughout this inquiry will be validated by examining credibility, transferability, dependability, and confirmability throughout the inquiry. To ensure that the scholarly practitioner is not misinformed, I will continually check my perception by incorporating a variety of instruments, methods, and sources to collect data. Additionally, I will engage in persistent and prolonged participation at the inquiry site, use peer debriefing, conduct member checks, develop detailed descriptions and notes, and engage in reflexivity (Mertler, 2022).

Assumptions, Delimitations, and Limitations

This inquiry was designed to determine the impact that differentiated instructional practices have on student proficiency, learning, and engagement in middle grades mathematics classrooms. This inquiry incorporates the challenges and benefits of differentiated instruction with a specific focus on its relationship to engagement and student success. The inquiry sites were determined based upon recognizing school need in conjunction with the willingness of school leadership to provide consent for the inquiry to occur at each site. The scope of this inquiry will be limited to teachers who provide formal consent to participate in the inquiry.

Limitations of this inquiry begin by considering that there is a high rate of teacher and student turnover at both sites. Additionally, time constraints for teachers, effective implementation, large class sizes, and teacher knowledge may limit the results of this inquiry. For the purpose of this inquiry, it is assumed that teachers will attend and participate in all professional learning opportunities in order to effectively implement differentiated instructional strategies within their classrooms. It is also assumed that teachers will progress monitor students, encourage student participation, and keep records and logs throughout the inquiry. Additionally, it is assumed that support staff and school administrators will remain supportive of the implementation for the entirety of the school year and that students will actively participate in differentiated instruction learning groups.

Role of the Scholarly Practitioner

I currently serve as the Director of K-12 Curriculum and Instruction in the Mary Beth County School District. Positions previously held prior to my current role include teacher, principal, and curriculum director. The majority of my career has been spent in elementary and middle schools; however, I have served on two K-12 school leadership teams throughout my 21

year career in education. My experiences thus far have taught me the importance of engaging students and adapting instruction to meet the needs of all learners in an effort to increase student proficiency and understanding. As a result, increasing student proficiency through the use of differentiated instruction in middle grades mathematics classrooms is my inquiry topic.

As a district-level leader, I do not directly supervise any of the inquiry participants or collaborative partners associated with this inquiry. However, I am often viewed as a supervisor in a position of authority. As such, this has been noted as a limitation. As the Director of K-12 Curriculum and Instruction, I lead district curriculum and instruction endeavors throughout Mary Beth County Schools. Additionally, I provide professional learning opportunities to instructional coaches on best instructional practices on a regular basis. It can be assumed that I believe that differentiated instruction is an essential element of best instructional practices that leads to greater student learning and engagement within the classroom. For this reason and in an effort to refrain from my own biases and presuppositions regarding the influence of differentiated instructional practices within the classroom, I will heavily rely on collaborative partners to cross-examine and validate all qualitative and quantitative research findings throughout this inquiry.

Summary

This chapter provides an overview of the inquiry including inquiry design and procedures as well as guiding questions. This inquiry will be completed using a mixed-methods, convergent approach encompassing both qualitative and quantitative data throughout the inquiry. As outlined in the PDSA cycles, data will be analyzed throughout the inquiry during each phase.

The focus of practice throughout this inquiry is to determine if differentiated instructional practices have an effect on student proficiency, learning, and engagement. Data will be collected during Phase One to establish a baseline. Additionally focus groups and surveys will be conducted

to determine student, teacher, and professional learning needs. During Phase Two classroom observation data and survey results will be analyzed to continue professional learning and revise practices within the classroom as needed. During Phase Three, final surveys and a final focus group will be conducted to establish outcome data. Outcome data will then be analyzed, and inquiry results will be shared with collaborative partners and inquiry participants. Chapter 4 will present the findings from the analysis.

Further discussion of the outcomes of the inquiry will be presented in Chapter 4, and Chapter 5 will include a summary of findings as well as reflections from the scholarly practitioner.

Chapter 4: Results

The purpose of this inquiry was to examine the relationship between differentiated instructional practices, student engagement, and student proficiency in middle grades mathematics. While the original design included both Westhaven Middle School and Royal Ridge Middle School, Westhaven Middle School withdrew prior to implementation, leaving Royal Ridge Middle School as the sole study site. Within Royal Ridge, only two teachers participated: one seventh grade mathematics teacher and one eighth grade mathematics teacher. Findings are therefore drawn from these two classrooms, representing a focused case study of differentiated instruction in middle grades mathematics.

The purpose of this chapter is to present the results of the study in relation to the guiding inquiry questions. Specifically, it examines (1) the effect of differentiated instruction on student proficiency in middle grades mathematics, (2) how the use of differentiated instruction influenced teachers' perceptions of student learning, and (3) the ways in which differentiated instructional practices shaped student engagement. By organizing the findings around these inquiry questions, this chapter provides evidence of how differentiated instruction was implemented in the study site and highlights the outcomes and patterns that emerged from both quantitative and qualitative data sources.

This chapter begins with a review of the pilot study results, which were used to refine the survey instruments, focus group protocols, and classroom walkthrough tool. By highlighting the feedback and adjustments made during the pilot process, the chapter establishes the foundation for the data collection methods that followed. Next, the chapter provides an explanation of data collection procedures and analysis methods, reflecting the convergent mixed-methods design described in Chapter 3. Quantitative results, including End-of-Grade assessments, NC Check-Ins,

and classroom-based diagnostic measures such as i-Ready, are presented alongside qualitative findings from teacher and student surveys, focus groups, classroom observations, and informal conversations. This is followed by demographic information about the participating teachers and students, offering context for interpreting the results. The findings are then organized in alignment with the inquiry questions, examining the effect of differentiated instruction on student proficiency, its impact on teacher perceptions of student learning, and the ways in which it influenced student engagement. Finally, the chapter concludes with a summary of key findings, which serve as the basis for the interpretation and implications that will be discussed in Chapter 5.

Pilot Study

The pilot study served as a critical first step in refining the research instruments and confirming the clarity of the teacher and student surveys as well as the focus group protocols. Early findings offered valuable insight into teacher and student perceptions of differentiated instruction within middle grades mathematics classrooms. During the pilot study, teachers reported that students valued opportunities for collaboration and for exercising choice in how they demonstrated understanding. However, they also expressed frustration when grouping practices did not consistently reflect readiness levels, which at times limited the effectiveness of peer interactions.

Teachers who participated in the pilot acknowledged the theoretical importance of differentiation and recognized its potential to strengthen student engagement and achievement. At the same time, they raised concerns regarding the practical challenges of managing small-group instruction alongside whole-class learning within the extended 80–90-minute instructional block. Time management, lesson planning, and sustaining student engagement across multiple

formats emerged as key areas of tension. The pilot focus group further highlighted the need for targeted professional learning. Teachers indicated specific support was required in three areas: designing and managing flexible groups, leveraging the enVision curriculum to deliver tiered instruction, and planning lessons more efficiently to maximize instructional time. These findings directly informed the inquiry procedures outlined in Chapter 3 by shaping the development of professional learning sessions, clarifying survey and focus group questions, and guiding the design of the classroom walkthrough tool. Adjustments such as simplifying student survey wording, adding demographic options, and refining focus group prompts ensured that instruments were developmentally appropriate and yielded measurable outcomes.

Ultimately, the pilot study established the reliability and clarity of the data collection instruments while also surfacing professional learning priorities that became central to Phase One of the inquiry. By confirming the feasibility of the methods and identifying areas of teacher need, the pilot provided a strong foundation for the implementation and analysis of differentiated instruction practices at Royal Ridge Middle School.

Data Collection

While the original design included both Westhaven Middle School and Royal Ridge Middle School, Westhaven Middle School withdrew prior to implementation, leaving Royal Ridge Middle School as the sole study site. Within Royal Ridge, only two teachers participated: one seventh grade mathematics teacher and one eighth grade mathematics teacher. Findings are therefore drawn from these two classrooms, representing a focused case study of differentiated instruction in middle grades mathematics.

Data was collected using a convergent mixed-methods approach that incorporated both quantitative and qualitative measures across three distinct phases of the Plan–Do–Study–Act

(PDSA) cycle. This design allowed for continuous integration of data, where each phase informed the next, and findings were triangulated to strengthen credibility. Instruments included teacher and student surveys administered through Qualtrics, teacher focus groups recorded and transcribed using Microsoft Teams, classroom walkthroughs documented with a differentiated instruction observation tool, and student performance measures such as NC Check-Ins, i-Ready diagnostics, and End-of-Grade (EOG) assessments. Each data source was selected to align with the guiding inquiry questions, ensuring that both proficiency outcomes and participant perceptions were captured systematically.

Phase I focused on establishing baseline measures. Prior to implementation, quantitative data from the 2023–24 End-of-Grade mathematics assessments, as well as available i-Ready diagnostic data, formative assessments, and NC Check-Ins, were collected to provide a clear picture of proficiency levels and identify areas of student need. Following approval from the university’s Institutional Review Board (IRB) and Mary Beth County Schools, participants were selected through purposeful sampling. Invitations outlining the purpose, procedures, and voluntary nature of the study were shared with middle grades mathematics teachers at Royal Ridge Middle School. Two teachers, one seventh grade and one eighth grade, volunteered to participate and provided informed consent. Their students were subsequently included in baseline data collection and participated in classroom-administered surveys.

Baseline teacher and student surveys were administered using Qualtrics links provided during scheduled class and planning periods. Teachers and students completed surveys independently, however, not all students participated in the surveys, resulting in a lack of consistency in survey results. The surveys captured initial perceptions of engagement, instructional approaches, and the presence of differentiated practices in the classroom.

Teachers also participated in an initial focus group conducted in person at Royal Ridge Middle School. The session was guided by a structured protocol and facilitated by the practitioner. Discussions explored teachers' current understanding of differentiated instruction, grouping practices, instructional challenges, and professional learning needs. The focus group was audio-recorded with consent and transcribed for analysis. Together, these data sources established a comprehensive baseline for comparison across subsequent phases of the study.

Phase II represented the implementation and ongoing data collection period. During this phase, differentiated instructional practices were introduced and supported through professional learning sessions, collaborative planning, and coaching provided by the scholarly practitioner and inquiry partners. Quantitative data was gathered at regular intervals, throughout the grading period, through the administration of NC Check-Ins and updates to i-Ready diagnostic measures. These results were tracked to monitor student growth and identify emerging proficiency trends. Concurrently, qualitative data was collected through bi-weekly classroom walkthroughs, which documented the frequency and quality of differentiated instructional practices such as flexible grouping, scaffolding, and the use of multiple problem-solving strategies. Problem-solving strategies observed and reinforced during this phase included visual models, algorithmic approaches, use of manipulatives, decomposition and re-composition of numbers, proportional reasoning, and student-selected strategies such as guess-and-check, making tables, and drawing diagrams. Teachers were encouraged to model and allow student choice in strategy selection to support conceptual understanding and engagement.

Walkthroughs were conducted throughout Phase II of the inquiry to monitor the implementation of differentiated instructional practices and collect observational data aligned to the guiding questions. Consistent with the plan outlined in Chapter 3, walkthroughs occurred on

a bi-weekly schedule over an eight-week implementation period, allowing for multiple observations of each participating teacher. Each walkthrough lasted approximately 15–20 minutes and was conducted during regularly scheduled mathematics instructional blocks to capture authentic classroom conditions.

Walkthroughs were completed by the scholarly practitioner, in collaboration with designated collaborative inquiry partners, including the school principal, assistant principal, and instructional coach. Prior to data collection, all observers reviewed the walkthrough instrument and discussed observation protocols to ensure consistency and shared understanding of indicators. To maintain reliability and minimize bias, the same observers were used throughout the implementation phase, and all walkthroughs were non-evaluative in nature. A custom walkthrough form, developed by the scholarly practitioner and refined during the pilot study, guided each observation. The instrument included both checklist indicators and open-ended response fields aligned with the inquiry's focus on differentiated instruction, such as flexible grouping, student choice, formative assessment, and engagement strategies. During each walkthrough, observers documented evidence directly on the form and supplemented it with field notes and brief post-observation reflections.

Following each observation cycle, the scholarly practitioner compiled and coded walkthrough data to identify emerging trends in differentiation practices. Observation data was triangulated with teacher survey results, focus group feedback, and student engagement data to deepen understanding of how differentiated instruction was being implemented and how it influenced classroom dynamics. No evaluative feedback was provided to participants; walkthroughs served solely as a data collection tool to support analysis of instructional change over time.

Teacher and student surveys were administered pre and post implementation to capture evolving perceptions of engagement, differentiation, and instructional effectiveness. All surveys were created and distributed using the Qualtrics platform to ensure confidentiality and secure data collection. Teacher surveys were completed individually during independent time, using electronic links shared via email by the scholarly practitioner. Student surveys were administered in mathematics classrooms during scheduled class periods. Students completed the surveys electronically using school-issued devices. Informal conversations with students during observations, coupled with anecdotal field notes, provided naturalistic data to enrich survey and performance findings. Each round of data analysis during this phase was used not only to study progress but also to make adjustments to professional learning and classroom implementation, consistent with the improvement science model.

Phase III marked the closing of the study and the collection of outcome data. During this phase, post-surveys were administered by the scholarly practitioner using the Qualtrics platform to both teachers and students, mirroring the baseline instruments to allow for direct comparison of changes in perceptions and experiences. Teacher surveys were completed individually during planning periods, and student surveys were conducted in mathematics classrooms using school-issued devices under teacher supervision. Teachers also participated in a final focus group facilitated by the scholarly practitioner, which was conducted in person, recorded via Microsoft Teams, and later transcribed for coding and analysis. The focus group explored shifts in teachers' understanding of differentiation, adaptations to grouping practices, and reflections on student engagement and learning.

Classroom walkthroughs continued during this phase, conducted by the scholarly practitioner and collaborative inquiry partners (including the principal, assistant principal, and

instructional coach) to document final evidence of differentiated practices in action. Observation data was recorded using the established walkthrough tool and supplemented by field notes to capture contextual details. Quantitative outcome data was drawn from the 2024–25 End-of-Grade mathematics assessments and i-Ready diagnostic measures, collected and analyzed collaboratively by the scholarly practitioner and inquiry partners. These results were compared to baseline data to identify changes in proficiency and to assess the overall impact of differentiated instruction within the study site. Member checking with teacher participants was conducted during this phase to verify the accuracy of thematic interpretations, and final results were shared with collaborative inquiry partners through summary reports and debriefing sessions.

By structuring data collection across three phases and integrating both quantitative and qualitative measures, this study was able to capture not only changes in student performance but also the evolving perspectives of teachers and students as they engaged with differentiated instructional practices. The systematic alignment of instruments, procedures, and analysis with the inquiry questions ensured that findings were both credible and replicable, providing a comprehensive account of how differentiation was implemented and experienced in middle grades mathematics classrooms. Maintaining alignment between research questions, data sources, and analytic strategies is essential for establishing credibility and dependability in practitioner inquiry (Mertler, 2022). A convergent mixed-methods approach strengthens validity by integrating multiple forms of data to provide a more complete understanding of the study (Creswell and Clark, 2018).

Data Analysis

The study employed a convergent mixed-methods case study design at a single school site in which quantitative and qualitative data were collected concurrently, analyzed separately, and then integrated to answer the guiding inquiry questions. Quantitative data was analyzed

descriptively to identify changes in student performance and engagement across the study period. Qualitative data, including teacher focus group transcripts, survey responses, classroom walkthrough notes, and informal teacher reflections, were analyzed thematically using Saldaña's (2021) coding framework.

Initial qualitative data analysis used an inductive coding process to identify recurring language and patterns across focus groups. Pre-implementation data showed that teachers primarily viewed differentiated instruction as remediation for struggling students, emphasizing “pulling low students” for extra help—reflecting a Tier 2 support mindset rather than core instructional design. While post-implementation data revealed a clear shift. Teachers described differentiation as embedded within whole-group instruction and guided by formative assessment. They referenced increased student engagement, small-group collaboration, exit tickets, and data-informed grouping. The cross-time comparison demonstrated movement from a remediation-focused perspective to a more proactive, inclusive, and data-driven approach. Emergent themes included increased student engagement and instructional flexibility, indicating a meaningful shift in teacher perception and practice following implementation.

Following inductive analysis, deductive interpretation was applied using Gardner's Theory of Multiple Intelligences and the Multi-Tiered System of Supports (MTSS) as conceptual lenses to interpret how emerging themes aligned with differentiated instructional practices and Tier 1 instructional responsiveness. This secondary analytic layer allowed for examination of how emergent themes aligned with differentiated instructional practices and strengthened Tier 1 instructional responsiveness. Integration of quantitative and qualitative findings enabled identification of convergence, divergence, and complementarity between numerical trends and participant perceptions. Triangulation across data sources enhanced the credibility of findings, and member checking with both teacher participants was conducted to confirm the accuracy and

trustworthiness of interpretations. While the case study design situates findings within the unique organizational and instructional context of the school, it also acknowledges inherent limitations related to transferability and generalizability.

Student Performance Data

Student performance data was analyzed using descriptive statistics to examine changes in proficiency over time. Baseline scores from the 2023–24 End-of-Grade (EOG) assessments, i-Ready diagnostic, and NC Check-Ins were compared with interim and outcome data collected during the 2024–25 school year. Percentages of students meeting grade-level benchmarks, mean proficiency rates, and shifts across grading periods were calculated to capture patterns of growth.

To examine shifts in student understanding during the implementation of differentiated instructional practices, NC Check-In data was analyzed across three grading periods for both Grade 7 and Grade 8 mathematics. The NC Check-Ins provided a series of benchmark assessments measuring % correct on grade-level content standards at three key points in the 2024-2025 school year. Check-In A was administered prior to the implementation of differentiated instruction, Check-In B occurred at the beginning of implementation, and Check-In C was administered at the end of the implementation period. This data allowed for an examination of patterns in student performance across the duration of the study, reflecting the potential influence of differentiated strategies on content mastery and learning stability.

Grade 7 totals 99 students. In Grade 7, results demonstrated minor fluctuations with a return to near-baseline levels by the end of the implementation phase. As shown in Table 29, the average % correct on content standards began at 42.6 % on Check-In 7A, declined to 38.2 % on Check-In 7B, and increased again to 42.4 % on Check-In 7C. The initial decrease reflects the period of time prior to study implementation; however, the subsequent recovery suggests that

students regained and stabilized understanding as differentiated practices became embedded. Gains were most notable among students who entered the year performing below grade level, indicating that scaffolding, targeted small-group instruction, and exposure to multiple problem-solving strategies contributed to closing foundational gaps.

In Grade 8, NC Check-In scores indicated a modest increase followed by stabilization. The average % correct rose from 32.0% on Check-In 8A to 34.0 % on Check-In 8B and remained nearly constant at 33.8 % on Check-In 8C. While the pattern does not show sustained growth beyond mid-year, the consistent performance across the final two grading periods suggests that differentiated instruction may have supported students in maintaining understanding during a period of instructional transition. Qualitative data from teacher reflections reinforced this interpretation, citing the use of flexible grouping, formative assessments, and tiered supports to address varied readiness levels. These stable outcomes imply that differentiated instruction helped prevent further decline and supported continuity in learning for students with diverse needs.

Across both grade levels, NC Check-In data revealed stability or incremental improvement in content mastery during the implementation of differentiated instructional practices. While neither grade exhibited dramatic gains in overall proficiency, the observed trends suggest that differentiation contributed to maintaining performance levels amid instructional change and targeted growth among students with the greatest academic needs. These findings align with the study's broader results indicating that differentiated instruction, when supported through professional learning, intentional planning, and consistent application, can positively influence student engagement and learning outcomes even in the early phases of implementation.

The i-Ready Diagnostic is an adaptive, computer-based assessment designed to measure students' mastery of grade-level standards and identify their instructional placement in reading and mathematics. The assessment dynamically adjusts in difficulty based on student responses, allowing for a precise measure of each learner's current performance level. Results are reported in categories indicating whether a student is performing above, on, mid, or below grade level. Students performing on or above grade level demonstrate proficiency in most or all grade-appropriate standards, while those at the mid-level are approaching proficiency and may require targeted support to close minor gaps. Students performing below grade level exhibit more significant deficits in foundational skills, often expressed as one, two, or three or more grade levels below expectations, signaling the need for differentiated instruction and intervention. This diagnostic data provides a consistent, standards-aligned measure used to monitor growth, guide instructional planning, and evaluate the impact of interventions over time.

Analysis of schoolwide data for the entire seventh-grade student body revealed persistent performance gaps across the 2024–25 academic year. At the beginning of the year (BOY), prior to implementation of differentiated instructional strategies, only 4% of students were performing mid or above grade level, while 16% were classified as early on grade level, representing a combined 20% meeting or exceeding grade-level expectations. The majority of students (80%) began the year performing below grade level, including 46% one grade level below, 12% two grade levels below, and 22% three or more grade levels below.

By the middle of the year (MOY), these distributions remained largely stable, with 4% mid or above grade level and a slight increase to 18% early on grade level. The proportion of students one grade level below declined from 46% to 40%, indicating incremental progress for a small subset, though the proportion three or more grade levels below rose from 22% to 25%,

Table 29

Content Standard Mean % Correct Across Grading Periods: Grade 7

	NC Check in 7A (prior to implementation)	NC Check in 7B (beginning of implementation)	NC Check in 7C (post implementation)
Content Standard Mean % Correct	42.6	38.2	42.4

Table 30

Content Standard % Correct Across Grading Periods: Grade 8

	NC Check in 8A (prior to implementation)	NC Check in 8B (beginning of implementation)	NC Check in 8C (post implementation)
Content Standard % Correct	32.0	34.0	33.8

highlighting continued academic struggles among the lowest-performing learners. Because differentiated instruction had not yet been fully implemented at this stage, these midyear results likely reflect the impact of standard instructional practices and general supports rather than targeted intervention.

At the end of the year (EOY), following the implementation of differentiated instructional practices in selected classrooms, modest upward movement was observed at higher proficiency levels. The %age of students performing mid or above grade level doubled from 4% to 8%, while early on grade level students remained stable at 17%. The proportion of students one grade level below held constant at 40%, and the share of students two grade levels below decreased from 12% to 9%, suggesting some progress in closing gaps for students who were nearer to grade-level expectations. The percentage of students performing three or more grade levels below increased slightly from 25% to 27%, indicating that significant learning gaps persisted among the most academically at-risk students.

Because these results reflect the entire seventh-grade cohort, not all of whom received differentiated instruction, the observed trends represent overall schoolwide performance rather than direct measures of the intervention's effectiveness. The modest gains in upper proficiency bands and slight reductions in mid-range deficits suggest limited but positive movement across the grade level, while the persistent challenges among the lowest-performing students underscore the need for more comprehensive and sustained instructional supports.

The following section examines outcome data specific to the classrooms where differentiated instruction was implemented, allowing for a more direct analysis of its impact on student growth and proficiency. Analysis of the i-Ready diagnostic data for the seventh-grade study participants revealed subtle yet meaningful shifts in student performance from the

beginning to the end of the implementation period. At the Beginning of Year (BOY), none of the 21 students performed at or above grade level, and only 14 % demonstrated early on-grade-level proficiency. The majority of students, approximately 62 %, were one grade level below expectations, while the remaining 24 % were two grade levels below. This data underscored a classroom profile characterized by significant readiness gaps and a clear need for targeted support through differentiated instruction.

By the Middle of Year (MOY), following the initial implementation of small-group and scaffolded strategies, there was slight upward movement among students performing at the early on-grade-level range, increasing from 14 to 18 %. The percentage of students one grade level below decreased modestly from 62 to 59 %, while those performing two grade levels below also declined from 24 to 18 %. Although one student (5 %) remained three or more grade levels below, the overall distribution indicated progress toward narrowing skill gaps among students in the lowest performance categories. These trends, while incremental, align with research suggesting that differentiated instruction requires sustained implementation before major shifts in proficiency emerge (Tomlinson & Moon, 2013).

At the End of Year (EOY), performance patterns reflected both improvement and persistent challenge. The percentage of students demonstrating early on-grade-level proficiency increased again to 23 %, representing a nine-percentage-point gain from baseline. Importantly, the proportion of students two grade levels below decreased sharply to 5 %, and those three or more grade levels below remained stable at 5 %. However, the percentage of students one grade level below increased to 68 %, indicating that while many students moved out of the lowest tiers, they had not yet reached full grade-level mastery. This pattern suggests that differentiated instruction, particularly through scaffolding, small-group reteaching, and exposure to multiple

Table 31

iReady Diagnostic Results from BOY to EOY: Grade 7

	Beginning of Year (BOY): Prior to Implementation	Middle of Year (MOY): Prior to Implementation	End of Year: Post Implementation
Percentage of Students Mid or Above Grade Level	4%	4%	8%
Percentage of Students Early On Grade Level	16%	18%	17%
Percentage of Students 1 Grade Level Below	46%	40%	40%
Percentage of Students Two Grade Levels Below	12%	12%	9%
Percentage of Students Three or More Grade Levels Below	22%	25%	27%

problem-solving strategies, helped elevate students toward the next proficiency band even if complete grade-level attainment had not yet been achieved.

Taken together, the i-Ready diagnostic results illustrate that differentiated instruction contributed to stabilizing and slightly improving student performance among study participants despite wide readiness disparities. Students benefited from tiered supports that emphasized conceptual reinforcement and individualized pacing, reducing the proportion of those performing significantly below grade level. These findings are consistent with the focus group reflections reported later in this chapter, which highlighted teachers' growing confidence in using data to inform grouping and scaffolding decisions. While gains were modest, the results provide evidence that targeted differentiation can yield incremental progress in mathematics achievement, particularly when implemented with consistency and supported by ongoing professional learning.

These i-Ready findings directly address Inquiry Question 1, which examined the effect of differentiated instruction on student proficiency in middle grades mathematics. The seventh grade results suggest that while overall gains were incremental, differentiated practices supported measurable movement out of the lowest proficiency tiers and fostered steady improvement among students performing below grade level. Teachers' use of scaffolding, flexible grouping, and data-informed reteaching allowed more students to approach grade-level readiness by the end of the year. Although full proficiency was not yet achieved for most students, the reduction in those performing two or more grade levels below indicates meaningful progress toward narrowing achievement gaps. These results reinforce the premise that differentiated instruction, when implemented consistently and responsively, can positively influence student proficiency even within classrooms characterized by diverse readiness levels and persistent foundational

gaps.

An examination of schoolwide i-Ready diagnostic data for the eighth grade student body revealed a complex pattern of performance across the 2024–25 academic year, with evidence of widening proficiency gaps and limited movement toward grade-level mastery for many students. At the beginning of the year (BOY), prior to any differentiated instructional efforts, 21% of students were performing mid or above grade level, and another 18% were classified as early on grade level. Collectively, 39% of the cohort demonstrated performance aligned with grade-level expectations. The remaining 61% of students entered the year performing below grade level, including 27% one grade level below, 8% two grade levels below, and 26% three or more grade levels below, figures that pointed to substantial learning gaps across the grade.

By the middle of the year (MOY), overall performance distributions reflected signs of academic decline rather than improvement. The proportion of students mid or above grade level declined slightly to 18%, and those early on grade level dropped to 12%, bringing the total percentage performing at or near grade level down to 30%. Meanwhile, students one grade level below increased from 27% to 33%, and those two grade levels below rose from 8% to 12%, suggesting that some learners were struggling to maintain early gains. The percentage of students performing three or more grade levels below remained unchanged at 26%, suggesting that the lowest performing students continued to struggle. Because differentiated instruction had not yet been implemented across the entire school, this stability likely reflects the limitations of general classroom practices, not differentiated instruction practices, in meeting diverse learning needs.

At the end of the year (EOY), following the introduction of differentiated instructional strategies in select classrooms, the distribution shifted again, this time revealing both positive and concerning trends. The proportion of students mid or above grade level declined sharply to

Table 32

iReady Diagnostic Results from BOY to EOY: Grade 7 Study Participants

	Beginning of Year (BOY): Prior to Implementation	Middle of Year (MOY): Prior to Implementation	End of Year: Post Implementation
Percentage of Students Mid or Above Grade Level	0%	0%	0%
Percentage of Students Early On Grade Level	14%	18%	23%
Percentage of Students 1 Grade Level Below	62%	59%	68%
Percentage of Students Two Grade Levels Below	24%	18%	5%
Percentage of Students Three or More Grade Levels Below	0%	5%	5%

4%, a significant drop from the start of the year, while the early on grade level category rebounded to 19%, suggesting that some students regained footing near grade-level proficiency. Combined, only 23% of students were performing at or near grade level by the end of the year. Among those below grade level, 30% were one grade level behind, a slight improvement from MOY, while 10% remained two grade levels below. Notably, the proportion of students three or more grade levels below rose to 37%, representing a growing segment of the population facing deep learning deficits.

Since these results reflect all eighth grade students, not only those who participated in the study, the patterns observed represent schoolwide performance rather than direct evidence of the differentiated instruction intervention. The decline in upper-level proficiency, paired with growth in the lowest category, underscores the ongoing academic recovery challenges faced by the grade level as a whole. Still, the rebound in the early on grade level group may point to small scale progress among students closer to proficiency, potentially influenced by targeted supports or emerging differentiation in some classrooms. Overall, the data illustrates that while isolated gains occurred, the majority of the cohort remained below grade level, emphasizing the urgency of implementing systematic, tiered interventions and expanding differentiated practices to address persistent disparities in readiness.

Subsequent analysis focuses specifically on the eighth grade classroom engaged in the differentiated instruction study, offering a more detailed look at how intentional grouping, scaffolding, and flexible instruction influenced student growth trajectories compared to these broader schoolwide patterns. An analysis of i-Ready diagnostic results for the eighth grade study participants demonstrated notable shifts in student performance over the course of the 2024–2025 academic year. At the beginning of the year, none of the students were performing at or

above grade level. All participants scored below grade level, with 72 % performing three or more grade levels below proficiency and the remaining 28 % performing two grade levels below.

These baseline data highlighted significant learning gaps and reinforced the importance of implementing differentiated instructional practices to address individual student needs.

By the middle of the year, performance distributions showed evidence of gradual improvement.

The proportion of students performing three or more grade levels below decreased from 72 % to 44 %, while those performing two grade levels below declined from 28 % to 22 %.

Approximately 28 % of students advanced to the category of one grade level below, and 6% reached early on grade level performance. Although zero students yet demonstrated mid or above grade level mastery, these midyear results indicated that targeted scaffolding, small-group instruction, and flexible grouping were beginning to support students in closing foundational skill gaps.

At the end of the year, continued upward movement was observed. Seventeen % of students reached mid or above grade level performance, marking the first time any eighth grade students participating in the study met or exceeded grade level expectations. The proportion of students performing three or more grade levels below proficiency decreased further to 39 %, while those two grade levels below fell to 11 %. One third of the students, or 33 %, remained one grade level below. Although no students scored in the early on grade level category at the end of the year, overall results reflected positive movement across performance bands, particularly for those who began the year with the most substantial deficits. The reduction in the lowest proficiency levels and the emergence of grade level performance suggest that differentiated instructional strategies contributed to meaningful academic growth among eighth grade participants. These findings support the conclusion that sustained differentiation efforts can

Table 33

iReady Diagnostic Results from BOY to EOY: Grade 8

	Beginning of Year (BOY): Prior to Implementation	Middle of Year (MOY): Prior to Implementation	End of Year: Post Implementation
Percentage of Students Mid or Above Grade Level	21%	18%	4%
Percentage of Students Early On Grade Level	18%	12%	19%
Percentage of Students 1 Grade Level Below	27%	33%	30%
Percentage of Students Two Grade Levels Below	8%	12%	10%
Percentage of Students Three or More Grade Levels Below	26%	26%	37%

promote upward mobility for students with persistent learning gaps when consistently applied within classroom instruction.

These results directly address Inquiry Question 1 by illustrating how differentiated instruction influenced student proficiency as measured by the i-Ready diagnostic assessment. The shift from a baseline in which all students performed below grade level to an end of year distribution that included students performing at or above grade level demonstrates measurable growth within the study cohort. The steady reduction in the proportion of students performing three or more grade levels below expectations, from 72 % at the beginning of the year to 39 % at the end, signals meaningful progress among the most academically at-risk learners. Similarly, the appearance of 17 % of students meeting grade level proficiency by the end of the year reflects the cumulative impact of strategies such as scaffolding, flexible grouping, and targeted support embedded throughout the differentiated instruction model. While the overall gains were modest, the upward movement across performance bands provides evidence that differentiated instruction contributed to tangible improvement in student proficiency as captured through the i-Ready diagnostic results.

End-of-Grade (EOG) mathematics results for the 2024–25 school year revealed encouraging growth among seventh grade study participants who engaged in differentiated instructional practices. Of the 22 students in the study group, 11 demonstrated proficiency, resulting in a 50 % proficiency rate. In comparison, the overall seventh grade proficiency rate at Royal Ridge Middle School was 44.08 %, with 41 out of 93 students scoring at or above grade level. The study participants, therefore, outperformed the broader cohort by nearly six percentage points, suggesting that differentiated instruction contributed to higher rates of proficiency within the study classrooms.

While EOG proficiency provides a summative measure of achievement, these results gain additional significance when interpreted alongside i-Ready diagnostic data. i-Ready trends throughout the year reflected consistent growth among students participating in differentiated instruction, even for those who began the year performing well below grade level. Because i-Ready data is predictive of EOG performance, the upward movement observed across diagnostic periods reinforces that differentiated instruction had a measurable effect on learning outcomes. Together, these data sets suggest that the implementation of scaffolding, readiness-based grouping, and varied problem-solving strategies promoted both growth and achievement, narrowing proficiency gaps and supporting students' transition toward grade-level mastery. The 2024–25 End-of-Grade (EOG) mathematics data for eighth grade students provided an additional indicator of student proficiency for evaluating the effects of differentiated instruction. Among the 18 study participants, one student achieved proficiency, representing 5.56% of the group. In comparison, the overall eighth grade proficiency rate at Royal Ridge Middle School was 11.11 %, with four students meeting grade-level expectations. While the proportion of proficient students remained low for both the study group and the grade level cohort, this data highlights the persistent academic challenges faced by students transitioning to algebraic concepts in middle school mathematics.

It is important to interpret these findings in conjunction with i-Ready diagnostic data, which serve as a predictive measure of EOG outcomes. Although proficiency rates were low, i-Ready results demonstrated consistent growth across the study period, particularly among students who began the year two or more grade levels below expectations. This alignment suggests that differentiated instruction positively influenced learning trajectories even if students did not yet demonstrate proficiency on the summative assessment. The EOG outcomes therefore

Table 34

iReady Diagnostic Results from BOY to EOY: Grade 8 Study Participants

	Beginning of Year (BOY): Prior to Implementation	Middle of Year (MOY): Prior to Implementation	End of Year: Post Implementation
Percentage of Students Mid or Above Grade Level	0%	0%	17%
Percentage of Students Early On Grade Level	0%	6%	0%
Percentage of Students 1 Grade Level Below	0%	28%	33%
Percentage of Students Two Grade Levels Below	28%	22%	11%
Percentage of Students Three or More Grade Levels Below	72%	44%	39%

Table 35

EOG Mathematics Proficiency: Grade 7 Study Participants vs. All Grade 7 Students (2024-25)

	Number of Students	Number Proficient	Percentage Proficient
Study Participants	22	11	50%
All Grade 7 Students	93	41	44.08%

reflect the cumulative effect of long-standing foundational gaps, while the i-Ready growth trends provide evidence of accelerated progress toward mastery. Together, these complementary data sources reinforce that differentiated instruction fostered meaningful academic growth, improved readiness, and positioned students for continued gains in subsequent school years.

Survey Data

Teacher and student surveys were administered at both the beginning and end of the study using Qualtrics to measure perceptions related to differentiated instruction. The instruments included five point Likert scale items with response options of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree, allowing participants to express the extent of their agreement with each statement. For teachers, items were organized around key domains such as confidence in implementing differentiated instruction, use of flexible grouping and scaffolding, and perceived impact on student engagement and learning outcomes. The student survey included parallel constructs that examined perceptions of choice and voice in learning, collaboration with peers, and engagement with instructional tasks. Quantitative data was analyzed descriptively, with frequencies, percentages, and mean scores calculated for each item to capture overall response trends. Comparisons between pre and post survey results revealed positive shifts across multiple domains, indicating growth in teacher confidence and instructional flexibility, as well as increased student perceptions of engagement and choice in the learning process.

To enhance interpretability of the survey results, mean scores from the five point Likert scale were converted to percentages representing the relative level of agreement or mastery for each item. Each Likert response option ranged from 1 (“strongly disagree”) to 5 (“strongly agree”). To express these values as percentages, the mean score for each survey item was divided

Table 36

EOG Mathematics Proficiency: Grade 8 Study Participants vs. All Grade 8 Students (2024-25)

	Number of Students	Number Proficient	Percentage Proficient
Study Participants	18	1	5.56%
All Grade 8 Students	36	4	11.11%

by the maximum possible value of 5 and then multiplied by 100. This conversion provided a more intuitive understanding of changes in teacher perceptions and practices from pre to post study. For example, a mean of 3.5 corresponds to 70% agreement, while a mean of 5.0 reflects 100% agreement. Presenting data in this format allowed for clearer visualization of growth across survey items and facilitated comparison between variables when displayed in both tabular and graphical form.

Teacher survey data reflected significant growth in teachers' understanding, confidence, and implementation of differentiated instructional practices over the course of the study. The most notable increases occurred in areas directly related to planning and delivering responsive instruction. Agreement with the statement "I understand what differentiated instruction means" rose from a mean of 70% to 100%, and "I differentiate instruction based on the needs of the learners in my classroom" increased from 50% to 80%, demonstrating substantial gains in both conceptual understanding and instructional application. Teachers also reported greater use of small group instruction, with mean ratings increasing from 50% to 70%, and a corresponding decline in agreement with "I primarily teach the class using a whole-group approach" (from 70% to 50%), reflecting a clear shift toward more flexible grouping structures and targeted instruction.

Growth was also evident in teachers' beliefs about providing students with choice and varied opportunities for learning. Agreement with "I allow my students to use the strategy of their choice when problem solving" increased from 50% to 80%, and "I offer my students varying assignments based on their learning needs" rose from 70% to 90%, suggesting more consistent implementation of differentiated tasks aligned with student readiness. Although agreement with "I teach my students multiple strategies to use when solving math problems"

remained stable at 80%, the consistently high rating indicates that teachers already valued exposing students to multiple approaches prior to the study. Similarly, perceptions of student proficiency, “When assessing standards, 80% of my students are proficient.” remained unchanged at 70%, reflecting continued recognition of persistent gaps in mastery despite improvements in engagement and instructional flexibility. Teachers also reported modest growth in engagement perceptions, as the mean for “My students are active participants during math class” increased from 80% to 90%.

Overall, these results suggest that teachers developed greater confidence and skill in implementing differentiated instruction, particularly through flexible grouping, formative assessment, and providing choice in learning strategies and assignments. The data indicates a meaningful shift away from traditional whole group instruction toward more responsive practices designed to meet diverse student needs. At the same time, stable perceptions of proficiency underscore the ongoing challenge of translating increased differentiation and engagement into consistent mastery of grade level standards. Teachers’ reflections throughout the study echoed these findings, highlighting both their growth in understanding and practice and continued challenges with time management and balancing small group instruction within the broader structure of the mathematics classroom.

Because only one seventh grade student completed the pre-study survey, baseline data was insufficient for meaningful comparison across time. This limited participation constrains the ability to measure change but does not diminish the value of the post-study findings. At the conclusion of the study, eight seventh grade students completed a post-study survey designed to measure their perceptions of instructional practices and engagement in mathematics. Although comparative analysis was not feasible, the post-study responses provide important insight into

how students perceived the differentiated instructional practices implemented throughout the study period. Consequently, the analysis of the seventh grade participants focuses primarily on these end of study results to capture prevailing student perceptions following the implementation of differentiated instruction.

The student survey consisted of eight Likert scale items rated from *Strongly Disagree (1)* to *Strongly Agree (5)*, with higher mean values indicating stronger agreement. Mean scores were converted to percentages to enhance interpretability, allowing for clearer visualization of trends in student perceptions of differentiated instruction and engagement. Results indicated positive perceptions of the differentiated instructional practices implemented by the seventh grade mathematics teacher. Students reported a high sense of participation and engagement, with the statement “I am an active learner in math class” yielding a mean of 3.75 (75%). Similarly, students expressed confidence in their understanding of instructional content ($M = 3.88$, 78%), suggesting that scaffolding and targeted supports enhanced clarity and comprehension. The highest mean, 4.00 (80%), was associated with the item “Teaching is designed to meet my needs as a learner,” reflecting students’ perceptions that instruction was increasingly responsive to their readiness levels and learning preferences.

Responses also suggested that whole group instruction remained present but balanced with differentiated practices. Agreement with “My teacher primarily teaches the class using a whole group approach” produced a mean of 3.63 (73%), serving as a reverse indicator of differentiation. This finding implies that while students still experienced traditional instruction, they also recognized opportunities for individualized or small group differentiated learning. Perceptions of small group instruction were moderately positive ($M = 3.38$, 68%), as were items related to the teaching of multiple problem solving strategies ($M = 3.75$, 75%). These findings

Table 37

Percentage Gain in Teacher Perceptions and Practices Related to Differentiated Instruction

Survey Item	Pre-Study %	Post-Study %	Change
I understand what differentiated instruction means.	70%	100%	+30%
I differentiate instruction based on the needs of the learners in my classroom.	50%	80%	+30%
I teach using small group rotations at least twice a week.	50%	70%	+20%
I primarily teach the class using a whole-group approach. (reverse indicator)	70%	50%	+20%
I teach my students multiple strategies to use when solving math problems.	80%	80%	0%
I allow my students to use the strategy of their choice when problem solving.	50%	80%	+30%
I offer my students varying assignments based on their learning needs.	70%	90%	+20%
My students are active participants during math class.	80%	90%	+10%
When assessing standards, 80% of my students are proficient.	70%	70%	0%

align with classroom observation data documenting the teacher's increased use of flexible grouping and explicit modeling of diverse mathematical strategies.

Student choice and task variation were also moderately reflected in survey responses. Agreement with “My teacher allows me to use the strategy of my choice when problem solving” and “My teacher offers me varying assignments based on my learning needs ” both averaged 3.38 (68%), suggesting that students were aware of growing opportunities for autonomy in learning. Although these values represent developing rather than fully established practices, they indicate progress toward more personalized and flexible instruction compared to the baseline classroom environment.

Taken together, the post study results reveal that seventh grade students viewed their mathematics classroom as engaging, supportive, and responsive to diverse learning needs. Despite the small pre-study sample size, the end of study data provides evidence that differentiated instruction contributed to improved student perceptions of participation, understanding, and instructional quality. The overall pattern of results suggests that differentiation not only enhanced student engagement but also helped create a classroom environment where learners felt that their individual needs were being met.

These findings directly address Inquiry Question 3, which sought to determine how implementing differentiated instruction impacts student engagement in middle grades mathematics classrooms. Although only one seventh grade student completed the pre-study survey, limiting opportunities for longitudinal comparison, the post-study responses from eight students provide meaningful insight into how differentiation shaped their engagement and perceptions of learning. The consistently moderate to high mean scores across most survey items, particularly those reflecting engagement (75%) and instructional alignment with learning

needs (80%), indicate that differentiated instruction positively influenced students' experiences in mathematics. Students perceived their classroom as more interactive and responsive, describing greater opportunities for participation, collaboration, and individualized support. Even without a robust baseline for comparison, the overall pattern of responses demonstrates that differentiated instruction fostered increased engagement, stronger understanding, and a greater sense of ownership over learning among seventh grade participants.

The student survey analysis for eighth grade participants focused specifically on examining how differentiated instruction influenced engagement, perceptions of learning, and opportunities for choice in mathematics. A total of thirteen students completed the pre-study survey, and eleven students completed the post-study survey. The survey instrument consisted of eight Likert-scale items rated on a five-point scale ranging from *Strongly Disagree (1)* to *Strongly Agree (5)*.

Survey items were identical to the seventh grade survey items. Mean scores were converted to percentages to allow for easier interpretation and comparison across items and time points.

Overall, results reflected mixed but informative patterns in student perceptions of differentiated instruction. Agreement with statements related to engagement and active learning showed notable improvement. The item "I am an active learner in math class" increased from a mean of 3.46 (69.2%) to 3.91 (78.2%), suggesting that differentiated instructional strategies fostered greater participation and investment in the learning process. This finding aligns with classroom observation data, where students were seen engaging more frequently in collaborative problem-solving and peer discussions during differentiated lessons.

Perceptions of instructional clarity and design showed modest declines between the pre- and post-study surveys. The mean score for "I am able to understand what is being taught" decreased from 3.62 (72.3%) to 3.18 (63.6%), while "Teaching is designed to meet my needs as

Table 38

Student Perceptions of Differentiated Instruction and Engagement (Post-Study Results, Grade 7)

Survey Item	Post-Study % (Mean Agreement)
I am an active learner in math class.	75% (M = 3.75)
I am able to understand what is being taught.	78% (M = 3.88)
Teaching is designed to meet my needs as a learner.	80% (M = 4.00)
My teacher primarily teaches the class using a whole-group approach.	73% (M = 3.63)
My teacher teaches using small group instruction at least twice a week.	68% (M = 3.38)
My teacher teaches multiple strategies to solve math problems.	75% (M = 3.75)
My teacher allows me to use the strategy of my choice when problem solving.	68% (M = 3.38)
My classmates and I have varying assignments based on our learning needs.	68% (M = 3.38)

a learner decreased from 4.00 (80.0%) to 3.55 (71.0%). These shifts may reflect the challenges associated with adjusting to new instructional routines and increased cognitive demand as the teacher implemented varied grouping and task structures. The complexity of differentiated lessons, while beneficial for engagement and critical thinking, may have temporarily influenced students' confidence in content understanding, particularly among learners accustomed to more traditional, whole-group instruction.

Student perceptions of classroom structure also showed slight declines, with “My teacher primarily teaches the class using a whole-group approach” decreasing from 4.15 (83.0%) to 4.00 (80.0%), and “My teacher teaches using small group instruction at least twice a week” decreasing from 3.31 (66.2%) to 3.00 (60.0%). While these decreases may initially appear negative, they actually reflect an intentional instructional shift away from reliance on whole-group delivery toward more individualized and small-group differentiation. This shift is consistent with teacher reflections indicating increased confidence in managing flexible groupings and supporting students through scaffolded instruction.

Positive patterns emerged in student perceptions of choice and instructional flexibility. The statement “My teacher teaches multiple strategies to solve math problems” showed a slight increase from 4.00 (80.0%) to 4.09 (81.8%), while “My teacher allows me to use the strategy of my choice when problem-solving” remained stable (3.85 to 3.82). Similarly, “My teacher offers me varying assignments based on my learning needs” rose slightly from 3.69 (73.8%) to 3.72 (74.4%). These findings indicate that students recognized and valued the growing presence of differentiated practices that allowed for individual approaches to problem solving and task completion.

Taken together, the results demonstrate that differentiated instruction had a measurable, if

nuanced, impact on eighth grade student perceptions of engagement, instructional variety, and agency in mathematics learning. Students increasingly viewed themselves as active learners and recognized opportunities for multiple strategies and varied assignments, even as some expressed uncertainty about instructional clarity during the transition to differentiated practices. These perceptions mirror teacher reflections and observation data indicating that differentiation was still developing as a consistent classroom norm but had begun to yield positive shifts in engagement and ownership of learning.

In relation to Inquiry Question 3, these findings suggest that the implementation of differentiated instruction contributed to increased engagement and participation among eighth grade mathematics students, particularly as they experienced greater collaboration and autonomy. While perceptions of understanding and structure fluctuated, likely due to the adjustment period inherent in pedagogical change, the overall trend supports the conclusion that differentiated instruction fostered a more interactive and student centered learning environment.

When considered together, the student survey results from both the seventh and eighth grade cohorts illustrate a shared trend toward increased engagement and awareness of differentiated instructional practices, accompanied by ongoing variability in perceptions of instructional clarity and structure. While participation rates differed, both groups demonstrated strong post-study agreement that their teachers incorporated multiple strategies and provided opportunities for collaboration and choice. Seventh grade students, who completed only the post-study survey, reflected generally positive perceptions of their learning experiences, reporting high levels of agreement with statements related to being active learners and having access to different ways of solving problems. Similarly, eighth grade students demonstrated measurable growth in engagement-related items, particularly in feeling like active participants in

mathematics learning.

However, both grade levels exhibited some uncertainty regarding instructional clarity and pacing, a finding that aligns with teacher reflections about the challenges of managing differentiated lessons while ensuring consistent understanding for all learners. Despite these fluctuations, the collective data from both cohorts indicates that students increasingly recognized and valued differentiated instruction as a framework that emphasized collaboration, flexibility, and individualized learning opportunities. These findings reinforce the broader quantitative and qualitative evidence presented throughout this chapter, suggesting that differentiated instruction, even when implemented on a small scale, can foster greater student engagement and ownership of learning in middle grades mathematics classrooms.

Teacher Reflections

Teacher perceptions were further examined through reflections gathered during classroom observations and informal conversations. Data was coded thematically, producing categories related to readiness, scaffolding, flexible grouping, formative assessment, and professional learning needs. From these categories, several themes emerged. Teachers emphasized the challenge of addressing wide variations in student readiness, expressed growing confidence in using scaffolding and flexible grouping to support engagement, and identified the need for continued professional learning focused on managing small group instruction and using formative assessment to guide differentiation. One teacher explained, “Every class has such a wide range of needs. It feels like I’m teaching three different levels at once, but differentiation in small groups help me give students what they actually need in the moment.” Another reflected on the growing use of flexible grouping, noting, “It took time to get the groups right, but once I started changing them based on data instead of just ability, I saw more students

Table 39

Percentage Gain in Student Perceptions and Practices Related to Differentiated Instruction for Grade 8 Study Participants

Survey Item	Pre-Study % (Mean Agreement)	Post-Study % (Mean Agreement)	Change
I am an active learner in math class.	69.2% (M = 3.46)	78.2% (M = 3.91)	+9.0%
I am able to understand what is being taught.	72.3% (M = 3.62)	63.6% (M = 3.18)	-8.7%
Teaching is designed to meet my needs as a learner.	80.0% (M = 4.00)	71.0% (M = 3.55)	-9.0%
My teacher primarily teaches the class using a whole-group approach.	83.0% (M = 4.15)	80.0% (M = 4.00)	-3.0%
My teacher teaches using small group instruction at least twice a week.	66.2% (M = 3.31)	60.0% (M = 3.00)	-6.2%
My teacher teaches multiple strategies to solve math problems.	80.0% (M = 4.00)	81.8% (M = 4.09)	+1.8%
My teacher allows me to use the strategy of my choice when problem solving.	77.0% (M = 3.85)	76.4% (M = 3.82)	-0.5%
My classmates and I have varying assignments based on our learning needs.	73.8% (M = 3.69)	74.4% (M = 3.72)	+0.6%

participating and staying on task.”

At the start of the study, both teachers framed differentiated instruction primarily in terms of structural adjustments, such as grouping or providing additional support for struggling learners. Over time, however, their reflections demonstrated growth toward more intentional practices. Both teachers described using data more strategically to guide grouping decisions, incorporating multiple problem-solving strategies into instruction, and relying more consistently on formative assessments to adapt lessons in real time. As one teacher described, “I used to plan groups once at the start of a unit, but now I change them after every quiz or exit ticket depending on what students still need.” Another teacher added, “Using warm-ups and exit tickets has helped me see where students are before I move on. It’s made me slow down and reteach right away instead of waiting until the test.” While they acknowledged persistent challenges, including sustaining rigor within groups and anticipating misconceptions, they also noted that differentiation allowed them to better identify and respond to student needs. One teacher summarized this growth, saying, “Differentiation used to feel like extra work, but now it feels like the only way to really see what my students understand.”

Focus Groups

In the qualitative strand, a thematic analysis was conducted to examine patterns in teacher experiences with differentiated instruction across the implementation period. Following Saldaña’s (2021) guidance, first-cycle coding employed descriptive coding to capture teachers’ language and observable instructional behaviors across focus group transcripts, classroom walkthrough notes, survey responses, and informal reflections. Initial inductive coding occurred through iterative readings of the data, allowing patterns to emerge from participant language rather than being predetermined.

Analysis of the first focus group, conducted prior to implementation, revealed that teachers primarily framed differentiated instruction as targeted support for struggling learners. Early first-cycle codes reflected this orientation and included scaffolding support, ability groups, remediation, and readiness gaps. For example, statements such as, “When I think about differentiated instruction, I think about pulling my lowest kids to the table and giving them extra help so they can keep up,” were coded as a support-oriented conception of differentiation, aligned more closely with Tier 2 intervention than with whole-group instructional design.

The thematic analysis of the first focus group revealed that both teachers articulated a functional but developing understanding of differentiated instruction. Teacher A described the approach as “offering more structure for students who needed additional help”, while Teacher B emphasized the importance of “meeting students at their individual levels.” Their perspectives reflected Tomlinson’s (2014) description of differentiation as a proactive adjustment of instruction for readiness, interest, and learning profiles, though their emphasis was initially on structure and classroom management.

Instructional practices at the beginning of the study centered on blended approaches that combined whole class instruction with small group work, peer collaboration, and independent practice. Engagement was measured informally through questioning, facial expressions, peer teaching, and participation strategies. Grouping decisions varied, with Teacher A relying more on ability groups and Teacher B experimenting with random groups to reduce off task behavior. Both teachers described exposing students to multiple problem solving strategies and using a variety of assessments, but they also noted limitations, including the challenge of sustaining engagement in small groups and the difficulty of accelerating students with foundational gaps. At this stage, both teachers identified professional learning needs in the areas of classroom

management and intervention strategies. “Teachers often find that the greatest challenges in differentiation lie not in understanding the theory, but in managing the classroom to make responsive teaching feasible, particularly when working with small groups while maintaining engagement for the whole class.” (Tomlinson, 2014, p. 89) This is supported by the following quote made by the Teacher A: “I know small groups are important but managing them while keeping the rest of the class on task is really hard. I need more ideas for how to plan rotations and keep everyone engaged.”

As implementation progressed, coding of the final focus group revealed notable shifts in teacher language and instructional decision-making. More frequent first-cycle codes included exit tickets, flexible grouping, student discussion, peer collaboration, strategy variation, and formative assessment practices. For example, the statement, “I started using exit tickets to decide who needed help the next day,” was coded as formative assessment use and data-informed grouping, while reflections describing increased student discussion during small-group work were coded as student engagement and collaborative learning structures. These codes reflected movement from remediation toward readiness-based instructional responsiveness embedded within core instruction.

During second-cycle analysis, initial inductive codes were clustered into broader categories representing recurring cross-time patterns across data sources. Key categories included readiness-based instructional decision-making, formative assessment and data-informed adjustment, flexible grouping and collaborative structures, scaffolding within Tier 1 instruction, and ongoing professional learning needs. Cross-time comparison between initial and final focus groups demonstrated a shift from grouping for remediation or classroom management toward grouping for instructional responsiveness and learning evidence.

Following inductive category development, deductive coding was applied using Gardner's Theory of Multiple Intelligences and the Multi-Tiered System of Supports (MTSS) as conceptual lenses. Deductive codes derived from MTSS included Tier 1 instructional responsiveness, data-informed instructional adjustment, and readiness-based support, emphasizing the strengthening of core instruction through differentiation. Deductive codes informed by Multiple Intelligences included multiple pathways to learning, strengths-based engagement, and strategy variation, particularly when teachers described students accessing content through discussion, visual representation, or collaborative problem-solving. This second analytic layer examined how emergent practices aligned with the theoretical framework guiding the inquiry.

Categories were then synthesized into three overarching themes that captured the core qualitative findings: (1) Differentiation as a developing but increasingly intentional practice; (2) Instructional decision-making increasingly driven by real-time assessment data; and (3) Growing teacher confidence in small-group instruction alongside persistent structural and management challenges. These themes were supported by explicit comparisons between pre- and post-implementation data, which reflected a shift in teacher understanding from viewing differentiation primarily as support for struggling students to conceptualizing it as readiness-based, flexible instruction embedded within Tier 1 practice.

These themes provided the analytic framework for interpreting how teachers understood and enacted differentiated instruction over the course of the inquiry and how they perceived its impact on student learning and engagement. In subsequent sections, findings related to teacher perceptions, classroom practice, and student engagement are presented through the lens of these themes. Together, they illustrate both continuity and change across the implementation period, offering insight into how teachers refined their differentiated instructional practices within the

Table 40

Summary of Teacher Perceptions from Initial and Final Focus Groups

Theme	Initial Focus Group	Final Focus Group
Understanding of Differentiated Instruction	Teachers viewed DI as providing structure and support for struggling learners.	Teachers described DI as tiered instruction that meets students at their readiness level and offers multiple pathways for learning.
Instructional Strategies	Whole-group instruction with limited small-group or independent work.	Increased use of peer collaboration, small-group rotations, and student-led learning.
Grouping Practices	Grouping based on ability (7th grade) or random assignment (8th grade).	Grouping based on assessment data, behavior, and occasional student choice.
Assessment Practices	Reliance on quizzes and informal observation; minimal formative use.	Regular use of exit tickets, warm-ups, and questioning to guide instruction.
Demonstration of Learning	Traditional quizzes and assignments used to assess understanding.	Peer teaching, student reflection (“shout-out board”), and applied demonstrations of learning.
Professional Learning Needs	Requested strategies for managing small groups and maintaining engagement.	Requested support for differentiating rigor and anticipating student misconceptions.

contextual realities of their mathematics classrooms

The concluding focus group, conducted after the implementation period, revealed important shifts in teachers' perceptions and practices. By the end of the study, both participants expressed a more refined and student-centered understanding of differentiation. Teacher B described differentiation as "meeting students exactly where they were" and emphasized providing multiple pathways for problem solving, while Teacher A referred to the practice as "tiered learning that required careful adjustment of tasks to match student readiness levels." The teachers' instructional methods had also matured, reflecting a transition from structural differentiation based primarily on grouping to more responsive, data-driven approaches. Both teachers demonstrated increased intentionality in lesson planning, incorporating formative assessments and flexible grouping strategies to adjust instruction in real time. This evolution from procedural to purposeful differentiation suggests growing pedagogical confidence and a deeper understanding of how to align instructional design with individual learner needs. Ultimately, these shifts underscore that the professional learning and coaching embedded in the study supported meaningful changes in teacher mindset and practice, contributing to more equitable and engaging learning experiences for students.

Teacher B reported using peer instruction and collaborative learning more intentionally, noting, "I'm being more deliberate about using peer discussions. Instead of just letting them work together, I plan specific roles and questions so they're really teaching and learning from each other." This shift reflects a deeper understanding of how structured collaboration can reinforce conceptual understanding and promote student engagement. Teacher A incorporated student-led groups and peer-assisted learning in ways that reflected increased confidence in facilitation. As the teacher explained, "At first, I was nervous about letting students guide the

discussion, but now I see they can handle it. I just move between groups to support them instead of directing everything.” This shift demonstrates growing assurance in using collaborative structures to promote student independence and deeper engagement. Both teachers made more consistent use of formative assessments, including exit tickets, warmups, and open ended questions, to monitor progress and adapt instruction in real time. Grouping practices became more strategic as Teacher B relied on both behavioral and academic factors when assigning groups, and Teacher A used assessment data alongside occasional student choice to increase motivation. Both continued to emphasize the importance of multiple problem solving strategies, with Teacher B supplementing the district curriculum with visualization techniques and Teacher A incorporating targeted problem solving strategies to help students recognize and correct common misconceptions. Demonstrations of learning became more authentic and student centered, with Teacher B using a “shout-out board” to encourage reflection and Teacher A inviting students to teach lessons to their peers. Despite these advances, both teachers identified ongoing professional learning needs, with Teacher B seeking strategies to anticipate misconceptions earlier and Teacher A requesting support in differentiating rigor within small groups.

This integration of early and late focus group findings shows a clear trajectory of growth. At the beginning of the study, the teachers described differentiated instruction primarily in terms of structure, grouping, and classroom management. By the end of the study, their perspectives had evolved toward more intentional and student-centered practices, with greater emphasis on formative assessment, flexible grouping, and authentic demonstration of learning. Although persistent challenges remained, the shifts in teacher perceptions and practices underscored professional growth and reflected closer alignment with research-based best practices in

differentiated instruction.

Demographics

Royal Ridge Middle School served as the sole site for this inquiry after Westhaven Middle School withdrew prior to implementation. The mathematics department at Royal Ridge included multiple teachers across grades 5–8 and Math 1; however, only two consented to participate in this study. For confidentiality, these participants are referred to as Teacher A and Teacher B. Teacher A was responsible for teaching multiple sections of seventh grade mathematics, while Teacher B taught multiple sections of eighth grade mathematics. Together, they served approximately 200 students, although only 24 students and their families provided the necessary consent to participate in data collection for this inquiry.

Both teachers reported some prior exposure to the concept of differentiated instruction, but neither had received extensive, formalized training in its implementation. Their self-reported professional learning experiences were limited to general instructional strategies rather than targeted support in differentiation, which made them ideal candidates for examining how structured professional development could influence practice.

The broader context of Royal Ridge Middle School was essential to understanding the significance of the inquiry. The school served just under 400 students and reflected the racial, cultural, and socioeconomic diversity of the district. As outlined in Chapter 3, the demographic breakdown of the school included 50 Hispanic students, 91 Black students, 36 students identifying as two or more races, 4 Asian students, 3 American Indian students, 2 Pacific Islander students, and 180 White students. A substantial proportion of the student body is also categorized as economically disadvantaged, reflecting the economic challenges faced by the community.

Academically, the school has historically struggled with mathematics proficiency. Although Royal Ridge recently improved its state-assigned letter grade from a D to a C, it remained only marginally above the threshold for low-performing status. Schoolwide mathematics proficiency during the 2023–24 academic year was 49.7 %, with particularly low performance among historically underserved subgroups, including Black and Hispanic students, students with disabilities, and those from economically disadvantaged backgrounds. Achievement gaps are evident within the study body, and proficiency rates tend to decline as students progress to higher grade levels, particularly in seventh and eighth grade.

These factors underscored the importance of this inquiry. By focusing on the implementation of differentiated instructional practices in seventh and eighth grade mathematics classrooms, the study sought to explore whether intentional strategies could address persistent gaps, support student engagement, and contribute to incremental improvements in proficiency within a challenging instructional context. This focus was particularly critical given the persistent disparities in performance across student subgroups and the limited progress observed through traditional, whole-group instruction. The study therefore positioned differentiation not only as an instructional approach but as a potential lever for equitable access to rigorous mathematics learning.

Results

The results of this inquiry are presented in alignment with the three guiding inquiry questions. Quantitative and qualitative findings are integrated within each section to provide a comprehensive understanding of the effects of differentiated instruction in seventh and eighth grade mathematics classrooms at Royal Ridge Middle School. Across the three guiding questions, the results suggest that differentiated instruction was associated with modest

proficiency gains, improved teacher perceptions of student learning, and higher levels of student engagement. Teachers demonstrated professional growth, moving from a structural understanding of differentiation toward more student-centered practices that emphasized formative assessment, flexible grouping, and authentic demonstration of learning. Students reported and displayed greater engagement when provided with opportunities for collaboration and choice. While the limited scope of the study prevents broad generalization, the findings contribute meaningful insight into the potential of differentiated instruction to support student success in middle grades mathematics. Taken together, the results illustrate how the intervention influenced achievement (Inquiry Question 1), teacher practice and perception (Inquiry Question 2), and student engagement (Inquiry Question 3) in ways that were consistent with the design and data collection procedures described earlier in the chapter.

Inquiry Question 1

To address the first inquiry question, “What is the effect of differentiated instruction on student proficiency in middle grades mathematics classrooms?”, the study examined student performance data from NC Check-Ins, i-Ready diagnostics, and End-of-Grade (EOG) assessments. Analysis revealed modest but meaningful gains among study participants, particularly when compared to overall grade level performance. In both the seventh and eighth grade classrooms that participated in the differentiated instruction initiative, results demonstrated incremental improvement in targeted areas, with the greatest growth occurring among students who began the year performing below grade level. These trends suggest that scaffolding, exposure to multiple problem-solving strategies, and small-group instruction contributed to progress that might not otherwise have occurred. This pattern aligns with Phase II walkthrough data, which documented consistent use of flexible groups, multiple representations, and targeted

reteaching in the study classrooms, indicating that the instructional changes teachers implemented were visible in the classrooms at the same time the incremental growth appeared in student data.

At the schoolwide level, EOG mathematics proficiency rates declined across both grade levels between the 2023–24 and 2024–25 school years. However, comparison of study participants with their respective cohorts reveals an important distinction. Among seventh grade study participants, 50 % achieved proficiency on the 2024–25 EOG, substantially exceeding the 44.08 % proficiency rate for all seventh grade students at Royal Ridge Middle School. This gap of nearly six percentage points indicates that students exposed to differentiated instruction outperformed their peers overall. In contrast, within the eighth grade cohort, 5.56 % of study participants demonstrated proficiency on the EOG test, compared to 11.11 % proficiency across the entire eighth grade population. Although the eighth grade study participants performed below the schoolwide average, both groups showed parallel patterns of growth and stabilization in diagnostic data throughout the year, suggesting that differentiation supported learning continuity even when proficiency outcomes remained limited. Because the eighth grade study group entered the year with substantially lower i-Ready placements and a higher proportion of students two or more grade levels below expectations, these EOG results should be interpreted as evidence of slowed decline and movement across performance bands rather than as an absence of impact. In both grades, the differentiated classrooms either exceeded the schoolwide rate (Grade 7) or mirrored the schoolwide trajectory despite serving more academically vulnerable learners (Grade 8), which provides outcome level support for Inquiry Question 1.

The proficiency percentages in Table 41 represents EOG mathematics proficiency for entire grade levels, not only those who participated in the differentiated instruction study. Results

show declines in proficiency between the 2023–24 and 2024–25 school years, with Cohort 1 decreasing by 16.35 percentage points and Cohort 2 by 38.15 percentage points. Some students in Cohort 2 did not take the Grade 8 Mathematics EOG in 2024–25 because they were enrolled in Math 1, which may have affected cohort averages. These findings highlight broader schoolwide challenges in maintaining mathematics proficiency across grade transitions and underscore the need for differentiated instruction and targeted support structures to address persistent gaps in readiness and achievement.

Table 42 provides the schoolwide backdrop against which the study classrooms must be interpreted. Despite steep cohort-level declines, the differentiated classrooms did not experience declines of the same magnitude, indicating a potential buffering effect of the intervention. This comparison confirms that the Grade 7 differentiated classroom outperformed its cohort and that the Grade 8 classroom, while still below the cohort average, followed similar growth patterns to the broader grade despite serving students with greater initial learning gaps. Together, these data points address Inquiry Question 1 by showing that differentiated instruction contributed to proficiency gains or stabilization relative to the school context.

Inquiry Question 2

To address the second inquiry question, “How does the use of differentiated instruction impact teachers’ perceptions of student learning for middle school mathematics students?”, teacher reflections, survey responses, and focus group discussions were analyzed. Findings revealed that differentiation enhanced teachers’ ability to identify and respond to student learning needs. At the beginning of the study, both Teacher A and Teacher B described differentiation primarily in terms of structure and grouping. Teacher A emphasized the use of ability groups to provide more structure for struggling students, while Teacher B experimented with random grouping to reduce

off-task behavior. These early descriptions aligned with the pilot study feedback in which teachers requested support for flexible grouping, lesson pacing, and using district curriculum resources to tier tasks, demonstrates coherence between the pilot findings and what teachers actually enacted during the study. Over time, teachers reported a more nuanced and student-centered understanding of differentiation. Teacher A explained that differentiation allowed opportunities for targeted support while simultaneously giving advanced learners space to extend their thinking. Teacher B emphasized that collaborative problem-solving and peer instruction helped students build confidence and revealed misconceptions more readily. Both described differentiation as a practice that made learning more visible and actionable, though they continued to acknowledge challenges in balancing small-group work with whole-class instruction and in differentiating rigor within groups. This shift from “grouping for management” to “grouping for learning evidence” is central to Inquiry Question 2 because it shows that teachers began to view differentiation as a mechanism for surfacing student thinking rather than simply organizing the classroom.

Teacher surveys corroborated these findings, showing increased confidence in grouping strategies, formative assessment practices, and the intentional use of multiple problem-solving strategies by the end of the study. Survey items that increased the most (understanding of DI, differentiating based on learner needs, and using small groups more frequently) map directly onto the practices the teachers described in the final focus group, providing quantitative confirmation of the qualitative reports. In combination, these shifts indicate that differentiated instruction positively influenced how teachers perceived students’ learning needs and their own efficacy in meeting those needs, thereby answering Inquiry Question 2.

Inquiry Question 3

Table 41

Comparison of EOG Mathematics Proficiency Rates for Entire Grade-Level Cohorts, 2023–24 to 2024–25

	Grade Level 2023-24	Grade Level 2024-25	2023-24 EOG Proficiency Percentage	2024-25 EOG Proficiency Percentage	Percentage Change
Cohort 1	Grade 6	Grade 7	60.43	44.08	-16.35
Cohort 2	Grade 7	Grade 8	49.26	11.11	-38.15

Table 42

Comparison of EOG Mathematics Proficiency Rates for Study Participants vs. Cohorts, 2024-25

Grade Level 2024-25	Group	2024-25 EOG Proficiency Percentage
Grade 7	Study Participants	50.00
Grade 7	All Students	44.08
Grade 8	Study Participants	5.56
Grade 8	All Students	11.11

To address the third inquiry question, “How does implementing differentiated instruction impact student engagement in middle school mathematics classrooms? both student and teacher data was analyzed. Student surveys indicated growth in several key areas, including the perception that their teachers provided multiple strategies for problem-solving, allowed for choice in demonstrating understanding, and created opportunities for collaboration. For example, the percentage of students agreeing with the statement “My teacher teaches multiple strategies to solve math problems” increased from baseline to post-implementation by 5%. Although some pre-implementation data were limited (particularly in Grade 7), the available post-implementation responses consistently reflected that students noticed more varied instruction, more chances to work with peers, and more ways to show what they knew, which are all core indicators of engagement associated with differentiated instruction.

Classroom observations confirmed these survey findings. Differentiated classrooms exhibited higher levels of active participation, student-led discussions, and collaborative problem-solving compared to more traditional settings. Teacher reflections reinforced these observations. Teacher A noted that students often paid closer attention to peers than to teacher-led explanations, while Teacher B highlighted the value of random grouping strategies for maintaining focus. This observational data, collected on a bi-weekly schedule across the implementation phase, strengthens these findings because engagement was not captured at a single point in time but was observed repeatedly as teachers became more confident with differentiation practices.

Students themselves provided compelling evidence of increased engagement through open-ended survey responses. One student remarked, “Working in groups makes math easier to understand because we get to hear different ways of solving it,” while another wrote, “When I

can choose how to show my answer, I feel like I learn more.” These comments illustrate how choice and collaboration made mathematics feel more meaningful and accessible. Such comments align with the engagement constructs embedded in the student survey (active learner, strategy choice, varying assignments) and therefore serve as qualitative confirmation that the differentiated practices implemented in the classrooms were experienced by students as engaging. Accordingly, this data addresses Inquiry Question 3 by demonstrating that differentiated instruction contributed to higher student participation, perceived relevance, and collaborative learning opportunities.

Summary of Findings

This chapter presented the findings of the inquiry into differentiated instruction at Royal Ridge Middle School. Although the original design called for participation from two schools, Westhaven Middle School withdrew, and the study was ultimately conducted in a single site with only two teacher participants. This reduced scope limited the breadth of the study, yet it provided a focused case study of how differentiation was enacted in two seventh and eighth grade mathematics classrooms.

The findings across the three inquiry questions suggest that differentiated instruction yielded modest but meaningful benefits in the study classrooms. For student proficiency, results pointed to incremental growth that was most visible among learners who entered below grade level, indicating that scaffolding and flexible grouping supported progress that might not have occurred otherwise. Teachers’ perceptions also shifted over the course of the study. What began as a primarily structural understanding of differentiation, focused on grouping and classroom management, evolved into a more student-centered perspective that emphasized formative assessment and the intentional use of multiple strategies to surface and address student thinking.

Even so, both teachers identified continued challenges related to time, rigor, and the complexities of balancing small group and whole class instruction, underscoring the need for ongoing professional learning. Evidence from student surveys, classroom observations, and student reflections pointed to increases in engagement. Students not only participated more actively but also described mathematics as more meaningful when given opportunities for collaboration and choice. This alignment of quantitative and qualitative data suggests that differentiated instruction can simultaneously influence achievement, teacher practice, and student engagement when supported with intentional structures. In direct relation to the inquiry questions, the study showed (1) differentiated instruction supported proficiency gains or stabilization for learners with identified gaps, (2) teachers' perceptions of student learning became more precise and responsive as they used data to group and scaffold, and (3) students experienced mathematics as more participatory and relevant when differentiation was present.

The convergence of quantitative and qualitative findings indicates that differentiated instruction has the capacity to influence multiple aspects of the classroom, student achievement, teacher practice, and learner engagement, when supported with intentional structures. Even with limited prior training, the participating teachers were able to implement strategies that produced measurable academic gains and shifts in instructional practice, while also fostering greater student confidence and involvement. At the same time, the results highlight the conditions necessary for sustaining these outcomes. Differentiation requires ongoing professional learning, careful planning, and adequate support to ensure that teachers can balance group management, rigor, and responsiveness to student needs. Although the small sample size and single-site design limited generalizability, the findings add to the evidence that differentiated instruction is a promising strategy for improving mathematics learning in middle grades. The results point to its

potential to promote both equity and engagement when teachers are provided with the resources and support needed for effective implementation. These conclusions are particularly salient for districts serving diverse and economically disadvantaged populations, such as Royal Ridge's context, because they suggest that differentiation can operate as a practical, classroom-level lever for mitigating performance declines that are visible in schoolwide student performance data.

The collective evidence from this study underscores the value of differentiated instruction as both an instructional strategy and a catalyst for reflective teaching practice. By connecting teacher growth, student engagement, and incremental proficiency gains, the findings highlight the potential of differentiation to bridge the gap between instructional theory and equitable classroom practice.

Chapter 5 will expand on these findings by situating them within the broader body of literature, exploring implications for practice at both the school and district levels, and offering recommendations for future research and professional learning that address scalability and sustainability.

Chapter 5: Summary, Conclusions, and Recommendations

This chapter presents a summary of the inquiry, including an overview of the problem of practice, the differentiated instruction intervention, the research design, and the phases through which the study was conducted. The purpose of the study was to examine how differentiated instructional practices influenced student proficiency, teachers' perceptions of student learning, and student engagement in Grades 7 and 8 mathematics at Royal Ridge Middle School. A convergent mixed-methods design, grounded in improvement science and the Plan–Do–Study–Act (PDSA) cycle, guided data collection and analysis across baseline, implementation, and outcome phases.

Three research questions framed this inquiry and are revisited in this chapter: the effect of differentiated instruction on student proficiency, how differentiated instruction shaped teachers' perceptions of student learning, and how differentiated practices influenced student engagement. The following sections summarize the findings, interpret the results in relation to existing literature and the theoretical framework, describe the study's limitations, and offer implications and recommendations for practice and future research.

Summary of the Findings

The findings of this inquiry were drawn from a convergent mixed-methods design that integrated quantitative measures, including NC Check-Ins, End-of-Grade (EOG) assessments, i-Ready diagnostics, and Likert-scale teacher and student surveys, with qualitative data from classroom walkthroughs, teacher reflections, and beginning and end-of-study focus groups. When examined together, these sources provided a comprehensive understanding of how differentiated instruction shaped proficiency, instructional practice, and engagement in the participating seventh and eighth grade mathematics classrooms.

Quantitative data showed patterns of growth associated with the implementation of differentiated instruction. NC Check-In results indicated stabilization and incremental improvement across grading periods, with the most notable gains among students who entered the year performing below grade level. These trends were especially visible in the seventh grade classroom, where participating students

ultimately outperformed their grade-level cohort on the EOG assessment, suggesting that differentiated instruction, specifically scaffolding and flexible grouping contributed to improved readiness for grade-level content. Even when eighth grade proficiency remained lower overall, diagnostic data showed consistent progress over time, indicating that differentiated practices supported continuity of learning despite persistent skill gaps.

Student survey data further highlighted growth in engagement and awareness of differentiated instruction. Both grade levels reported strong perceptions of collaboration, increased opportunities to solve problems using multiple strategies, and access to varied assignments aligned to learning needs. Eighth grade students demonstrated notable gains in feeling like “active learners,” while seventh grade students expressed generally positive views of choice, strategy use, and collaborative work. Although some variability remained regarding instructional clarity and pacing, survey results overall reflected an increased recognition of differentiated practices as part of daily instruction.

Qualitative findings provided deeper insight into teacher learning and student engagement. Classroom walkthroughs documented increasing use of flexible grouping, scaffolds, manipulatives, and multiple representations of mathematical thinking. Teachers’ written reflections and focus group responses showed a clear shift from viewing differentiation as a structural task, primarily centered on grouping, to understanding it as an adaptive, student-centered process informed by formative assessment. Teachers described gaining confidence in facilitating small group instruction, analyzing student readiness, and designing tasks that allowed students to approach problems in varied ways. At the same time, they identified continued challenges related to time, balancing whole group and small group structures, and providing targeted intervention, emphasizing the need for sustained professional learning.

Student engagement also emerged as a consistent pattern across qualitative data. Teachers observed increased participation, richer mathematical discourse, and more meaningful collaboration as differentiation became more routine. Students reported that tasks felt more relevant and manageable when they had opportunities to choose strategies, work with peers, and demonstrate understanding in different ways. This alignment between teacher observation and student perception reinforced the role of

differentiated instruction in fostering greater ownership of learning and elevating engagement levels within the mathematics classroom.

Taken together, the convergence of quantitative and qualitative findings suggests that differentiated instruction positively influenced both instructional practice and the student experience. While proficiency gains were modest and varied between grade levels, the broader patterns across surveys, observations, and reflections indicate that differentiation supported improved academic behaviors, teacher responsiveness, and student engagement, key indicators of progress within an improvement science framework.

Interpretation of the Findings

The findings of this inquiry are closely aligned with the research and frameworks discussed in the literature review. Together, the results provide evidence that differentiated instruction (DI), when implemented thoughtfully and supported through cycles of improvement science, can influence student proficiency, teacher practice, and student engagement in middle grades mathematics. This section interprets the findings through the lens of the three research questions, grounded in the theoretical and conceptual frameworks of differentiated instruction, Gardner's Theory of Multiple Intelligences, and Multi-Tiered Systems of Support (MTSS). The interpretations are organized around the three inquiry questions and grounded in the qualitative themes that emerged from the coding process: Differentiation as a developing but increasingly intentional practice; Instructional decision-making increasingly driven by real-time assessment data; and Growing teacher confidence in small-group instruction alongside persistent challenges.

Inquiry Question 1

The first research question, *What is the effect of differentiated instruction on student proficiency?*, revealed two key patterns that help explain how differentiated instructional practices influenced achievement outcomes in the study classrooms.

The first major pattern involved stabilization and incremental gains in student proficiency. NC Check-In data showed that scores in both grades either remained stable or improved across the year.

These improvements were especially visible among students who began the year performing below grade level, where scaffolding, flexible grouping, and exposure to multiple problem-solving strategies contributed to closing foundational gaps. Seventh grade study participants ultimately outperformed their full grade-level cohort on the EOG, suggesting that differentiated instruction played a role in supporting readiness for grade-level content. This finding aligns with Tomlinson (2014) and Pozas et al. (2020) who argue that differentiated instruction enhances student learning when teachers intentionally adjust content, process, and product based on readiness. DI can close gaps between student ability and school expectations, particularly when instruction is responsive to assessment data. The incremental gains observed in this inquiry reflect these claims and reinforce the idea that even early-stage differentiation can promote academic progress.

A second pattern was that differentiated instruction appeared to buffer students against the broader cohort-level declines seen in the schoolwide data. While grade-level EOG proficiency rates decreased from the prior year, the differentiated classrooms did not experience declines of the same magnitude. The Grade 7 differentiated classroom exceeded its grade-level cohort, and the Grade 8 classroom maintained learning trajectories comparable to the full grade despite serving students with significantly greater initial learning gaps. This finding is consistent with the MTSS framework described in Chapter 2, which emphasizes the importance of strong Tier 1 instruction in meeting diverse readiness levels and reducing the need for more intensive supports (Averill & Rinaldi, 2011). In this inquiry, differentiated instruction functioned as a Tier 1 refinement that helped mitigate the impact of broader achievement declines. The outcome reflects research suggesting that DI supports the most academically vulnerable learners, helping maintain learning continuity during periods of instructional or contextual challenge.

These two achievement-related patterns directly reflect the qualitative themes generated through the coding and thematic analysis in Chapter 4. The theme of differentiation as a developing but increasingly intentional practice helps explain why incremental gains were most apparent among students needing foundational support. Teachers grew more adept at applying scaffolds, flexible grouping, and

strategy instruction over time. Likewise, the theme of instructional decision-making increasingly driven by real-time assessment data provides insight into how teachers made timely instructional adjustments that helped stabilize learning even as cohort-level scores declined. The pattern showing that differentiated instruction buffered students from broader declines is linked to the theme of growing teacher confidence amid persistent structural challenges, which influenced their ability to sustain responsive instruction despite contextual pressures. Together, the findings and themes illustrate that differentiated instruction supported both incremental proficiency gains and learning stability, especially for students who entered the year with significant academic gaps.

Inquiry Question 2

The second research question, *How does the use of differentiated instruction impact teachers' perceptions of student learning for middle school mathematics students?*, revealed several important patterns in how teachers understood and responded to student learning needs as they implemented differentiated instruction.

The first pattern highlights a shift in teachers' understanding of differentiated instruction over the course of the study. Early in the study, teachers described differentiation primarily as grouping or structural organization. Teacher A initially defined it as offering more structure for students who needed additional help, while Teacher B described it as meeting students at their individual levels but still framed it largely through grouping decisions. By the conclusion of the study, both teachers described DI as tiered instruction shaped by readiness and ongoing evidence of student learning and saw DI as a more intentional and responsive process that offers multiple pathways for learning and more accurately reflects student needs. This evolution mirrors theoretical perspectives presented in the literature review. Tomlinson (2014) and Bondie et al. (2019) emphasize that differentiation is not simply a set of strategies but a mindset grounded in responsive instructional decision-making. Teachers' movement toward this understanding indicates deepening pedagogical knowledge and increased instructional intentionality. Additionally, this progression reflects the qualitative theme of differentiation as a developing but

increasingly intentional practice. Teachers moved from procedural use of grouping to a more pedagogical understanding rooted in instructional purpose.

The second key pattern centers on teachers' expanded use of formative assessment. Throughout the study, teachers began using warm-ups, exit tickets, and questioning strategies more systematically. One teacher explained, "Using warm-ups and exit tickets has helped me see where students are before I move on. It's made me slow down and reteach right away". Another stated, "I used to plan groups once at the start of a unit, but now I change them after every quiz or exit ticket depending on what students still need". These changes align with the literature review, which emphasized formative assessment as central to effective differentiation (Erkens, 2016). The conceptual framework, specifically MTSS, also underscores the importance of timely, data-driven adjustments that occurs within Tier 1 instruction. The teachers' reflections indicate that they internalized these principles and began using short-cycle assessment data to guide decisions in real time. These findings directly connect to the theme of instructional decision-making increasingly driven by real-time assessment data, which emerged from the coding of teacher reflections describing how short-cycle assessment enabled them to identify misconceptions earlier and provide targeted support more promptly.

The third pattern reveals that teachers grew more confident in their ability to differentiate while still acknowledging areas for growth. Teacher B explained, "I'm being more deliberate about using peer discussions, so they're really teaching and learning from each other," while Teacher A noted increased confidence in facilitating peer-assisted groups, saying, "At first, I was nervous about letting students guide the discussion, but now I see they can handle it". Both teachers also acknowledged ongoing needs, such as differentiating rigor and anticipating misconceptions. This combination of growth and challenge reflects the research discussed in the literature review. Klepsch & Seufert (2020) and Hidayati (2020) argue that while teachers often value DI, they require sustained coaching and collaborative learning to manage its complexities. The findings of this inquiry align with that literature, suggesting that differentiated instruction is strengthened when teachers receive structured support. Additionally, these experiences reflect the theme of growing teacher confidence alongside persistent structural and

management challenges. Taken together, these patterns demonstrate that DI positively influenced how teachers perceived student learning. They became more attuned to readiness differences, more responsive in their instructional adjustments, and more confident in using data to guide decision making.

Inquiry Question 3

The third research question, *How does implementing differentiated instruction impact student engagement in middle school mathematics classrooms?*, revealed three patterns connected to students' perceptions of participation and access.

The first pattern emphasizes increased student participation. Eighth- grade students showed a rise in agreement with the statement "I am an active learner in math class," increasing from 69.2% to 78.2%. Seventh grade students reported high levels of agreement with statements about being active learners and having different ways to approach problems. This finding supports that differentiated instruction enhances engagement by providing tasks that fall within the learner's zone of proximal development (Vygotsky; Ainscow, 2020) and aligns with the identified theme of differentiation as a developing but increasingly intentional practice, as teachers' more purposeful use of scaffolds and multiple strategies created conditions for greater student involvement. When instruction is targeted to readiness, students are more likely to remain actively involved.

The second pattern highlights increases in collaborative engagement. Teacher B described planning specific roles and questions students are teaching and learning from each other, while Teacher A gained confidence in student-led discussions, saying, "I just move between groups to support them instead of directing everything". These findings align with Gardner's Theory of Multiple Intelligences, which suggests that interpersonal skills and verbal reasoning are activated through collaborative learning. DI promotes these types of interactions by offering structures that support student-to-student discourse and shared problem solving. This pattern reflects the identified theme of growing teacher confidence alongside persistent structural and management challenges. As teachers grew more comfortable facilitating peer collaboration, students experienced more meaningful and sustained engagement in mathematical conversations.

The third pattern focuses on the availability of multiple pathways for learning. Student surveys indicated that agreement with the statement “My teacher teaches multiple strategies” rose slightly (80% to 81.8%), and students consistently reported that they had access to different ways of solving problems. This aligns with research emphasizing that differentiation allows students to choose strategies aligned to their strengths (Gomaa, 2014; Anggoro et al., 2024). This is also consistent with the conceptual framework, which positions DI as a means of supporting cognitive engagement by offering flexible pathways for learning, and the theme of instructional decision-making increasingly driven by real-time assessment data. As teachers became more adept at adjusting tasks and providing strategy options, students experienced instruction that was more aligned with their readiness and learning preferences. Collectively, these patterns and themes indicate that differentiated instruction positively influenced student engagement by increasing opportunities for active learning, collaboration, and strategy choice. Students recognized the classroom as more interactive and responsive, and teacher reflections confirm that increased engagement was an observable outcome of their evolving practice.

Limitations of the Inquiry

Several limitations shaped the design and scope of this inquiry, and additional limitations emerged during implementation and analysis. Together, these constraints influenced the consistency of the findings and the degree to which the results can be generalized beyond the study context.

One of the most significant limitations originally identified was the high rate of teacher and student turnover in the district. Although the two participating teachers remained consistent throughout the study, teacher turnover at the district level reduced the number of educators who were able to participate in the inquiry and contributed to the shift from an initial two-school design to a single-site case study. Fluctuating student rosters also created challenges, as changes in enrollment made it difficult to maintain continuity in instructional groups, ensure consistent survey participation, and accurately track student progress over time. This instability limited opportunities for building sustained momentum with differentiated instructional practices, particularly as teachers worked to deepen their skills while simultaneously responding to shifting classroom compositions.

Time constraints also posed a challenge. Differentiated instruction requires deliberate planning, continual analysis of student readiness, and preparation of tiered tasks. Teachers reported that limited planning time restricted their ability to develop differentiated lessons with the rigor and depth necessary for consistent implementation. Competing instructional priorities, including pacing calendars, district curriculum expectations, and preparation for state assessments, further limited the amount of time available for designing and refining differentiated tasks.

Class size was identified as an additional limitation. Larger classes made it difficult for teachers to manage multiple small groups simultaneously while maintaining productive engagement across the room. Differentiation can be more difficult to implement in classrooms with high student-to-teacher ratios, and this was evident during implementation when teachers struggled to monitor all groups and provide targeted feedback during each rotation.

Another limitation identified concerned the level of teacher knowledge and readiness to implement differentiated instruction. Although teachers engaged in professional learning and coaching throughout the study, both participants entered the inquiry with varying degrees of familiarity with DI practices. Challenges related to maintaining rigor within differentiated groups, anticipating misconceptions, and planning for readiness-based acceleration persisted throughout the implementation period. These learning curves likely influenced the depth and consistency of the differentiated instruction that was delivered.

The positionality of the scholarly practitioner also served as a limitation as my role as a district-level leader may have influenced participant responses during surveys, reflections, and focus groups. Despite clear communication that participation was non-evaluative, teachers may have felt compelled to present their instructional practices or perceptions in a positive manner. This potential bias is inherent in practitioner research conducted within one's own district.

Several limitations emerged during implementation. The most consequential was the withdrawal of Westhaven Middle School prior to the start of the intervention. As a result, the study shifted from a two-site inquiry to a single-site case study with only two participating teachers. This reduction

significantly limits the generalizability of the findings and reduces the extent to which cross-site comparisons could be made.

The small sample size also contributed to data limitations. For example, only one seventh-grade student completed the pre-study perception survey, which restricted the ability to examine changes in student perceptions over time. While post-implementation surveys were completed by more students, the absence of baseline data limited the strength of any pre/post comparisons. Similar participation inconsistencies occurred in other data sources, including classroom observations and reflective feedback.

The duration of the implementation period also served as a constraint. Differentiated instruction is a complex, long-term practice that benefits from multiple cycles of implementation and refinement. Because the study spanned only a portion of the school year, teachers had limited time to plan, practice, reflect, and improve their use of DI strategies. A longer implementation window may have resulted in more noticeable changes in student proficiency and more consistent instructional shifts.

Finally, instructional challenges surfaced during classroom implementation. Difficulties in maintaining student engagement during small-group rotations and balancing whole-group instruction with targeted support. Teachers also noted the challenge of accelerating students with significant foundational gaps within a single instructional block. These challenges reflect the complexity of teaching middle school mathematics and likely influenced the degree to which differentiated instruction could be applied consistently and effectively in day-to-day practice.

In summary, the inquiry was shaped by limitations related to turnover, time, class size, teacher readiness, researcher positionality, reduced participation, a shortened implementation period, and classroom-level instructional challenges. While these constraints do not diminish the value of the findings, they provide important context for interpreting the outcomes and understanding the boundaries of the study's contributions.

Implications of the Findings for Practice

The findings of this inquiry have several important implications for my work as a district-level practitioner and for others seeking to improve instructional responsiveness through differentiated

instruction. As I reflect on the results, it is clear that differentiation holds meaningful promise for strengthening instruction, but it also requires intentional structures, sustained support, and a long-term commitment to teacher development. From a practitioner's perspective, this study reinforced that meaningful instructional change does not occur simply through professional learning sessions or isolated coaching; it requires systems, routines, and ongoing opportunities for teachers to reflect, adjust, and grow.

One of the most significant implications for practice is the need to provide teachers with consistent coaching focused specifically on differentiated instruction. The participating teachers made noticeable growth in their ability to use flexible grouping, interpret formative assessment data, and design learning experiences matched to student readiness. However, their progress also revealed how much support is needed to sustain and deepen these practices., which aligns to the supporting literature associated with MTSS. As a practitioner, I recognize that we must create structured coaching cycles, protected planning time, and collaborative routines that allow teachers to test strategies, share successes, and troubleshoot challenges. Teachers need time and guidance to plan differentiated lessons with appropriate rigor, monitor student progress, and adjust grouping regularly. Without these supports, DI risks becoming an isolated strategy rather than an embedded part of instructional practice. Figure 10 presents a process-oriented framework illustrating how DI is embedded into instructional practice through aligned, system-level structures. The process begins with leadership expectations and a shared vision for differentiated instruction, which establish DI as a core instructional priority rather than an isolated strategy. These expectations are enacted through collaborative planning structures that provide protected time and routines for teachers to design instruction aligned to student readiness. Instructional coaching cycles then support implementation by offering opportunities for modeling, feedback, and reflection focused specifically on differentiated practices. These supports lead to consistent classroom implementation of differentiated instruction, characterized by flexible grouping, formative assessment, and responsive instructional adjustments. Student data, reflection, and instructional adjustment serve as the final stage of the process, informing next steps and feeding back into leadership decisions, planning, and coaching. Together, this framework emphasizes differentiated instruction as a continuous

improvement process sustained through intentional structures rather than individual teacher effort alone.

The findings also highlight the importance of building teacher confidence in managing small group instruction. Both teachers in the study expressed growth in this area, yet they also identified persistent challenges related to pacing, monitoring student behavior, and providing targeted intervention while managing the rest of the class. From my practitioner lens, this signals the need for practical tools and structures, such as group rotation templates, model lessons, exemplar tiered tasks, and anchor activities, that teachers can implement immediately, as seen in Appendixes J, K, and L. Ensuring that teachers have access to materials that support students' independence during small group rotations can alleviate management concerns and allow teachers to focus more effectively on targeted instruction.

Additionally, the results of this inquiry underscore the importance of professional learning that elevates the role of formative assessment in driving instructional decisions. Teachers grew more adept at using warm-ups, exit tickets, quick checks, and student dialogue to understand readiness levels and adjust instruction accordingly. As a practitioner, I see a clear need to embed assessment literacy as a core component of professional development related to differentiation. Teachers must be supported in designing assessments, analyzing trends, and using that information to adjust grouping and task design in real time.

This study also carries implications for practice beyond my district. Although this was a small-scale inquiry, the patterns observed, stabilization of proficiency, increased engagement, and improved teacher responsiveness, are consistent with what many districts face when implementing differentiated instruction. Other schools or districts may benefit from understanding that early gains may be modest, but that differentiation can create meaningful shifts in engagement and instructional quality, especially for students who begin the year significantly below grade level. The results suggest that DI can serve as a mechanism for strengthening Tier 1 instruction within broader MTSS frameworks and can help schools move toward more equitable learning environments by ensuring that students are met at their levels of readiness.

The results of this study have practical implications for strengthening teaching and learning

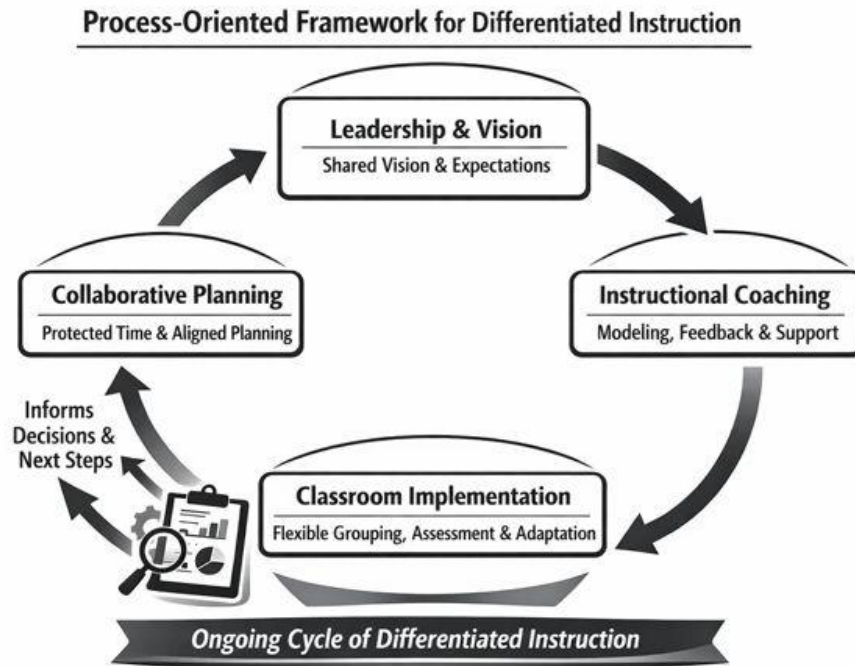


Figure 7. Gardner's Theory of Multiple Intelligences.

within my district and in similar contexts. The inquiry reinforced the importance of coaching, collaborative planning, formative assessment, and system-level support for teachers. As a practitioner, I view differentiated instruction not merely as a strategy, but as a comprehensive approach that, when implemented thoughtfully and supported consistently, has the potential to improve engagement, deepen understanding, and create more equitable classrooms. At the district level, these findings suggest the need for intentional structures such as protected collaborative planning time, instructional coaching models aligned to DI, and professional development that emphasizes readiness-based instruction. District improvement plans could embed DI as a Tier 1 expectation within MTSS, ensuring the coherence between classroom practice and district goals for equity and achievement. At the state level, these results reinforce the importance of policies that prioritize formative assessment, professional learning for differentiation, and instructional coaching as core components of school improvement. Aligning state guidance and district policy with the realities of classroom implementation would help scale DI practices more effectively and support teachers across diverse instructional contexts.

Implications of the Findings for Equity

The findings of this inquiry carry meaningful implications for equity and connect directly to the equity lens I established, as I framed equity as ensuring that every student has access to rigorous, responsive mathematics instruction that meets their individual needs. The results of this study reinforce that differentiated instruction can serve as a practical approach for addressing long-standing opportunity gaps in middle grades mathematics.

One key implication for equity is that differentiated instruction increases access to grade-level content for students who have historically struggled to meet proficiency benchmarks. Many students in this study entered the year significantly below grade level, yet the use of flexible grouping, scaffolded tasks, and multiple problem-solving strategies helped stabilize their performance and prevent further academic decline. These patterns suggest that DI can create instructional pathways that support students who might otherwise remain disengaged or disconnected from core mathematical learning. This aligns with the equity commitments I made prior to beginning the research study, which emphasized the need to

expand opportunity, not simply measure achievement disparities.

Another implication relates to the role of formative assessment in promoting equitable classrooms. As teachers learned to use warm-ups, exit tickets, and questioning strategies more effectively, they gained clearer insight into student needs and were able to respond with targeted supports. This level of responsiveness is essential for equity, as it reduces the likelihood that students fall behind unnoticed or receive instruction mismatched to their readiness levels. When formative assessments guide instructional decisions, students with diverse learning profiles are more likely to experience success.

The findings also highlight the importance of offering multiple pathways for students to access and demonstrate their understanding. Students in this study reported valuing opportunities to use different strategies, engage in peer collaboration, and solve problems in ways that reflected their strengths. These experiences are important for equity because they acknowledge the varied ways students make sense of mathematical concepts. When instruction includes visual, verbal, collaborative, and hands-on approaches, more students see themselves as capable learners with meaningful contributions to make.

Teacher capacity emerged as another important equity consideration. Both participating teachers were in the beginning teachers in the early stages of their careers, and their growth over the course of the study illustrates the importance of investing in beginning teachers if equitable instructional practices are to be implemented effectively. Without sufficient coaching, resources, and structural support, teachers often struggle to meet the diverse needs of learners, which disproportionately affects students who start the year with significant gaps. Strengthening teacher skill in differentiation is an equity strategy as much as it is an instructional one.

This inquiry also pointed to the systemic nature of equity work. Differentiated instruction proved helpful within these two classrooms, but its impact is shaped by the broader structures within a school or district. Access to coaching, time for collaborative planning, clarity around instructional expectations, and a culture of continuous improvement all influence the degree to which DI can take root. The stabilization in achievement observed in the differentiated classrooms illustrates the potential of equity-focused instructional practices when they are supported at the system level.

The implications of this study reinforce the core belief that equity is achieved when every student is provided instruction that aligns with their readiness, leverages their strengths, and challenges them appropriately. Differentiated instruction has the capacity to help schools and districts move toward that vision by expanding access, increasing engagement, and creating more responsive and inclusive mathematics classrooms.

Recommendations for Practice

The results of this inquiry suggest several important recommendations for strengthening differentiated instruction in middle grades mathematics. These recommendations stem from identified needs and documented findings, reflecting what is necessary to support teachers in delivering responsive, rigorous instruction that meets the diverse needs of learners within Mary Beth County Schools and similar contexts, such as other rural school districts.

One recommendation is to provide sustained, professional learning that focuses specifically on differentiated instruction. The participating teachers demonstrated growth in their ability to interpret student readiness, design flexible groupings, and use multiple instructional pathways, yet they also expressed the need for additional support in managing small groups and differentiating rigor. This indicates that professional learning related to DI cannot be limited to one-time workshops. As suggested by Tomlinson (2014), teachers benefit most from ongoing coaching cycles that include modeling, co-planning, observation, and feedback, as differentiation is complex work that cannot be mastered through one-time training. Embedding DI-focused coaching into the regular rhythm of instructional support helps teachers build the confidence and instructional agility needed for successful differentiation.

Another recommendation is to establish structured collaborative planning routines that prioritize differentiation. As suggested in MTSS research, teachers need dedicated time to design tiered tasks, analyze assessment data, and plan for readiness-based groupings. Collaborative teams should engage in structured conversations about which students need scaffolding, which require enrichment, and how tasks can be designed with multiple access points. When teachers have protected time and support for collaborative planning, differentiation becomes more sustainable and more likely to be implemented

consistently across classrooms and grade levels.

Strengthening the use of formative assessment as an instructional driver is also essential. Throughout the inquiry, teachers increasingly used warm-ups, exit tickets, and student dialogue to understand where students were in their learning. To build on this progress, the district should continue to provide professional learning and tools that help teachers design short-cycle assessments, interpret student thinking, and adjust instruction in real time. Integrating formative assessment into PLC discussions and instructional coaching sessions can reinforce its role as a core component of differentiation rather than an optional add-on.

The district should also consider developing or curating resources that support teachers in implementing differentiated instruction more efficiently. Participants in the study noted the need for tasks with multiple entry points, anchor activities that promote independence, and materials that facilitate flexible grouping. Providing high-quality, ready-to-use resources, such as tiered task banks, graphic organizers, small group templates, and exemplar routines, can reduce planning time and ensure that differentiation is accessible to teachers.

Embedding differentiated instruction within the district's broader MTSS framework is another important recommendation. The inquiry demonstrated that DI can strengthen Tier 1 instruction, particularly for students who begin the year significantly below grade level. To leverage this potential, district and school leaders should articulate how DI aligns with Tier 1 expectations, how it supports intervention efforts, and how it fits into existing coaching, walkthrough, and PLC structures. Making differentiation an explicit component of MTSS ensures coherence and helps teachers understand how DI contributes to a more equitable instructional system.

A final recommendation is to prioritize early-career support for beginning teachers as part of the district's strategy for improving equitable instruction. Both participating teachers were early in their careers and demonstrated meaningful growth with sustained support. This highlights the importance of mentorship, coaching, and opportunities for peer observation that focus on DI as a core instructional skill. When new teachers build these competencies early, they are better equipped to respond to diverse student

needs and to contribute to a culture of responsive instruction.

These recommendations emphasize the importance of systems-level support, collaborative structures, and sustained professional learning. Acting on these findings can help build a more responsive and equitable instructional environment where all students, regardless of their starting point, have access to rigorous mathematics learning.

Recommendations for Future Study

The findings and limitations of this inquiry point to several important directions for future research. Because this study was conducted with a small sample and over a limited timeframe, additional investigation is needed to deepen understanding of how differentiated instruction influences student learning, teacher practice, and engagement in middle grades mathematics. Future inquiry should explore how sustained implementation of differentiated instruction over multiple years influences student achievement, particularly in high poverty or historically low performing settings. Researchers must also continue to study the specific types of professional learning and coaching that best support teachers in maintaining rigor, managing small group structures, and integrating DI with district-adopted curricula. Additionally, more research is needed to understand how differentiated instruction can be scaled across schools and grade levels while maintaining fidelity and quality.

One recommendation for future study is to extend the duration of implementation. Differentiated instruction requires repeated cycles of planning, practice, reflection, and refinement. A study that spans an entire school year or multiple years would make it possible to examine how teachers' use of differentiation evolves over time and whether more substantial gains in student proficiency emerge with sustained support. A longer timeframe would also capture seasonal patterns in engagement, retention of skills, and the cumulative impact of DI on students who begin the year far below grade level.

Another recommendation is to broaden the number and diversity of study sites in future research. This inquiry ultimately took place in a single school with two participating teachers, which limited the ability to compare implementation across settings. Future research should include multiple schools with differing demographics, leadership structures, and instructional cultures. Such an approach would help

determine the extent to which context influences the success of differentiated instruction and would provide stronger evidence about transferability across districts or states. Additionally, future studies should consider incorporating elements of experimental design, including the use of comparison or control groups, which would allow researchers to more clearly isolate the effects of the instructional approach and draw stronger inferences about its impact.

Future studies should also prioritize consistent and comprehensive data collection. In this inquiry, uneven participation in pre-study surveys restricted the ability to measure changes in student perception over time. Researchers who replicate this work should establish clear participation protocols, administer surveys during class periods to ensure student access, and incorporate additional measures such as observational rubrics, student work samples, or recorded small group sessions. These additional data sources would offer a richer picture of how students experience differentiated instruction and how teachers' decisions shape those experiences.

Another recommendation is to investigate differentiated instruction within the structure of MTSS and schoolwide equity efforts. Because DI strengthened Tier 1 instruction in this study, future researchers may benefit from examining how differentiation influences the need for supplemental interventions, how it affects intervention scheduling, and how it interacts with schoolwide systems for supporting diverse learners. Understanding how DI functions within a tiered support framework could offer valuable insights into scale-up efforts.

Research should also explore the relationship between teacher experience and successful implementation. Both participants in this study were beginning teachers who benefited from coaching and structured support. Future studies might compare how novice and veteran teachers approach differentiation, which kinds of professional learning lead to the greatest instructional shifts, and how teacher beliefs or confidence influence fidelity. Insights from this type of work could guide districts in tailoring professional development to teachers at different stages of their careers.

These recommendations underscore the value of continued study of differentiated instruction, particularly in schools serving students with wide variations in readiness and significant foundational

gaps. Additional research has the potential to deepen understanding of effective implementation, strengthen instructional systems, and support more equitable outcomes for students.

Conclusions

This inquiry examined the relationship between differentiated instructional practices, student engagement, and student proficiency in middle grades mathematics within a high-needs school context. Guided by improvement science and grounded in commitment to responsive, student-centered instruction, the study sought to determine how differentiated instruction could support more equitable and responsive mathematics learning for students who entered the school year with significant variations in readiness. Although the scope of the study narrowed when one school withdrew, the focused implementation at Royal Ridge Middle School offered meaningful insights into how teachers develop differentiated practices and how students respond to them.

The findings demonstrate that differentiated instruction contributed to greater student engagement, more responsive teaching, and incremental improvements in proficiency, particularly for students performing below grade level. Teachers shifted from viewing differentiation as a structural strategy to understanding it as an instructional mindset grounded in formative assessment and flexible grouping. Students reported feeling more active and supported in their learning, and performance patterns across the semester reflected stability and small gains rather than the decline observed in comparable groups. These outcomes align with the literature review and reinforce that differentiated instruction, when supported through coaching and intentional structures, can strengthen Tier 1 mathematics instruction.

The inquiry also highlighted the complexity of implementing differentiation with fidelity. Teachers identified continued needs related to planning time, rigor, small-group management, and the integration of DI with pacing expectations. These challenges, combined with limitations such as a short implementation window and a small sample size, shaped the extent of the instructional and academic shifts observed. Even so, the study provided valuable insight into the early stages of learning and adopting differentiation and illuminated both the promise and the challenges of this work.

Overall, the inquiry affirmed that differentiated instruction holds potential as a meaningful lever

for improving mathematics instruction and expanding equitable access to grade-level content. With sustained support, intentional structures, and ongoing professional learning, DI can help create classrooms where students engage more deeply, teachers respond more effectively, and instructional pathways reflect the diverse needs of learners. The study contributes to the growing body of practitioner knowledge on differentiation and offers direction for both future research and continued systemwide improvement efforts.

Scholarly Practitioner Reflections on Leadership

Engaging in this inquiry has been one of the most meaningful experiences of my professional career, not only because it deepened my understanding of differentiated instruction, but also because it reshaped my leadership in ways that will influence how I approach instructional improvement moving forward. Throughout this process, I grew as a leader who listens more intentionally, supports more responsively, and recognizes the importance of building systems that honor the diverse needs of both students and teachers. This work allowed me to move beyond designing structures from a district lens to engaging side-by-side with educators as we examined practice, confronted challenges, and envisioned more equitable mathematics classrooms together.

One of the most significant areas of growth was my development as a reflective and adaptive leader. Differentiated instruction is grounded in responding to learner needs, and I found that effective leadership requires the same level of responsiveness. The inquiry required me to shift from assuming what teachers needed to asking, observing, and co-constructing solutions with them. This approach aligns closely with distributed and transformational leadership, where leadership is shared and influence is cultivated through relationships, collaboration, and empowerment rather than directives. As I coached teachers through cycles of planning, reflection, and adjustment, I recognized that meaningful change is not achieved through compliance-driven structures; it grows from cultivating trust, nurturing curiosity, and creating conditions that allow teachers to take instructional risks.

My leadership also strengthened through the lens of improvement science. Engaging in iterative Plan–Do–Study–Act cycles required me to embrace small tests of change, gather evidence without

judgment, and refine ideas based on what surfaced from classrooms rather than what seemed theoretically ideal. This disciplined focus on continuous improvement helped me adopt a more measured, patient stance, one grounded in the belief that progress emerges from consistent refinement, not sweeping initiatives. As a result, I leave this inquiry more equipped to guide system-wide instructional improvement through strategic, data-informed leadership.

Throughout the study, I also deepened my understanding of equity-centered leadership. I originally defined equity as ensuring that every student has access to instruction that meets their readiness and honors their learning needs. As I observed students engaging more confidently, teachers planning more responsively, and classrooms becoming more accessible to learners with varied backgrounds, I was reminded that equity is not an abstract concept; it is realized through the daily instructional decisions teachers make and the supports leaders provide. This inquiry strengthened my commitment to leading with an equity lens by ensuring that resources, professional learning, and instructional expectations are aligned with the goal of expanding opportunity for all students.

I also gained insights into the leadership traits most essential for sustaining differentiated instruction. Patience, humility, and perseverance emerged as vital qualities. Teachers needed space to grow, reassurance when strategies felt challenging, and affirmation when shifts in practice began to take hold. My role was to create an environment where questions were welcomed, experimentation was encouraged, and learning was ongoing. This experience strengthened my belief that instructional leadership must be grounded in empathy and relational trust, and it affirmed my commitment to leading through partnership rather than authority.

As I reflect on the overall journey, I recognize that this inquiry not only contributed to my development as a scholarly practitioner but also reinforced the purpose behind my work. I entered this profession to improve outcomes for students, particularly those who have been historically underserved. This study allowed me to engage deeply in that mission by working alongside teachers, analyzing authentic classroom data, and building a clearer vision of what it takes to support responsive mathematics instruction across a system. The insights gained will shape the decisions I make, the professional learning

I design, and the leadership I strive to embody in the years ahead.

Closing this inquiry, I feel more grounded, more informed, and more inspired to continue leading with clarity, purpose, and an unwavering commitment to equitable learning experiences for every student. This work has reaffirmed that leadership is not defined by position, but by action and by the willingness to learn, adjust, and keep moving forward in service of those we teach and lead.

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APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL

APPENDIX B: INFORMED CONSENT FORM

Informed Consent to Participate in Research

Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: Increasing Student Achievement through the Use of Differentiated Instructional Practices in Middle Grades Mathematics

Principal Investigator: Amanda G. Atwell, EdD student

Institution, Department or Division: Department of Educational Leadership, College of Education, East Carolina University

Address: 402 Mary Beth Drive, Greenville, NC 27858

Telephone #: 252-814-9692

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?

The purpose of this research is to determine if differentiated instructional practices in the classroom have a direct impact on student engagement and student proficiency. You are being invited to take part in this research because you are a teacher at Westhaven or Royal Ridge Middle School. The decision to take part in this research is yours to make. By doing this research, we hope to learn if differentiated instruction has an impact on student engagement and/or student proficiency in the mathematics classroom.

If you volunteer to take part in this research, you will be one of about 4 people to do so.

Are there reasons I should not take part in this research?

I understand that I should not volunteer for this study if I am not a teacher at Westhaven or Royal Ridge Middle School or if I am not planning to remain employed by the Mary Beth School District for the remainder of the 2024-25 school year.

What other choices do I have if I do not take part in this research?

You can choose not to participate. There will be no repercussions for doing so.

Where is the research going to take place and how long will it last?

The research will be conducted at Westhaven and Royal Ridge Middle Schools. You will need to come to the conference room at times during the study if you are participating in focus groups or interviews. The total amount of time you will be asked to volunteer for this study is daily for the remainder of the school year.

What will I be asked to do?

You will be asked to do the following: You will be asked to implement differentiated instructional practices within your classroom throughout the school year. Professional

development, modeling of lessons, and planning assistance will be provided to you on a regular basis and at other times as needed.

What might I experience if I take part in the research?

We don't know of any risks (the chance of harm) associated with this research. Any risks that may occur with this research are no more than what you would experience in everyday life. We don't know if you will benefit from taking part in this study. There may not be any personal benefit to you but the information gained by doing this research may help others in the future.

Will I be paid for taking part in this research?

Unfortunately, we will not be able to pay you for the time you volunteer while being in this study.

Will it cost me to take part in this research?

It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?

ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- The investigator(s) conducting this study.
- The Institutional Review Board (IRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.

How will you keep the information you collect about me secure? How long will you keep it?

All data will be kept on a secure drive on a password protected laptop. Surveys will be conducted using Qualtrics, which will provide additional levels of security.

What if I decide I don't want to continue in this research?

You can stop at any time after it has already started. There will be no consequences if you stop and you will not be criticized.

Who should I contact if I have questions?

The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 252-814-9692 between the hours of 9am – 4pm Monday through Friday.

If you have questions about your rights as someone taking part in research, you may call the University & Medical Center Institutional Review Board (UMCIRB) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may contact the Director for Human Research Protections, at 252-744-2914.

I have decided I want to take part in this research. What should I do now?

The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read (or had read to me) all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By signing this informed consent form, I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

Participant's Name (PRINT)	Signature	Date
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Person Obtaining Informed Consent: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

Person Obtaining Consent (PRINT)	Signature	Date
---	------------------	-------------

APPENDIX C: FOCUS GROUP PROTOCOL

Title of Inquiry: Increasing Student Learning through Differentiated Instructional Practices
in Middle Grades Mathematics

Date & Time of Focus Group:

Location of Focus Group:

Facilitator: Amanda Atwell

Note Taker:

Audio/Video Recording Tool:

Focus Group Participants:

[Ground Rules]

“My name is Amanda Atwell, and I will be the facilitator for today’s focus group on differentiated instruction. The purpose of this focus group is to learn more about your perspective on differentiated classroom instruction and student engagement. You have been asked to participate because you are participating in this study, and your opinions and experiences will help me learn more about classroom instruction, teaching methods, and student engagement. After the conclusion of the focus group, the information we discussed will be coded and categorized to identify themes across participants. Your personal information will not be connected to the results of this focus group.”

“I am passing around a consent form. By signing this form, you are agreeing to participate in this focus group on differentiated instruction. If you feel uncomfortable for any reason signing this form, you are free to leave at any time. Please take a moment to read and sign the consent form.”

“Before we begin, I would like to notify you that this session will be recorded to support transcription accuracy. I would like to go over a few ground rules for the focus group. These are in place to ensure that all of you feel comfortable sharing your experiences and opinions.”

[Ground Rules]

1. *Confidentiality* – Please respect the confidentiality of your peers. As facilitator, I will only be sharing the information from this focus group anonymously.
2. *One Speaker at a Time* – Only one person should speak at a time to make sure that we can all hear what everyone is saying.

3. *Use Respectful Language* – In order to facilitate an open discussion, please avoid any statements or words that may be offensive to other members of the group.
4. *Open Discussion* – This is a time for everyone to feel free to express their opinions and viewpoints. You will not be asked to reach consensus on the topics discussed. There will be no right or wrong answers.
5. *Participation is Important* – It is important that everyone’s voice is shared and heard to make this the most productive focus group possible. Please speak up if you have something to add to the conversation!”

“Are there any questions before we start?”

“Thank you, now let’s begin.”

[Questions to be Asked, Listed Fully and in Order]

1. Provide a brief summary of your understanding of differentiated instruction.
2. What teaching methods do you use in your classroom on a regular basis?
3. In what ways do you measure student engagement?
4. What drives your decision making when grouping students for instruction?
5. How do you ensure students are exposed to multiple strategies for problem solving?
6. In what ways do you allow students to demonstrate their learning in your classroom?
7. What professional learning do you need in order to differentiate instruction in your classroom?

[Conclusion Text]

“Thank you for participating in today’s focus group. As a reminder, I will share the information learned during this session with the school leadership team in an effort to improve classroom instruction and student engagement. If you have any additional thoughts that you would like to share at a later time, please contact me at aatwell@beaufort.k12.nc.us.”

Documentation of Informed Consent

My signature certifies that I have decided to participate having read and understood the information presented. I understand that my participation in this study is completely voluntary and that all information shared will remain confidential and only be shared anonymously.

_____ (Signature) _____ (Date)

APPENDIX D: FOCUS GROUP QUESTIONS (BEGINNING OF INQUIRY)

1. Provide a brief summary of your understanding of differentiated instruction.
2. What teaching methods do you use in your classroom on a regular basis?
3. In what ways do you measure student engagement?
4. What drives your decision making when grouping students for instruction?
5. How do you ensure students are exposed to multiple strategies for problem solving?
6. In what ways do you allow students to demonstrate their learning in your classroom?
7. What professional learning do you need in order to differentiate instruction in your classroom?

APPENDIX E: FOCUS GROUP QUESTIONS (END OF IMPLEMENTATION)

1. Provide a brief summary of your understanding of differentiated instruction.
2. What teaching methods do you use in your classroom on a regular basis?
3. In what ways do you measure student engagement?
4. What drives your decision making when grouping students for instruction?
5. How do you ensure students are exposed to multiple strategies for problem solving?
6. In what ways do you allow students to demonstrate their learning in your classroom?
7. What professional learning do you need in order to continue to differentiate instruction in your classroom?

APPENDIX F: STUDENT PRE AND POST SURVEY

(including Demographical Data)

1. What grade are you in? (Select one)

6
7
8

2. What is your gender? (Select one)

Male
Female

3. What is your race or ethnic background? (Select one)

American Indian or Alaska Native
Asian
Black or African American
Native Hawaiian or Other Pacific Islander
White
Hispanic or Latino

Please answer the remaining questions using a scale of one to five with one being strongly disagree and five being strongly agree.

4. I am an active learner in math class.

1-strongly disagree
2-disagree
3-unsure/neutral
4-agree
5-strongly agree

5. I am able to understand what is being taught.

1-strongly disagree
2-disagree
3-unsure/neutral
4-agree
5-strongly agree

6. Teaching is designed to meet my needs as a learner.

1-strongly disagree

- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

7. My teacher primarily teaches the class using a whole-group approach.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

8. My teacher teaches using small group instruction at least twice a week.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

9. My teacher teaches multiple strategies to solve math problems.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

10. My teacher allows me to use the strategy of my choice when problem solving.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

11. My classmates and I have varying assignments based on our learning needs.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

APPENDIX G: TEACHER PRE AND POST SURVEY

(including Demographical Data)

1. What grade do you teach? (Select one)

6
7
8

2. What is your gender? (Select one)

Male
Female

3. What is your race or ethnic background? (Select one)

American Indian or Alaska Native
Asian
Black or African American
Native Hawaiian or Other Pacific Islander
White
Hispanic or Latino

Please answer the remaining questions using a scale of one to five with one being strongly disagree and five being strongly agree.

4. I understand what differentiated instruction means.

1-strongly disagree
2-disagree
3-unsure/neutral
4-agree
5-strongly agree

5. My students are active participants during math class.

1-strongly disagree
2-disagree
3-unsure/neutral
4-agree
5-strongly agree

6. When assessing standards, 80% of my students are proficient.

1-strongly disagree

- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

7. I differentiate instruction based on the needs of the learners in my classroom.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

8. I primarily teach the class using a whole-group approach.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

9. I teach using small group rotations at least twice a week.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

10. I teach my students multiple strategies to use when solving math problems.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

11. I allow my students to use the strategy of their choice when problem solving.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

12. I offer my students varying assignments based on their learning needs.

- 1-strongly disagree
- 2-disagree
- 3-unsure/neutral
- 4-agree
- 5-strongly agree

APPENDIX H: DIFFERENTIATED INSTRUCTION WALKTHROUGH FORM

Teacher:
 Grade Level:
 Observer:
 Date:

Physical Environment		
	Evident	Not Evident
Designed for quick and easy groupings of tables and chairs	Evident	Not Evident
Is arranged for teacher and student movement during classroom work times	Evident	Not Evident
Provides work areas for individual needs, including knowledge & ability levels	Evident	Not Evident
Reflects current content or skills through student displays and artifacts evident of differentiated practices	Evident	Not Evident
Teacher Behaviors		
Provides time for students to actively process information	Evident	Not Evident
Applies assessment information to guide instruction	Evident	Not Evident
Uses stations for individual and small group instruction	Evident	Not Evident
Shows evidence of differentiated practices	Evident	Not Evident
Uses a variety of instructional strategies and activities to teach standards	Evident	Not Evident
Engages students in various flexible grouping designs	Evident	Not Evident
Presents students with choice in learning activities	Evident	Not Evident
Student Engagement		
Exhibits on-task behavior while working	Evident	Not Evident
Uses materials/resources on the student's own level of success	Evident	Not Evident
Appears to feel respected and emotionally safe	Evident	Not Evident
Participates in individual and small group instruction	Evident	Not Evident
Uses the strategy of their choice when problem solving	Evident	Not Evident

APPENDIX I: LETTER OF AGREEMENT AND SUPPORT



Beaufort County Schools

Dr. Matthew F. Cheeseman, Superintendent

321 Smaw Road

Washington, North Carolina 27889

252-946-6593

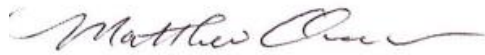
www.beaufort.k12.nc.us

November 15, 2024

Dear Institutional Review Board:

The purpose of this letter is to inform you that I give Amanda Atwell permission to conduct the research titled, "INCREASING STUDENT LEARNING THROUGH THE USE OF DIFFERENTIATED INSTRUCTIONAL PRACTICES IN MIDDLE GRADES MATHEMATICS" at Chocowinity Middle School and PS Jones Middle School, Beaufort County Schools. This letter also serves as assurance that Chocowinity Middle School and PS Jones Middle School comply with requirements of the Family Educational Rights and Privacy Act (FERPA) and the Protection of Pupil Rights Amendment (PPRA) and will ensure that these requirements are followed in the conduct of this research. The research will be conducted with oversight from Dr. Elizabeth Hodge, East Carolina University. The research shall be conducted with all confidentiality requirements outlined in Beaufort County Board of Education policy 4700 Student Records and policy 4705/7825 Confidentiality of Personal Identifying Information as attached for reference. Please feel free to contact me directly should you have questions.

Sincerely,



Matthew Cheeseman, Ed.D.
Superintendent

APPENDIX J: DIFFERENTIATED INSTRUCTION GROUP ROTATION TEMPLATE

Teacher:
Grade Level:
Date:

Rotation	Teacher-Led Group	Collaborative Task	Independent/ Digital Practice	Anchor Activity
Group A				
Group B				
Group C				
Group D				

APPENDIX K: TIERED TASK TEMPLATE WITH EXEMPLAR

Teacher:
Grade Level:
Date:

Tier	Task Description	Supports
Tier 1 – Foundational		
Tier 2 – On-Level		
Tier 3 – Advanced		

	Tier	Task Description	Supports
Exemplar	Tier 1 – Foundational	Solve ratio problems using visual models with guided steps.	Worked examples, vocabulary support
	Tier 2 – On-Level	Solve multi-step ratio problems and justify reasoning.	Strategy reminders, peer discussion
	Tier 3 – Advanced	Create and solve a real-world ratio problem using two strategies.	Minimal scaffolding, challenge prompts

APPENDIX L: ANCHOR ACTIVITY WITH EXEMPLAR

Teacher:
Grade Level:
Date:

Anchor Activity Type	Description
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Exemplar	Anchor Activity Type	Description
	Skill Reinforcement	Standards-aligned practice with self-checking
	Mathematical Reasoning	Error analysis and misconception correction
	Vocabulary & Concepts	Frayer model or visual glossary
	Reflection	Learning journal and strategy reflection