Examining the Relationship Between Differentiated Instructional Practices and Middle School NAEP Reading Scores

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Abstract: The objective of this quantitative study was to analyze data from the 2019 the National Assessment of Educational Progress (NAEP) Reading scores compared to variables that represented differentiated and individualized approaches to instruction. Specific variables were analyzed utilizing Cohen's d effect size calculations and significance tests. Variables utilized for this study included how often educators utilized team-teaching practices, differentiation practices, and ability grouping. Additionally, two staffing variables were evaluated. The first staffing variable asked teachers how often they had access to a special education teacher and the second asked how often educators utilized a reading specialized for ability grouped instruction. The results of the NAEP data analysis found that differentiated instruction and teaching practices had no significant impact on student achievement results on the 2019 8th grade NAEP reading assessment. This study found that some of the variables analyzed led to a decrease in student achievement the more often differentiated instructional strategies were utilized to individualize support for students. The findings from this study found that differentiation may not be a factor that improves student outcomes, and implications addressed focusing on differentiation as a teacher management tool rather than a tool to improve student achievement in future studies.

Keywords: differentiation, individualization, ability grouping, grouping strategies, NAEP

1. Introduction

The implementation of differentiated instruction strategies has been commonplace in public school settings for decades and meeting diverse learner needs continues to be a priority for educators, administrators, and other stakeholders within K-12 public schools. Policy changes dating back to the All-Handicapped Children Act of 1975, now known as the Individuals with Disabilities Education Act (IDEA, n.d.), have reinforced the development of a fully inclusive school-based environment that guarantees students access to a Free Appropriate Public Education (FAPE) within the least restrictive environment (LRE) for all learners (IDEA, n.d.). Today, students entering public school settings with more diverse backgrounds relating to their primary language spoke at home, socio-economic status, and home-based support environments (Tomlinson, 2009). Due to the increasing diversity of student populations, differentiation has been prioritized by many districts in addressing diverse learning needs successfully in the classroom.

In addition to practices related to personalized and individualized learning, differentiated literacy instruction has been utilized as a strategy to manage students who come into the public-school setting with diverse literacy skills. Tomlinson (2009) identified four shared principles related to differentiation and literacy instruction. These principles outlined how differentiation can successfully align with best practices in reading instruction. Research has shown that differentiated literacy instruction recognizes that students are all unique and most effectively respond to reading instruction when their readiness, interest, and learning profile are recognized by the educator (Tomlinson, 2009). The relationship between differentiation and reading instruction has been established through various research studies (Tomlinson, 2009), but since 2017, national averages for reading proficiency have declined from 37% percent proficient on the National Assessment of Educational Progress NAEP in 2017 to 35% of students showing proficiency on the NAEP assessment in reading during the 2019 school year (NAEP, n.d.). Even though educational institutions across the nation are prioritizing the implementation of differentiated practices in the classroom, there is a lack of growth and achievement on the average NAEP reading scores over the last several years. The purpose of this study is to examine what type of relationship could between differentiated instructional practices and the 2019 NAEP 8th grade reading scores.

The middle school level was chosen for this research study since middle school students are unique learners due to the developmental changes taking place during these years (McDonald, 2010). Teachers who work with middle school students typically have background knowledge regarding meeting unique learner needs during adolescence, and the consensus among those that research the middle school age are that these years are "marked by profound physical, emotional, social, and cognitive development, and that learning is impacted" (Tomlinson et al., 1998, p. 3) during this time. Specifically, this research study will explore how 8th grade NAEP reading scores could be impacted by specific instructional approaches that are differentiated and individualized to meet the needs of middle school students.

Although there is a plethora of research available on differentiated reading instruction at the elementary school level, there are limited studies about how differentiated reading practices have impacted middle school reading achievement. At the elementary level, the need for differentiated practices in reading has been established through best practices in reading instruction that focus on the concepts of teaching students at a level that is appropriate for their developmental reading needs. These levels are typically identified as independent, instructional, and frustration levels (Tomlinson, 2009). Additional elementary studies have found that due to the wide range in reading levels at the elementary level, there is more of a need for developing a classroom that is highly differentiated to meet learner needs. Fir mender et al. (2013) found that within their study of five elementary schools, the average range of grade level reading comprehension scores at grade 9.3 at grad 3, 11.3 at grade 4, and 11.6 at grade 5. Due to the diverse reading comprehension abilities within these classrooms, teachers at the elementary level continue to differentiate instruction frequently to meet learner needs. This range in reading ability has led to extensive amounts of research studies to analyze how to best meet emerging and early reading needs. However, studies regarding differentiated reading practices at the middle school level are limited, and studies that explore how reading achievement has been impacted through differentiated and individualized instruction are even less prevalent.

This study will provide educators, administrators, and policy stakeholders the opportunity to reflect on the impact that differentiated instruction has had on secondary students in literacy instruction, with a specific focus on reading. As districts are faced with training educators on differentiated instruction to meet diverse learning needs, it is imperative to begin to evaluate the effectiveness of differentiated instruction to ensure that strategies and practices staff receives training on are effective in supporting students in their learning and achievement. Additionally, policy decisions continue to reinforce the need for differentiated work as classrooms across the country become more diverse. Therefore, understanding the effectiveness of individualized and differentiated supports is essential to continue to inform the stakeholders making these financial and political decisions. The purpose of this study was to examine how differentiated instruction practices impacted 8th grade NAEP reading scores. The literature review outlined three areas related to the study 1) differentiation in reading instruction 2) collaboration and teaming in a differentiated classroom and 3) individualized and personalized instruction. Based on the review of literature and the data available from the 8th grade NAEP reading scores, this study will address four research questions:

1) What is the impact on 8th grade reading scores when a teacher designs student groups based on student achievement level?
2) What is the impact of co-teaching on reading scores for 8th grade students?
3) What is the impact of one-on-one help from a reading specialist for students in an 8th grade reading class?
4) What is the impact on 8th grade reading scores when differentiated instruction is utilized by the classroom teacher?

Within secondary institutions, differentiated practices have struggled to maintain momentum in recent years. Much of the current research available is not focused on the overall effectiveness of differentiation. In their meta-analysis review of differentiated practices within a secondary setting, Smale-Jacobse'set al. (2019) found that "there are too few high-quality studies on the effectiveness of differentiated instruction in secondary education" (2019, p. 17). Additionally, Smale-Jacobse'set al.(2019) review identified that although there is some evidence to show that differentiation will result in higher student achievement results, the results were inconsistent and fragmented with a focus on some aspects of differentiation and not others. Due to the lack of research related to differentiation in the secondary setting, it is vital that researchers continue to analyze the relationship between differentiated instructional practices and student achievement results. For the purposes of this study, differentiation will be

defined as the instructional practices in which a teacher, specialist, or team identify the knowledge and skills students need to have to master a skill or content, and then pre-plan for varied instructional approaches utilizing a wide variety of approaches to meet varied and diverse learning needs (Acosta-Tello & Shepherd, 2014). Additionally, differentiation should be personalized to meet the "unique learning needs of students in any classroom" (Campbell, 2009 p. 9). This literature review will analyze three themes. The three topics that will be addressed throughout this review are (1) differentiation in reading instruction (2), collaboration and teaming within a differentiated classroom, and (3) individualized and personalized instruction within a differentiated classroom.

When identifying trends in available research related to differentiation and reading instruction, one of the most frequent components of reading instruction is how to differentiate for students to increase comprehension levels. Jefferson et al. (2017) studied the impact that Tier I differentiation strategies had on reading fluency and comprehension. The results of their quasi-experimental study found that using differentiation in seven different3rd grade elementary classrooms resulted in benefits in some ways, but not others. Although the study found mixed results, classrooms that received differentiated literacy instruction saw an increase in reading comprehension scores (Jefferson et al., 2017). An additional study that supported the impact that differentiation had on comprehension was Little et al.'s 2014 study that evaluated the use of differentiated reading instruction on middle school advanced learners. The School-Wide Enrichment Model-Reading Framework (SEM-R) was utilized for this study. The study included 2,150 students in the 6th and 7th grade from 47 classrooms (Little et al., 2014). An oral reading fluency (ORF) assessment, Aims web benchmark fluency test and Gates-Mac Ginitie Reading test (GMRT) were utilized to measure reading comprehension in classrooms that received the differentiated model of instruction (Little et al., 2014). The results of the study found that fluency and comprehension were the same or increased with a differentiated model of reading instruction compared to a more traditional model. The study stressed that the time spent on direct instruction could be reduced considerably and replaced with independent reading and more individualized and differentiated support without negatively impacting student achievement scores.

As students in classrooms become more diverse, and continued policy regulations demand for inclusive learning opportunities, the concept of team teaching, co-teaching and collaboration with various teacher experts has become more popularized. Regarding collaboration and teaming within a differentiated classroom, there is a diverse set of research currently available that was found to support the positive impact that collaboration has had on educators' abilities to differentiate instruction in the classroom. Lamb et al., conducted a 2008 interview that included three different teachers in a teaming process related to reading instruction. The three participants: a teacher librarian, a Reading First coach, and a teacher who had been teaching in a bilingual setting for 20 years, reflected on their collaboration process and the effectiveness of the teamed approach regarding differentiated instruction (Lamb et al., 2008). This collaborative group of educators worked to redesign reading instruction in an elementary bilingual classroom by embedding differentiated and innovative instructional techniques. Students were exposed to shared reading, recording themselves and listening to their reading, and intentionally embedding quality technology tools into the classroom (Lamb et al., 2008) The collaborative effort of the group had a positive impact on their experiences in education as adults, and the perceptions from each of these teachers was that students were positively impacted using varied and differentiated instructional models (Lamb et al., 2008). This interview specifically looked at three teachers from different backgrounds - literacy coaching, teacher librarian and general education teacher. However, all additional studies use in this literature review focus on team teaching through the lens of a general education and special education teacher working together to meet student needs in an inclusive classroom setting.

Although differentiation, individualization and personalization are often utilized interchangeably, they each address student learning in a separate way to ensure all students are achieving and growing in the K-12 public school setting. Due to the limited scope of this study, the various definitions of individualization, personalization and differentiation will not be explored; however, analyzing how educators individualize and personalize learning in differentiated classrooms will be examined. Various studies are currently available identifying how school systems are utilizing a variety of supports to meet student needs through individualized and personalized approaches. Tutoring services in a one-on-one environment have been found to be one way in which school districts respond to individualizing student needs. Morton and Araujo's 2014 case study assessed the impact that an individual reading tutor had on student achievement. Through the case study read-alouds and writing samples were used to improve the student's comprehension and overall literacy skills. This article focused on a fourth-

grade student who did not pass the State of Texas Assessment of Academic Readiness (STAAR) exam and due to this, the student's parents searched out for help and found a reading tutor who was also a reading professor at an area university (Morton & Araujo, 2014). Several key takeaways resulted from this study for educators in elementary classrooms including identifying and utilizing culturally relevant material, including time for reflection and personal debriefing, utilizing new and effective technology, encouraging interactive retelling, and using less silent reading time and more conversation in the classroom (Morton & Araujo, 2014).

Our theoretical framework for this research adopts a scientific inquiry-based approach. The framework was described in great details in The Impact of Conversations on Fourth Grade Reading Performance - What NAEP Data Explorer Tells? (Bond & Zhang, 2017). In summary, the research methods combined the inquiry process with scientific knowledge, reasoning, and critical thinking. We started with an extensive exploration of the dataset, and that led to the designing of the research questions. The research questions further guided us to mine the data with great in-depth.

2. Methods

This study utilized a quantitative design approach by analyzing data from the National Assessment of Educational Process (NAEP) Data Explorer to determine how various differentiated and individualized instructional strategies impacted student achievement in reading at the 8th grade level. Specific tables were used based on selected variables from the 2019 NAEP scores. The tables were analyzed to determine what the relationship was between differentiated practices and student achievement in reading at the middle school level. This section explains how the NAEP Data Explorer was utilized for this study and will look at the participants included in the study as well as how the data was analyzed to determine the relationship between the NAEP reading scores and differentiation practices.

2.1. NAEP Data Explorer: Participants and Sampling

The National Assessment of Educational Progress (NAEP) is the nation's largest assessment used to assess students' achievement in various content areas. The NAEP was first administered in 1969 and utilizes a "multistage design that relies on stratification (i.e., classification into groups having similar characteristics)" to select specific students for the assessment each year (The Nation's, 2009, p. 14). The assessment utilizes a highly technical structure and framework for administration each year and has become known as the gold standard approach for assessment implementation in K-12 school settings (NCES, 2019). The NAEP Data Explorer utilizes representative sampling through a probability sample design (National Center for Education Statistics, n.d.). Representative sampling is accomplished through the analysis of each district to determine a sampling of participants to offer the assessment to (NCES, 2019). The NAEP utilizes the Common Core of Data (CCD) and the Private School Survey (PSS) frame to determine who to select for the NAEP assessment each year (Sikali et al., 2013). The sampling of students selected to take the NAEP are representative of the students that make up the entire student body of those attending K-12 public and private school districts in any given year. NAEP ensures that "The school probabilities are proportional to the estimated number of students in the grade assessed" (National Center for Education Statistics, n.d.).

2.2. Study Sample and Data Collection

The 2019 NAEP assessment included a variety of subjects, but for the purposes of this study, read scores will be analyzed. During the 2019 NAEP, 294,000 4th and 8th grade students took the NAEP reading assessment (NAEP Reading, 2019). The scores for these assessments are available in all 50 states and include 27 large urban districts that participated in the 2019 NAEP assessment (NAEP Reading, 2019). Although both public and private institutions were included in the 2019 NAEP, only K-12 national public institutions will be analyzed for this study. Public school students include charter schools and all elementary and secondary students in public institutions but exclude the Bureau of Indian Education schools and Department of Defense Education Activity schools (NAEP, n.d.). The 2019 NAEP results will be analyzed and included students who took the assessment at grades four, eight, and eleven.Grade eight scores will be utilized, and only national data will be used. The NAEP 2019 reading assessment includes three different components that could be used for analysis. The three components include the composite reading score, literary experience scale, and gain information scale (NAEP Reading, 2019). Each of these components will be reviewed throughout this study.

2.3. Data Analysis

This study identified five variables used in the 2019 NAEP. Each variable focused on teacher or instructional factors related to a specific practice in differentiation and individualized support for students. Variable one (T136408) asked teachers how often they created student groups with different achievement levels (teacher-reported). Variable two (T136412) asked how often teachers used differentiated instruction for reading (teacher-reported). Variable three (C104602) asked to what extent a reading specialist was utilized to provide one-on-one support to help students achieve. Variable four (T132501) asked educators how often they taught jointly as a team in the same class. Finally, variable five (C092501) asked whether teachers had access to a special education teacher. These five variables were utilized to analyze the relationship between reading scores for 8th grade students and differentiated instructional practices. Tables and charts were utilized from the NAEP Data Explorer to analyze the specific variables chosen for this study. Additionally, the University of Colorado's Effect Size Calculator was utilized to determine Cohen's *d* effect size (Becker, 2000). Cohen's *d* effect size is defined as the difference between means which are divided by the standard deviation (Becker, 2000). Effect sizes are measured as d=.2 as a small effect size, d=.5 as medium, and d=.8 as a large effect size. Measuring effect sizes in this way does present certain risk because conventional operational definitions of what is a small versus large effect size could be limiting due to the diversity of studies that take place within behavioral science (Becker, 2000). This study seeks to explore the relationship between differentiated instructional practices and 8th grade reading scores for students in national public-school settings, however, it must be noted that no causal relationships can be determined from this study.

3. Results and Findings

This section reports on the results of the 2019 NAEP reading assessments against variables that implemented individualized and differentiated instruction within the classroom. Three teacher factor variables were utilized for this study. The first teacher factor was teacher created student groups based on achievement, the second was the teacher teaches jointly with another teacher in the classroom, and the third was the teacher engaged in differentiated instruction. Additionally, two instruction factors were utilized. These two factors analyzed whether there was one-on-one support from a reading specialized for students and examined whether there was a special education teacher available for support. The results from the 2019 NAEP assessment included the mean scaled scores and the standard deviation. Additionally, each variable included a significance test as well as an analysis of Cohen's *d* effect size.

3.1. Research Question #1: Student Grouping

The first research question asked what the impact was when a teacher designed student groups based on student achievement level in reading for 8th grade students. Utilizing the NAEP 2019 assessment, research question one looked at the variable *"when you teach English/language arts, how often do you use the following strategies: I create student groups with different achievement levels"*. This variable was grouped under the Instructional Content category and the Modes of Instruction/Classroom Activities subcategory. The data from this variable was compared to the average NAEP composite reading score in 2019. The table below represents the results from the 2019 NAEP reading score.

Table one analyzed the scale scores and standard deviations of the 8th grade 2019 NAEP reading assessment against educators that created student groups based on achievement levels. Following this, a significance test was run for this data. The alpha was set at p=.05.

Table 1 Average scale scores and standard deviations for grade 8 reading in 2019 by educators who create student groups based on achievement (T136408).

Year	Jurisdiction	Create student groups based on achievement	Average Scale Scores	Standard Deviation
2019	National Public	Never or hardly ever	265	38
		Once in a while	264	38
		Sometimes	264	37
		Often	263	37
		Always/almost always	259	38

Based on the findings represented in table one, the more an educator used student groups based on achievement, the lower their NAEP 2019 mean reading score was. The highest average score was 265 (SD=38) against teachers who never or hardly ever utilized student grouping based on achievement. According to the data analysis, educators who almost always or always utilized student grouping based on achievement had a mean average score of 259 (SD=38) on the 2019 NAEP reading assessment.

A significance test was run to determine the difference in average scare scales between variables for creating student groups based on achievement. The *p*-value ($p<.05$) was calculated for the effect of student groups based on achievement compared to the NAEP reading scores for 8th grade students. The alpha was set at .05.

Table 2 Utilizing the NAEP Data Explorer, a significance test was run to examine the difference in average scare scales between variables for creating student groups based on achievement (T136408).

Reading, grade 8 Difference in average scales between variables for creating student groups based on achievement (T136408) National Public, 2019					
	Never or hardly ever (265)	Once in a while (264)	Sometimes (264)	Often (263)	Always/almost always (259)
Never or hardly ever (265)					
Once in a while (264)	X Diff = -1 P-value = .5262 Family size = 10				
Sometimes	X	X			

(264)	Diff = -1 P-value = .3705 Family size = 10	Diff = 0 P-value = .9325 Family size = 10		
Often (263)	X Diff = -2 P-value = .1034 Family size = 10	X Diff = -1 P-value = .3602 Family size = 10	X Diff = -1 P-value = .0776 Family size = 10	
Always/almost always (259)	X Diff = -6 P-value = .0002 Family size = 10	X Diff = -5 P-value = .0017 Family size = 10	X Diff = -5 P-value = .0000 Family size = 10	X Diff = -4 P-value = .0002 Family size = 10

Legend
< Significantly lower
> Significantly higher
X No significant difference
Created by NAEP Data Explorer

The *p*-value was significant for teachers who always/almost always implement using student grouping based on achievement compared to teachers who did not use groups as often (*p*=.0002 never/hardly ever; *p*=.0017 once in a while; *p*=.0000 sometimes; *p*=.0002 often).

Table 3 Effect sizes of mean score differences amongst teachers who utilized student grouping strategies and those that did not (T136408).

Group 1	Group 2	Cohen's *d*
Always or almost always	Never or hardly ever	-.16
Always or almost always	Once in a while	-.13
Always or almost always	Sometimes	-.13
Always or almost always	Often	-.11
Never or hardly ever	Always or almost always	.16
Once in a while	Always or almost always	.13
Sometimes	Always or almost always	.13
Often	Always or almost always	.11

Based on Cohen's definition, effect size is small at *d*=.2, medium at *d*=.5 and large at *d*=.8 (Becker, 2000). Becker's effect size calculator was utilized to compute the effect size for various variables throughout this study (Becker, 2000). Cohen's *d* effect size was calculated to determine the effect size of those educators who never or hardly ever utilize student groups based on achievement to educators who always or almost always create student groups based on achievement. Effect sizes were calculated for each of the significant findings from the variable utilizing student groups based on achievement. The Cohen's *d* effect size for those who always or almost always used student grouping compared to those that never did was *d*=-.16. The effect size for those who always or almost always used student groups against those who only sometimes or once in a while used student groups was *d*=-.13. Finally, those teachers that often-utilized student groups compared to those that almost always or always utilized student groups was *d*=-.11. Each of the Cohen's d effect sizes that were run for this variable had a small effect size.

3.2. Research Question #2: Individualizing Through Team Teaching

Research question two asked what the impact was related to co-teaching on reading scores for 8th grade students. To answer this research question, the NAEP 2019 variable *"How often do you do the following in this school? Teach jointly as a team in the same class* "was used. This variable was located under the Instructional Content category and the Modes of Instruction/Classroom Activities subcategory. Only students in a national public school were analyzed for this research question. This data compared the average NAEP composite score for reading in 2019 to the variable. The table below represents the results from the 2019 NAEP reading score. Table three analyzed the teacher factor variable teaching jointly in the same class by the 8th grade reading scores for the 2019 NAEP assessment. The table included the average scale scores and standard deviation for all national public schools who participated in the 2019 assessment.

Table 4 Average scale scores and standard deviations for grade 8 reading in 2019 by educators who teach jointly in the same class (T132501).

Year	Jurisdiction	Teach jointly in the same class	Average Scale Scores	Standard Deviation
2019	National Public	Never	264	37
		Once or twice a year	265	37
		Once/twice a month	261	38
		Once/twice a week	261	38
		Every day or almost	260	38

Table four found that teachers who never taught jointly in the same class had an average NAEP 2019 reading score of 264 (SD=37). Teachers who engaged in co-teaching once or twice a year had a slightly higher average scale score at 265 (SD=37), and teachers who engaged in joint teaching every day or almost every day had a mean score of 260 (SD=38) which was four points lower than those that never utilized a co-teaching model.A significance test was run to determine whether there was a significant difference in the NAEP reading scores with an increase in team or joint teaching in the classroom.

Table 5 Significance test to examine the difference in average scare scales between variables for the frequency in which teachers engage in joint teaching practices (T132501).

Reading, grade 8 Difference in average scales for the frequency of team-teaching practices (T132501) National Public, 2019					
	Never or hardly ever (264)	Once/twice a month (265)	Once/twice a year (261)	Once/twice a week (261)	Every day or almost (260)
Never or hardly ever (264)					
Once/twice a month (265)	X Diff = -1 P-value = .3371 Family size = 10				
Once/twice a year (261)	X Diff = -3 P-value = .0702 Family size = 10	X Diff = -4 P-value = .0338 Family size = 10			
Once/twice a week (261)	X Diff = -3 P-value = .0140 Family size = 10	X Diff = -4 P-value = .0102 Family size = 10	X Diff = 0 P-value = .9148 Family size = 10		
Every day or almost (260)	X Diff = -3 P-value = .0000 Family size = 10	X Diff = -5 P-value = .0008 Family size = 10	X Diff = -1 P-value = .06710 Family size = 10	X Diff = 0 P-value = .7089 Family size = 10	

Legend
< Significantly lower
> Significantly higher
X No significant difference
Created by NAEP Data Explorer

There was a significant difference between classrooms that engaged in joint teaching once or twice a week or daily compared to classrooms that did not engage in any kind of joint teaching. The *p*-value was p=.0140 for those teachers that never co-taught compared to teachers that co-taught once or twice a week, and it was p=.0000 for those teachers that never co-taught compared to those that taught jointly on a daily basis. The increased frequency in jointly teaching the same class resulted in lower reading scores on the 2019 NAEP.

Table 6 Effect sizes of mean score differences amongst teachers who teach jointly in the same class (T132501).

Group 1	Group 2	Cohen's *d*
Every day or almost	Never or hardly ever	-.11

Every day or almost	Once/twice a year	-.13
Once/twice a week	Never or hardly ever	-.08
Once/twice a week	Once in a while	-.11
Never or hardly ever	Once/twice a week	.08
Never or hardly ever	Every day or almost	.11
Once/twice a year	Once/twice a week	.08
Once in a while	Every day or almost	.03

Cohen's *d* effect size was calculated for teachers that never teach jointly in the same class compared to teachers who teach every day or almost every day. Cohen's *d* was calculated and resulted in an effect size of *d*=-.11, this was a small effect size. A Cohen's d effect size was also run for those that engage in joint teaching always or almost always compared to those that only engage in co-teaching once in a while (*d*=-.13) and for those that only engaged in joint teaching once in a while compared to those that co-taught almost always or always (*d*=.03); both were found to have a small effect size.

3.3. Research Question #3: Individualized One-on-One Support

Research question three asked what the impact was of one-on-one help for students in 8th grade reading classrooms. To help answer this research question, two variables in the teacher factor category and the teacher support subcategory were used against the NAEP 2019 reading assessment. Variable one asked staff how often a reading specialist was utilized for one-on-one instruction based on student achievement. Variable two asked whether there were special education teachers available for 8th grade students with an identified disability. Only students in a national public school were analyzed for this research question. The data from this variable was compared to the average NAEP composite reading score in 2019. The table below represents the results from the 2019 NAEP reading score.

Tables seven and eight looked at variables that addressed individualized instructional support for students through a reading specialist or special education teacher.

Table 7 Average scale scores and standard deviations for grade 8 reading in 2019 by individualized supports through a reading specialist (C104602).

Year	Jurisdiction	Reading specialist support students one-on-one	Average Scores	Scale	Standard Deviation
2019	National Public	Not at all	264		39
		Small extent	264		37

	Moderate extent	263	38
	Large extent	265	37

Table seven represents the average scale scores and standard deviation for the 2019 NAEP reading assessment against teachers who identified that there was a reading specialist to support students based on achievement in a one-to-one environment. Statistically, there was little to no change in assessment scores between those teachers that did not utilize a reading specialist at all (264, *S*D=39) compared to those that used reading specialists to a large extent (*265,* SD=37). When running the statistical analysis, the NAEP Data Explorer indicated that the nonresponsive data for this variable was greater than 15 percent, but not greater than 50 percent which could impact the reliability of this data set (NCES, 2019).

A significance test was run, and no significance was found between those who received one-on-one instructional support from a reading specialist and those that did not on the NAEP 2019 reading scores. A Cohen's *d* effect size was calculated for those that do not utilize a reading specialist at all compared to educators that use them to a large extent and there was a small effect size found (*d*=.03). There was limited impact on the NAEP 2019 reading scores based on whether a reading specialist was available; however, the scores increased to 265 (SD=37) from a 264 (SD=39) if a reading specialist was used to support students in one-one-one achievement-based instruction to a large extent.

Table 8 Average scale scores and standard deviations for grade 8 reading in 2019 by individualized supports through a special education teacher (C092501).

Year	Jurisdiction	Special education teacher available for SD	Average Scores	Scale	Standard Deviation
2019	National Public	Yes	262		38
		No	260		38

Based on the response data from the 2019 NAEP results, the average scale scores of the NAEP reading assessment for those classrooms that had a special education teacher available was 262 (SD=38) compared to 260 (SD=38) for those that did not have a special education teacher available. A significance test was run, and no significance was found between those who received special education support from a teacher and those that did not on the NAEP 2019 reading scores. There was little to no difference in NAEP 2019 reading scores whether there was a special education teacher available or not. The average scale scores differed two points for those that had a special education teacher compared to those that did not.

3.4. Research Question #4: Differentiated Instruction

The final research question in this study asked what impact differentiated instruction had on reading achievement for 8th grade students. The fourth research question utilized the variable *"When you teach English/language arts, how often do you use the following strategies? I use differentiated instruction for reading (i.e., instruction tailored to student ability and learning style)"*. This variable was located under the Instructional Content category and the Modes of Instruction/Classroom Activities subcategory. The data collected national public-school students and staff and compared the average NAEP composite reading score from 2019 to the variable.

Table nine analyzed educator's frequency in differentiating instruction for students against the 2019 NAEP reading scores for 8th grade students.

Table 9 Average scale scores and standard deviations for grade 8 reading in 2019 by utilizing differentiated instructional practices (T136412).

Year	Jurisdiction	Differentiated instruction	Average Scores	Scale	Standard Deviation
2019	National Public	Never or hardly ever	270		34
		Once in a while	267		36
		Sometimes	266		37
		Often	263		37
		Always/almost always	258		38

Based on the mean scale scores from the 2019 NAEP assessment, as a teacher differentiated instruction more frequently, NAEP reading scores decreased. Teachers who never or hardly ever differentiated instruction for students had an average scale score of 270 (SD=34), teachers who only differentiated once in a while were slightly lower at 267 (SD=36). When looking at teachers who always or almost always implemented differentiation strategies in the classroom, the average scale score was 258 (SD=38) compared to an average scale score of 263 (SD=37) for educators who often differentiated instruction for students.

A significance test was conducted comparing the average scale scores for the differentiation variable against the NAEP 2019 reading scores. Table 10 represents the results of the significance test.

Table 10 Utilizing the NAEP Data Explorer, a significance test was run to examine the difference in average scare scales between variables for differentiating instruction (T136412).

Reading, grade 8 Difference in average scales between variables for differentiating instruction (T136412) National Public, 2019					
	Never or hardly ever (265)	Once in a while (264)	Sometimes (264)	Often (263)	Always/almost always (259)
Never or hardly ever (265)					
Once in a while (264)	X Diff = -4 P-value = .0982 Family size = 10				
Sometimes (264)	X Diff = -4 P-value = .0410 Family size = 10	X Diff = 0 P-value = .7535 Family size = 10			
Often	X	X	X		

(263)	Diff = -8 P-value = .0005 Family size = 10	Diff = -4 P-value = .0108 Family size = 10	Diff = -4 P-value = .0001 Family size = 10	
Always/almost always (259)	X Diff = -13 P-value = .0000 Family size = 10	X Diff = -9 P-value = .0000 Family size = 10	X Diff = -9 P-value = .0000 Family size = 10	X Diff = -5 P-value = .0000 Family size = 10

Legend
< Significantly lower
> Significantly higher
X No significant difference
Created by NAEP Data Explorer

Based on this significance test, teachers that implement differentiated practices often or always/almost always were found to be significantly lower (p=.0000)compared to those teachers that never or sometimes implemented differentiation practices in the classroom.

Table 11 Effect sizes calculated based on teachers who differentiated instruction and those that did not (T136412).

Group 1	Group 2	Cohen's d
Often	Never or hardly ever	-.20
Often	Once in a while	-.11
Often	Sometimes	-.08
Always or almost always	Never or hardly ever	-.33
Always or almost always	Once in a while	-.24
Always or almost always	Sometimes	-.21
Always or almost always	Often	-.13
Never or hardly ever	Often	.20
Never or hardly ever	Always or almost always	.33
Once in a while	Often	.11

Once in a while	Always or almost always	.24
Sometimes	Often	.08
Sometimes	Always or almost always	.21

A Cohen's *d* effect size was calculated for teachers who often differentiated against those who never or hardly ever differentiated (*d*=.20), those who often differentiated compared to those who only differentiated once in a while (*d*=.11), and those who often or sometimes differentiated (*d*=.08). A Cohen's *d* effect size was run for teachers who always or almost always differentiate compared to those that differentiate once in a while (*d*=.24), sometimes differentiate (*d*=.21) and those who often differentiate (*d*=.13). Each of these factors had a small effect size. The factor that had the largest effect size was those teachers who never or hardly ever differentiated compared to those that always or almost always differentiated. Cohen's *d* effect size was *d*=.33 for this factor, which is still a small effect size, however, it was the most significant finding for this variable.

4. Discussion

The importance of developing an inclusive classroom setting in which differentiated practices are intentionally designed to support students with individualized learning needs has been a topic that has been well researched over the last several decades and continues to warrant further research as a tool for supporting diverse learning needs. This study sought to examine how various differentiated instructional strategies supported the achievement of 8th grade students in their reading scores on the NAEP 2019 assessment. The discussion section will review each of the four research questions analyzed for this study and will work to uncover trends within differentiated, personalized, and individualized instruction in relation to 8th grade reading scores.

4.1. Differentiating through Student Groups

When considering how differentiated strategies impact learning in the classroom, achievement-based student grouping is one factor to consider regarding a differentiation strategy that has potential to have positive or negative effects on learning needs. Tomlinson (1999) found that many of today's students come to the classroom with high levels of potential, but often do not have the "experience, support, models, and plans that, if present would make education a fundamental expectation of life" (p. 20). On the other hand, many other students come to the classroom with a set of skills and knowledge that prepare them to be ready to learn in the classroom at high levels (Tomlinson, 1999). Due to the diversity in the skills that students come into the classroom with, flexible grouping strategies, including grouping students based on achievement level, have been a differentiated strategy used to meet the complex range of skills students have in the classroom.

This study analyzed the 2019 8th grade variable regarding whether or not a teacher used achievement grouping in the classroom (T136408) against 8th grade NAEP reading scores. The results of the study found that teachers who always or almost always used student grouping based on achievement had an average scale score of 259 (SD=38) compared to teachers who never or hardly ever used achievement-based grouping in which the scores were 264 (SD=38). Although there was a negative impact on the NAEP scores for teachers that utilized student achievement grouping frequently, when Cohen *d*'s effect size was run for each paired group and the effect size for all groups was small for all groups. The largest effect size was for those who implemented student grouping never or almost never compared to almost always at -.16. The effect size showed that there was little impact in student achievement when educators engaged students in grouping strategies compared to those that did not engage students in achievement-based groups. This finding supports Little et al.'s (2014) study that resulted in findings that showed that differentiation had little to no impact on reading achievement compared to a traditional model of classroom instruction. Ultimately, this data supports the fact that much of the research available regarding student achievement and differentiated instruction has been found to make no difference oronly marginal differences in student outcomes regardless of the frequency of implementation of the differentiated strategy, in this case, student grouping.

4.2. Co-teaching as a Differentiated Support

The second research question analyzed the teacher factor asking whether educators taught jointly in the same class (T132501) against 8th grade NAEP reading scores in 2019. The results of the study showed that educators who never engaged in team-teaching had an average scale of 265 (SD=37). Those teachers that once or twice a year engaged in team teaching had an average score of 265 (SD=37). Finally, those teachers who every day or almost every day participated in joint teaching practices had an average scale score of 260 (SD=38). A significance test was run, and the effect sizes were analyzed for each grouping. Once again, the effect size for each group was small and joint teaching was found to have no significant impact on student scores on the NAEP 2019 8th grade reading assessment. The most significant effect size was those teachers who engaged in joint teaching every day or almost every day compared to those that only engaged in joint teaching once or twice a year (-.13).

The findings from previous studies contradicted the findings from this study regarding joint teaching practices. Schnorr and Davern (2005) found that when implementing joint teaching practices with a general education teacher and special education teacher in a joint elementary reading classroom there were significant advantages identified. These advantages were most typically outlined as teacher advantages and included the importance of teaching teams engaging in collaborative work and planning together (Schnorr & Davern, 2005). However, Schnorr and Davern (2005) also point to possible positive impacts in student learning based on the implementation of research-based reading strategies in a co-taught classroom. Servilio (2009) conducted a similar study in which co-teaching took place between a general education teacher and special education teacher. The results of this study were similar. Student growth was a component of the study, but the positive outcomes from the co-teaching relationship were between the teachers working collaboratively together.

The findings from this study showed that joint teaching practices made little to no difference in student achievement results, at least on the 8th grade NAEP reading scores. However, based on other published studies, there has been documented value in implementing joint teaching to continue to encourage teaching collaboration, confidence, efficacy, and capacity. Xiaojun's(2019) publication on pre-service teacher's self-efficacy in team teaching found that pre-service teachers who participated in teacher teams had a more advanced understanding of student success and a better pedagogical awareness as they continued to advance in their future teaching. This study, among others, stressed the importance of developing teacher self-efficacy to positively impact student achievement results. Although this study does not show that student results were impacted by team teaching, various other available studies found that the importance of team teaching was established due to developing and building collaborative relationships among colleagues that could result in an increase of teacher self-efficacy and confidence in the implementation of best practices in instruction.

4.3. Individualization Through One-on-one Reading Specialist Support

The third research question explored how differentiated practices have been implemented in individual interventions and supports. The NAEP variable (C104602) asked educators how often they have used one-on-one reading specialist support to work with individual students at various achievement levels. The results of the study found that a teacher who utilized a one-on-one reading specialist for one-on-one reading instruction to a large extent had an average scale score of 265 (SD=37) on the NAEP reading assessment in 2019 compared to an average scale score of 264 (SD=39) for those teachers that did not utilize a reading specialist at all. Various studies explore how an individualized support like a reading specialist teaching a student in small group or individual tutoring sessions could impact student achievement. One such study conducted by Morton and Araujo (2014) found that implementing a reading tutoring intervention in a one-on-one setting supported this student in the areas of comprehension and overall literacy skills. An additional study conducted by Gest and Gest (2005) found that students who received individualized tutoring and instructional support not only built better literacy skills but were also identified as spending more time on task. The benefits of individualized support can be seen through these studies; however, this study did not see any significant change in NAEP reading scores when a reading specialist was or was not supporting students on an individual level.

Additionally, data was analyzed to determine if there was a special education teacher available for students with identified disabilities to provide individualized and specialized instruction to the staff (C092501). The data from the 2019 NAEP reading assessment found that those that did not have access to a special education teacher had an average scale score of 260 (SD=38) compared to those that did have access to a special education teacher that

had an average scale score of 262 (SD=38). This data was supported by research that found a slight growth in student achievement in co-taught instructional settings where a special education teacher and general education teachers worked together to meet individual special education needs (Schnorr&Davern, 2005; Servilio, 2009). There was small growth in student achievement scores for teachers that utilized a special education teacher compared to those that did not, but the growth was not significant. Ultimately, one-on-one individualized instruction either through reading specialist support or a special education teacher did not have a significant impact on the scores for the 8th grade NAEP reading assessment in 2019.

4.4. Differentiated Instruction

The final research question examined whether differentiated instructional strategies (T136412) had an impact on the 2019 NAEP reading scores for 8th grade students. The results from the statistical analysis showed that teachers who never or hardly ever differentiated instruction had an average scale score of 270 (SD=34). Those who once in a while differentiated instruction had an average scale score of 267 (SD=36) and those who always or almost always differentiated had a scale score of 258 (SD=38). Effect sizes were run for each grouping and the group that had the largest effect size were those teachers that implemented differentiation always or almost always compared to those that never or hardly ever implemented differentiated instruction. The effect size was still small at -.33, however, this was the most significant finding out of all variables analyzed throughout this study. Overall, as a teacher differentiated instruction more in the classroom, the NAEP 2019 8th grade reading scores for students went down. This finding supports Smale-Jacobse et al.'s (2019) research on differentiated practices that found that there are very few studies currently available to show that differentiation is an effective instructional tool. Additionally, studies on differentiating instruction for students in a reading classroom were mixed in their results and did not always conclude that differentiation itself was an indicator related to an increase in student achievement results (Little et al., 2014; Tobin & McInnes, 2008). Instead, differentiation is often found to be a good way to individualize for student needs and support students in the classroom in a successful way. Differentiation is an effective teacher strategy for managing diverse groups of learners, but may not impact student achievement results in the classroom.

5. Conclusion

Differentiation has a longstanding history in K-12 educational settings as an effective strategy for teachers to engage students in varied learning especially as classrooms become more diverse and inclusive. Within a reading classroom, Tomlinson has argued that differentiation is a sound approach to ensure students are receiving individualized and differentiated reading instruction in the classroom (Tomlinson, 2009). This study sought to explore whether differentiated strategies had an impact on 8th grade NAEP 2019 reading scores. Due to the limited studies currently available regarding the impact that differentiated strategies have on reading classrooms at the secondary level, the study was conducted to determine whether there was a relationship between student achievement and differentiated strategies implemented in the classroom. This study analyzed the impact of NAEP reading scores related to co-teaching, one-on-one support from a specialist, and differentiated strategies like student grouping. Based on the analysis from this study, several conclusions could be made that should be utilized to inform future research on differentiation as a strategy in secondary classrooms.

5.1. Achievement Grouping as a Differentiated Strategy

This study analyzed whether an instructor designing student groups based on achievement level resulted in an increase in student achievement scores on the 2019 NAEP reading assessment for 8th grade students. The results of the study found that this common instructional strategy often termed "ability grouping" resulted in no significant impact in achievement scores on the NAEP reading assessment. Although commonly utilized in classrooms, the use of ability grouping to differentiate for students and meet their needs did not result in an increase in student achievement results. Teachers should be cautious when utilizing ability groups at the secondary level because this study did not find any benefit in doing so, and if ability groups are utilized too often it could negatively impact a student's confidence in his or her own learning due to being tracked into certain groups based on ability.

5.2. Differentiation Not Making the Difference

This study supported the mixed results found in past studies regarding the impact that differentiated instructional strategies have on student achievement. This study found that regardless of differentiated strategy or approach, no significant impact on student achievement occurred. In fact, a significant finding from this study was that the more a teacher differentiated in the classroom, the lower the 8th grade NAEP reading scores were. The results from this study contradict current research available that found that differentiation may make a positive impact on student achievement, but often the results from current studies were found to be minimal or unchanged when differentiation was utilized (Jefferson et al., 2017; Little et al., 2014). Ultimately, differentiation as a strategy is likely useful for a classroom teacher when attempting to meet diverse learner needs but based on the findings from this study and others; it does not necessarily result in an increase in student achievement.

5.3. Individualized Expert Support: Impact on Student Achievement

The results of this study found that utilizing individualized support staff such as a special education teacher, team teacher or reading specialist made no significant impact on the reading achievement for students taking the 8th grade NAEP in 2019. Most studies currently available related to individualized student support and team-teaching focus specifically on teacher perceptions in the joint teaching practices (Lamb et al., 2008; Schnorr & Davern, 2005). However, this study sought to look at the impact on student achievement results that occur when individualized reading specialist support or co-teaching were utilized to differentiate reading instruction for students. The results of this study found that even when utilizing joint teaching practices and a reading specialist, there was no increase in scores for students on the NAEP 2019 reading assessment. Scores remained largely unchanged whether an individual teacher expert was utilized regularly, or not at all.

5.4. Implications

The findings from this study suggest that differentiated instructional practices may not improve student achievement results in reading at the middle school level. Additionally, utilizing expert staff to implement individualized and differentiated supports did not positively impact reading achievement results. The implications of this are that although differentiation is a sound instructional strategy for teachers working in diverse classroom settings, the implementation of differentiation does not have a positive impact student achievement results for 8th grade students on the NAEP reading assessment. Although beyond the scope of this study, differentiation is likely more of an effective management tool than it is a tool that would help to increase student achievement results. Teachers, administrators, and policymakers should use the data from this study to understand that utilizing strategies or specialized staff to differentiate will not automatically result in any noticeable increases in student achievement. Instead, stakeholders should encourage differentiation as a classroom management tool to meet diverse learner needs in a classroom without the expectation of increasing student achievement results. When utilized as a management strategy instead of a student achievement strategy, differentiated practices could have a great impact on teacher and student perceptions in the classroom.

Additionally, it is worth noting that although specialized staff members like special education teachers and reading specialists did not appear to make a positive impact on student achievement results on the NAEP reading scores for 8th grade students, they also did not hinder the scores. Instead, scores remained virtually the same whether a specialized staff member was utilized or not. The assumption could be made that reading specialists and special education teachers are typically only used in a classroom for students that are academically struggling. Although no actual academic growth was seen in classrooms where specialized staffs were almost always used, the scores in these spaces were comparable to classrooms that did not require a specialized staff member. Although further research would be needed to confirm the impact of specialized staff members in classrooms with struggling learners, it appears that these staff members were able to support struggling learners enough to reach the potential that was similar to those classrooms that did not need as much individualized support.

5.5. Limitations

This study had several limitations. One limitation was the way in which the data was collected. Data was based on secondary data and thus inherited potential validity problems when the data was collected. The variables were pre-decided and there may be correlations that appear not to be natural. These correlations should not be interpreted

as having a cause-and-effect relationship. When looking at past NAEP cycles, there were limited to no questions that related to differentiation. Over time, it would be important to continue to analyze trend data to determine whether differentiated practices result in similar outcomes year after year instead of simply analyzing one year's worth of data. Additionally, this study intentionally examined middle-level learners in the8th grade against various variables, but this became a limitation due to the lack of resources many districts have related to personalizing learning for students at the secondary level. Elementary schools, due to various funding sources, often benefit from reading specialists and coaches, however, as students get older these supports often shift and change. Due to this trend in public education for secondary systems, there was limited data available on how reading specialists are utilized at the middle school level because many districts were not able to answer this question on the NAEP because they do not have this resource available to them. The lack of reading specialists at the 8th grade level limited the ability to run accurate statistical analyses regarding specialized support personnel. Finally, due to confidentiality concerns, the NAEP does not provide the exact sample size for its annual assessment; the range is typically form 10,000-20,000 students which could create validity and reliability concerns for this data analysis (NCES, 2018).

5.6. Recommendations for Future Research

Many district leaders and educators have made assumptions that by implementing differentiated practices in the classroom student achievement results should increase. However, this study, and others, found that differentiation alone does not attribute to any increase in student achievement results. Future research should instead begin to focus on how differentiation could be utilized as a classroom management tool for working with diverse learners. Research should also begin to explore teacher and student perceptions regarding implementing differentiated practices into the classroom. Additionally, future research should continue to focus on how student agency and teacher efficacy may be impacted when differentiation is successfully put into place. Finally, there is evidence from this study that found that by using specialized instructors like reading specialists and special education teachers, students were able to maintain the same scores as their peers regardless of their reading ability. However, due to the limited student demographic information available for the purpose of this study, many conclusions about this were not able to be determined. It is important that future research focus particularly on struggling learners and how specialized instructors could support students who are struggling in their academic success. Ultimately, more research around differentiated and individualized instruction must take place to determine whether differentiation has the potential to positively impact student achievement, or if it is a tool that should be researched to manage increasingly diverse classrooms in K-12 public schools.

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