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The Effects of Parental Engagement Programs on Grades 3-5 Milestones Student Achievement

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Walden University
2022

Abstract

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Student Achievement

by

Deborah Coleman Malone

MA, Walden University, 2010

BS, Shorter College, 2007

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

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Abstract

Although the Every Student Succeeds Act sets the parameters for parents and families to be involved in their children's education, there are no specified guidelines on how that involvement should be designed to best impact student achievement. The purpose of this study was to compare Grade 3-5 students' mean Milestones test scores in English Language Arts, mathematics, and science (dependent variables) at two Southeastern United States elementary schools which offered parental involvement/parental engagement programs—a nonmandatory or mandatory program (independent variable), represented by School A and B, respectively. The theoretical foundations of the study were the social and human capital theory and the school, family, and community partnership framework. The seven research questions compared student achievement scores for Grades 3-5 English Language Arts and mathematics and for Grade 5 science between schools. A quantitative design, using ex post facto data from the 2018-2019 school year (n = 1076), included seven independent samples t tests to determine statistically significant differences in mean Milestones test scores among students at School A and B. The results indicated a significant difference in all three grades, across all three subject areas. Students from School B with the mandatory parental engagement program experienced higher achievement in all subjects than students at School A with nonmandatory engagement. These results support the need for mandatory parent involvement programs that guide parents in how to support their children's achievement. This study may contribute to positive social change by encouraging educators to promote new strategies and partnerships with parents and families specifically designed to improve student achievement.

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Dedication

First, I dedicate this study to Jesus for giving me the courage and strength to finish this journey. I present a special dedication to my mother, children, and granddaughter. Thank you, mom, for demanding of me to go to school despite how challenging the environment was at that time. To my kids, you make me proud. To my granddaughter, you are my greatest inspiration. It is good to invest in yourself.

Acknowledgments

Proudly, I can say that I am on the last leg of this journey which has been one of the most challenging accomplishments of my life, more so than seeing this dissertation through to the end. For that, I give Jesus all the glory, for I could not have made it without his presence daily. Thanks to my friends and neighbors worldwide, my biggest fans, and proofreaders. I am grateful that you went out of your way to assist me. To my family and friends who always cheered and believed in me through this journey, I appreciate you! I am also grateful to my committee members and countless editors. I appreciate your expertise and guidance, Drs. Brenda J. Kennedy, Shereeza Muhammad, Anissa Harris, and Markus Berndt. Thank you, and may many blessings come into your lives.

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Chapter 1: Introduction to the Study

The reauthorization of the Every Student Succeeds Act (ESSA; 2015) Title 1 was a leap toward positive social change in schools. The Act provided support for schools to engage parents in their child's education. The ESSA (2015) required the development of comprehensive family engagement plans, and demands transparency and accountability. According to Epstein and Sheldon (2016), the policy that was communicated to educators emphasized the need to engage families but did not explain how to meet the requirements in ways that lead to the most significant effects. Consequently, the policy created a critical gap between the intent and the implementation of the legislation (Epstein & Sheldon, 2016). Furthermore, a gap existed between parent involvement (PI)/parent engagement (PE) at home and at school (Boonk et al., 2018; Epstein, 2018; K. Ortiz, 2018). In this study, *PI* and *PE* are used interchangeably or are presented as the acronym *PI/PE*.

Boonk et al. (2018) categorized PI/PE as home-based and school-based. PI/PE at school includes chaperoning on field trips and attending school events. Parents' most common school-associated activity was appearance at the parent-teacher meeting (K. Ortiz, 2018). Home-based PI/PE includes nonformal learning and teaching activities at home. Similar scholarly reviews found positive results for home-based PI/PE, when parents told stories and/or taught students' letters, words, and numbers (Boonk et al., 2018). In most cases, home activities and behaviors are designed to promote learning at home, such as assisting with homework. Investigations have also demonstrated that programs focusing on increasing PI/PE in education positively affect children, families, schools, and the community (Egalite, 2016; Epstein, 2018). Epstein's theory of participation is a framework that can be used for schools and classrooms to guide PI/PE activities, and variables to guide successful implementation. These activities assist educators in developing curriculums and methods to aid in their students' academic success (Cole, 2017; Epstein, 1987, 2018). Henderson and Berla's (1994) argument reinforces the theory that when school personnel partners with parents to help students learn, kids tend to flourish academically and become life-long learners (Cole, 2017; Epstein, 2018; Gartu, 2017).

Epstein (2018) proposed six flexible areas of family involvement: "parenting, communication, volunteering, learning at home, decision-making and collaboration with the community" (p. 46). According to the study, the most significant change can be accomplished by providing relevant policies and detailed strategies and partnering with the school to provide parents and practitioners with data-driven decisions (Willemse et al., 2018). Epstein's six participation types play a significant role in helping families become knowledgeable and create bilateral communication between parents and the academic institution (Epstein, 2018). Additionally, Epstein (2018) described volunteering as inviting families to participate in the school's activities, such as assisting in the class, continuing learning at home, parent-school associations, or joining organizations such as the Parent-Teacher Association (PTA). Furthermore, Epstein (2018) described collaborating with the community as schools working and guiding parents to available resources regarding student development and learning.

My study was conducted to determine if there are differences in student achievement, as measured by the Milestones Assessment, a student academic achievement standard test, among students who attend schools with different types of PI/PE programs. PI in schooling is vital for children's academic success. The purpose of this study was to compare differences in Grade 3-5 students' mean test scores in English Language Arts (ELA), mathematics, and science (dependent variable) at two Southeastern United States elementary schools which offer different PI/PE programs—a nonmandatory or mandatory program (independent variable), represented by School A and B, respectively. The results of this study may lead to educational social change by having school administrators and teachers evaluate their PI/PE programs to see how they are structured to engage parents in their student's success process. I used Epstein's framework to simplify the different forms of PI/PE: society, school, and guardians. (Epstein, 1987, 2018; Sharples et al., 2018). According to Epstein, parental influence affects students understanding and adds significance to academic accomplishment.

Willemse et al. (2018) investigated applicants' understandings, attitudes, and experiences with family-school partnership (FSP) and made recommendations for curriculum development. The authors asked first-year teacher candidates if they felt prepared for FSP and what they had hoped for in the preparation but not gotten. Willemse et al. thought that gathering data from last year candidates would help to identify topics that were lacking from the current curricula. The authors used surveys to gather information about the programs. Teacher candidates in primary and secondary education programs were associated because other studies authors examined suggested differences in parent–teacher collaboration between primary and secondary programs. Working with parents is a legally-mandated competency for each country. the author speaks on Epstein's call for teacher education programs regarding family, school, and community partnerships to redefine the profession of teaching. According to Willemse's et al. (2018), teachers have neglected parent partnerships. Willemse et al. found fostering parental partnerships to be an invaluable core competency of teaching.

Epstein (1987) implored educators not to restrict family-school partnerships to a teacher-level requirement, but to consider family, school, and community partnerships as an essential component of the school's organizational structure. Epstein suggested that teacher programs take new teachers further than trivial communications with parents, but to strategize and provide goals that link engagement actions and specific academic subjects. Epstein also added that the lack of attention to the community is an untapped resource of student support.

In this chapter, I present the development and background of my study, the problem statement, the purpose of the study, research questions, and hypotheses. This chapter includes a discussion of the study's theoretical framework, nature, definitions, assumptions, scope and delimitations, limitations, significance, and a summary

Background

PI has been studied as a vital factor contributing to educational achievement. PI/PE affects areas such as attendance, academic success, discipline, and student motivation. Similarly, studies have shown that inadequate PE leads to low student engagement and accomplishment (Dawkins, 2017). According to Dawkins, there are four factors to student achievement in reading. These factors indicate that students' growth and development are influenced by five sub-systems: family, school, community, culture, and time. Dawkins suggested that the factors affecting reading achievement are teacher effectiveness, distinguished instruction, professional growth, and PI/PE. The overall results indicated that teachers believed that an increased parental involvement is needed in reading. The findings suggested that school leadership actively supporting research-centered PI/PE structures and approaches are vital for establishing a direct relationship program. The features that encourage programs that involve all students' families starts with the principals' support for family and community engagement, active support of research-based structures, and process by district leaders (Epstein & Sheldon, 2016).

In 2015, the Barack Obama administration reauthorized the Elementary and Secondary Education Act (ESEA). The Act requires schools to implement a program with characteristics to develop PI/PE programs (Darling-Hammond et al., 2016). The Obama Administration recognized that parents and public partnerships in education are vital to advancing student accomplishment. The Obama Administration passed the ESSA (2015) to support the state and local efforts with funding through Title. The ESSA attempts to engage families in developing comprehensive engagement plans that invest in family and community engagement.

According to Bryan et al. (2018), school counselors can uniquely involve family and community in school-related partnerships because of their ability to address children's complex needs. Using the School Counselor Leadership Survey and School Counselor Involvement in Partnerships Survey, Bryan et al. (2018) preformed a regression analysis and found the measures that predicted counselor partnership and community involvement were extensive. The predictors combined self-efficacy, the consciousness of roles about partnerships, collaboration, social climate, and principal/leadership expectations (Bryan et al., 2018).

The partnership between schools and parents can positively affect a child's attitude toward school, behavior, self-esteem, attendance, and motivation (Gartu, 2017; Henderson & Berla, 1994; Jeynes, 2017). According to Bryan et al. (2018), partnerships with parents and schools are essential to developing college readiness, especially for underrepresented K–12 students. School counselors are already positioned to serve students and make partnership decisions, strengthened by their role as psychoanalysts. School counselors are leaders in providing services of student collaboration with the school, family, and the community (Bryan et al., 2018).

Beard 2017 investigated primary grade teachers' perception of PI/PE in a school in Tennessee to examine the current levels of PI/PE, and teacher perceptions of PI/PE at the school. Beard (2017) suggested that educators need more ideas for strategies to implement to engage parents in school activities. The findings of this study indicated that teachers and parents believe when parents are frequently in-contact or participate in activities, they communicate the importance of education to their children. The study findings show that teachers are open to ideas about effective strategies to involve parents and to encourage parents to become active participants at the school.

Through my study, I aim to provide statistical data to educate stakeholders about the differences in Milestones test scores among Grade 3-5 students at two schools (one with nonmandatory PI/PE, and one without mandatory PI/PE). School administrators need data-driven research to influence programs that educate guardians and educators and reinforce partnerships for learner achievement in elementary academic institutions. In addition, data-driven analysis related to the State Milestones ensures that instructors have the knowledge and persuasive results needed to participate in bilateral relationships with parents, request funding from public and private sources, and implement policies into standard practice (Beard, 2017).

Problem Statement

The problem I investigated in this study was the unknown metrics in Milestones student achievement (i.e., ELA, mathematics, science) among Grade 3-5 students at two Southeastern United States elementary schools which offered different PE programs—in one program PI/PE is not required (i.e., nonmandatory = School A) and in the other school's program, PI/PE was required (i.e., mandatory = School B). Although the ESSA sets the parameters for parents and families to be involved in their children's education, there is limited research on what strategies work best. The policy inconsistencies present in the local district may affect student achievement in the schools.

According to Cole (2017) and Epstein (2018), the more that parents are involved, the greater the opportunity for students to excel academically and become productive citizens. Both schools in my study site are in the same school district. School B requires parents to be involved if their kids are to attend school. School A does not require parents' participation for a student to attend. According to the district website, all schools in the district provide parents with resources and access to information to support their children's academic development and learning. At School A, it is up to individual parents to engage and use the resources available; School B regulates how parents engage and use the resources available.

There is no local research to determine if a mandatory approach to PI/PE affects student achievement. The students in School A and B completed the annual Milestones assessment for ELA, math, and science content areas. As is standard with the summative assessment, the state provides score ranges for the different learner levels on the assessment. Table 1 includes the percentage of students reported at each Milestones learner level in the 2018/2019 schoolwide report.

Table 1

Percent of Students Reported at 2019 Schoolwide Milestones Levels by Subject & School

		% by Milestones Learner Level			
Subject	School	Beginning	Developing	Proficient	Distinguished
ELA	A	42.5	31.8	19	6.7
	B	8.3	29.1	47.0	15.7
Math	A	29.6	41.9	21.2	7.3
	B	9.1	32.6	39.6	18.7
Science	A	53.6	19.6	21.4	5.4
	B	11.0	27.4	47.9	13.7

Data from Table 1 indicated that Grades 3-5 students from School B—the one with a mandatory PI/PE program—were more proficient in ELA, mathematics, and science when compared to School A. Conversely, more students at School A were at the beginning or developing level when compared to School B. The only exception was that more School B students were developing learners in Grade 5 science (i.e., 27.4 vs. 19.6% for School B and A, respectively). School A did not require parental engagement but School B did require participation. The Milestones learner levels indicated differences in achievement that needed further statistical exploration.

Purpose of the Study

PI in schooling is vital for children's academic success. The purpose of this study was to compare differences in Grade 3-5 students' mean test scores in ELA, mathematics, and science (dependent variables) at two Southeastern United States elementary schools which offer different PI/PE programs—a nonmandatory or mandatory program (independent variable), represented by School A and B, respectively. To explore possible differences, I used a quantitative design.

Research Questions and Hypotheses

To accomplish the purpose of this study, I developed the following seven research questions and their associated hypotheses:

Research Question 1 (RQ1): What is the difference in the mean test scores on the state ELA Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

Null Hypothesis ($H_0 1$): There is no statistically significant difference in mean scores on the state ELA Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

Alternative Hypothesis (H_a1): There is a statistically significant difference in mean scores on the state ELA Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ2: What is the difference in the mean test scores on the state math Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

H_02: There is no statistically significant difference in mean scores on the state math Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a2: There is a statistically significant difference in mean scores on the state math Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ3: What is the difference in the mean test scores on the state ELA Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

H_03: There is no statistically significant difference in mean scores on the state ELA Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a3: There is a statistically significant difference in mean scores on the state ELA Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ4: What is the difference in the mean test scores on the state math Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

$H_0$4: There is no statistically significant difference in mean scores on the state math Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a4: There is a statistically significant difference in mean scores on the state math Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ5: What is the difference in the mean test scores on the state ELA Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

$H_0$5: There is no statistically significant difference in mean scores on the state ELA Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a5: There is a statistically significant difference in mean scores on the state ELA Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ6: What is the difference in the mean test scores on the state math Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

*H_0*6: There is no statistically significant difference in mean scores on the state math Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

*H_a*6: There is a statistically significant difference in mean scores on the state math Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ7: What is the difference in the mean test scores on the state science Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

*H_0*7: There is no statistically significant difference in mean scores on the state science Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

*H_a*7: There is a statistically significant difference in mean scores on the state science Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

Theoretical Foundation

I used the social capital theory developed by Coleman (1998), human capital theory by Schulz, (1961), and school, family, and community partnership (SFCP) developed by Epstein (2018) as the conceptual frameworks for the study. These three frameworks informed the problem, purpose, and research questions in this study and serve as the theoretical foundation of this study.

Social Capital Model

In the social capital model, Coleman (1988) described how elements of society interact with each other and shape relationships. These relationships are viewed as resources that can grow and accumulate as an investment in people. Child development in school is profoundly shaped by social capital theory. For example, having a stable family structure supports a student's educational achievement. When the family is further cultivated through external support, individuals can develop an extraordinary value and develop specific skills and credentials (Coleman, 1988).

Human Capital

Schultz argued that the well-being of socioeconomically disadvantaged people resulted from the lack of knowledge, apart from physical efforts and land ownership, resources, and skills that people are born with or acquire later in life (Schultz, 1961). Becker (1962) built on Schultz's theory and formulated the human capital theory, and suggested that workers' skill-set or capabilities that can be improved or elevated through training and education. For this study, the concept of human capital is the approach to education and economics as an investment in one's future, the cost of professional training, college tuition, and parent programs for example.

SFCP

Epstein described in his SFCP framework how school/educators and home/guardians have different objectives, roles, and tasks (Epstein, 2018). Epstein's model is a road map to developing action plans to create partnerships and strategies that support continual school-family improvement. Epstein described how authentic school-family-community partnerships should work in practice. According to Epstein, for a school to flourish, three primary influences cannot work independently of the other. First, a positive mutually reinforcing school is when the family is like a school where each child is treated special and included. Next, Schools should be like families, and partner with parents to create schools to feel and look like a family. A family reinforces the importance of learning, homework, and supporting activities that leads to student success. Lastly, schools and families like communities where groups of parents work together in programs, create reward systems for making progress, and celebrate creativity and student success.

Epstein, Schultz, and Coleman's theoretical foundations informed the research problem and my exploration into differences in student achievement based upon PI/PE programs at two different schools. In Chapter 2, I provide additional discussion on the theoretical frameworks.

Nature of the Study

I employed a quantitative research design that allowed me to explore the relationship among variables after an event or action occurred (Creswell & Creswell, 2017). My objective was to investigate whether there was a difference in the mean scores of the students grouped by type of PI/PE program. According to Creswell and Creswell (2017), my choice was appropriate. According to Statistical Package for Social Science (SPSS; Laerd Statistics, 2015), the independent samples *t* test is an inferential statistical test appropriate to determine whether there is a statistically significant difference between the means of two unrelated groups. In this study, I compared the dependent variable—test score means of two groups of students— and the independent variable, type of PI/PE program. More precisely, this analysis allowed me to determine whether the variance between the two groups' test scores was statistically significant.

The state's Department of Education (DoE) provided the archival Milestones test data for both School A and School B. The information included student scores in math, science, and ELA from the 2018/2019 school year, aligned by subject area for each school. Grade 3 and Grade 4 student data sets were for ELA and math. Grade 5 student data sets included ELA, math, and science, Therefore, the research questions in this study compared ELA and math scores for three grades (i.e., Grades 3-5), and science scores for only one (i.e., Grade 5). I received the deidentified student data in an Excel spreadsheet. I used student test scores to determine the PI/PE level and analyzed the data using an independent samples *t* test. The students' mean test scores of the two independent groups determined whether there was a statistically significant difference in two subject areas for students in Grades 3-4, and in three subject areas for Grade 5 for students in schools with different PI/PE programs—nonmandatory and mandatory.

Definitions

Dependent variables: The dependent variables are measures being examined in a study. Dependent variables for this study were the students' test scores in math, science, and ELA (Lodico et al., 2010, p. 79).

Effect size: Numerical Set for the Social Science a mathematical concept is applied to measure the relationship's power among two variables Laerd Statistics (2015).

Independent variable: The value is independent of other variables in your study (Lodico et al., 2010). In this study, School A offers a PI/PE program with nonmandatory parental participation. School B, however, provides a mandatory PI/PE program that requires parents to participate in specific ways. The program difference—nonmandatory or mandatory parental participation—is the independent variable in this study.

Parent involvement (PI) and parent engagement (PE): ESSA (2015) amended these terms to *parent engagement*: "[a] parent's involvement in regular discussion and significant communication that comprises learner academic education and warranties that parents get involved in helping their child's learning" (Klein, 2016; U.S. DoE, 2001). PI and PE may be used interchangeably in this study. Home-based PI activities support student learning, such as assisting with homework, revising a test, and monitoring learner progress. In this study, the acronyms PI, PE, or PI/PE refer to parental engagement.

School choice or *choice schools*: Choice schools consist of an array of elementary and secondary education options available to students and their families (U. S. DoE, 2019).

State Milestones: State Milestones are summative learning assessments (Dudley, 2021), a single assessment system with End of Grade (EOG) measures. The Milestones occur at the end of an instructional period and measure student achievement or mastery of intended learning outcomes (Dudley, 2021).

Statistical significance: Statistical significance is a resolution the analyst uncovers about the data results that are not explainable by chance (Laerd Statistics, 2015).

Assumptions

I assumed that the data provided by the state was accurate and true as the data were archived, collected, and housed at the DoE. I additionally assumed that the data in the study were value-free and unbiased as they were quantitative rather than qualitative in nature. I also assumed that the scores accurately reflected the achievement of the respective students. The assumptions in this study were critical as they framed and guided the process of gathering evidence and conclusions about statistically significant differences in test scores in two subject areas for Grades 3-4 students and in three subject areas for Grade 5 students in schools with different PI/PE programs—nonmandatory and mandatory.

Scope and Delimitations

The students' Milestones Assessment test scores are the dependent variable, and the two school types are the independent variables. I wanted to find out if there was a significant difference in the Milestones Assessment test scores of students at two different schools PI/PE programs. The study included a quantitative analysis, breaking-down an occurrence into numerical values with a specific statistical analysis (Creswell & Creswell, 2017).

Data were from students in one school district but from two Title 1 schools with similar demographics. I verified that each Title 1 school offered the same subject areas and grade levels to students of similar ages. I additionally aligned the ethnic, racial, and socioeconomic status (SES) of the student body (see Table 1).

The archived data included 2018/2019 state Milestones Assessment test scores for students in ELA and math (i.e., Grades 3-5) and science (i.e., Grade 5 only). Grades K-2 and 6-12 were excluded from the study. The retrieved data set included 514 raw test scores for School A and 555 for School B. As archived data are a type of convenience sampling, the results may not be overtly generalized to a larger population.

Limitations

For this study, the inability to control the environment and timeframe is a limiting factor because I only used data collected in the 2018/2019 school year. Gathering data from a finite time may affect the generalizability of the results. However, I also considered other factors that may create methodological limitations or bias in an ex post facto study that compares the differences in two groups.

Methodological Limits

A confounding variable is an external factor that may influence the independent and/or dependent variables in a study. Failing to account for confounding variables can cause a researcher to wrongly estimate the relationship between the independent and dependent variables (Kallus et al., 2018). In this study, I analyzed pre-existing student achievement data from Grades 3-5 students. Although the two groups of students were from schools with similar demographic construction, I did not gather these data and could not control for SES, maturation, or other external factors that may have contributed to the students' actual achievement scores. Additionally, I was unable to control for any specific variable other than PI/PE program that may account for part of the variance between the two groups. Therefore, the generalizability of my findings are limited.

Bias

Bias is another factor that may limit a research study. Selection bias occurs when researchers use inappropriate procedures for selecting a sample. It generates false similarity in the data and leads to perceived non-existent relationships between variables. Agreement bias may occur when participants are given only binary responses such as “yes/no” or “true/false. Monetary bias also occurs sometimes if a participant is incentivized to respond or participate (Creswell & Creswell, 2017; Levit et al., 2018; Titmuss, 1970, as cited in Zutlevics, 2016). I used convenience sampling with large sample size and a limited period (i.e.., the 2018/2019 school year).

In this study, bias was not a limitation as all data were archived and included items with more than two responses. Additionally, there were no direct participants in this study—all data were deidentified so that selection, agreement, or monetary bias were not factors. I selected the two schools because they participated in the State's Title 1 program, but one had an additional mandatory PI/PE requirement.

Significance

PI in a child’s education is vital for academic success. The study may provide insight for school administrators regarding the importance of communication with families to improve the home and school relationships, as it relates to test scores. I intend for this research to help educators understand the value of mandatory PI/PE programs in schools. Similarly, the investigation may benefit the education sector because schools and districts leaders in other states may want to establish PI/PE programs. Hopefully, the information may provide state educators with valuable data to understand the achievement gap and support PI/PE programs in public schools.

Additionally, the findings may help schools and district leadership make conclusions for strategies regarding the implementation of PI/PE programs. Using strategies to help their children succeed academically requires wide-ranging PI/PE program directives as part of the whole school approach. With greater statistical data parents may better choose to support their children’s learning and support educators at home. When teachers collaborate with parents and guardians, there is an advantage to the learner in both the school and home. This study's results may be appropriate for creating positive effects on student achievement and bring social change to families and schools.

Furthermore, the study may help create policies that produce classrooms and other environments that enhance learning and social/cultural sensitivity. The most significant challenge in the education system is state policymakers providing parents and educators with relevant policies and detailed strategies to create relationships at school. The policymakers and schools in the state may prioritize PI/PE at the school level, leading to better opportunities for children to become more inventive, curious, and ground-breaking thinkers. Increased opportunities give students a higher chance of attending university and cultivating higher thinking. The results would help lead to generations of adults passing new values to a new generation. This research is meaningful and valuable because it provides statistical data to provide insight to stakeholders about the differences in Milestones test scores among Grade 3-5 students at two schools (one with mandatory and one with nonmandatory PI/PE programs). Parents, students, and educators may use the conclusions of this study to establish programs and seek increased funding for PI/PE in schools.

Summary

In this study, I used a quantitative design to investigate Grade 3-5 students' mean test scores in ELA, mathematics, and science (dependent variable) at two Southeastern United States elementary schools which offered different PI/PE programs—a nonmandatory or mandatory program (independent variable), represented by School A and B, respectively. Social and human capital theories as well as the theory of SPCF guided this study. Researchers that have supported PI as positively influencing learners' academic accomplishments are plentiful.

The objective of the study was to explore whether students' Milestones Assessment test scores showed a statistically significant difference between School A and School B's PI/PE school program and if a possible gap existed in student achievement. Showing a relationship between PI/PE and test scores may lead to updates to current school PI/PE standards and provide a basis for more state funding. Chapter 2 consists of a literature review regarding PI/PE strategies and ways to merge the curriculum into PI/PE programs.

Chapter 2: Literature Review

It is unknown if there are differences in the Milestones test scores among Grade 3-5 students, at two schools with different requirements for parental involvement. Therefore, the purpose of this study was to compare differences in Grade 3-5 students' mean test scores in ELA, mathematics, and science (dependent variable) at two Southeastern United States elementary schools which offered different PI/PE programs—a nonmandatory and mandatory program (independent variable), represented by School A and B, respectively.

In Chapter 2, I present the literature search strategies, the theoretical frameworks, and a detailed review of the literature related to key variables: definition of and historical effects of PI/PE, PI/PE curriculum and development, and support and strategies for PI/PE. I continue Chapter 2 with a discussion of the literature.

Literature Search Strategy

I identified studies and peer-reviewed articles to explore PI/PE, programming, and academic achievement. The literature review was from Walden University library research reports, and dissertations. I used primary sourced literature reviews, and published reports. I reviewed journal articles from, ERIC, Education Research, and other resources. The viewpoints provide a varying perspective of PE and its encouragement on student achievement. I searched peer-reviewed articles from academic journals using the EBSCOhost and ProQuest databases. These sources reviewed the varying viewpoints on PE of student achievement. I used the Google Scholar search engine to conduct more research and as a cross-referencing tool. These databases have a wide range of references that are relevant to the topic of study. To ensure validity and credulity I used current literature of studies no later than 5 years. I also choose up-to-date studies. I also identified limited up-to-date studies on parenting curriculum programs. The search terms include combinations of the following keywords: *parent curriculum, curriculum programs, parent curriculum programs, parent and school partnership program, curriculum implementation, parental engagement, academic achievement, elementary school, advantages of parental engagement, the effectiveness of parental engagement, and parental engagement* and *academic achievement*. I used detailed keywords and search terms limiting the literature for the study.

Theoretical Foundation

The theoretical foundations for the study are from social capital (Coleman, 1988), human capital (Schulz, 1961), and SFCP theories (Epstein 1987, 2018). These three theories link the element of learning studies, academic success, and PI/PE. Social capital theory refers to the intangible, rooted resources in interpersonal relationships. For example, social institutions (schools, churches, families). When parents and educators seek out these networks, they enhance a unique understanding. According to Pravdiuk et al. (2019) and Schultz (1961), human capital is knowledge, skills, ability, additional traits people are born with, and formal education. Epstein's six forms of involvement method are parenting, communication, volunteering, learning at home, decision making, and collaboration with the community. Epstein’s work provides an underlying structure and model for educational institutions and classrooms that are meant to assist educators in developing curriculums, procedures, and practices to aid parents to help their children academically (Epstein, 1987, 2018).

Historical Implications of Social Capital

The social capital model is traced back from the mid-1900s to Marx (1946). Dika (2003) noted, the 1980s inspired much interest in the model of social capital. Despite Coleman (1988) and Bourdieu's (2011) contrasting views of educational achievement and attainment (p. 13). Bourdieu was the first sociologist to analyze social capital, noting the difference between middle class excelling through school compared to the working-class dropout rate in the French education system" (Dika, 2003, p. 15). Both Bourdieu and Coleman's models vary in their perception of social capital. Bourdieu claimed that there were unsatisfactory academic attainments due to access to schooling and institutional resources (Bourdieu, 2011). Bourdieu viewed "social capital as a tool of repetition for the upper-class" (as cited in Dika, 2003, p. 15). In contrast, Coleman viewed the social capital model as a construct to regulate, where the customs are traits of the community, conviction, and data channels (Bourdieu, 2011; Burt, 2017; Coleman, 1988; Putnam, 1993; Stevens & Patel, 2015).

Coleman's idea of social capital and education achievements of individuals as various forms of capital. These investments are the payoff for students' academic performance (Becker & Lewis, 1973; Coleman, 1988). Physical capital, human capital, and social capital help creative activity. Parents are the human capital resource in my study that establishes better relationships with educators and achievement. Putnam (1993) and Lin (2017) shared the idea of social capital as network development. Networks are visible, share data, and are designed to solve problems that benefit everyone. According to Lin (2008), social capital takes on social, human, and other models. According to Lin 2008), "overwhelming attention is on the capacity of education (i.e., on-the-job-training) rather than the capital of skills and knowledge that is the generator of the return" (p. 6). My theoretical view of PI/PE is the tangible resource or asset of human capital as one's abilities and knowledge to be transferred to a student.

Social Capital

Coleman (1966) was the first to document the achievement gap. Coleman was a sociologist with interest in the sociology of education and public policy. Coleman was interested in different categories of capital and interactions, precisely people, physical and social capitals. Coleman's idea was to bring the economist's principle of rational demand in the marketplace with supply and demand. Bourdieu and Coleman's view of social capital was incorporated in the power, status, and the uneven distribution of social capital between individuals. There are three forms of social capital: bonding, bridging, and linking. Bonding is a connection within a group or community branded by high resemblance in demographics, outlooks, and available resources. In social capital, bonding exists between two individuals who partner together with close relations. According to Erik Erikson's theory of psychosocial development, parents' activity with their children is a common expression of generativity that creates social capital. These results suggest that generativity is a social factor that distinguishes individual and community levels. The individual level is the interaction between two individuals (teacher and parent). The community level of social capital is the opportunity created by the school for parents to participate. Stevens and Patel (2015) used PI/PE factors from the School and Family Partnership Survey to illustrate the relationships between generativity and social capital characteristics. It can hold that all people's capabilities are either acquired at birth or are learned (Stevens & Patel, 2015; Stevens et al., 2018). For example, *nature* refers to genes and hereditary factors that affect who we are in the physical likeness or personality traits each person possesses. *Nurture* refers to the variables that are environmental factors such as childhood experiences, the values we were taught, the social relationships, and different cultures we encounter, which affect who we become.

Bridging in social capital is the interactions between the smaller groups and the connection of knowledge and information outside the community through relationships with each other and organizations (Claridge, 2018; Stevens & Patel, 2015; Stevens et al., 2018). The term *linking* is described by the relationships built with institutions and authority figures (e.g., schools, employers, and coworkers in the workplace). Bonding, bridging, and linking are key elements of PI/PE. When a parent spends time with their child in school or at home these elements have a positive influence on their child's achievement.

Human Capital Theory

The notion of human capital is traced back to an economist named Theodor Schultz and his interest in underdeveloped nations. Schultz believed that poor people's well-being relies on knowledge, apart from physical efforts and land ownership, resources, and skills that people are born with or acquire (Schultz, 1961). Becker and

Lewis (1973) illustrated the relationship between the quantity and quality of children in families, is like commodities. Becker and Lewis's suggested in the study that one or two children can acquire the most quality relationships from their parents, but it becomes more difficult when the number of children increases to maintain the same level of quality. The cost goes beyond the necessary food, clothing, and shelter. The time spent on each child also increases, and the family's time, or lack thereof, becomes a more significant factor. The more quality desired in the child, the more resources are required. Becker (1985), suggested in a national review that increasing the returns for specialized human capital is a force that divides time and investments in human capital between married couples. Becker focused on the division of childcare and housework among women, which took more effort than men performing the same hours in a career (Becker, 1985). As women entered the workforce in greater numbers in the 20th century, the demand for parents' time at home increased. Pressure on women as heads of households and primary childcare providers became an issue (Stevens et al., 2018).

Measuring Social and Human Capital

Individuals who believe in their worth create opportunities for themselves by embracing personal and professional development, encouraging and inspiring others, for example. Corporations, enterprises, and institutions place value on human capital (Lee & Lee, 2016; Pravdiuk et al., 2019). The cost of professional training, college tuition, and parent programs is an example of human capital. It is the means of a person in a free country's pursuit of happiness (Schultz, 1961). Investing in human capital results in higher student test scores and parental involvement. Positive changes in educational outcomes emerge with investing in people. Investing in human capital brings new ideas, opportunities, and change. In this study, one school district strategically assesses its human capital annually through requirements for PI/PE. By comparing student achievement among students who attend schools with different expectations of PI/PE, I evaluated data on human capital.

Measuring social capital depends on the level of analysis. The interests of the researcher play a part in the measuring. The source, method, or significance of the study is a factor (Stevens & Patel, 2015; Stevens et al., 2018). The *macro level*, requires a structural measurement. The macro level data are usually secondary and not intended to measure social capital (Stevens et al., 2018). In an investigation of the *group level*, it is important to remember the group's framework. The measurement at the group level relates to the rank or role of the leadership of a group or organization's culture (Stevens et al., 2018). The measures at the *individual level* (micro) are less challenging than in groups. The individual-level measurements use questionnaires and surveys with indicators. The researcher should be familiar with social connections, social networks, and social support (Stevens et al., 2018). Once these steps are complete and there is an absence of approved measurements, most researchers categorize the critical factor and develop their instruments themselves. This section's main point is to clarify humans as capital and the measurement of worth. In my study, I used measurement of worth, student's test scores as a quantifiable metric for academic success

Epstein's Framework for School, Family, and Community Engagement

In this study, Epstein's framework to improve school, family, and community engagement is SFCP. In this section, I provide the historical development of the need for engagement as well as the process for engagement program development in schools relative to Epstein's framework.

History of PI/PE

According to ESSA (2015), the term PI was changed to PE and is defined as regular dialogue and meaningful communication involving student academic education. The Act guaranteed that parents participate in assisting their child's learning (Klein, 2016). According to Henderson and Berla (1994) involving parents results in improved academic success for students. Henderson and Berla's study may be decades-old, yet the reports are relevant. Children thrive when schools partner with families to assist in their learning. The study by Henderson and Berla's used the word *family* in the place of *parents* (Henderson & Berla, 1994). They selected the word *family* as many family units include non-biological or children that they did not parent from birth. School B in my study allows any family member to take part in mandatory PI/PE time. PI/PE requires parents to take part in every area of a child's education and development. Henderson and Berla's (1994) works are a prerequisite to family support. The results of collaboration between schools and families are wide-ranging. The parents with high PI/PE the child will likely take advantage of other educational opportunities after Grade 12 (Henderson & Berla, 1994).

PI/PE Programs

Research on the efforts to educate parents about ways to assist their children's learning goes back to the 1800s. Formal groups like the National Congress of Mothers (NCOM) formed and led to the development of the modern-day PTA. Parents had a more significant role in educating children around the 1920s. Parent role was limited to volunteer teachers and supporters. This type of engagement had a superficial level of interaction and remained in place until it shifted again in the 1960s. In the 1980s, federal government policies around parental behaviors and attitudes toward PI/PE were occurring in families of the middle-class (Boonk et al., 2018; Park & Holloway, 2017). During this time the state and local governments spent 60% of the total public funding for children in public school.

Epstein's SFCP contributes to the increased educational process. Epstein’s six areas of engagement are adaptable and customizable to a school PI/PE program (Epstein, 1987, 2018). Epstein's model is unique because it incorporates PI/PE at school and role at home. The SFCP model learning tool for replacing longstanding experiences with new knowledge. Kirwan’s (2016) book provided a similar model to Epstein's SFCP. Kirwan (2016) suggested three factors that are important to create and build on an organization’s learning and knowledge. Individual level of learning is critical for generations of learning opportunities and involvements. At the team level, collaboration is a need for knowledge sharing (Kirwan, 2016).

Epstein's six participation types are parenting, communicating, volunteering, learning at home, and decision-making. Epstein's participation types are a framework for schools and classrooms to follow in helping educators develop programs and practices (Cole, 2017; Epstein, 1987, 2018). Epstein's (2018) six types of engagement are:

(a). *Parenting*: In this context, is a guide to create home settings that support a child's learning. Parenting includes assisting parents with way to help families become knowledgeable about their child growth. Providing parent recourse that create home settings that support child learning.

(b). *Communicating*: This type of engagement is bidirectional communication between the parent and the school. Bidirectional communication is useful to share information about their child's improvement and growth. Parents learn strategies that guide them to available school resources. Parents learn about their roles and responsibilities to help their children succeed. (e.g., creating a parents' resource center). Making available a resource center allowing parents to use educational tools (i.e., books and computers).

(c). *Volunteering*: Parents take part in the school's activities, events, and helping in the classroom. Volunteering provides opportunities for school's associate to set goals.

(d). *Learning at home*: Parents receive the knowledge needed to help their children. It is beneficial for parents who lack an understanding of the school curriculum.

(e). *Involving parents in the decision-making*: The most common involvement at school is parent-school associations or organizations such as the PTA. Parents' suggestions can motivate students' learning.

(f). *Collaborating with the community*: Working and guiding parents to resources available to support family practices and learning. The community resources consist of activities that benefit students, parents, and schools. (p.46)

The No Child Left behind Act (NCLB, 2004) confirmed prior research that parents might be the missing key to student achievement. The U. S. federal government (NCLB, 2004) described significance as a critical component in education when implementing PI/PE. Schools should have clear and measurable goals. The NCLB set expectations for states to meet or exceed standards to close student achievement gaps. Children must have a fair, equal, and significant opportunity to get a high-quality education and schools must increase academic standards to improve student achievement. The NCLB focus was on what to teach students from basic math, letter sounds, and reading. The focus was also on what students are being taught, the strategies, interventions, programs, and curriculum supported by rigorous validation of effectiveness.

ESSA's goal was to engage low SES and minority parents (Falk et al., 2021; Kena et al., 2015; McKinney, 1975; Rogers, 2018;). The reauthorization of ESSA supported school districts' efforts to develop PI/PE programs. The idea was to develop a comprehensive family engagement plan funded in part by at least 2% of Title I funds. The Act permitted states to divide 1% of Title I, Part A funds toward creating resources to support family engagements.

The Race to the Top was a foundational element of the educational initiative for President Obama. A grant was a reward for innovation and reforms in the states and local

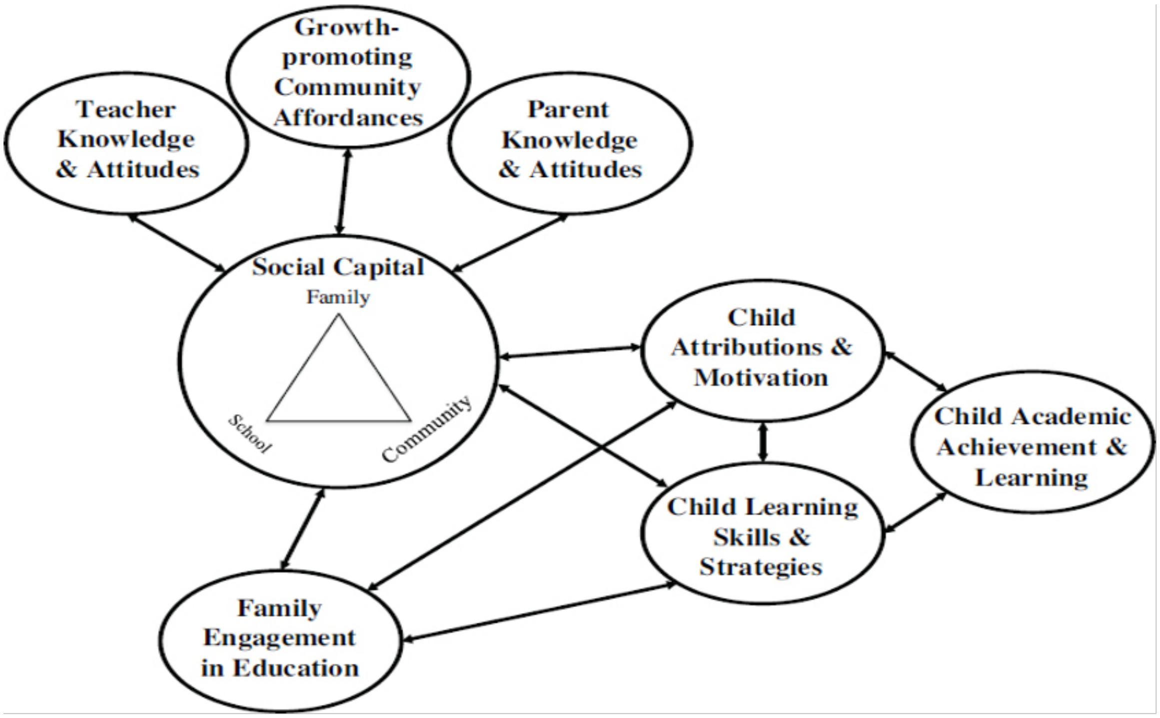
K-12 school districts (McNeal, 2014; Rogers, 2018). Monies were given for the programs that were effective, secure, and healthy. The program called for transparency and accountability (ESSA, 2015). States were to provide comprehensive report cards on individual schools, teachers, and school leaders (Kena et al., 2015; Patterson et al., 2018). Support for teachers and principals engaging families (Kena et al., 2015; Rigby, 2015). The proposal was designed to encourage professional development programs for educators and school leaders. Districts could include engaging families and parents to measure teacher effectiveness in evaluations. Students and families should expand educational opportunities like the choice of public-school programs or other educational options for schooling within the public school system (Patterson et al., 2018; Zimmer et al., 2019). Both, School A and School B in this study are public schools, but School B is a “choice” school.

Summary

I reviewed the literature on social capital theory as it relates to human relationships. I included Epstein's theory of SFCP, as parents are the resource to partner with teachers and schools (institutions). According to Lin (2008), human capital had "high attention in the capacity of education and on-the-job-training and the capital of skills and knowledge that is the generator of the return" (p. 5). I linked human and social capital theories with Epstein's six types of participation. Figure 1 shows how family involvement and social capital connect.

Figure 1

Hypothesized Benefits of Parents' Engagement Connecting Parent/Family Involvement and Social Capital



If PI/PE is a resource and is beneficial to student success, PI/PE strategies need to be further researched.

Literature Review Related to Key Concepts and Variables

The social and human capital theory is the theoretical foundation for this study. I investigate students' mean test scores at two schools' different PI/PE programs. This review of the literature begins with PE and includes PI and the words *parent participation* (PP), as well (ESSA, 2015; Klein, 2016). Every approach is not mentioned in this study. Similar frameworks outline strategies associated with PI/PE in students' academic achievement. The literature approaches assess PI/PE as systematic teaching and learning for adults. First is a historical review of PI/PE, emphasizing the importance of partnering in past, present, and future. Next, I discuss the various activities and variables associated with investigating PI/PE. In this section of the review, I discuss program implementations, parent curriculum and development. I also review several PI/PE methods that advance student learning. This study adds to the existing knowledge of students' Milestones test scores at two different schools PI/PE programs.

History of PE

For a historical look at PI/PE, reviewing some of the methods, implications, strategies, and analysis is helpful. Parental education classes teach the family how to best assist their child's learning. In 1965, a decade after Brown v. Board of Education. James Coleman, a sociologist at Johns Hopkins was asked whether public education was fair (cited in Egalite, 2016). In one of the most extensive social science surveys ever conducted, Coleman looked at outcomes like how well the students were learning, how teachers encourage children's learning, and whether peers and family were important factors in education (as cited in Egalite, 2016). Coleman found family background was the most significant determinant of how a child learns (as mentioned in Egalite, 2016).

Egalite (2016) reported on Coleman’s 1965 study and confirmed that family background was the most significant determinant of the associations between home life and school performance. Egalite’s first conclusion is inequalities in school are the quality of area or community a family lives in rather than family influences. The logic is families choose their children’s schools by selecting the community where they live. Parents who decide on good schools may benefit as a value. The highly educated parents will likely consider the quality of the local schools (Egalite, 2016). Educated parents are also more likely to be involved with their children’s teachers and ensure they get what they need from schools (Egalite, 2016). These parents are more likely to read to their children than less-educated parents. Child development and human capital are enhanced because of the parent’s education, language skills, and communication abilities with their children (Egalite, 2016). Egalite examined family variables (i.e., family education, family income, parents’ criminal activity, and family structure) that are basic to all parent/family structures regardless of socioeconomic status and considered how schools could offset potentially negative variables. Egalite suggested that Coleman’s report confirms that family is strongly connected to student achievement, but that more quantitative research was needed to confirm statistically significant relationships.

Haskins and Jacobsen (2017) highlighted students’ parent expectancy to PI/PE characteristics. PI/PE's most potent aspects proved intricate. Haskins and Jacobsen (2017) proposed that parents sustain high expectations in their children’s schooling by connecting with their children about school (Haskins & Jacobsen, 2017). Authors like Egalite (2016) and Zimmer et al (2019) compared family structure, home life, and school performance. Although intangible and marginalized, the mission was to discover the determining factor of students' academic success (Zimmer et al., 2019; Egalite, 2016); it is crucial to rely on experimental or quasi-experimental research to identify the differences in family context function separately from any school.

Jeynes (2017) examined the relationship between PI/PE in a meta-analysis of 28 studies on PI/PE in Latino kindergarten through first-year college. The results indicated a significant relationship between PI/PE and Latino student academics. When the results were insignificant, he used effect size with a calculation of zero. I used the effect size in my study to determine how many participants needed to show a small, medium, or large effect size. Jeynes also used manipulations. He also used standardized mean difference to estimate the effect of PI.

Vandergrift and Greene's (1992) study focused on the number of parents who actively participated, such as parents who provided hands-on help at the school (e.g., coming to parent training and workshops, reading in the classrooms, helping with homework, attending parent advisory committee meetings). Vandegrift and Greene reported that parents struggle to help their children with academic achievement. For PI/PE strategies to succeed, they must match the individual parent's needs. The results from the Arizona At-Risk Pilot Project "suggested [that a] best practice [in] PI/PE was to establish rapport at school and with the parent … and does not require high levels of commitment of participation" (p. 59). The authors suggested understanding how these needs are addressed when parents become familiar with school personnel and are accustomed to seeing the community's personality.

Vandergrift and Greene also planned a program around weekly workshops on Good Parenting Skills, which was presented in English by a district native Spanish speaker. However, the weekly workshops were not meeting the needs of the members. The program members determined that to involve parents: "they had to meet them where they are" (Vandergrift & Greene, 1992, p. 59). After completing interviews, the authors understood that parents want to learn English (Barger et al., 2019; Jones et al., 2018; Vandergrift & Greene, 1992). The researchers revised the PI/PE program to respond to parents, offering English as a Second Language (ESL) classes (Barger et al., 2019; Jones et al., 2018; Vandergrift & Greene, 1992). The teacher interviews revealed that many parents had a 2nd or 3rd-grade education (Vandergrift & Greene, 1992).

The parents received reading in Spanish and English and parents began to read with their children (Vandergrift & Greene, 1992). There are many reasons parents cannot spend time on their child's learning. According to Vandergrift and Greene, the ideal parent is willing to take part and commit to their child's education, but it is hard to find such parents among at-risk families (Vandergrift & Greene, 1992). I included this section on Vandergrift and Greene's research because it provides a view of what the two schools in my study offer in the PI/ PE programs or the lack thereof.

The United States DoE (2001) subsidized an investigation in 71 Title 1 schools. The study was on the effects of standards-based instructional practices. The focus was "(a) standards and assessments. (b) Developing or advanced teaching methods. (c) Instructor training and math instruction skills. (d) Instructors' professional development ratings. (e) school districts' standards practices, and (f) school's outreach to parents" (p. 110). To measure outreach of how often instructors contact parents was the method used in the investigation. The results of the investigation showed that most contact with parents consisted of parent-teacher conferences. This communication included information on the techniques to assist their child. Regular telephone calls, and email was the way teacher contacted parents. The parent was given information on the academic progress of struggling students. The investigator found that their child's reading and math scores improved with regular contact with the parents. The student's academic achievement was 40% higher when the instructor contacted the parents (Boonk et al., 2018; Westat & Policy Studies Associates, 2001). In my study, the schools' outreach and information level are similar. According to U.S. World News, in 2017, the state in my study ranked 38 in the country in education. In 2018, the state moved backward to 42 in education, and in 2019 made a major come back to 30.

PE Types, Activities, and Variables

Authors like Boonk, Epstein, Dawkins, Barger, et al., and Cole's concept of participation motivated my study's approach to the PI/PE program. As well as other authors mentioned in this section. These authors concepts and considerations help me understand using Milestones test scores as a variable. I also wanted to understand the activities incorporating a successful PI/PE program. Epstein understood the importance of merging school and family, creating guides to PE types, activities, and variables. Activities like sharing in the decision making, and helping the teacher in the classroom gave educators more time to develop better programs (Cole, 2017; Epstein, 1987, 2018). According to Boonk et al. (2018), PI/PE can be home-based and school-based. Home-based engagements and behaviors promote learning at home; assisting a child with homework is an example. Boonk et al. found that the variables most associated with promoting academic achievement were “(a) reading at home, (b) parents that are holding high expectations/aspirations for their children's academic achievement and schooling,

(c) communication between parents and children regarding school, [and] (d) parental encouragement and support for learning" (Abstract). Regardless of a school administration's expectations for parental involvement, these engaging behaviors affect children, families, and schools. In my study, School B requires the participation of parents at school with activities such as volunteering to chaperone field trips. School A does not require PI.

Parental participation contributes to educational success factors such as academic achievement, discipline, and student motivation toward school (Dawkins, 2017; K. Ortiz, 2018). In my study, I focused on investigating academic achievement only. PI at home often consists of parents listening to the child read and helping with homework (Barger et al., 2019). The focus was on four educational outcome measures: the action of academic achievement, grades, standardized tests, and teacher evaluation.

Boonk et al. (2018) performed a systematic review of studies investigating learners' PI. and the relationship with children's academic achievement from 0 to 18 years. Boonk also found a positive effect using surveys for math, reading, and science achievement surveys. He found parent and child interaction: during storytelling, attended events, volunteered at schools, and participated in fundraising to show positive results. Studies reviewed by Boonk indicated negative results in the relationship between variables, such as parental expectations and aspirations, and parental punishment.

Park and Holloway's (2017) longitudinal study utilizing hierarchical linear modeling examined three school-based PI/PE types for the long-term effect on student and school-level achievement. The authors focused on the three kinds of PI/PE that help an individual's child and are categorized as public and private goods and parent networks. The public's interest is most likely advantageous to the school rather than an individual student. The individual-level PI/PE represents the range of parent networks representing private or public good and individual achievement levels. The parent network reflects through peer interaction and describes how parents navigate their child's classroom.

Park and Holloway (2017) measured school-based PI/PE with six items using the Early Child Longitudinal Study-Kindergarten Cohort (ECLS-K) and The National Center for Education Statistics. The item list starts with what they termed *private-good* activities (e.g., attending an open house, back-to-school night, and parent-teacher conferences). Their indicated *public-good* activities included PTA meetings, classroom volunteering, and fundraising. The studies did not link worldwide school-based PI/PE and student achievement. The results suggested that each school-based PI/PE measurement may differ when associated with specific achievement domains. Therefore, the authors argued that there is value in developing models that examine each measurement's unique effects. While some researchers argued that parents might react to low achievement by increasing their involvement, a teacher may ask the parents of a low-performing child to attend extra tutorials. There are solutions to increasing PE (Park & Holloway, 2017). Nevertheless, Epstein suggested that educators develop more comprehensive programs that center on the school, families, and society using the six types of PI/PE participation and practices (Epstein & Sheldon, 2016).

Additionally, Barger et al.'s study (2019) approach was a quantitative synthesis of 448 independent studies. The approach contained 480,830 families and discovered insignificant positive associations "between parents' regular occurring PI/PE in children's education and academic adjustment" like success, engagement, and motivation that continued over time (p. 856). The results further indicated that parents' involvement positively links children's social-emotional changes and delinquency over time. On the contrary, when children's academic adjustment was examined in this study by Barger et al., different PI/PE types were positively associated with adjustments, such as parents' discussion about school and participation in events at the school. However, a parent helping with homework was negatively associated with students' achievement but not negatively associated with PI/PE.

According to Barger et al. (2019) and Muller (2018), there are different types of PI/PE. The types of PI/PE are (a) collaboration, (b) associated learning, (c) developmental curriculum, (d) many synchronized settings, and (e) dual capacity building. PE exists in various forms. For example, volunteering in the classroom, participating at PTAs, and attending conferences with parents and teachers. Chaperoning field trips and helping with homework are some of the main forms (Barger et al., 2019; Reynolds et al., 2017). Epstein (2018) offered a structure of family-school-community collaboration for the corresponding unity of homes, schools, and communities that affect children's education.

Epstein (2018) and Barger et al. (2019) described PI/PE as establishing a mutual language and concentration for the events in learning. These authors further categorized their results of PE as the following:

- Increased student achievement

- Increased positive behavior
- Higher performance in culturally diverse groups

In summary, the concept of PI/PE addresses three groups: (a) home-based engagement, (b) school-based engagement, and (c) academic socialization (Barger et al., 2019). In a nationwide survey of parents from kindergarten through 12th grade, over 85% agreed they received correspondence from the school. Parents received emails, memos, newsletters, and notifications from their children's schools. According to Barger et al., 55% of parents received emails or written notes from their children's schools, often expressing appreciation from teachers. Parents had discussions with teachers about increased home participation and awareness of student success at school.

Parent Curriculum, Support Programs, and Strategies

If parental engagement yields positive educational outcomes, improving PI/PE may contribute to closing the academic achievement gap (Scott, 2018). If improving PI/PE positively supports improved student achievement, then the development of curriculum programs to foster PI/PE or to create PI/PE programs is also appropriate. In this study, I investigated differences in student achievement among students at schools with different expectations for PI.PE. Therefore, sharing the literature on curriculum, program support, and strategies for improving PI/PE is appropriate. Research in this literature review includes the idea that PI/PE should be part of the school curriculum.

Kuo (2016) developed a curriculum course for teachers, including lectures, group activities, and discussions. The family literacy course was three credit hours, and the weekly meetings and events focused on one of the five strengths of FACE. The strong points of early literacy are family involvement, access to books, expanded learning, and mentoring partnerships. The activities used five books related to FACE. The curriculum was to help new teachers understand how literacy advances students' academic success and how culture affects children's connection to readers and learning opportunities (Kuo, 2016). The study was qualitative grounded theory method using a survey questionnaire. The data analysis included open coding groups, evolving themes, and the effect of FACE's five strengths. Studies investigating programs like mandatory PI/PE curriculum strategies can add to the body of work in education. Providing data-driven research toward parents learning might provide new knowledge to improve PI/PE skills. In turn, they were developing good habits in students to continue into adulthood.

Panichpongsapak et al.'s (2019) review continued Kuo's idea of developing a program. Kuo and Panichpongsapak et al. showed parents' and teachers' roles as partners in students' success. Panichpongsapak et al. (2016) developed a program that enhanced curriculum and learning management. The study was a 4-phase process that included 32 teachers. The data collection consisted of an evaluation form, a questionnaire, and a test (Panichpongsapak et al., 2016). The different levels were used to describe the findings. The indicator to enhance curriculum was *very much*. Learning management ability was *modest* (Panichpongsapak et al., 2016). The results were useful for further research, for example, the administrator's usefulness in judging policy in the current situations, curriculum techniques, and school teachers' learning management competency (pp. 178 – 179). The researchers could not infer the different teacher strategies (p. 179). The results were *very satisfactory*. Panichpongsapak et al. (2016) were able to describe the results of research procedures acutely and plainly in four steps: first, pre-test before development; second, developing a program; third, integrating knowledge; and fourth, post-test after development.

Willemse et al. (2017) recommended curriculum development and investigated first-year teacher applicants' understandings, attitudes, and experiences about family-school partnerships (FSPs). Through survey data, they examined 1,144 teacher applicants from 2017 in their first-year training at three colleges (i.e., one in Belgium, the Netherlands, and the United States, respectively. Teacher candidates completed surveys from elementary and high school education programs. The teachers were asked to respond to items about their teacher preparation for FSPs and about education or training they had not received. Data were analyzed using a multivariate analysis of variance (MANOVA). The survey data was used to provide insight into the teachers' understandings of their outlook on FSP. Teachers were then asked about their experiences in their teacher preparation.

The data analysis results showed modest support for FSPs' value. The understanding and bias of teacher to parent communication were also modest (Willemse et al., 2017). There were teacher preferences and choices. The Cronbach's alpha on the attitude scale for the *final year* measured reliability. There were three independent variables *year* (first-year teachers and year teachers). The programs were an elementary school and a high school). The teachers' surveys described their understanding of collaboration with parents. The results were that 1006 answered this question with a 12% nonresponse rate. The answers could have more than one comment describing their understanding of collaboration. Each comment had a separate code. In total, 2067 comments were added and used from the survey.

The results from teachers' contributions to curriculum and development responses showed a need for change to the curriculum to ensure growth and expand partnerships (Willemse et al., 2017). The study results expanded partnerships and improved attitudes amongst secondary education applicants (Willemse et al., 2017). Willemse et al., (2018) identified challenges with FSP that raised concerns about existing approaches being sufficient or if a more developed approach was needed in all countries. The first part of the study looked at research on pre-service teachers' preparation in initial teacher education programs (ITE). It was concluded that FSP preparation depended upon the inclinations and knowledge of individual educators, time, and content requirement of the curriculum.

Part two of the study dealt with the approaches to improve teacher preparation regarding family engagement to preservice and in-service in professional development. The professional development included teamwork, collaboration with parents, support for interprofessional collaboration in education, learning goals, simulations, and the importance of working with parents. In this issue, Joyce Epstein speaks on the contributions and calls for a new direction in ITE programs with five areas of concern. The first concern was redefining teachers. Next, teachers collaborating with parents is a core professional competency. There were other competencies to be regularly addressed for future teachers as a requirement in methods, tests and assessments, and classroom management. Epstein's third concern was that ITE programs take future teachers past communicating with parents but include learning to design and conduct linking engagement activities for student learning in specific subjects. The fourth concern was the lack of attention to the community as an untapped resource for support and information. Finally, Epstein supports more attention to teacher in-service education on family and community engagement.

Graham's (2016) study on the Comparison of Classroom Settings on ELA of 7th graders identified effective strategies to increase student skills as a variable. The classroom surroundings (looping and traditional) were an independent variable. ELA Teacher Candidate Assessment of Performance (TCAP) was the dependent variable (Graham, 2016). A random sampling of 188 students (94 looping and 94 traditional classrooms) was used in the study at a West Tennessee middle school (Graham, 2016). A *Mann-Whitney U* test was used to analyze the data. The results indicated no statistically significant difference in performance between the groups using small effect size. The finding led to more research to improve student skills on standardized tests.

According to Epstein and Sheldon, research-based practices and methods are critical for developing a basic program. Epstein and Sheldon (2016) analyzed 21 school districts to find factors supporting the policy development of PI/PE. The analysis included 347 schools. Epstein and Sheldon (2016) addressed how schools' and districts' practices affect the value of in-school partnership programs. The main fact that could stagnate a partnership program is the school principal's support. The results showed that a system of PI/PE might be an excellent first step toward creating a partnership program. The dependent variables were the quality of basic program implementation, advanced implementation, percentage of involved parents, and students' average attendance. The independent variables were school variables and principals' support. The school report of district and district variable was facilitation. A tow-level hierarchical linear model (HLM) was used to analyze the data.

Summary and Conclusions

The reauthorization of the ESSA (2015) supported schools in engaging parents in their child's education. ESSA required the development of comprehensive family engagement plans. There was a demand for transparency and accountability-the policy communicated to educators to stress the need to engage families. However, the ESSA provided no clarification on how to meet the requirements in ways that lead to the most significant effect. The policy created a critical gap between the legislation's intent and implementation of the policy. Schools created PI/PE programs, but there is no rquired evaluation of the effectiveness of the programs. This study intended to determine if there is a significant difference in Milestones test scores (a factor used by the state to determine a school's success) at two elementary schools with different PI/PE programs. I used archived student test scores as the dependent variables in this nonexperimental quantitative study. The two schools served as the independent variables.

Chapter 3 is about the methodology of the study. I provide a justification and rationale for the study, procedures for selecting the population and obtaining the ex post facto data, and details on instrumentation and operationalization of the constructs. I included a description of the data analysis plan and actual processes for collecting and analyzing the data. I conclude Chapter 3 with a discussion of protections and ethics that I applied throughout the methodology.

Chapter 3: Research Method

The purpose of this quantitative, ex post facto study was to compare differences in Grade 3-5 students' mean test scores in ELA, mathematics, and science (dependent variables) at two Southeastern United States elementary schools that offered different PI/PE programs—a nonmandatory or mandatory program (independent variable), represented by School A and B, respectively. In Chapter 3, I describe the research design, methodology, and archived data sample. I also describe data collection, instrumentation, and operationalization of constructs. The data analysis plan, threats to validity, and ethical procedures are also discussed.

Research Design and Rationale

In this quantitative, ex post facto study, I sought to compare the Milestones assessment achievement of Grades 3-5 students at two different elementary schools (i.e., School A and B) to determine if there was a statistically significant difference in mean test scores of students from schools with different PI/PE programs. As the PI/PE programming was already established at these two schools and I was comparing student outcomes after the fact, the ex post facto or causal-comparative design was the most appropriate for this study.

Variables

I used different subject areas and grade combinations to compare the PI/PE variable. I developed seven research questions with their respective hypotheses. One for each subject, grade, and PI/PE combination.

The dependent variables are the Milestones ELA, mathematics, and science test score. The test scores included students in Grades 3 through 5. The science test scores are only for Grade 5.

The independent variables are two elementary schools that offer different PI/PE programs, a nonmandatory and a mandatory program. The state data from School A represents the nonmandatory PI/PE program. School B's data represented the mandatory PI/PE program.

Justification of Research Design

Researchers in other studies used different methodologies to investigate similar student achievement. Many of these investigations used quantitative design and involved analyses related to hierarchical linear modeling (Epstein & Sheldon, 2016; Park & Holloway, 2017). Researchers used survey analysis (Avnet et al., 2019); and meta-analysis (Barger et al., 2019; Jeynes, 2017). There were also studies related to narratives (Scott, 2018), grounded theory (Kuo, 2016), and case studies (Boonk et al., 2018).

The design for this study was the ex post facto or causal-comparative design because research investigators use this type of design to find out the basis or significance of differences that have already happened amongst groups of people (Lodico et al., 2010). There were no time and resource constraints consistent with design choice. Social scientists aim to figure out why things happen, seeking a valid explanation of social circumstances that require more research. As a gap exists in the literature about the statistical difference in student test scores relating to nonmandatory PI/PE and mandatory PI/PE school programs, this design is appropriate for this study.

Methodology

In this ex post facto study, I collected archived data. Therefore, there are no participants in this study. However, to detail the source of the data, I provide a clear description of the population and sample from which the archived data were gathered. I additionally discuss the procedures for collecting archived data, the instrumentation used in the data set, and the operationalization of variables.

Population Selection

In this district, the public education funds follow a student to the school or services that best fit their needs. The school types are public, private, charter, or home-based. Schools of *choice* are any other learning environment that families may choose. The population district in this study contains (a) 76 elementary schools: 67 neighborhood and nine choice schools; (b) 19 middle schools: 18 neighborhood and one choice school; (c) 22 high schools: 18 neighborhood and two choice schools, plus two other education programs; (d) eight charter schools; and (e) 14 other education programs.

The district operates in seven regions with over 100,000 students. The district has performance measures, targets, and initiatives to ensure success in all goal areas. The district monitors and collects data with rigorous growth checks. Continuous training sessions are offered to principals to support the aligning, refining, monitoring, and evaluating the improvement at all schools. Archived data analyzed in this study were from two elementary schools in this district. Both are public, Pre-K through Grade 5 elementary schools in the same district. According to the schools' website, student descriptive data are similar, with most students identifying as Black and low numbers identifying as white, Hispanic, Asian, or multigroup (see Table 1). There were no students reported as identifying as Native American or Pacific Islander. Together, these schools educate about 1,500 students. Table 2 shows the racial demographics of School A and B.

Table 2

Racial Demographics of Elementary Students from School A & B

		Race %				
School	PI/PE	White	Hispanic	Black	Multi-group	Asian
A	Nonmandatory	3	4	84	2	7
B	Mandatory	1	3	92	0	4

Despite the similarities in demographics between School A and B, the two schools' students differ in achievement levels (see Table 1).

Sampling & Procedures

The study sample was student Milestones achievement scores from students at two elementary schools in a densely populated district in a Southeastern region of the United States. I did not select student data sets; rather, the data were in preexisting groups based on the school. This type of sampling method is *convenience sampling* (Lodico et al., 2010). This sampling method was appropriate for my study as I was exploring the post-effects of PI/PE programming on student achievement. Therefore, analyzing differences from the preexisting groups was an appropriate choice.

Sample Retrieval & Frame

A representative from the state's DoE provided me with a deidentified spreadsheet that included student Milestones achievement data for students in Grades 3, 4, and 5 from the two selected schools. Data sets included achievement scores for ELA, mathematics, and science. The DoE was responsible for sanitizing data or removing identifiable personal material from data sets before transmission. Upon my receipt, there was no identifiable personal material in the data set.

The sampling frame included the following inclusion and exclusion criteria. The inclusion criteria were scores from student in Grades 3 through 5 in ELA, math, and science for the 2018/2019 school year. The Milestones assessment was not administered to other elementary grades at the two schools. Specifically, Grades 3 through 5 students completed the ELA and mathematics assessments; only Grade 5 students were assessed in science.

Although the state also required students in Grades 8,10, and 11 to take the Milestones assessment, this study focused on elementary-level grades. Therefore, the exclusion criteria for this study were scores from a student in Grades other than 3-5 or years other than 2018/2019.

Sample Size

According to the G power IBM SPSS statistical power (v. 25) predictive analytics software, an analysis that reveals the least sample size desirable to detect the effects of the independent *t* test in this study, each group in this study minimally needed 64 data sets to achieve an 80% power, a 5% difference detected, with an alpha of 0.5 using a two-sided *t* test. Table 3 includes the output from the G*Power 3 analysis.

Table 3

*G*Power 3 Protocol of Power Analysis for a priori Sample Size*

	Description	Calculation
Input:	Tail(s)	2
	Effect size d	0.5
	α err prob	0.05
	Power (1-β err prob)	0.80
	Allocation ratio N2/N1	1
Output:	Noncentrality parameter δ	2.8284271
	Critical t	1.9789706
	Df	126
	Sample size Group 1	64
	Sample size Group 2	64
	Total sample size	128
	Actual power	0.8014596

t test Mean: Difference between two independent means (two groups)

Note: G* Power 3.1.9.4 Protocol of power

Archival Data

The DoE provided summative learning assessment data from the Milestones achievement test. The complete database included 514 raw test scores for School A, with a nonmandatory PI/PE program, and 555 raw test scores for School B, with a mandatory PI/PE program. The archived data included 1069 sets of student data.

Within the data set, each test score was delineated by subject (i.e., ELA, math, and science) and group (i.e., nonmandatory and mandatory PI/PE). The test scores were (a) from Grade 3, 4, and 5 students, (b) demonstrating end of the year Milestones test scores in ELA, math, and science, and (c) for students enrolled in the two study site schools, which were both Title 1 public school.

Milestones Data Description

According to the State DoE website, the Milestones assessment is administered at the end of an instructional period and measures student achievement or mastery of intended learning outcomes. The statewide summative assessment data are used to assess instructional programs; support school and district improvement efforts, and inform policy decisions. The assessment is administered with secure procedures, and all data are evaluated and housed at the state level. The Milestones assessments are in place to assess federal and state legislative requirements for student competency in ELA, math, and science. The state academic standards stipulate students' academic ability for a specific grade level.

The Milestones assessment provides students with critical information about their achievement and preparedness for the next level of learning—for example, the next grade, course, or attempt, such as college or career. According to the state handbook, the Milestones measure how well students learned and developed skills in the state-approved skills and content standards in ELA, math, science, and social studies.

The Milestones are a single assessment system consisting of end-of-grade subject matter measures. The Milestones are administered primarily on the computer. The assessment includes features in technology-enhanced items in all grades and courses. The Milestones consist of open-ended (i.e., constructed-response) items in all grades and courses. According to the website, a writing component (students' response to passages) is part of each grade level and course assessment.

Gaining Access & Permission for the Data

I first had to complete an application via the DoE website to collect data for this study. The data application specified that the requested data must already exist within the department, and, according to the website, the request must be for educational purposes. The State follows the Forum Code of Data Ethics to reinforce the ethical use of data. Additionally, the data request could not require calculations, analyses, tabulations, or formatting. The requestor also could not profit from the requested data or use it. Per the stated guidelines, Student Data Privacy Review Board approved my request for student-level data before processing. I gained permission to collect archived data sets through the application process, phone, and email communication (see Appendix A).

After receiving the authorization for data, the DoE's representative aggregated all the data for the target school district (see Appendix A). I formatted and sanitized student identification information. As no personal or identifying information was included, the ex post facto data were exempt from the consent processes needed with actual participants in a study. The state DoE complied with all applicable federal, state, and local laws and regulations regarding information confidentiality and security.

Instrumentation and Operationalization of Constructs

According to the state DoE website, the State developed and designed the Milestones to meet student needs. The process took roughly three years and involved educators at every step. Every test item on the Milestones was reviewed by the educators at least twice. Educators continue to provide input in the further development of the assessment.

Background

According to the State's DoE website, the College, and Career Ready Performance Index (CCRPI) and measuring adequate yearly progress began in 2012 as an alternative to No Child Left Behind requirements. Students in Grades K-12. ESSA 2015 completed the test. The state improved and revised the CCRPI as part of the Criterion-Referenced Competency Tests (CRCT), End of Course Tests (EOCT), and state writing assessment results for all areas. The CCRPI was replaced with the state Milestones, and the state administered the assessment for the first time for the 2014-2015 school year. The Milestones reduced the number of indicators to focus on compared to the CCRPI. The Milestones provided opportunities and outcomes, growth, and improvement into one test taken by Grades 3 through 8 in math and ELA at the EOG. Students took the EOG in the fifth and eighth-grade science classes.

Scoring

The Milestones serves as a key component of the State's accountability system. According to the state's website, content and measurement experts leading the alignment

study teams for ELA, math, science, and social studies first thoroughly reviewed and evaluated the Milestones Assessment System design and development process.
The Milestones serve as a key component of the State's accountability system. According to the state's website, content and measurement experts leading the alignment study teams for ELA, Mathematics, science, and social studies first thoroughly reviewed and evaluated the Milestones Assessment System design and development process.

According to the state DoE website, indicators and scoring components simplify the scoring on the Milestones (i.e., writing a component response to the passage read by the student). The scoring on a 0-100-point scale streamlined online reporting. Committees inspect the Milestones for performances based on how many students selected correct and incorrect answers. The review analyzes how different students' performances are to detect potential bias over another group. The development process began when the state posted the Milestones test blueprints and content weight on each content area test on the DoE's website. Qualified professional assessment specialist writes items for the state tests.

Reviewing the items ensures alignment with the curriculum, appropriateness, and possible partiality or sensitivity problems. A different state educator committee examines each of the items. The review process analyzes how other students perform over another group to detect bias. If the committee accepts an item, it is revised or recommended for re-field testing, or the item is rejected. If the items are accepted after field-testing, the items get attached to an operational test form. The test was developed to measure students' assessment content and statistical data for each test requirement and assess the same content and statistical attributes. The state Milestones are appropriate to this study because the Assessment System began in 2014/2015. Educators are directly involved at every phase, according to the state website.

The students' multiple-choice questions scored against the final, official answer keys. Test sections were evaluated, and effort status was determined for each subject area. The development and operational use of the Milestones constructed-response items were student constructs, rather than selected-response involved data recognition corporation (DRC) and Performance Assessment Services (PAS). The process included pre-range finding, range-finding, hand-scoring, training materials development, field tests scoring, and operational scoring. For each field-tested item reviewed, DRC reviewed 300-500 responses from the sample selected 45-55 responses that composed each pre-range finding set. DRC ensured to include answers to questions in the pre-range finding sets to get consensus scores and response-specific scoring feedback from the group. The range finding involved further in-person meetings to fine-tune the scoring to the individual constructed-response items and confirm the consensus scores generated during per-range finding. The Range finding committee consisted of the state educator and DRC.

The scoring staff finalized the range finding sets, including the input and feedback from the pre-range finding calls. Each committee began by looking at students' work one response at a time. The student responses were used to ground, range, finding participants' thinking regarding the general attributes of each score point. For every student response, committee members' scores were noted and discussed until a consensus score was reached. Student responses were discussed to emphasize scoring guideline language and the relevant point from the Milestones scoring philosophy. The committee in each rage finding group worked item by item for the grade or course was completed.

The post-range finding facilitators assembled field test training materials to rain raters for field test scoring. The responses regarding the scoring concepts were illustrated into anchor sets, training sets, and qualifying sets. The training and qualifying sets contained student responses that were consensus-scored by the state range-finding committee members.

The tests are in the four core subject areas (ELA, math, science, and social studies). Third graders must pass the English subject test to get to Grade 4. Students in Grade 5 must pass the English and math portions to go to the next grade. According to the state technical report, the reliability coefficient relates from test to test. And ranges from 0 to 1, where 0.80 measures the least acceptable level of reliability for assessments such as the Milestones assessment system. Reliability was above the criterion of 0.80 for each subject area for the 2018/2019 year. The average reliability coefficient for Grades 3 through 5 for ELA was 0.90, math 0.93, and Grade 5 science was 0.92.

A different state educator committee examined the items. State educators also examined the field test data when new items were field-tested. The committees inspected the item's performance. The performance is based on how many students select correct and incorrect answers. The review included analyzing how different students performed. This review was to detect potential bias over another group. The committee accepted items, revised, or recommended re-field testing, or rejected them. If the items were accepted after being field-tested, they were then attached to an operational test form. The fifth step was developing the test form students completed as the assessment and content, and statistical data were considered. Each test must assess the same content and statistical attributes. Many test forms are compared in any given administration (e.g., year-to-year test). The test must be challenging to ensure that students are held to the same standards. This challenge for the student represents the changes in that student achievement. There is no fluctuation in the properties of the test form. Tests administered for the first time also establish standards for the test. The educator decides the total points a student will earn to meet the different levels of achievement.

The contractor produced documents in each phase of the development process. The contractor produces evidence with the State's content standards. The contractor builds confidence of input for the state educators through each test development phase. The State DoE is the independent evaluator of the test's alignment. The State evaluates academic standards of the State Milestones Assessment System's development process. The results of these studies met the professional standards for quality and rigor.

Validity

Validity ensures that what the instrument claims to measure is what it is measuring, i.e., the instrument (Lodico et al., 2010, p. 88). According to the State's DoE website, several sources of evidence support the validity or score clarification for the states' Milestones. According to the website, the Standards for Education and Psychological Testing (AERA, APA & NCME, 2014) stipulates the sources of valid evidence that are vital to gathering and filing support claims for an evaluation. The categories are test content, response processes, internal test structure to other variables, consequences of the test use, and or not jointly exclusive. According to the state, the evidence could fall into several categories and be continuous during development. The evidence on the state test content from previous developmental activities steered the final phase of the test development and eventually produced the test forms given to students. The participation of the state educators provided a solid rationale for the integrity of the content and design of the Milestones as a tool to initiate valid interpretations of student performance. The teachers bought the endorsed curriculum and written curriculum perspective to the process. According to the state website, the evidence-based response process was the best opportunity to spot and remove the possible cause of invalidity through the assessment development process.

The Milestones test items were reviewed in multiple rounds of the development process for doubt, unfairness, understanding, inappropriateness, and inaccuracy to certify a suitable construct and the essence of the real performance. The evidence is based on an internal test structure, and differential item functioning (DIF) was used to lessen items and test bias. According to the website, DIF was applied, including systematic items, to ensure that test-takers with the same fundamental ability level were given the same chance of correctly responding to the item.

Reliability

Reliability refers to the consistency of scores and an instrument's capability to produce the same score for an individual over repeated testing and different individuals (Lodico et al., 2010, p. 89). For a tool to be valid, it must first be reliable (Cronk, 2008). According to the State's Technical Report, the Milestones is a highly reliable assessment, indicating that it would produce stable scores if the same group of students was to take the same test repeatedly without any fatigue or memory.

The state Milestones were assessed for internal consistency for multiple-choice items using Cronbach's alpha. The result of Cronbach's alpha is a reliability coefficient that measures internal consistency. The coefficient ranges from 0 to 1, with the latter representing 100% reliability. According to the State, the Milestones reliability coefficient must be 0.80 or higher for inclusion in the statewide assessment.

The reliability for the 2018/2019 Milestones assessment was above the criterion of 0.80 for each subject area. The average reliability coefficient for Grades 3 through 5 for ELA was 0.90, math was 0.93, and science was 0.92. These coefficients indicate strong internal consistency for each instrument. Therefore, the archived data set retrieved from the DoE is assumed to adequately represent the students' actual skill level in the indicated subject and grade levels.

Appropriateness for this Study

The state Milestones data is appropriate for this study as they are a valid, reliable tool for measuring student skill levels in the subjects and grade levels that are explored in this study. Both schools require students to complete the Milestones assessments annually. Educators are directly involved at every phase, according to the state website. The tests are in the four core subject areas: ELA, math, science, and social studies. Third graders must pass the English subject test to go to Grade 4. Fifth graders must pass the English and math portions to progress to the next grade. Because this is a high-stakes standardized test, students must excel in advancing to the next grade. As Barger et al.

(2019) and Epstein and Sheldon (2016) have shown that PI/PE has customarily helped students succeed in school, exploring student achievement data may provide insight into the outcomes of different PI/PE programs (see Avnet et al., 2019; Barger et al., 2019; Cole, 2017; Epstein, 2018; Epstein & Sheldon, 2016; Muller, 2018).

Operationalization of Dependent and Independent Variables

According to the state website, the Milestones are an instrument designed to provide students with critical evidence regarding their success and readiness for the next level of learning. The Milestones is a single assessment system with EOG measures given to Grades 3 through 5 to measure ELA, math, and science. The Milestones serve as the final exam and provide a percentage of the student's final grade that consists of different questions and the completion time required per subject. The resulting scores are interval data, representing student skill and knowledge level for grades or subject areas.

The number of questions is approximately 30 to 60, and the completion period is 60 to 90 minutes, not including breaks. There were (a) technology-enhanced items in all grades and courses, (b) open-ended (constructed-response) questions in all grades and courses, (c) a writing section (students read a passage and respond) at each grade level within the assessment, (d) a reported Lexile score assessment in all grades and courses, and (e) estimated norm-referenced performance ranges for all grades and courses. The website's content areas were all selected responses for the science Milestones. Each subject area has several components. The Milestones scores for each grade and subject area were the dependent variables in this study.

ELA. ELA components include Reading and Vocabulary, Vocabulary Acquisition and Use, and Writing and Language. Each component is weighted differently on the test and accounts for several points. The variable for Grade 3 ELA ranges from 180 to 830, Grade 4 ELA from 210 to 775, and Grade 5 ELA from 210 to 760. The exact structure applies for each grade (see Appendix B, B.2, B.4). For the beginning learners with scores in the lower threshold, the skills required at this level specified by the state's content standards are not met, and the student cannot grasp informational passages and literature.

Math. The math component consisted of Operations and Algebraic Thinking, Number and Operations, Measurement and Data, and Geometry. Grade 3 math scores range from 290 to 705, Grade 4 math scores range from 270 to 715, and Grade 5 math scores range from 265 to 725. Each grade had the same structure (See Appendix B.1. B 3, B.5).

Science. The science component consisted of Earth Science, Physical Science, and Life Science. Science is only offered to Grade 5 in the state. Science scores range from 160 to 785 (Appendix B.6). The Proficient Learner has the knowledge and skills for the state's content standards requirement. Students are ready for the next grade level and on the path to college or a career. Distinguished Learners are skilled in the knowledge and at their grade level. Students are ready for the next grade level and are on the right path to college and career.

Achievement Level Descriptors. According to the state's DoE website, the committees of the State's educators developed the Achievement Level Descriptors

(ALDs). The ALDS represents the knowledge and skills required in each grade level's content area (Appendix B). The ALDS is *beginning learner, developing learner, proficient learner,* and *distinguished learner*. Each level indicates the student skill level or proficiency in the content area for the appropriate grade level. To provide consistent interpretation of student achievement, each year, the Milestones scores are aggregated, and the score range is published for anyone interpreting the scores.

According to the state website, *beginning learners* have not developed the learning skills required at the level specified by the state’s content standards. The beginning learners cannot grasp written informational passages that indicate the student is on the right path for college and career and requires considerable academic support. The *developing learners* have moderately developed the knowledge and skills specified by the state’s content standards. The *proficient learners* have demonstrated the information and skills required for the state’s content standards and are prepared to move to the next grade. *Distinguished learners* excel in knowledge and competency at this grade level, are ready for the next grade, and are on a favorable path for college and career.

The Milestones learner levels in this study were based on raw scores from student assessments. The point value or range for each Milestones achievement level varies from yearly; however, the Milestones levels for the 2019 data set were based on the point ranges provided in Table 4.

Table 4

Raw Score Range for the State 2019 Milestones Achievement Level by Descriptor

		Raw score range for each Milestones level			
Subject	Grade	Beginning	Developing	Proficient	Distinguished
ELA	3	180-474	475-524	525-580	581-830
	4	210-474	475-524	525-573	574-775
	5	210-474	475-524	525-586	587-760
Math	3	290-474	475-524	525-579	580-705
	4	270-474	475-524	525-584	585-715
	5	265-474	475-524	525-579	580-725
Science	5	160-474	475-524	525-594	595-785

Student scores included in the testing population for the 2019 data set were grouped according to the scoring parameters in Table 2. According to the state website, the state's accreditation commission establishes standards and encourages high-quality instruction for children; these point ranges were used as a guide to assess student achievement.

Independent Variable: Type of PI/PE Program. According to the district website, both schools use district resources, including Infinite Campus, a web and mobile application focused on informing parents about instruction. Infinite Campus includes Title I program information, college information, PE tips, and other student guidance offerings. Infinite Campus is a feature for parents who want to ensure their child understands the classwork. Through the application, parents can access grades, attendance, and schedules. Several other features are available on the application: a one-stop resource for parents to find support, social-emotional development tips, and a Parent Toolkit. The Parent Toolkit also encourages and celebrates diversity among early learners. There is a guide for physical health, a young adult's guide to inform parents, and other family resources. Although both schools have access to Infinite Campus, only School B requires parents to engage through the application.

Families who do not have a home computer are available to students attending both schools via a lending library; computers may be used at any location. According to the district website, parents, students, and staff have real-time access to information confidently and securely through the website. The portal allows the parent to view and browse student assignments in real-time.

School B’s PE approach and mandatory hours of service produce the structure. According to the district website, the students can be selected through an automated process of choice of schools. According to the school website, mandatory School B offers a comprehensive, interdisciplinary educational program to students in an organized setting and what the district provides. The student selection is random, enrollment commitment is one year, the school requires PI/PE service hours, and students must display good standing to continue enrollment. Parents must attend Parent University workshops and accumulate volunteer hours (i.e., 16 hours each year) through attendance. Parents volunteer 8 hours in the first semester and 8 hours in the second semester. Although there are other guidelines for mandatory School B, these are the most significant. The mandatory program does provide an opportunity for other family members to perform parent service hours (i.e., grandparents, adult aunts, uncles, and siblings).

Data Analysis Plan

To test the null and alternative hypotheses for the research questions in this study, I followed best practices in setting up my database, screening the data, and preparing it for statistical analysis. The purpose of the analysis was to address the research questions by testing the null hypotheses. The results of the data analysis are provided in Chapter 4. The research questions and their aligned null and alternative hypotheses are:

RQ1: What is the difference in the mean test scores on the state ELA Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

$H_0$1: There is no statistically significant difference in mean scores on the state ELA Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a1: There is a statistically significant difference in mean scores on the state ELA Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ2: What is the difference in the mean test scores on the state math Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

$H_0$2: There is no statistically significant difference in mean scores on the state math Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a2: There is a statistically significant difference in mean scores on the state math Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ3: What is the difference in the mean test scores on the state ELA Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

$H_0$3: There is no statistically significant difference in mean scores on the state ELA Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a3: There is a statistically significant difference in mean scores on the state ELA Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ4: What is the difference in the mean test scores on the state math Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

$H_0$4: There is no statistically significant difference in mean scores on the state math Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a4: There is a statistically significant difference in mean scores on the state math Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ5: What is the difference in the mean test scores on the state ELA Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

H_05: There is no statistically significant difference in mean scores on the state ELA Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a5: There is a statistically significant difference in mean scores on the state ELA Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ6: What is the difference in the mean test scores on the state math Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

H_06: There is no statistically significant difference in mean scores on the state math Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a6: There is a statistically significant difference in mean scores on the state math Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

RQ7: What is the difference in the mean test scores on the state science Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

$H_0$7: There is no statistically significant difference in mean scores on the state science Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

H_a7: There is a statistically significant difference in mean scores on the state science Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

Data Screening

According to Laerd (2015), before the analysis, the researcher must screen the data set to ensure that the data sets are complete and appropriate for the study's parameters. In this study, I verified that the cases of students and variables were in the appropriate spreadsheet rows and columns. Specifically, I ensured that all student cases were accurately represented in the database by the variables in the research questions: Milestones scores, grade level, school subject, and type of school PI/PE program. The next step was to screen the data for possible outliers or data points that should be excluded.

Validate Data for Analysis

After the data were screened, I imported the data set into SPSS (v.25) to compare the means of the student cases in two groups with an independent samples *t* test. Before completing the analysis, the best practice is to validate that the data set meets the appropriate assumptions for the selected test. According to Laerd (2015), six assumptions must be met for an independent samples *t* test:

1. The dependent variable must be continuous data at the ratio or interval level.
2. The independent variable must be two or more categorical independent groups.
3. There must be independence of observation—meaning there is no relationship or overlap between the two groups.
4. There should be no significant outliers—data points that do not follow the usual pattern.
5. The dependent variable should be approximately normally distributed for each category of the independent variable.
6. The data set must have homogeneity of variances. (Laerd Statistics, 2015, *Assumption*, para. 2)

I detail how the collected data met these assumptions in Chapter 4.

Statistical Analysis

The data were analyzed using SPSS (v. 25), and the normality, outliers, and homogeneity were met (Laerd Statistics, 2015). After the data were confirmed to meet the assumptions for the analysis, I completed an independent samples t test to evaluate the null hypotheses in this study.

Confounding Variables

According to Lodico et at. (2010), a confounding variable is an influence other than the dependent and independent variables in the study that may influence the outcome of the findings. I strategically considered possible confounding variables and designed the study to avoid undue influence. In a study on student achievement, racial diversity, SES, and teacher/student ratios may be confounding variables. To mitigate the influence of these factors, I purposefully selected School A and B—similar schools in racial diversity, SES distribution, and student/teacher ratios.

Both schools have similar diversity ratios of 84% for School A's nonmandatory PI/PE programs and 91% for School B's mandatory PI/PE (see Table 2). Additionally, 99% of the students at both Title 1 schools received free and reduced-price lunches. Further, the cost-of-living index for School A was 95.4, and that of School B was 97.2. Finally, although the state average for teacher/student ratio was 15:1, the ratios at School A and B were 13:1 and 14:1, respectively. Choosing schools with similar construction and student populations is one way to mitigate the influence of confounding variables.

Parameters for Interpretation of Results

The research questions and the aligned null and alternative hypotheses were analyzed for results and findings based upon 80% power, 95% confidence intervals, and a *p* value of .05. *Power* is the probability that the independent samples *t* test will discover a statistically significant difference when the difference exists. Simply speaking, a power of .80 or greater means an 80% or greater chance of finding a statistically significant difference when there is one. The independent samples *t* test in SPSS default to 95%

confidence intervals, indicating there is a 95% chance that the researcher will reject the null hypothesis. Confidence intervals provide an indication of the magnitude of the effects of the findings. In this study, a large effect size refers to the fact that there is a practical significance in the difference between the programs. The analyses is this study were completed with a *p* value of .05.

Threats to Validity

Internal and external validity has two types of threats to validity that could affect this study (Creswell & Creswell, 2017). The threats to external validity relate to factors that may have affected the results and the expected difference of PI/PE on students' performance on the test.

External

According to Lodico et at. (2010), external validity refers to the extent to which results from a study can be applied to or generalized to other situations, groups, or events. The three most important external validity are testing sample bias and Hawthorne's effect. There was no treatment of participants, no pretest or posttest. The data collection could not be generalized outside the state's target school district. The Hawthorne effect does not apply to the study as there were no participants (Creswell & Creswell, 2017).

Internal

According to Lodico et al. (2010), internal validity refers to the confidence that the causal relationship being tested is trustworthy and not influenced by other factors. History, maturation, instrumentation, testing, selection bias, regression to the mean. Social interaction and attrition. History did not influence the condition of the study because the data used was archival and already gathered. There was no pretest and posttest in this study; therefore, there were no maturation threats. There was no observation, testing procedures, or data collection in the study, and no instrumentation was used, such as questionnaires and surveys. The participant selection was convenient sampling. Attrition was not an issue as the data collection was archival. Regression towards the mean was a factor; however, I removed and documented the excluded data points and explained their reasoning for outliers. I also provided a specific cause for removing outliers. Social interaction influence was not a factor because the two schools I selected had subjects with the same values. For example, students in Grades 3,4, and 5 were chosen for the study. I matched the subject area as closely as possible, grade level, age, ethnicity, and SES. However, other influences such as teaching experience, gender percentages, and school climate/culture could not be controlled.

Construct

Construct validity involves looking for evidence that an instrument accurately measures an abstract trait or ability (Creswell & Creswell, 2017). According to Lodico et al. (2010), an individual could use the Mental Measurement Yearbook (MMY) from most universities and large public libraries. MMY is a synopsis of a wide variety of measurement instruments. However, this study used no tool for measuring abstract trait or abilities.

Statistical

Statistical validity occurs in research when conclusions are founded on adequate analysis using acceptable statistical methods (Creswell & Creswell, 2017). Threats can lead to incorrect conclusions about relationships. For example, repeating tests to find something significant or incorrectly concluding a relationship exists when it does not. For this study, the sample size was large enough to avoid this threat, and data were not manipulated.

Ethical Procedures

Permissions

The DoE permitted me to use archived student data (see Appendix A). According to the DoE's Office of Legal Services, all data files distributed in response to requests are from the public domain. All records are free to use, and possession of the file is de facto permission to use the data contained in the file—no letters of permission or signed permission forms for individual requests. There was no direct contact with students, teachers, or principals of the selected elementary school; no participants were involved in this study.

Treatment of Data

Archival data were the only data source used in this analysis. It did not include demographic or personal identifying information. Walden University’s IRB (No. 06-12-20-0138496) approved this study. There were no ethical concerns for participants as there were no participants in the data collection process.

Storage

I used a password-protected storage drive and created a folder to save and store data to ensure confidentiality. The provided data were transmitted to me via email in an Excel document. I then imported the dataset into the SPSS database and stored it in a secure password-protected file. I adhered to the university standard to ensure anonymity for this study's purposes. The data will be stored for five years. For this study, all data inputs in SPSS are stored in a secure computer system.

Destruction of Data

I will destroy the data after five years following Walden's IRB plan and guidelines establishing the efficiency of data disposal in compliance with the Confidentiality and Data Usage Agreement. FERPA does not specify technical requirements governing data destruction. Methods discussed and online documents are considered best practices for educational agencies and institutions when establishing record retention and data.

No identifiable information was included in the file. According to the State website, deleting electronic files or using a desk shredder for paper documents for low-risk information is sufficient. More robust methods of destruction may need to be provided for more sensitive data to ensure that the data are irretrievable.

Summary

In Chapter 3, I introduce the research design, methodology, sampling, and procedures was introduced. I discussed the archived data set, the population, data collection, instrumentation, and the operationalization of constructs. I included data analysis, threats to validity, and ethical procedures. I used an independent samples *t* test to measure student grades to determine if there was a significant difference in the mean test scores between the two groups for this study. I explained the data collection and the use of archival data. I stated how I used SPSS to calculate the mean score. In Chapter 4, I will briefly review the study's purpose, research question, and hypotheses. I also describe the results of the study.

Chapter 4: Results

The purpose of this study was to compare differences in Grade 3-5 students' Milestones test scores in ELA, mathematics, and science (dependent variable) at two Southeastern United States elementary schools that offer different PI/PE programs—a nonmandatory or mandatory PI/PE program (independent variable), represented by School A and B, respectively. Using an ex post facto design, I investigated differences in student achievement in Grades 3 through 5 ELA and math and in Grades 5 (only) science. I compared student-groups based on their school's PI/PE program type—whether it required parent/guardian participation in their PI/PE program.

The seven null hypotheses stated, in general, that there was no statistically significant difference in the test scores on the state Milestones in ELA and math for Grades 3-5 students and science only for Grade 5 students at the two schools with different PI/PE programs. In Chapter 4, I address the research questions and hypotheses. Then, I describe the data collection process, the demographic characteristics, and the appropriateness of the data set. I also provide the analysis results in the context of the RQs.

Data Collection

I collected the data for this study according to the data collection plan. I received the intact, deidentified data set 15 days after my initial request. The DoE review board approved my request for student data, and a representative provided a data set that included the following: school year, system identification, school identification, a randomly assigned, sequential number to code each student, grade level, test subject score, and ALDs performance level. There were no discrepancies in the planned and actual data collection process, as there were no actual participants in this ex post facto study.

The data consisted of state Milestones test scores in ELA, math, and science for students enrolled in the 2018/2019 school year. Data were from two schools and included Milestones scores from Grades 3, 4, and 5 in ELA, math, and science. The entire database had 1077 data sets, with 48.42% from School A and 51.58% from School B (n = 521 and 555, respectively). Overall, School A provided 34 fewer data sets than School B. School A's PI/PE program was nonmandatory, and School Bs was mandatory. Table 5 includes the number and percent of students represented in the sample, detailed by the school, grade, and subject.

Table 5

Number and Percent of Students in Sample by School, Grade, & Subject

		Subject					Total by school	
		ELA	Math		Science			
School	Grade	*n*	*n*	%	*n*	%	*n*	%
A	3	90	90		--		180	16.73
	4	75	75		--		150	13.94
	5	65	64		62		191	17.75
Total		230	229	48.52	62	48.06	521	48.42
B	3	92	92		--		184	17.10
	4	85	85		--		170	15.80
	5	67	67		67		201	18.68
Total		244	244	51.48	67	51.94	555	51.58
Overall		474	473	100.00	129	100.00	1076	100.00

Demographically, in the aggregated database, the subsample size for Grade 3 ELA and math (n = 182), Grade 4 ELA and math (n = 160); and Grade 5 ELA (n = 132), and math (n = 131) were within the required parameters of the G*Power analysis (n = 64). In the Grade 5 science subsample, although there were 129 data sets, 67 were from School B, but 62 were from School A. As the Grade 5 science sample sizes were short of the required n of 64, the extrapolation from the data set was affected. These details are discussed in the RQ7 results.

Results

I imported the data from the Excel spreadsheet sent to me from the DoE into SPSS version 25. I used SPSS to perform the statistical analyses (Laerd Statistics, 2015). There were no missing data in the spreadsheet.

The master database included 1076 sets of complete student data. School A recorded 521 data sets, and School B, 555. The data were sorted by school, grade, and course until subsets were formed for ELA, math, and science in the appropriate grades where the Milestones exam was offered. Table 6 describes the number, mean, standard deviation, and standard error means by PI/PE type, the grouping variable in this study.

Table 6

Descriptive Statistics of Student Milestones Scores by PI/PE Type, Grade, & Course

		PI/PE Type*							
		n		*M*		*SD*		*SEM*	
Grade	Subject	A	B	A	B	A	B	A	B
3	ELA	90	92	473.10	533.80	44.03	49.79	4.64	5.19
3	Math	90	92	487.34	535.32	42.04	41.56	4.43	4.33
4	ELA	75	85	478.28	521.20	58.41	44.39	6.75	4.82
4	Math	75	85	496.31	516.33	45.53	45.23	5.29	4.91
5	ELA	65	67	493.95	540.52	46.88	43.91	5.82	5.36
5	Math	64	67	488.03	537.90	40.10	45.53	5.13	5.56
5	Science	62	67	483.65	536.04	54.73	46.68	6.95	5.70
	Total	521	555						

*PI/PE Type is indicated by School A = nonmandatory or School B = mandatory

When comparing the number of student data sets from School A and B, most were similar. There were 10 fewer Grade 4 students in School A than in School B; however, both subsets included over 64 student scores, the parameter indicated by the G*Power analysis. The only subset below this ideal threshold was School A, Grade 5 science (n = 62). The implications of the analysis based on this sample size are discussed in RQ 7.

Statistical Assumptions for Independent Samples *t* Test

According to Laerd (2015), six assumptions must be met to run the selected analysis. Verifying that a data set meets these assumptions provides affirmation that the analysis is appropriately applied to a given situation. For the analysis in this study, I had to ensure or verify that

- the dependent variable data were continuous.
- there was one independent variable with two categories or groups.
- the two categories or groups of the independent variable also had independence of observation.
- there were no outliers in the data.
- the data were normally distributed, and that
- the data has a homogeneity of variances.

The discussion in this subsection verifies that the assumptions were met and that the independent samples *t* test is appropriate for the research design (Laerd Statistics, 2015).

Assumptions 1-3

According to the first assumption, the dependent variable must be interval or ratio data (Lodico et al., 2010). This study used Milestones scale scores to compare students 'performance taking the same grade/subject area assessments. These data were, by definition, continuous.

The two groups compared in this study, the independent variables, were determined by the type of PI/PE program—separate schools in different locations—creating independent groups without overlap in observation or membership. As these two independent groups are categorical and share no student members, the data gathered from students in these groups meet the criteria for Assumptions 2 and 3 (Lodico et al., 2010).

Assumptions 4-5

All groups in the RQs for this study were analyzed for outliers and normal distribution of data. I completed a comparison of each group explained any instances of violations to Assumptions 4 or 5. From the analysis of the assumptions, the groups in RQ1 and RQ5 had outliers that were adjusted. Even though all groups were also examined for the assumption of normality. The groups in RQs 2, 4-6 violated the assumption. This subsection includes detail on the process of meeting these two assumptions.

Assumption 4: Outliers. Assumption 4 relates to ensuring that there were no significant outliers in the data for the two groups of the independent variable in terms of the dependent variable. According to Laerd Statistics (2015), outliers can be determined using the SPSS Explore function in the *Descriptive* tab. Any data points that are 1.5 box lengths from the resulting boxplot are designated as *outliers*; if a data point is three or more box lengths, it is considered an *extreme outlier*. According to SPSS, outliers are categorized as mild (univariate) or extreme (multivariate) outliers. Mild outliers are indicated in SPSS with a circle; extreme outliers are indicated with a star. Multivariate or extreme outliers may be a problem for multiple variables. According to SPSS, the researcher should keep the univariate outliers and remove the multivariate outliers, the ones with stars.

According to Laerd Statistics, there are three reasons for outliers in the data: (a) data entry errors, (b) measurement errors, or (c) genuinely exceptional values. For example, if one student achieved a high score of 636 (i.e., extreme outlier) on the

Milestones assessment, the following options were available to me: (a) I could run the non-parametric Mann-Whitney U rather than *t* test; (b) I could modify the outlier by replacing the outlier's value with one that is less extreme (i.e., the next-largest value instead); (c) I could transform the dependent variable; (d) or include the outlier in the analysis (Laerd Statistics). Proper research reporting indicates that, for transparency, all decisions about managing outliers should be included in the results section of the data analysis. I report the results of the box-plot analysis for the independent variables in RQs 1-7 using this language and this process.

Assumption 5: Normal Distribution. Assumption 5 states that data must be normally distributed for each independent variable group. The Shapiro-Wilks test is commonly applied to verify groups normality, particularly for novice researchers without experience interpreting graphical methods of determining normality. In the Shapiro-Wilks, if the *Sig* value in the output is greater than .05 ($p > .05$), the data distribution is assumed to meet the assumption of normality. If the *Sig*. value is less than .05 ($p < .05$), the assumption of normality is violated. Normality must be assessed for each group in the comparison.

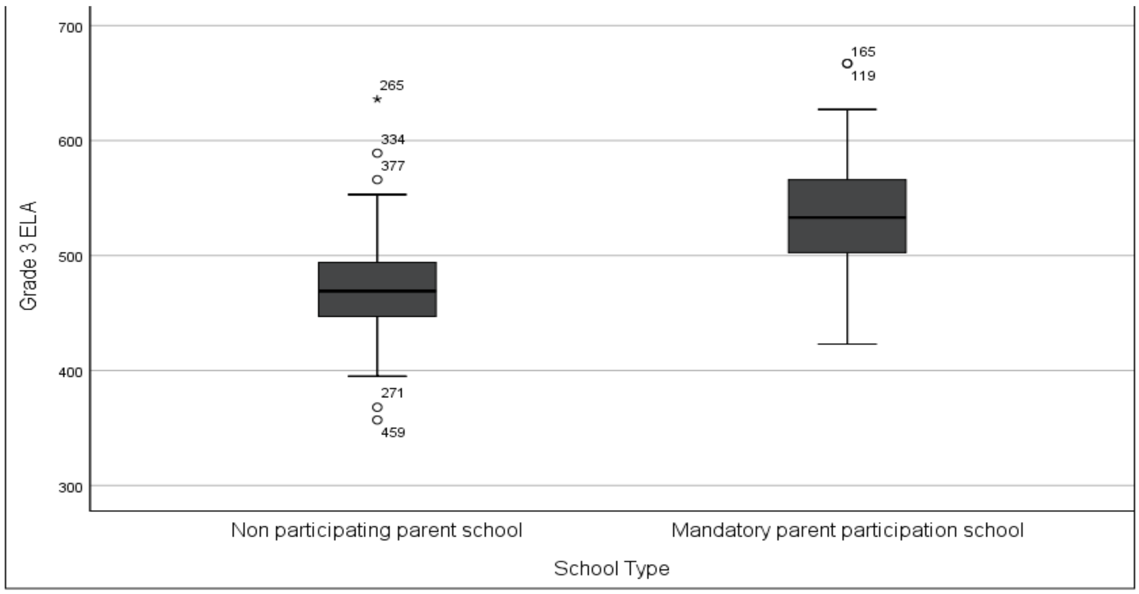
If a group fails to meet the assumption of normality, the researcher, according to Laerd Statistics (2015), must further analyze the distribution and make decisions based on best practices. The choices include using multiple assessment methods that include numerical or graphical techniques. Upon confirmation that the data violate the assumption of normality, the researcher's options are to transform the dependent variable, use a nonparametric rather than parametric analysis, or continue without making changes.

In this study, the t-test is considered "fairly robust to deviations from normality," meaning that if the "numbers in each group are equal or nearly equal, only strong violations of normality might cause problems" (Laerd Statistics, 2015, *Dealing with issues of normality*, para. 4). All circumstances relative to determining the assumption of normality should be properly disclosed in the results of the RQ. The normality for each independent groups in this study is reported by RQ using the language indicated in these processes.

RQ1: Grade 3 ELA. For the RQ comparing Grade 3 ELA scores in School A and B, I assessed each sample to determine alignment with Assumptions 4 and 5. There was an outlier in the School A data, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Figure 2 includes the RQ1 boxplot indicating an outlier in School A.

Figure 2

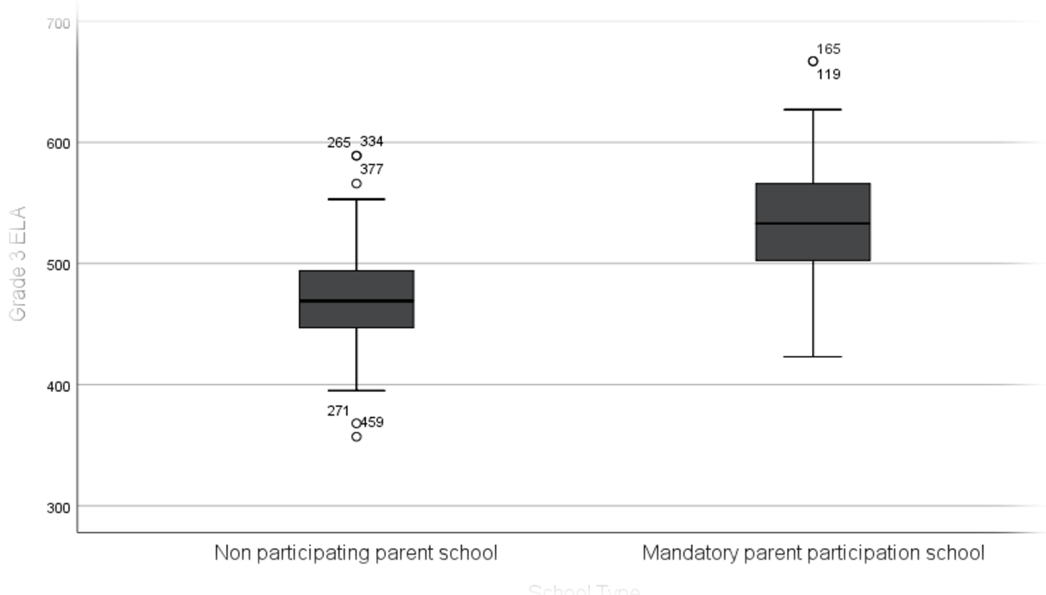
Grade 3 ELA Boxplot with Extreme Outlier



In this analysis, Grade 3 ELA indicated an outlier in the nonmandatory PI/PE program for Case 265. I analyzed the data set for data entry or measurement errors and genuinely values in the data set. As there was no evidence of error, I modified the outlier by replacing its value with the next-largest value, replacing Case 265 score of 667 with the score of 680. I then reran the boxplot, which revealed no extreme outlier in the independent variable. Figure 3 includes the revised boxplot for RQ1.

Figure 3

Grade 3 ELA Boxplot Without Outlier



For the RQ comparing Grade 3 ELA scores in School A and School B, I assessed each sample to determine alignment with Assumption 5. Milestones assessment scores were normally distributed for both School A and B, as assessed by Shapiro-Wilk's test ($p > .05$). Table 7 includes the RQ1 results of the normality test for these two groups.

Table 7

Grade 3 ELA Test of Normality by School & PI/PE Type

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DV	School & PI/PE Type	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
Grade 3 ELA	A—Nonmandatory	.089	90	.074	.978	90	.135
	B—Mandatory	.063	92	.200*	.987	92	.471

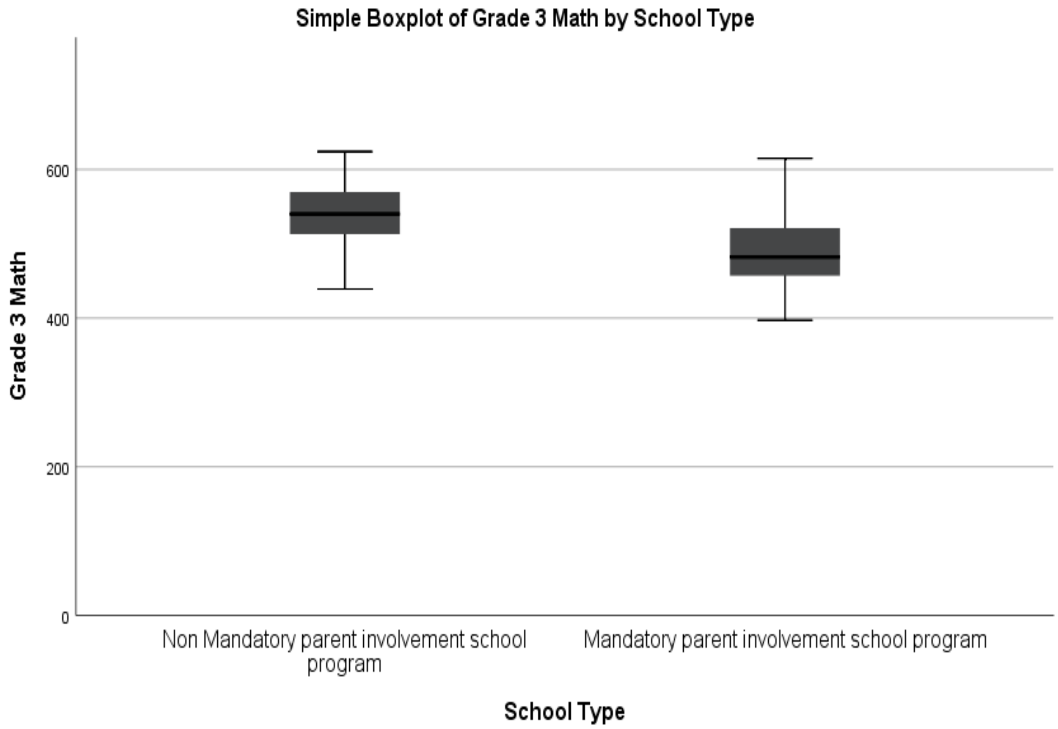
*. Lower bound of the true significance.

a. Lilliefors Significance Correction

RQ2: Grade 3 Math. For the RQ comparing Grade 3 math scores in School A and School B, I assessed each sample to determine alignment with Assumptions 4 and 5. There were no extreme outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Figure 4 includes the boxplot for RQ2, indicating no outliers.

Figure 4

Grade 3 Math Boxplot



For the RQ comparing Grade 3 math scores in School A and School B, I assessed each sample to determine alignment with Assumption 5. Milestones assessment scores were not normally distributed for School A but were for School B, as assessed by Shapiro-Wilk's test ($p > .05$). The sample sizes for Grade 3 math groups differed by only two participants. Table 8 includes the normality test results for the two groups in RQ2.

Table 8

Grade 3 Math Test of Normality by School & PI/PE Type

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DV	School & PI/PE Type	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
Grade 3 Math	A—Nonmandatory	.116	90	.004	.965	90	.015
	B—Mandatory	.079	92	.200*	.973	92	.054

*. Lower bound of the true significance.

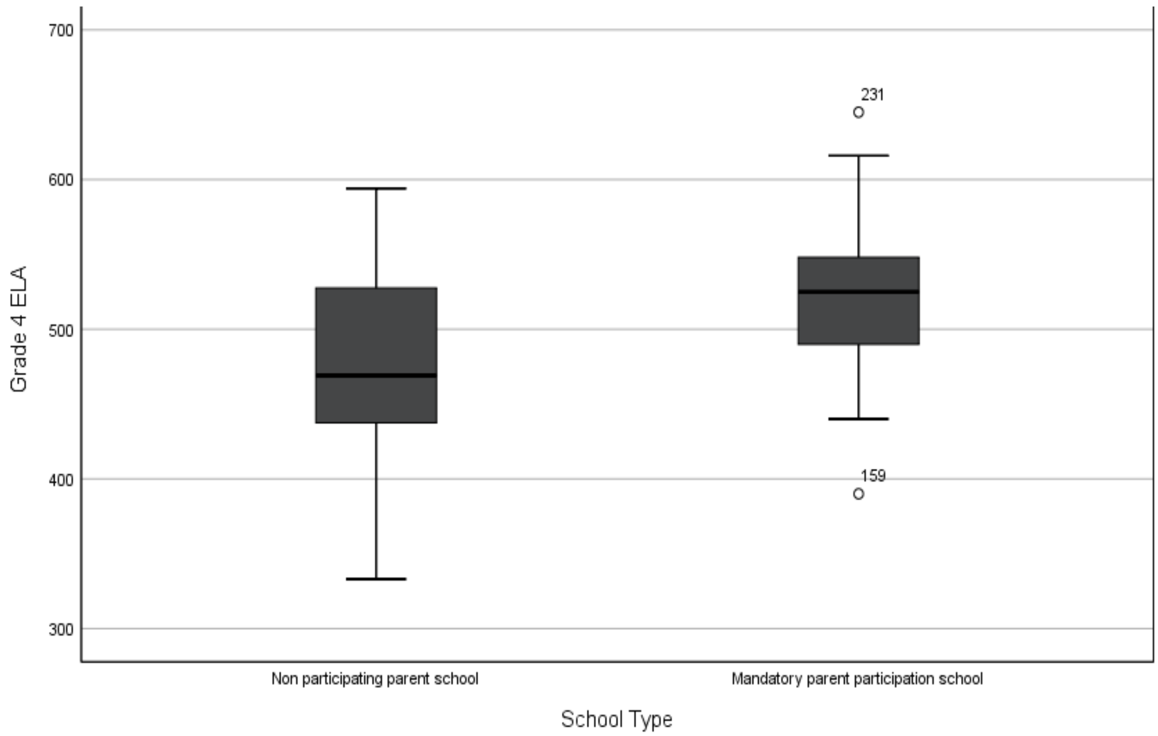
a. Lilliefors Significance Correction

According to Laerd (2015), if the distributions are only moderately skewed, the overall results are not problematic, as the residuals need to be normally distributed. A visual review of the boxplot graphic in Figure 4 indicates that the median for School B has a slight positive skew. As the student scores are from a standardized assessment with an underlying normal distribution, there is confidence that the variation in normality will not affect the outcome of the *t* test, which is robust relative to normality (Laerds Statistics, 2015).

RQ3: Grade 4 ELA. For the RQ comparing Grade 4 ELA scores in School A and School B, I assessed each sample to determine alignment with Assumptions 4 and 5. There were no extreme outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Figure 5 includes the boxplot for RQ3, indicating no extreme outliers.

Figure 5

Grade 4 ELA Boxplot



For the RQ comparing Grade 4 ELA scores in School A and School B, I assessed each sample to determine alignment with Assumption 5. Milestones assessment scores were normally distributed for both School A and B, as assessed by Shapiro-Wilk's test ($p > .05$). Table 9 includes the RQ3 results of the normality test for these two groups.

Table 9

Grade 4 ELA Test of Normality by School & PI/PE Type

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DV	School & PI/PE Type	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
Grade 4 ELA	A—Nonmandatory	.110	75	.026	.978	75	.224
	B—Mandatory	.071	85	.200*	.990	85	.784

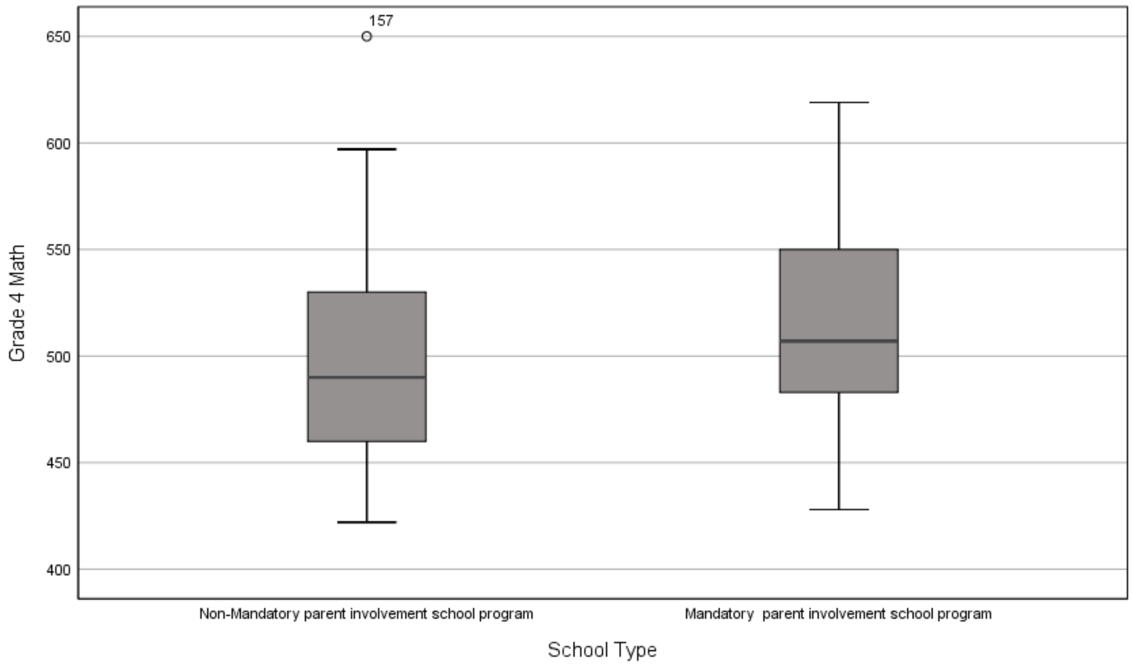
*. Lower bound of the true significance.

a. Lilliefors Significance Correction

RQ4: Grade 4 Math. For the RQ comparing Grade 4 math scores in School A and School B, I assessed each sample to determine alignment with Assumptions 4 and 5. There were no extreme outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Figure 6 includes the boxplot for RQ4, indicating no extreme outliers.

Figure 6

Grade 4 Math Boxplot



I assessed each sample for RQ4, comparing Grade 4 math scores in School A an School B to determine alignment with Assumption 5. Table 10 shows that Milestones scores were normally distributed for School B but not for School A, as assessed by the Shapiro-Wilk's test ($p < .05$). These sample sizes had the greatest difference in number with School B having ten more data sets than School A. According to Laerd (2015), if the distributions are only moderately skewed, the overall results are not problematic, as the residuals need to be normally distributed. As the student scores are from a standardized assessment with an underlying normal distribution, there is confidence that the variation in normality will not affect the outcome of the *t* test, which is robust relative to normality (Laerds Statistics, 2015). Table 10 includes the normality test for the two groups in RQ4.

Table 10

Grade 4 Math Test of Normality by School & PI/PE Type

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DV	School & PI/PE Type	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
Grade 4 Math	A—Nonmandatory	.140	74	.001	.950	74	.005
	B—Mandatory	.120	85	.004	.972	85	.062

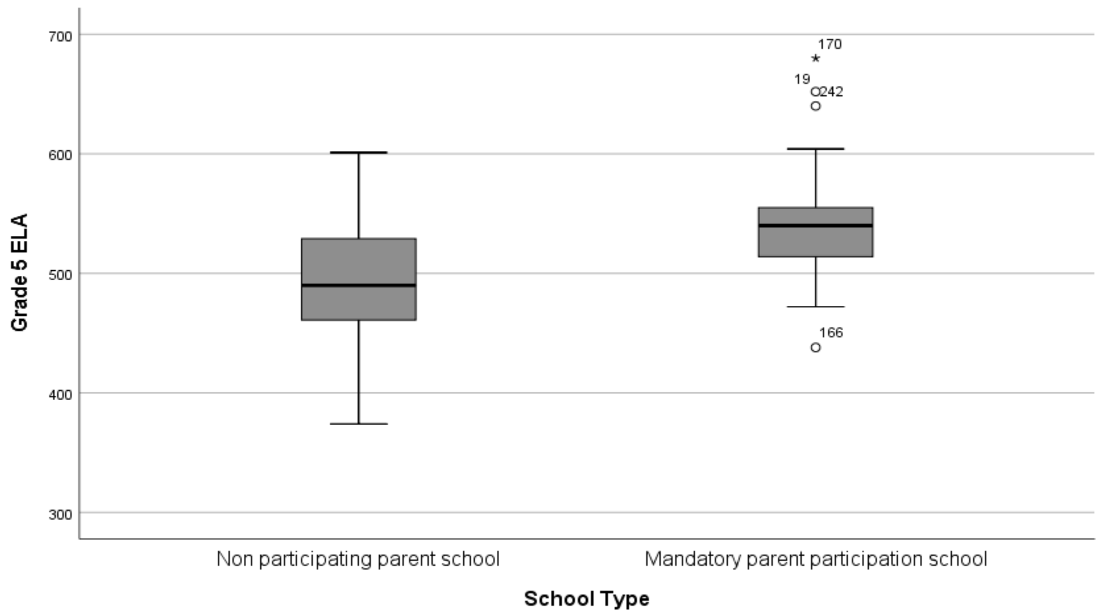
*. Lower bound of the true significance.

a. Lilliefors Significance Correction

RQ5: Grade 5 ELA. For the RQ comparing Grade 5 ELA scores in School A and School B, I assessed each sample to determine alignment with Assumptions 4 and 5. There was an outlier in the School B data, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Figure 7 includes the box plot for RQ5, indicating an extreme outlier in School B.

Figure 7

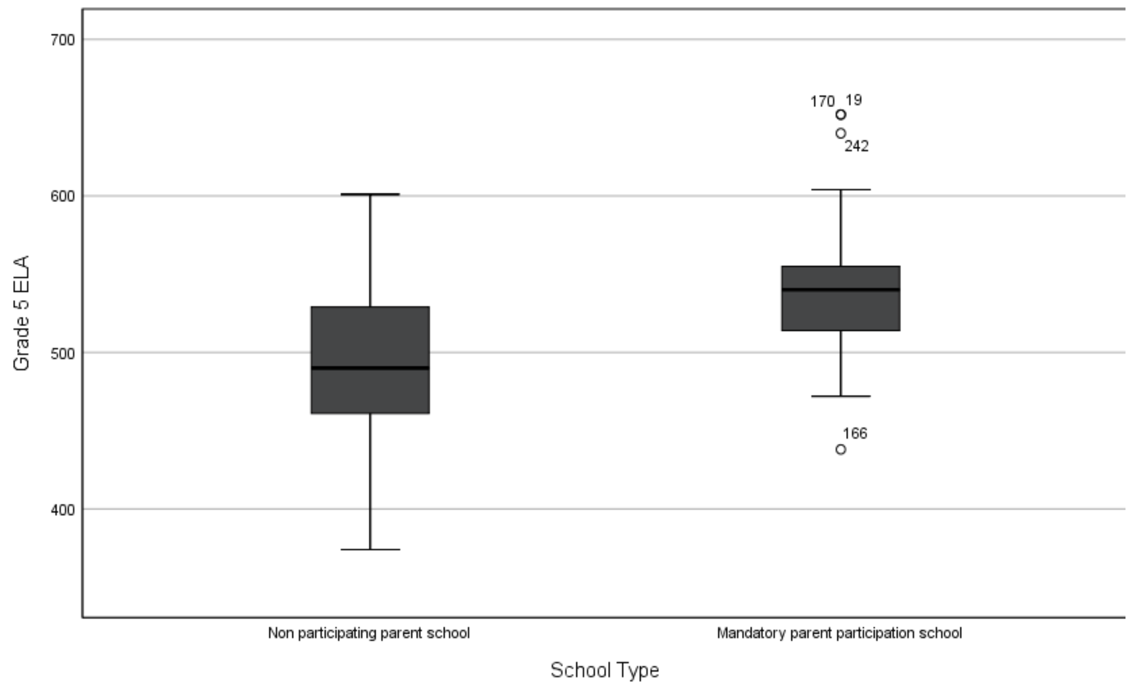
Grade 5 ELA Boxplot with Extreme Outlier



I analyzed the data set for data entry or measurement errors and genuinely values in the data set. As there was no evidence of error, I modified the outlier by replacing its value with the next-largest value, replacing the Case 170 score of 447 with the score of 680. I then reran the boxplot, which revealed no extreme outliers in the independent variable. Figure 8 includes the revised boxplot for RQ 5, indicating no extreme outliers.

Figure 8

Grade 5 ELA Without the Extreme Outlier



For the RQ comparing Grade 5 ELA scores in School A and School B, I assessed each sample to determine alignment with Assumption 5. Milestones assessment scores were normally distributed for School A but not for School B, as assessed by Shapiro-Wilk's test ($p > .05$). The sample sizes for Grade 5 ELA groups differed by only 2 participants. A visual review of the boxplot graphic in Figure 8 indicates that the median for School B has a slight negative skew. According to Laerd (2015), if the distributions are only moderately skewed, the overall results are not problematic, as the residuals need to be normally distributed. As the student scores are from a standardized assessment with an underlying normal distribution, there is confidence that the variation in normality will not affect the outcome of the *t* test, which is robust relative to normality (Laerd Statistics, 2015). Table 11 includes the normality test results for the two groups in RQ5.

Table 11

Grade 5 ELA Test of Normality by School & PI/PE Type

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DV	School & PI/PE Type	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
Grade 5 ELA	A—Nonmandatory	.078	65	.200*	.987	65	.729
	B—Mandatory	.143	67	.002	.960	67	.031

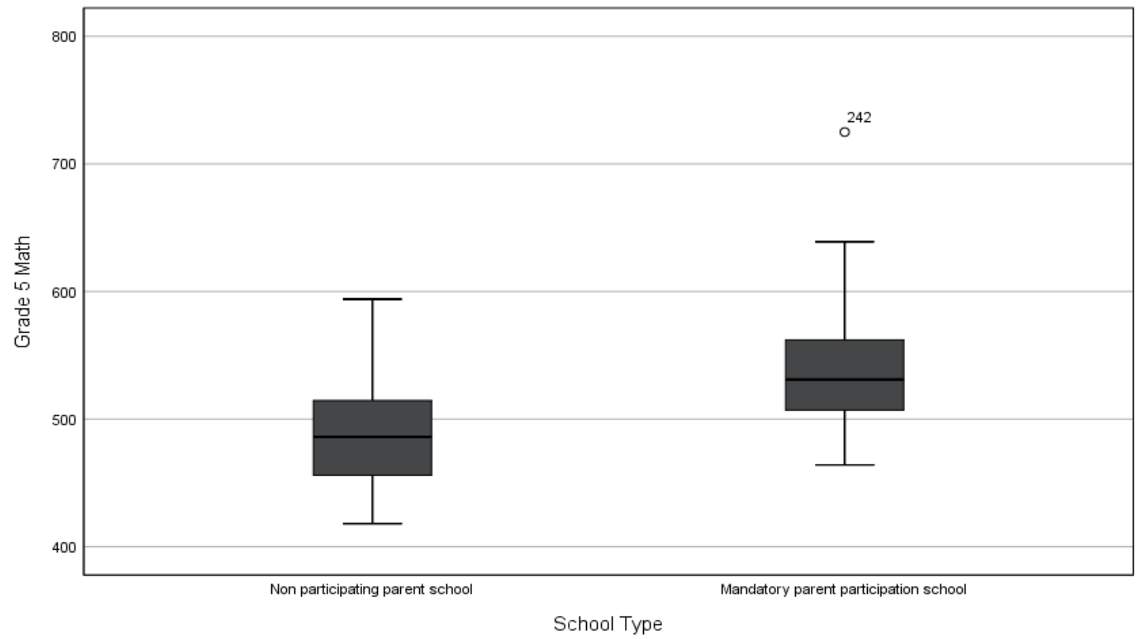
*. Lower bound of the true significance.

a. Lilliefors Significance Correction

RQ6: Grade 5 Math. For the RQ comparing Grade 5 math scores in School A and School B, I assessed each sample to determine alignment with Assumptions 4 and 5. There were no extreme outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Figure 9 includes the boxplot for RQ6, indicating no extreme outliers in the data.

Figure 9

Grade 5 Math Boxplot



I assessed each sample for RQ6, comparing Grade 5 math scores in School A and School B to determine alignment with Assumption 5. Milestones assessment scores were normally distributed for School A but not for School B, as assessed by Shapiro-Wilk's test ($p > .05$). The sample sizes for Grade 5 math groups differed by only three participants. A visual review of the boxplot graphic in Figure 9 indicates that the median for School B has a slight positive skew. According to Laerd (2015), if the distributions are only moderately skewed, the overall results are not problematic, as the residuals need to be normally distributed. As the student scores are from a standardized assessment with an underlying normal distribution, there is confidence that the variation in normality will not affect the outcome of the *t* test, which is robust relative to normality (Laerds Statistics, 2015). Table 12 includes the normality test results for the two groups in RQ6.

Table 12

Grade 5 Math Test of Normality by School & PI/PE Type

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DV	School & PI/PE Type	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
Grade 5 Math	A—Nonmandatory	.096	64	.200*	.975	64	.220
	B—Mandatory	.143	67	.002	.922	67	.000

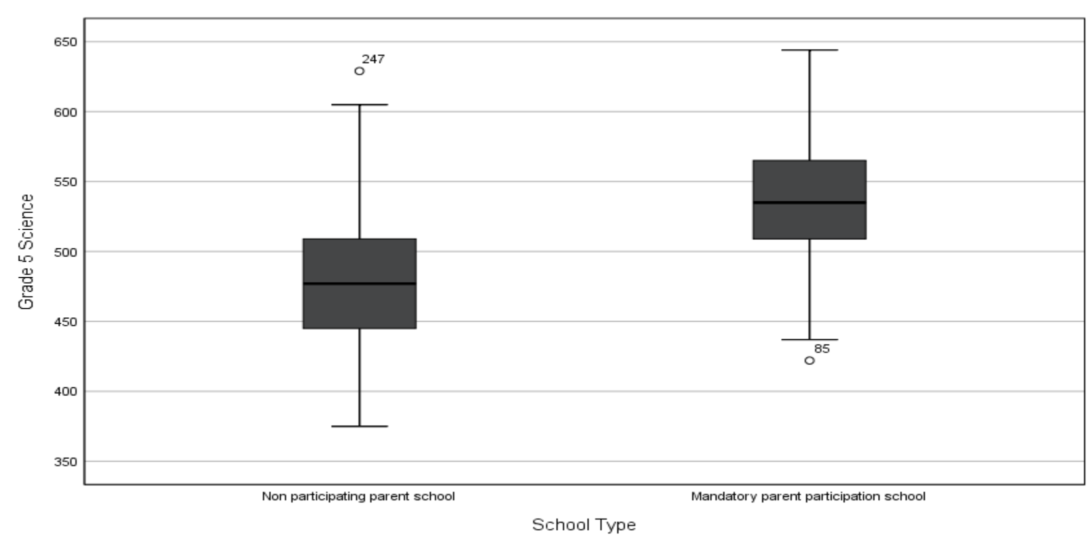
*. Lower bound of the true significance.

a. Lilliefors Significance Correction

RQ7: Grade 5 Science. For the RQ comparing Grade 5 science scores in School A and School B, I assessed each sample to determine alignment with Assumptions 4 and 5. There were no extreme outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Figure 10 includes the boxplot for RQ7, indicating no outliers in the data.

Figure 10

Grade 5 Science Boxplot



For the RQ comparing Grade 5 science scores in School A and School B, I assessed each sample to determine alignment with Assumption 5. Milestones assessment scores were normally distributed for both School A and B, as assessed by Shapiro-Wilk's test ($p > .05$). Table13 includes the results of the normality test for these two groups in RQ7.

Table 13

Grade 5 Science Test of Normality by School & PI/PE Type

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DV	School & PI/PE Type	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
Grade 5 Science	A—Nonmandatory	.084	62	.200*	.968	62	.101
	B—Mandatory	.078	67	.200*	.989	67	.833

*. Lower bound of the true significance.

a. Lilliefors Significance Correction

Assumption 6

Assumption 6 states that the groups in the independent variables have homogeneity of variances, a construct that indicates that the variance between the two groups for the independent variable are equal (Laerd Statistics, 2015, Assumption #6, para. 7). When the sample population of the two groups has the same variance, the formula is written as $H_A: \sigma_1{}^2 = \sigma_2{}^2$; if the sample populations are different, the variance is written as $H_A: \sigma_1{}^2 \neq \sigma_2{}^2$. Homogeneity of variance is assessed in SPSS Statistics with Levene's test of equality of variances. According to Laerd Statistics (2015), Levene's test in SPSS "will give you a valid result irrespective of whether you met or violated this assumption" as there are "two differently-calculated" independent samples t tests (Laerd Statistics, 2015, Assumption #6, para. 7). In SPSS,

Levene's test of equality of variances is completed concurrently with the independent samples *t* test analysis. The *Sig.* column of the Levene's output indicates the significance level (i.e., *p* value) to determine if the variances of the groups are equal in the population. If $p > .05$, the population variance of each group is equal. If the $p < .05$, there is a violation in homogeneity of variances. As Levene's significance level is part of the output for the *t* test output, this assumption is addressed by RQ in the findings.

Statistical Analysis Findings by RQ

I completed an independent *t* test for each RQ in this study to determine differences between the ELA, math, and science scores of Grades 3-5 students from two schools—those from School A which has a nonmandatory PI/PE program and those from School B, which has a mandatory PI/PE program. As this discussion is organized by RQ, I share the results of Levene's Test for Equality of Variance—a significance value that indicates if the sample meets or violates Assumption 6, homogeneity of variance; I provide the statistical findings from each *t* test and the conclusions relative to rejecting or accepting hypotheses; and I include Cohen's *d* value, the appropriate measure of effect size for a *t* test. According to Cohen, an effect size that accounts for 25% of the variance would be considered a *large* effect, while 9% and 1% would represent a *moderate* or *small* effect, respectively (Cronk, 2008). Including Cohen's *d* provides a statistical indicator on the extent of the effect created by the differences found in the means. After the analysis was complete, I also completed a G*Power analysis to calculate the actual power achieved in the analysis. The a priori sample size generated by the G*Power analysis using alpha 0.2 and a power of 80 was 64 per group. The values and parameters of these analyses are included with the discussion on each RQ.

RQ1 Results: Grade 3 ELA

RQ1: What is the difference in the mean test scores on the state ELA Milestones test for Grade 3 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory.

The ELA achievement scaled-scores means of Grade 3 students who attended the nonmandatory PI/PE school (n = 90) and the mandatory PI/PE school (n = 92) were analyzed with Levene's Test for Equality of Variances to determine homogeneity of variance. The significance (p = .145) was above .05, confirming that Assumption 6 was met. An independent samples t-test comparing the mean scores of the students at School A and B revealed a significant difference between the means of the two groups (t (180) = 8.706, p < .001). The mean of School A was significantly lower (m = 473.10, sd = 44.03) than the mean of School B (m = 533.80, sd = 49.79). The Cohen's d was 1.291, indicating a large effect size (i.e., d > .25). The post hoc G*Power analysis for the two Grade 3 ELA groups resulted in an achieved power of 91.8 percent. Table 14 includes the results of this analysis.

Table 14

Grade 3 ELA Independent Samples t-Test

	Levene's Test for Equality of Variances			*t*-test for Equality of Means				
DV		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Grade 3 ELA	Equal variances assumed	2.146	**.145**	**8.706**	180	**.000***	60.704	6.973
	Equal variances not assumed			8.718	178.201	.000*	60.704	6.963

*$p \leq .001$

Therefore, the null hypothesis that indicated there were no statistically significant differences among student scores based upon PI/PE type was rejected. The alternative hypothesis, therefore, was accepted.

RQ2: Grade 3 Math

RQ2: What is the difference in the mean test scores on the state math Milestones test for Grade 3 students from two schools with different PI/PE programs School A. nonmandatory, and School B, mandatory?

The math achievement scaled-scores means of Grade 3 students who attended the nonmandatory PI/PE school ($n = 90$) and the mandatory PI/PE school ($n = 92$) were analyzed with Levene's Test for Equality of Variances to determine homogeneity of variance. The significance ($p = .955$) was above .05, confirming that Assumption 6 was met. An independent samples *t*-test comparing the mean scores of the students at School A and B revealed a significant difference between the means of the two groups ($t(180) = 7.741$, $p < .001$). The mean of School A was significantly lower ($m = 487.34$, $sd = 42.04$) than the mean of School B (*m* = 535.32, *sd* = 41.56). The Cohen's *d* was 1.148, indicating a large effect size (i.e., *d* > .25). The post hoc G*Power analysis for the two Grade 3 math groups resulted in an achieved power of 91.8%. Table 15 includes the results of this analysis. Table 15 includes the results of this analysis.

Table 15

Grade 3 Math Independent Samples t-Test

	Levene's Test for Equality of Variances			*t*-test for Equality of Means				
DV		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Grade 3 Math	Equal variances assumed	.003	**.955**	**7.741**	180	**.000***	47.971	6.197
	Equal variances not assumed			7.740	179.797	.000*	47.971	6.198

*$p \leq .001$

Therefore, the null hypothesis that indicated there were no statistically significant differences among student scores based upon PI/PE type was rejected. The alternative hypothesis, therefore, was accepted.

RQ3: Grade 4 ELA

RQ3: What is the difference in the mean test scores on the state ELA Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B. Mandatory?

The ELA achievement scaled-scores means of Grade 4 students who attended the nonmandatory PI/PE school (*n* = 75) and the mandatory PI/PE school (*n* = 85) were analyzed with Levene's Test for Equality of Variances to determine homogeneity of variance. The significance (*p* = .01) was below .05, confirming that Assumption 6 was violated. As the population means did not reveal homogeneity of variance, I used the alternative *t* test calculations for unassumed equal variance. SPSS simultaneously calculates the analysis for equal variance assumed and unassumed. Additionally, I examined the confidence interval for the mean. Grade 4 ELA mandatory PI/PE mean student score was 42.92 points (95% CI, 26.53 to 59.31), higher than the nonmandatory PI/PE mean student score. Thus, even though the variances were unequal, there was a 95% confidence interval that the mean difference lies between 26.53 and 59.31

The independent samples *t*-test comparing the mean scores of the students at School A and B revealed a significant difference between the means of the two groups ($t(137.2) = 5.179$, $p < .001$). The mean of School A was significantly lower ($m = 487.28$, $sd = 58.41$) than the mean of School B ($m = 521.20$, $sd = 44.39$). The Cohen's *d* was .834, indicating a large effect size (i.e., $d > .25$). The post hoc G*Power analysis for the two Grade 4 ELA groups resulted in an achieved power of .88. Table 16 includes the results of this analysis.

Table 16

Grade 4 ELA Independent Samples t-Test

		Levene's Test for Equality of Variances		*t*-test for Equality of Means				
DV		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Grade 4 ELA	Equal variances assumed	6.716	**.010**	5.267	158	.000*	42.920	8.149
	Equal variances not assumed			**5.179**	137.249	**.000***	42.920	8.287

*$p \leq .001$

Therefore, the null hypothesis that indicated there were no statistically significant differences among student scores based upon PI/PE type was rejected. The alternative hypothesis, therefore, was accepted.

RQ4: Grade 4 Math

RQ4: What is the difference in the mean test scores on the state math Milestones test for Grade 4 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

The math achievement scaled-scores means of Grade 4 students who attended the nonmandatory PI/PE school ($n = 75$) and the mandatory PI/PE school ($n = 85$) were analyzed with Levene's Test for Equality of Variances to determine homogeneity of variance. The significance ($p = .869$) was above .05, confirming that Assumption 6 was met. An independent samples *t*-test comparing the mean scores of the students at School A and B revealed a significant difference between the means of the two groups ($t(157) = 2.775$, $p < .01$). The mean of School A was significantly lower ($m = 496.31$, $sd = 45.53$) than the mean of School B ($m = 516.33$, $sd = 45.23$). The Cohen's *d* was .441, indicating a large effect size (i.e., $d > .25$). The post hoc G*Power analysis for the two Grade 4 math groups resulted in an achieved power of .88. Table 17 includes the results of this analysis.

Table 17

Grade 4 Math Independent Samples t-Test

DV		Levene's Test for Equality of Variances F	Sig.	*t*-test for Equality of Means t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Grade 4 Math	Equal variances assumed	.027	**.869**	**2.775**	157	**.006***	20.019	7.213
	Equal variances not assumed			2.774	153.709	.006*	20.019	7.216

*$p \leq .01$

Therefore, the null hypothesis that indicated there were no statistically significant differences among student scores based upon PI/PE type was rejected. The alternative hypothesis, therefore, was accepted.

RQ5: Grade 5 ELA

RQ5: What is the difference in the mean test scores on the state ELA Milestones test for Grade 5 Students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

The ELA achievement scaled-scores means of Grade 5 students who attended the nonmandatory PI/PE school (n = 65) and the mandatory PI/PE school (n = 67) were analyzed with Levene's Test for Equality of Variances to determine homogeneity of variance. The significance (p = .275) was above .05, confirming that Assumption 6 was met. An independent samples *t*-test comparing the mean scores of the students at School A and B revealed a significant difference between the means of the two groups ($t(130)$ = 5.931, $p < .001$). The mean of School A was significantly lower (m = 493.95, sd = 46.88) than the mean of School B (m = 540.52, sd = 43.91). The Cohen's d was 1.033, indicating a large effect size (i.e., *d* > .25). The post hoc G*Power analysis for the two Grade 5 ELA groups resulted in an achieved power of .81. Table 18 includes the results of this analysis.

Table 18

Grade 5 ELA Independent Samples t-Test

		Levene's Test for Equality of Variances		*t*-test for Equality of Means				
DV		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Grade 5 ELA	Equal variances assumed	1.203	**.275**	**5.931**	130	**.000***	46.876	7.903
	Equal variances not assumed			5.926	128.815	.000*	46.876	7.911

*$p \leq .001$

Therefore, the null hypothesis that indicated there were no statistically significant differences among student scores based upon PI/PE type was rejected. The alternative hypothesis, therefore, was accepted.

RQ6: Grade 5 Math

RQ6: What is the difference in the mean test scores on the state math Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

The math achievement scaled-scores means of Grade 5 students who attended the nonmandatory PI/PE school ($n = 64$), and the mandatory PI/PE school ($n = 67$) were analyzed with Levene's Test for Equality of Variances to determine homogeneity of variance. The significance ($p = .908$) was above .05, confirming that Assumption 6 was met. An independent samples *t*-test comparing the mean scores of the students at School A and B revealed a significant difference between the means of the two groups ($t(129) = 6.577$,

$p < .001$). The mean of School A was significantly lower ($m = 488.03$, $sd = 40.99$) than the mean of School B ($m = 537.90$, $sd = 45.53$). Cohen's d was 1.150, indicating a large effect size (i.e., $d > .25$). The post hoc G*Power analysis for the two Grade 5 math groups resulted in an achieved power of .81. Table 19 includes the results of this analysis.

Table 19

Grade 5 Math Independent Samples t-Test

	Levene's Test for Equality of Variances			*t*-test for Equality of Means				
DV		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Grade 5 ELA	Equal variances assumed	.013	**.908**	**6.577**	129	**.000***	49.864	7.581
	Equal variances not assumed			6.593	128.561	.000*	49.864	7.563

*$p \leq .001$

RQ7: Grade 5 Science

RQ7: What is the difference in the mean test scores on the state science Milestones test for Grade 5 students from two schools with different PI/PE programs—School A, nonmandatory, and School B, mandatory?

The science achievement scaled-scores means of Grade 5 students who attended the nonmandatory PI/PE school ($n = 62$), and the mandatory PI/PE school ($n = 67$) were analyzed with Levene's Test for Equality of Variances to determine homogeneity of variance. The significance ($p = .162$) was above .05, confirming that Assumption 6 was met. An independent samples *t*-test comparing the mean scores of the students at School A and B revealed a significant difference between the means of the two groups ($t(127) = 5.864$, $p < .001$). The mean of School A was significantly lower ($m = 483.65$, $sd = 54.73$) than the mean of School B (*m* = 536.04, *sd* = 46.68). Cohen's *d* was 1.033, indicating a large effect size (i.e., *d* > .25). The post hoc G*Power analysis for the two Grade 5 science groups resulted in an achieved power of .80. Table 20 includes the results of this analysis.

Table 20

Grade 5 Science Independent Samples t-Test

	Levene's Test for Equality of Variances			*t*-test for Equality of Means				
DV		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Grade 5 ELA	Equal variances assumed	1.976	**.162**	**5.864**	127	**.000***	52.400	8.935
	Equal variances not assumed			5.828	120.353	.000*	52.400	8.991

*$p \leq .001$

Therefore, the null hypothesis that indicated there were no statistically significant differences among student scores based upon PI/PE type was rejected. The alternative hypothesis, therefore, was accepted.

Summary

The purpose of this quantitative, ex post facto study was to compare differences in Grade 3-5 students' mean test scores in ELA, mathematics, and science (dependent variable) at two Southeastern United States elementary schools which offered different PI/PE programs—a nonmandatory or mandatory program (independent variable), represented by School A and B. The findings indicated statistically significant differences in ELA, math, and science test scores in Grades 3, 4, and 5. The null hypotheses were rejected for each subject area, among all groups, across the seven RQs.

The data indicate that students at School B, the one with the mandatory PI/PE program, had higher performance on the Milestones assessment than those at School A, the nonmandatory PI/PE program. The results indicate higher academic outcomes from students at the school that required PI/PE. PI/PE type was probably a factor contributing to the variance between these means. The results may contribute to understanding the achievement gap between these two schools with different PI/PE programs. In Chapter 5, I discuss the conclusions, interpretations of the findings, implications for social change, and recommendations for future study.

Chapter 5: Discussion, Conclusions, and Recommendations

Parents’ involvement in their children’s schooling is vital for children's academic success. The purpose of this study was to compare differences in Grade 3-5 students’ mean test scores in ELA, mathematics, and science (independent variable) at two Southeastern United States elementary schools which offer different PI/PE programs—a nonmandatory or mandatory program (dependent variable), represented by School A and B, respectively.

The results indicate statistically significant differences in students' test scores for each subject and grade analyzed. Students in a nonmandatory PI/PE school program versus a mandatory PI/PE program experienced higher student achievement. In RQ1 through RQ7, the null hypotheses were rejected because there were significant differences ($p < .05$) in Grades 3 through 5 ELA, Grade 3 through 5 math, and Grade 5 science scores for the 2018/2019 school year. Although the a priori power estimation for the sample was 80., the achieved power of each analysis ranged from 80 to 93 for RQ1 through RQ7.

Interpretation of the Findings

The findings of this study indicate a statistically significant difference in test scores on state milestones in ELA, math, and science for Grades 3-5 students in School A, with the nonmandatory PI/PE program, than for students in School B, with the mandatory PI/PE program. Researchers have documented the concept of social capital to explain the influence of social capital position on the development of human capital and measured by the level of education (Coleman, 1988; Egalite, 2016). Researchers have also indicated that the educational achievements of individuals are related to numerous methods of capital that an individual possesses or does not possess (Schultz, 1961). For this study, social capital theory refers to parents as intangible resources (Praydiuk et al., 2019; Schultz, 1961) rooted in interpersonal relationships or social institutions. (e. g., schools, churches, and families). Coleman's (1988) explanations of social capital are frequently cited in educational literature as an account for group variations as a form of educational investment.

Findings of this study also support findings by other researchers and theorists. Jaynes's (2007) concluded that PI/PE positively affects student achievement, as evidenced by this study's findings that students in School B have statistically higher achievement than those in School A. Egalite's (2016) findings that programs focusing on increasing PI/PE in education positively affect children, families, schools, and the community are also supported by this study. Zimmer et al. (2019) affirmed that incorporating PI/PE practices such as mandatory PI/PE may contribute to significant gains in academic achievement. Improved student achievement was evidenced in School B with a mandatory PI/PE program. Additionally, Epstein and Sheldon's (2016) concluded that parental influence affects students understanding of the significance of academic accomplishment and suggested that school leaders actively support research-centered PI/PE structures and approaches for establishing program relationships. This study aligns with Epstein and Sheldon's recommendations.

Furthermore, Henderson and Berla's (1994) theory indicate that involving parents and families in student achievement improves academic success. School B's PI/PE approach encourages any family member (e.g., other adult relatives, grandparents, aunts, uncles, and siblings) to engage in service hours at the school. Willemse et al.'s findings (2017; 2018) indicated a need for changes in teachers' contributions to FSP curriculum and also in their development approaches to growth and partnerships. School B's mandatory PI/PE program may be an initiative that models a change in partnership with students' families and guardians.

According to Epstein and Sheldon (2016), school and district practices affect the quality of school-based partnership programs. The results of this study indicate that a policy on parental involvement may be a good first step. Still, other factors—principals' support for family and community engagement and active facilitation of research-based structures and processes by district leaders—are important for establishing a basic partnership program; more research is needed to investigate these findings using factors that promote programs that engage all students' families. Schools with these steps have higher percentages of engaged families (Epstein and Sheldon, 2016).

Limitations of the Study

The larger effect size means a practical significance in the difference between the programs. The difference is meaningful in Grade 3 through 5 ELA, math, and Grade 5 science. Even though Grade 4 math showed a statistically significant difference, the effect size was small. The practical significance of the mandatory PI/PE program difference appears to be less. There could have been confounding variables that affected all the analyses that may have had a more significant difference in Grade 4 math. More research is needed to investigate this finding.

The study's limitations were several confounding variables that could have reduced the validity of Grade 4 math, such as the inability to control the environment and timeframe. The data collection was from the 2018/2019 school year. There may have been other factors that created methodological limitations or biases in an ex post facto study comparing two groups. I did not gather the data for the two schools. Both schools had similar demographic construction. I could not control for SES, maturation, or other external factors that may have contributed to the actual achievement scores of the students. I could not control for any specific variable other than the PI/PE program that may account for part of the variance between the two groups. Therefore, the generalizability of my findings is limited to the state’s target school district. The data for this study were archived and included items with more than two responses and no direct participants. The data for this study were deidentified, so that selection, agreement, or monetary bias were not a factor. The two schools were selected because they participated in the State’s Title 1 program, but one had additional mandatory PI/PE requirements

Recommendations

I recommend similar studies in other states and districts with the characteristics of both schools. According to Lodico et al. (2010), the hypothetic-deductive technique is closely related to quantitative approaches that summarize data using numbers. Hypotheses and data collection methods in quantitative research are created before the study begins; these are theories, supported, and typically generalizable. The viewpoints apply to a wide range of similar circumstances and populations. The quantitative researcher may also use inductive reasoning as they look for similar experiences and results and form new ideas, concepts, or theories.

I also recommend using data for more than one school year. There are many types of archival data; however, educational research usually includes data that a school might keep at the individual student level, grade level, building, and district levels (Lodico et al., 2010). This data may include student absenteeism, graduation rates, suspensions, standardized state scores, and teacher grade book data.

I also suggest a recommendation related to the study by Willemse et al. (2017) that supports current research for curriculum enhancement in the family-school partnership for upper-grade levels. The study resulted in a need for change to the curriculum to ensure growth and expand partnerships. It concluded that FSP preparation depended upon the inclinations and knowledge of individual educators, time, and curriculum content requirements (Willemse et al., 2017)

Implications

The ESSA (2015) required states to develop comprehensive family engagement. Educators and school leaders could encourage professional development programs with effective PI/PE strategies. Many studies and investigations of PI/PE have confirmed that programs that focus on PI/PE in education help children, families, and school communities (Egalite, 2016; Epstein, 2018; Zimmer et al., 2019).

The results of this study may impact positive social change at the state, district, and school level by highlighting the connection between a mandatory PI/PE program and student achievement. The results of this study may provide awareness of the need for specific PI/PE strategies (Pravdiuk et al., 2019; Schultz, 1961) to improve students' academic success. The state and school districts could include mandatory PI/PE in the curriculum. Education is the accepted method to bring social change to individuals and the community. Parents and teachers represent change and are change-makers. Education is the students' stimulus and preservers of change. The state and school districts could create new policies, strategies, and renewed collaboration in PI/PE to close the achievement gap—by bringing parents and teachers together.

Conclusion

This study's results indicate a statistically significant difference in PI/PE in student performance in the student's math, ELA, and science test scores in Grades 3-5 for the 2018 -2019 school year. ESSA (2015) requires states to develop comprehensive family engagement plans. The Act required investment in family and community engagement, transparency, and accountability from educators engaging families. There are options for schooling, such as choice, charter, and public-school programs. Parents and educators could work together to find best practices for PI/PE. There is an opportunity to work with parents as partners in education. At the same time, there is a need for future studies to explore the availability of new data. Educators should look for innovative ways to develop new knowledge, ideas, and higher thinking skills for children. As the decision-makers, the parents, teachers, and administrators could work together to find best practices at school and learn strategies to work together as partners in children's education. At the same time, future studies are needed to explore the availability of new data. As a result, students would be more likely to attend college and develop new knowledge, ideas, and higher thinking skills. The results would be a society revolving of adults passing new learning values to new school groups.

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Appendix A: Confirmation to Provide Data

Sent: Friday, May, 26, 2020, 7:36 AM

To: RE: Research study

Regarding a letter of permission, the DoE of Education's Office of Legal Services takes the position that all data files distributed in response to data requests are in the public domain and as such are free to use, and possession of the file is de facto permission to use the data contained in the file. As such, we will not provide letters of permission or sign forms of permission for individual requests. In short, if you were not allowed to use the file, we would not provide the file, and so the very fact of you having the file means you have permission to use it. Further questions regarding the permission issue should be directed to the Department's Legal Services office –, in your state.

Systems Analyst

Appendix B: Grade 3 ELA—Reporting Categories, Item Type, & Depth of Knowledge

3rd Grade ELA Categories

Reporting Categories	# of Points	% of Test
Reading and Vocabulary	**32**	**53**
Key Ideas and Details	18	30
Craft/Structure/Integration of Knowledge and Ideas.	8	13
Vocabulary Acquisition and Use	6	10
Writing and Language	**28**	**47**
Writing	16	27
Language	12	20
Total	**60**	**100**

3rd Grade ELA Item

Type	# of Items	# of Points
1-pt Selected-Response and Technology-Enhanced	37	37
2-pt Technology-Enhanced	5	10
2-pt Constructed-Response	1	2
4-pt Extended Constructed-Response (Narrative Writing Genre)	1	4
7-pt Extended Writing-Response (Opinion or Informational/Explanatory Genre)	1	7
Total	**45**	**60**

3rd Grade ELA Depth of Knowledge

Depth of Knowledge	# of Points	% of Test
Level 1	6-12	10 - 20
Level 2	27-33	45 - 55
Level 3	9 -15	15 - 25
Level 4	6 - 12	10 - 20

Appendix C: Grade 3 Math— Reporting Categories, Item Type, & Depth of Knowledge

3rd Grade Math Categories

Reporting Categories	# of Points	% of Test
Operations and Algebraic Thinking	15	25
Number and Operations	20	35
Measurement and Data	17	30
Geometry	6	10
Total	**58**	**100**

3rd Grade Math Item Type

Type	# of Items	# of Points
1-point Selected-Response and Technology-Enhanced	42	42
2-point Technology-Enhanced	8	16
Total	**50**	**58**

3rd Grade Math Depth of Knowledge

Depth of Knowledge	# of Points	% of Test
Level 1	15-20	25 - 35
Level 2	26-32	45 - 55
Level 3	9 -15	15 - 25
Level 4	NA	NA

Appendix D: Grade 4 ELA—Reporting Categories, Item Type, & Depth of Knowledge

4th Grade ELA Categories

Reporting Categories	# of Points	% of Test
Reading and Vocabulary	**32**	**53**
Key Ideas and Details	18	30
Craft/Structure/Integration of Knowledge and Ideas.	8	13
Vocabulary Acquisition and Use	6	10
Writing and Language	**28**	**47**
Writing	16	27
Language	12	20
Total	**60**	**100**

4th Grade ELA Reporting Text Type

Type	32	100%
Writing	19	60
Language	13	40

4rd Grade ELA Item Type

Type	# of Items	# of Points
1-pt Selected-Response and Technology-Enhanced	37	37
2-pt Technology-Enhanced	5	10
2-pt Constructed-Response	1	2
4-pt Extended Constructed-Response (Narrative Writing Genre)	1	4
7-pt Extended Writing-Response (Opinion or Informational/Explanatory Genre)	1	7
Total	**45**	**60**

4th Grade ELA Depth of Knowledge

Depth of Knowledge	# of Points	of Test
Level 1	3-9	5 - 15
Level 2	24-30	40- 50
Level 3	15-21	25 -35
Level 4	6-12	10 - 20

Appendix E: Grade 4 Math—Reporting Categories, Item Type, & Depth of Knowledge

4th Grade Math Categories

Reporting Categories	**# of Points**	**% of Test**
Operation and Algebraic Thinking	11-12	20
Number and Operations in Base 10	11-12	20
Number and Operation Fractions	17	30
Measurement and Data	11-12	20
Geometry	6	10
Total	**58**	**100**

4th Grade Math Item Type

Item Type	**# of Item**	**# of Points**
Response and Technology-Enhanced Items (1 point)	42	42
Enhanced Items (2 point)	8	16
Total	**50**	**58**

4th Grade Math Depth of Knowledge

Depth of Knowledge	**# of Points**	**% of Test**
Level 1	17-23	30 – 40
Level 2	23-29	40- 50
Level 3	9-15	15 -25
Level 4	NA	NA

Appendix F: Grade 5 ELA—Reporting Categories, Item Type, & Depth of Knowledge

5th Grade ELA Categories

Reporting Categories	**# of Points**	**% of Test**
Reading and Vocabulary	32	53
Key Ideas and Details	17	28
Craft/Structure/Integration of Knowledge and Ideas.	9	15
Vocabulary Acquisition and Use	6	10
Writing and Language	**28**	**47**
Writing	16	27
Language	12	20
Total	**60**	**100**

5rd Grade ELA Item Type

Type	**# of items**	**# of points**
1-point Selected-Response and Technology-Enhanced	37	37
2-point Technology-Enhanced	5	10
2-point Constructed-Response	1	2
4-point Extended Constructed-Response (Narrative Writing Genre)	1	4
7-point Extended Writing-Response (Opinion or Informational/Explanatory Genre)	1	7
Total	**45**	**60**

5th Grade ELA Depth of Knowledge

Depth of Knowledge	**# of Points**	**% of Test**
Level 1	3-9	5 - 15
Level 2	24-30	40 - 50
Level 3	15-21	25 -35
Level 4	6-12	10 - 20

Appendix G: Grade 5 Math—Reporting Categories, Item Type, & Depth of Knowledge

5th Grade Math Categories

Reporting Categories	# of Points	% of Test
Operation and Algebraic Thinking	6	10
Number and Operations in Base 10	14	25
Number and Operation Fractions	17	30
Measurement and Data	12	20
Geometry	9	15
Total	**58**	**100**

5th Grade Math Item Type

Item Type	# of Item	# of Points
Response and Technology-Enhanced Items (1 point)	42	42
Enhanced Items (2 point)	8	16
Total	**50**	**58**

5th Grade Math Depth of Knowledge

Depth of Knowledge	# of Points	% of Test
Level 1	17-23	30 - 40
Level 2	23-29	40- 50
Level 3	9-15	15 -25
Level 4	NA	NA

Appendix H. Grade 5 Science—Reporting Categories, Item Type, & Depth of Knowledge

5rd Grade Science Categories

Reporting Categories	**# of Points**	**% of Test**
Earth Science	11	23
Physical Science	16	35
Life Science	19	42
Total	**46**	**100**

5th Grade Science Item Type

Item Type	**# of Item**	**# of Points**
Response and Technology-Enhanced Items (1 point)	30	30
Enhanced Items (2 point)	8	16
Total	**38**	**46**

5th Grade Science Depth of Knowledge

Depth of Knowledge	**# of Points**	**% of Test**
Level 1	2-7	5-15
Level 2	23-28	50- 60
Level 3	14-18	30 - 40
Level 4	NA	NA