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The impact of mathematics, science and language arts writing to learn strategies on the culture of learning in primary and secondary students

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THE IMPACT OF MATHEMATICS, SCIENCE AND LANGUAGE ARTS WRITING TO LEARN STATEGIES ON THE CULTURE OF LEARNING IN PRIMARY AND SECONDARY STUDENTS

by
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Dedications

To my wife Erica who tip toed into my life during this doctorate and to my boys Alexander, Jacob and David who are my gifts from my Lord and Savior, JESUS CHRIST.

To my parents Rabih and Houda Tarchichi, who instilled the importance of education, learning, knowledge, and family in my brother Tony, my sister Joni, and myself.

To my Lord, Savior, King, and GOD, JESUS CHRIST who I owe not only every modicum of success to, but also every breath I take, thank YOU for considering me worthy of following YOU.

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Abstract

Ronnie M. Tarchichi
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2016-2017
James Coaxum, Ph.D.
Doctorate in Educational Leadership

The purpose of this quantitative study was to institute student growth and achievement in standardized test scores in the district with the use of a writing to learn strategies. The objective of the study was to ensure growth and comfort for students with standardized testing and to train teachers to implement an approach to pedagogy (writing to learn strategies) centered on skills needed to increase standardized test scores. Using experimental research embodied in an action research design, five teachers were asked to take on different experimental and control groups of students in remediation periods known as either the twilight period (after school) or zero period (before school). The quantitative instrumentation involved in the study was the 2013 NJ ASK baseline exam, all pre-tests and all post-tests for the NJ ASK and PARCC, the 2014 standardized exam (NJ ASK) and the 2015 standardized exams (NJ ASK and PARCC). The qualitative data included teacher interviews, focus group interviews, and participant observation/field notes. The findings showed growth in standardized test scores of students in the experimental groups that received writing to learn strategies in comparison to the control groups that did not receive the strategies. In addition, the results revealed P Values obtained from a one-tailed T-Test suggesting a small significance and correlation between writing to learn strategies and improvement of students' standardized test scores.

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Chapter I

Introduction

Current public education in the State of New Jersey, among other states in The United States of America has had a shift in education since the beginning of the new millennium. In 2002, The No Child Left Behind (NCLB) Act was signed into law by President George W. Bush. The law was written with good intentions, which were to bridge the achievement gap between primary and secondary learners of all socioeconomic groups and students with special needs. Through standardized testing, schools would be accountable for the success of their students. The content subject areas that were tested on these standardized exams were language arts, mathematics and science only (Dee & Jacob, 2011; Mertler, 2011). If schools complied with the federal mandate, they would receive Title I funding from the federal government. If schools did not comply, they would be at risk of not receiving federal funding. Title I provides federal funding to school districts to educate students of lower socioeconomic status. If school districts were to receive this funding which many school district budgets are dependent upon, they would have no choice but to comply with the NCLB mandates. Meier, Kohn, Darling-Hammond, Sizer and Wood (2004) defined No Child Left Behind as "a step forward in the long battle to improve education for children traditionally left behind in American schools, in particular, students of color, students living in poverty, new English Language Learners (ELL), and students with disabilities. The broad goal of NCLB was to raise the achievement levels of all students, especially underperforming groups, and to close the achievement gap that paralleled race and class distinctions" (p. 3).

No Child left behind gave rise to a secondary initiative known as the Common Core State Standards (CCSS). The CCSS were written federally and passed to individual states in order to create congruency amongst the states in relation to academic subject matter including mathematics, language arts and science that students were responsible for learning. Forty two states adopted the common core standards in the United States. For instance, in the subject of Biology, all students were responsible for all standards set forth by the CCSS that arose from NCLB regardless of what public school they attended and the teacher they were assigned. An example of a Biology standard would be Matter and Energy where students would be responsible for the nature and properties of energy in a range of forms and potential transformations. According to the common core, the skills students learned were supposed to line up vertically for each grade level and content area (Mertler, 2011). Under the CCSS, it would be irrelevant if a student was from an affluent school district or a district that had a lower socioeconomic ranking. Much like NCLB gave rise to the CCSS, the CCSS gave rise to a curriculum that embodied all the standards that originated from the common core.

The common core standards then assisted curriculum writers to create a pacing guide for the curriculum, assisting instructors with staying on task to cover all required standards within the subject matter they taught. The pacing guide outlined a weekly schedule of content in a particular subject area and allowed the teacher to get through the entire curriculum in a school year. Figure 1 outlines the progression of how No Child Left Behind (NCLB) assisted in the creation of the Common Core State Standards (CCSS). The CCSS assisted in curriculum creation which dictated the teachers' pacing guide.

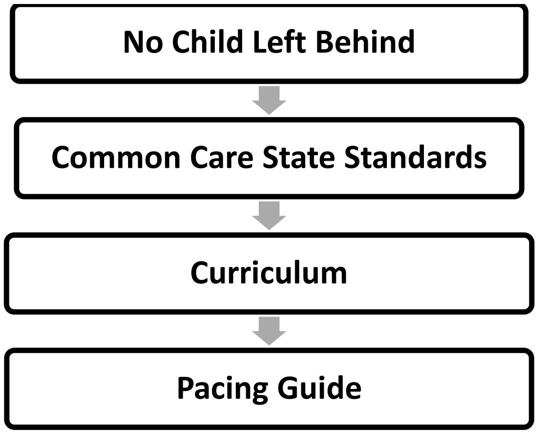

Figure 1. No Child Left Behind Progression.

The failure of the progression of NCLB was due to the lack of accountability for students that the legislation was designed to assist, both special needs students and students of a lower socioeconomic status (Dee & Jacob, 2011; Meier, Kohn, Darling-Hammond, Sizer & Wood, 2004). Primarily, students with special needs received accommodations within their instruction which generally moved their pacing guide at a much slower level in order to allow these students time to grasp a concept and completely understand the content before moving on to the next lesson. In a subject such as mathematics, a student, especially a student of special needs would be lost if teachers did not allow for understanding and rushed through content in order to fulfill needs of the curricular pacing guide. Secondly, students of low socioeconomic status, generally did not have the parental support that was generally seen in their peers that came from more affluent areas (Meier et. al., 2004). Therefore, parents that had a language barrier at home or parents who simply were not involved with their child's education placed more responsibility on the school district to find solutions to the child's increasing learning needs, which was also mandated by NCLB. Students with special needs often have the same lack of parental support issues in their homes as well, which puts these students at an even greater disadvantage than their peers in general education classes (Simpson, et. al., 2004).

Due to the lack of parental support these students receive, it is not possible to compare these students to their peers from a more affluent background, because there is a greater academic challenge to students who are economically disadvantaged (Knapp, Shields, and Turnbull, 1992). If they are incomparable due to a lack of a resources, then the pacing guide would be ineffective, rendering both the common core standards ineffective along with No Child Left Behind (Dee & Jacob, 2011). Meier et al. (2004) point out that "the biggest problem with the NCLB Act is that it mistakes measuring schools for fixing them. It sets annual test score goals for every school and subgroups of students within the schools that are said to constitute Adequate Yearly Progress" (p. 9). A test score cannot compare all students; more must be accounted for when judging the success of a student, the teacher and the school district (Meier et al. 2004; Simpson, et. al., 2004). NCLB has clearly failed students, especially students from a low socioeconomic background, rendering the implementation of the common core state standards ineffective for all students. The expectation that all students can learn the same way and at the same pace regardless of their background and socioeconomic status is improbable.

Problem Statement

The idea behind NCLB and the CCSS was well intentioned but did not work with diverse learners. The result has been poor standardized test scores in Title I districts and makes the job of a school leader difficult due to the fiscal constraints put on the school district receiving Title I funding, as state and federal funding is dependent upon student standardized test scores (Simpson, et. al., 2004). School leaders regardless of needed changes cannot move away from NCLB instruction due to budget constraints. The instruction is geared towards standardized test performance as the end result and under NCLB guidelines, if the common core is followed through a proper pacing guide, students should receive the appropriate instruction in order to be proficient on the state exams. More to the point, Mertler (2011) points out that "since NCLB places such high-stakes consequences on its mandated standardized testing, teachers must do a more thorough job of teaching to their respective curricular standards" (p 8).

However, the implementation of the common core standards also removed specific teaching practices such as writing that was beneficial to students in learning content because of the lack of time in the pacing guide. Teachers needed to get through the entire curriculum and writing to learn was removed from the curriculum. Writing to learn concepts assisted students in retaining information through critical thinking processes (Kurtz & Quitadamo, 2007). Writing to learn concepts were teaching tools that enhanced student understanding through writing down learned information in various ways which enabled the retention and understanding of subject matter. Writing to learn allowed students to grow in specific content areas through reverberation of material and enhanced analytical dissection of information (Wills, 1993; Zinsser, 1988).

Under the common core, writing was not covered due to a push in 21st century skills, especially technology. Due to the amount of standards covered in the curriculum and the compacted pacing guide, there was no room to support writing, even if an instructor wished to do so by adding it into the curriculum. It would put the instructor out of compliance with the pacing guide which would put students in danger of not being exposed to all the standards (Meier et al., 2004; Simpson et. al., 2004).

As stated, this decrease in educational writing has been perpetuated by an increase in technology in classrooms (Davis, Fisher, and Forde, 2009). The common core standards do not contextualize the importance of writing within the education of students. Due to the insignificance of writing within the common core, districts including The Wood School District located in New Jersey that have complied with NCLB have excluded writing from their curriculum. Students, because of a lack of writing within their curriculum, are not familiar with writing and have an aversion to the process (Davis et. al., 2009). Moore (1994) points out that "throughout their elementary and high school education, students progressively learn to dislike writing. Writing assignments in most secondary schools are mechanical and trivial; for example, only 3% of these assignments require students to write more than one paragraph" (p. 613). This is not only an issue with The Wood School District. Lack of writing proficiency has become a curricular and instructional issue throughout education, especially in science education (Kurtz, and Quitadamo, 2007; Prain, 2006; Ritchie, Tomas and Tones, 2010). Teachers throughout primary and secondary education do not utilize writing as a tool for learning compared to teachers that are not held accountable by NCLB and the CCSS. Consequently, students who are not offered writing strategies, suffer in their writing ability, critical thinking skills and analysis (Moore, 1994). Writing strategies in education require more student focus in content area assisting in the development of learning purpose and thought processes. Writing allows students to take ownership of their learning and content area growth (Prain, and Hand,1999).

Writing Strategies to Improve Student Achievement

There are both programmatic and curricular strategies that are used to improve student achievement in schools, they include student portfolios, pre and post standardized testing of students, capstone courses, staff development, data based teaching, student surveys, writing to learn strategies, and remediation periods. (Bond, 1995; Dellwo, 2010; Green, 1995). Curricular based strategies often produce more success within student achievement because they are based on the common core standards as is state standardized examinations. For the purpose of this study, writing to learn strategies are used as a focal point for improving student achievement. Strategies that are beneficial to diverse student learners that are constrained by state mandates such as Title I are curricular writing to learn strategies and programmatic remediation periods (Stecker et. al., 2005). In their study, Stecker et. al. highlight that curricular based pedagogy practices enhance student achievement through implementation of remediation and peer assisted learning strategies.

Writing to learn strategies. Writing to learn strategies have been a useful educational practice globally due to the decrease in educational writing (Davis, Fisher, and Forde, 2009; Graham and Perin, 2007). Researchers have used writing to learn strategies throughout elementary, middle school and high school settings in order to increase the overall academic performance and critical thinking ability of students (Graham and Perin, 2007; Hohenshell and Hand, 2006; Moore, 1994; Shellard and Protheroe, 2004). Graham and Perin (2007) concluded through a metanalysis on literature for writing intervention strategies that students need to be more proficient in writing skills and grammar. School curricula should include writing strategies that promote writing competence amongst their students (Graham and Perin, 2007). In his study, Moore (1994) determined that the writing problem inherent amongst students begins in primary and secondary education and follows them to their post-secondary education. Moore (1994) points out that "writing assignments in most secondary schools are mechanical and trivial; for example, only 3% of these assignments re-quire students to write more than one paragraph" (p. 613).

Writing to learn strategies are effective in promoting reading and research through the consistent focus of text and lettering tactics that contextualize a standard, lesson or subject (Harvey, 1998). Writing enhances the ability to learn a curriculum through inquiry, communication, coherence and consistency. Writing to learn strategies allow students to become self-correcting, promoting scholastic investigation and augmented critical thinking skills in regards to curriculum and instruction (Lipman, 1988).

The relevance of writing to learn strategies in education has grown throughout primary and secondary education amongst researchers, this significance pertains to all subject areas, especially mathematics, science and language arts (Zinsser, 1988). These subjects are especially significant for two main reasons. Primarily, because these subjects are the primary focus of standardized testing for students in primary and secondary education. Secondly, for a school district to be successful, it is imperative that language arts and mathematics are incorporated throughout the entire curriculum (Marzano, 2007).

Writing to learn strategies encourage creative critical thinking ability along with analytic skills that can be differentiated for any subject or content area (Shellard & Protheroe, 2004). Purposeful writing encourages collaboration amongst students, increases their participation and allows students to accurately illustrate what they have learned. Students become more active in the learning process, grow in fundamental skills of a particular content area and gain knowledge, comprehension and understanding in a subject or discipline as a result of participation in writing to learn strategies (Countryman, 1992).

Writing to learn strategies also contributes to the understanding of multiple subjects through cross curricula understanding and enhances the ability of students to create a connection between assessment and curricula. These strategies enhance development of vocabulary, grammar, and reading comprehension. Writing to learn strategies promote revision of student work in order for students to better understand possible mistakes. Through the contributions of these strategies, students gain skills that allow them to perform more accurately and fluently on standardized exams (Hohenhell & Hand, 2006). Writing to learn strategies can be incorporated within the classroom or can be offered through mentorship and peer tutoring in remediation periods recommended to students (Danoff, Harris, and Graham, 1993).

Remediation periods. Remediation periods such as after school twilight periods and before school zero periods can offer additional support to students who have a lack of support within their homes or have a learning disability and would benefit from additional support from their instructors (Torgesen et. al., 2001). Zero periods are named as such because they begin before first period in the morning and twilight periods are named as such because they are after the last period when the regular school day is over. Remediation periods are in class service models that assist students through collaborative teaching and strategic instruction. These periods are created for purposeful instruction where students are offered smaller class sizes and based upon individual student data, weak subject matter areas are targeted by instructors. Concepts within subject matter are identified and isolated in order to create strengths from existing academic weaknesses. In class remediation periods such as a twilight period have had great success for subjects such as mathematics and language arts (Saint-Laurent, Dionne, Giasson, Royer, Simard, and Piearard, 1998). In their study, Saint-Laurent et. al., (1998) deduced through a one year study conducted in thirteen different schools that in class service models increased writing scores in mathematics and language arts. For purposes of this study, remediation periods and writing to learn strategies were used as strategies to identify potential impacts on student achievement through standardized testing.

Purpose and Rationale of the Study

The purpose of this study was to determine the impact of utilizing writing to learn strategies during remediation periods to enhance student achievement through standardized test scores and to examine the connection between writing to learn strategies and remediation periods. The rationale in using remediation periods for writing to learn strategies in this study was that the students targeted performed poorly on standardized exams. The remediation periods provided time for students to capitalize on their weaknesses as test takers. The students that participated in writing to learn strategies improved their weak areas through individual instruction focused on these strategies. As the researcher, I was interested in tying programmatic learning such as in class remediation twilight and zero periods to curricular changes that incorporated writing to learn strategies. I was interested in how writing to learn strategies could enhance standardized test scores. When I arrived in the Wood School District in 2013, I spoke to multiple teachers in the district and asked what they believed was missing in the pedagogy that could be responsible for the consistently poor standardized test scores of the district. The general consensus amongst teachers was there was not much writing in the curriculum due to the new standards. Although, curriculum and pedagogy were what I believed to be the primary reason, I also thought a lack of writing in the district could have contributed to a decrease in standardized test scores

I hypothesized that we could enhance language arts literacy, science and mathematics test taking efficiency through enhanced writing and writing to learn strategies in testable grades, grades 3 through 12 (Ritchie et. al., 2010). I selected grades 4 through 7 to participate in the study. I began to research writing to learn strategies and realized that these strategies could potentially enhance standardized test scores within a population of students that had not been proficient on NJ ASK standardized tests. I knew that for writing to learn strategies to work, teacher instruction had to be skilled and effectual for all students (Prain, 2006). A critical piece of planning this study was learning and knowing the audience, and in this case, the audience was students and teachers. In order to expand the comprehension of students and teachers, I needed to begin with the enhancement of my understanding of writing to learn strategies (Moore, 1992).

For this study to be effective, teachers had to be instructed on writing to learn strategies so it could be incorporated in their daily instructional routine. Graham and Perin (2007) summarized eleven elements of effective adolescent writing instruction. These elements instructed were (1) writing strategies, (2) summarization which is reduction of larger content to main ideas, (3) collaborative writing which promotes multiple student engagement on the topic, (4) specific product goals which allows students to attain specific objectives in their erudition, (5) word processing allowing technology to assist in student learning goals, (6) sentence combining which combines paragraph intricacy further leading to enhanced reading comprehension, (7) prewriting which enables students to organize their thoughts in literary context, (8) inquiry activities increasing student critical and analytical thinking skills, (9) the process writing approach assisting students in the understanding of personalized literature, (10) the study of models where students study more fluent writing of others, and (11) writing for content learning where writing is used to learn a specific content or discipline (Graham and Perin, 2007).

These eleven elements of effective adolescent writing instruction assisted in the instruction of the fifteen writing to learn strategies. The fifteen writing to learn strategies include (1) focused free writing where students wrote about a topic in a reading passage or text, (2) entry and exit slips where students answered questions or statements about a reading passage presented by the instructor before or after the class, (3) reader/response writing where students created descriptions of specific reading passages, (4) summary response where students summed up the main idea of a text or passage, (5) clarification letters where students worked in groups and wrote notes to one another depicting parts of a text that were confusing and other members of the group would explain their understanding in a similar note, (6) group writing activities where students found the errors in an article or reading passage and rewrote it properly in a group setting, (7) dialectical notebooks which were multiple entry notebooks that assisted students to think more clearly about specific readings by writing down the particular quote or paragraph on one entry and their feelings about that quote or paragraph on another entry, (8) writing notebooks where students wrote consistently and casually in a journal on any educational topic they chose, (9) compacts where students condensed a multiple page writing sample on a topic into a well written one page writing sample, (10) concept metaphors where students created metaphors along with descriptions for specific ideas they were learning, (11) writing definitions where students were asked to write definitions for specific topics or words before they were taught by the instructor, (12) paraphrase assignments where students were asked to summarize the assignment given by the instructor in a paragraph, (13) writing interruptions were assignments that were given throughout a class where students stopped what they were currently working on and wrote a summary or specific questions on the lesson, (14) response papers which were writing responses to particular reading passage that were shared in a group work setting, and (15) synthesis papers where students wrote a paper based upon and formulated a main idea from two or more readings (Campbell and Fulton, 2003; Fulwiler, 2007; Graham and Perin, 2007; Moore, 1992; Zinsser, 1988).

The study was based on the premise that through these writing to learn strategies incorporated in classrooms and through the course of consistent instruction to both teachers and students, standardized test scores would increase in the Wood School District. The standardized tests that were utilized were the New Jersey Assessment of Skills and Knowledge (NJ ASK) and the Partnership for Assessment of Readiness for College and Careers (PARCC). The NJ ASK is a standardized exam administered by the New Jersey Department of Education to public school students in grades 3 through 8. The NJ ASK covers language arts, mathematics and science. The PARCC is a federal standardized exam issued by the state of New Jersey to public school students in grades 3 through 12. The PARCC covers language arts and mathematics. Writing to learn strategies were hypothesized to change classroom instruction through classroom practice, organization of ideas, cooperative learning, setting objectives, and providing feedback (Marzano et, al., 2001).

New Jersey Assessment of Skills and Knowledge (NJ ASK) standardized test scores had consistently decreased in the Wood School District for several years according to the New Jersey Department of Education in 2013. In order for test scores to increase, educators not only taught to enhance state test scores but also for the development of student growth, scholarship, and knowledge. The NJ ASK was critical for the future of the Wood School District as the district was named a priority school in 2013 due to consecutive years of low performance on standardized test scores. A priority school was a public school that was ranked at the bottom five percent of all schools within the state based upon proficiency in standardized exams. If growth was not realized in proficient scores on standardized exams, the state had an obligation to take over the administrative and instructional duties of the district in order to reach the desired objective. The subject matter tested on the NJ ASK exam that showed a steady decline in Wood School District were Science, Mathematics and Language Arts. Student standardized test scores, namely the New Jersey Assessment of Skills and Knowledge (NJ ASK) and the Partnership for Assessment of Readiness for College and Careers (PARCC) standardized exams were hypothesized to show growth with the implementation of writing to learn strategies in subject areas.

In order to implement this growth in standardized test scores on the NJ ASK and PARCC exam, educators need to provide exceptional pedagogy practices in mathematics, science and language arts education, employ excellent practices in standardized test preparation, and apply proper writing to learn strategies that could offer different ways to comprehend educational concepts (Zinsser, 1988). Writing to learn strategies offer a general solution to assist students in content understanding and standardized test taking in multiple subject areas including primary and secondary level mathematics, language arts, science, and a multitude of other disciplines (Kurtz and Quitadamo, 2007). The enhancement of content understanding is mirrored by enhanced critical thinking skills that assist students in the proficiency needed in standardized test taking (Lipman, 1988).

There is a relationship between student content knowledge, standardized test scores and writing to learn strategies. If a student knows the subject material well enough and they have gained the proper content knowledge, then theoretically, they should be proficient on a standardized exam testing the material learned from their instructor. Writing to learn in mathematics and language arts can make learning more interesting for students and enhance the learning process. In addition, writing to learn enhances student higher order thinking skills through analytic thinking needed to perform well across all subject areas (Zinnser, 1988). Therefore, writing to learn strategies was hypothesized to enhance NJ ASK standardized test scores in 4th through 7th grade students at the Wood School District. Hohenshell and Hand (2006) point out "the act of writing requires thinking, offers opportunities for reflection on content, promotes attainment of personal meaning, and furthers the development of processing skills, such as organizing ideas and reasoning" (p. 261). The hypothesis is that students who incorporate writing strategies in their learning will show more understanding of the content and be able to apply that knowledge in a standardized exam (Booth et al., 2008).

Writing to learn strategies have been studied in the past by several research scholars. Hohenshell and Hand (2006) examined writing to learn strategies in cellular biology and how those strategies enhanced the ability of student growth in scientific content. Countryman (1992) investigated mathematical writing to learn strategies that increase student performance and mathematical aptitude. Fulwiler (2007) researched writing and the importance of scaffolding instruction throughout curricular learning, while Kurtz and Quitadamo (2007) examined the importance of enhancing critical and analytical thinking skills in student performance. Holliday and Yore (2006) researched the connection between writing and reading in learning science subject matter. Moore (1992) investigated writing to learn in biological science and Prain (2006) explored learning to write in secondary sciences, both theoretical and practical applications.

These studies directly correlate to my study as Fulwiler (2007) and Hohenshell and Hand (2006) correlate the importance of science instruction in writing to learn. Not only is there a science portion of the NJ ASK exam but principles of the Mathematics portion of the NJ ASK and PARCC exams also embed scientific thinking and curricula. Countryman's (1992) research incorporates the importance of writing to learn strategies in mathematics and their influence on critical thinking skills necessary in standardized test taking. The impact of writing to learn strategies is that they will serve as a catalyst to bring about improved instructional methods and learning behaviors that enhance student standardized test taking performance on the NJ ASK exam.

Writing to learn strategies, if incorporated properly, yield new ways in which students would learn subject matter and successfully answer standardized test questions. Moore (1992) points out that “clear writing reveals how a clear mind attacks and solves a problem" (p. 10). The problem is a conceptual issue, which helps educators to understand proper pedagogy practices that enable students to comprehend mathematics and language arts more thoroughly (Booth et. al., 2008). Therefore the purpose of this study was to use writing to learn strategies as a strategy to increase standardized test scores (NJ ASK & PARCC) in the Wood School District.

This study was accomplished through an action research design that incorporated a quantitative and qualitative data design. NJ ASK and PARCC exam scores were used as data for the quantitative portion of the study. Qualitative data was collected through observations, field notes, and focus group interviews. Through quantitative and qualitative data, I attempted to show a correlation between writing to learn strategies and standardized test performance.

Research Questions

To address the importance of the writing to learn strategies on the standardized test taking process, the following research questions were posed:

1. How can writing to learn strategies be used to enhance student achievement?
2. What were the different writing to learn strategies that could be offered to students of the Wood School District that could be used as a learning tool for student growth and achievement?
3. How did writing to learn strategies offer the additional instructional advantage needed for students of the Wood School District to close the achievement gap?
4. What impact did teacher and administration collaboration have on delivery of writing to learn strategies?

Significance of the Study

A practical action research study was used to determine whether or not the benefits of writing to learn strategies in primary and secondary education had the potential to impact standardized test scores of students (Mertler, 2009) Therefore, this study is beneficial to all educators with objectives or aspirations to increase standardized test scores within their student body. This study provided awareness and feedback to educators on the benefits of writing to learn strategies and their significance in primary and secondary education. In addition, this study provided students with a means of learning curricula through writing to learn strategies and strengthened student achievement through comparative thinking. (Shellard and Protheroe, 2004; Silver, 2010).

Through writing to learn strategies, students grew in their understanding of cross curricular correlation, activating background information, determination of important ideas, synthesizing new information, drawing on inferences from pervious information, and building reading comprehension skills (Harvey, 1998). Student literacy skills enhanced through story writing and wring consistency caused growth of content understanding. Writing along with the analytic teaching offered in this study by instructors increased both analytical and critical thinking of students which allotted for greater understanding of subject matter (Kurtz and Quitadamo, 2007; Lipman, 1988; Ritchie, et. al., 2010). This study has shown writing to learn strategies allow students to learn content with greater understanding for the complete subject matter (Hohenshell & Hand, 2006). This study benefited all students and educators in pedagogy, learning, and erudition. Furthermore, the study benefited students' ability to properly take and perform well on standardized exams (Creswell, 2013).

Writing to learn strategies benefited teachers as well as students. Teachers through grew in content pedagogy techniques through the incorporation of writing to learn strategies within their lessons (Countryman, 1992; Zinnser, 1988). Teaching writing to learn strategies enabled growth and advancement in subject matter content for instructors (Urqahart and McIver, 2005). Through the use of professional learning communities, teachers learned writing to learn strategies and the proper pedagogy of these strategies which enhanced student learning (Darling-Hammond, 1998; DuFour and Eaker, 1998). The professional development of teachers within professional learning communities positively affected the ability of students to learn writing to learn strategies within the classroom (Guskey, 1997; Louis and Marks,1998).

The rationale was to identify factors that allowed writing to learn strategies to be effective in the Wood School District and Title I Districts. Districts such as Wood are districts that were aimed to be impacted by the No Child Left Behind legislation. This research could lead to possible interventions that could be used to close the achievement gap intended with NCLB (Simpson, et.al., 2004). Writing to learn strategies was aimed to benefit the Wood School District through student academic growth in mathematics, science and language arts through a connection in writing and literacy (Holliday, Yore, and Alvermann, 2006; Ritchie, Tomas, and Tones, 2010).

This study illustrated the need for writing to learn strategies to be explored further in Mathematics, Science and Language Arts with goals of increased student learning and achievement. Through this research, existing curricula and current curricular issues, pedagogy practices improved and writing to learn strategies could be accepted as an integral piece of a teacher's daily pedagogy routine. (Ornstein, et. al., 2007). While research exists on writing to learn strategies and the effects on education, very little research existed on the impact of writing to learn strategies on standardized test taking. Aside from this study, there is no research on writing to learn strategies and its effects on the NJ ASK or PARCC exam. The purpose of this action research study was to describe the impact of writing to learn strategies on student standardized test taking performance with definitive certainty using a pre and post-test model of design.

Conclusion

Writing to learn strategies are accepted as a form of learning in primary and secondary education, and the literature positions writing to learn strategies as a catalyst for critical thinking skills (Kurtz & Quitadamo, 2007). While writing to learn strategies have been addressed in pedagogy, the literature lacks a connection between writing to learn strategies and standardized test scores, especially the NJ ASK or PARCC exam. This practical action research study concentrated on the instruction of writing to learn strategies and its effects on standardized testing along with critical thinking skills of students (Lipman, 1988; Silver, 2010). This study presented an opportunity to address writing to learn strategies and their connection to standardized test performance of students. The potential of writing to learn strategies to impact standardized exams could catalyze interest in academia in both the practical and theoretical educational researcher. Performance assessments such as standardized exams could measure impact of writing to learn strategies used in classroom pedagogy and develop further understanding in content area (Green, 1995; Pugalee, 2005).

Chapter II

Literature Review

Introduction

Writing to learn strategies and interventions are needed for academic growth of students in all subject areas, content clarification and enhanced scholastic knowledge (Graham and Perin, 2007; Prain, 2006). Graham and Perin (2007) theorize, “despite the importance of writing, too many youngsters do not learn to write well enough to meet the demands of school or the workplace” (p. 445). Despite the use of writing to learn strategies in subject and content area, writing to learn has not been widely used in standardized test preparation. Writing to learn has not been used at all in standardized test preparation in New Jersey. Therefore, the effectiveness of writing to learn strategies and its impact on standardized test taking has not been thoroughly explored and is relatively unknown. The purpose of this study was to introduce writing to learn strategies as an educational tool to enhance proficiency on the NJ ASK and PARCC standardized test scores of students in the Wood School District. Further, the purpose was to observe the impact of writing to learn strategies on standardized test performance. The goals of the research were addressed through applied action research that utilized quantitative and qualitative data. Writing to learn strategies were introduced to primary students in the Wood School District and the impact of these strategies were measured through standardized test score growth and teacher perceptions of the efficiency of the writing to learn model.

This literature review focuses on studies and literature that are significant to writing to learn strategies in language arts, science and mathematics. In reviewing scholarly literature, the work of multiple researchers has assisted in the development of this study. The literature review is organized into ten sections. The first section embodies a literature review on No Child Left Behind (NCLB), its origin and impact on education; the second section addresses the common core state standards, its growth from NCLB and the mandates it places on educators and students; section three addresses curriculum along with curricular pacing guide and its comprehensive and explicit approach; section four defines high stakes testing and its applications in public education and NCLB; section five provides and introduction to writing to learn; the sixth section addresses writing to learn in the content area of science; section seven places importance on writing to learn strategies in the subject area of mathematics; section eight addresses writing to learn strategies and the content area of language arts; section nine discusses the concept of remediation periods in education and their importance in preparing students for academic rigor; and the final section introduces professional learning communities (PLCs) as a collaboration tool used by teachers and administration in order to evaluate the effectiveness of the writing to learn strategies (Dee and Jacob, 2011; Louis and Marks, 1998). To better represent the organization of the chapter, a categorization of the literature review is provided in Figure 2.

Following the discussion of professional learning communities, there is a discussion of the conceptual framework and a summary of the literature review. After a comprehensive search of the literature and studies, it was revealed that writing to learn strategies assisted students with growth of critical thinking skills, analytical analysis, and standardized test taking skills (Fulwiler, 2007; Kurtz and Quitadamo, 2007; Zinsser. 1998). This chapter will present insights into the literature that potentially contributed to writing to learn strategies positively affecting student assessment and scholarship (Prain and Hand,1999; Shellard and Protheroe, 2004).

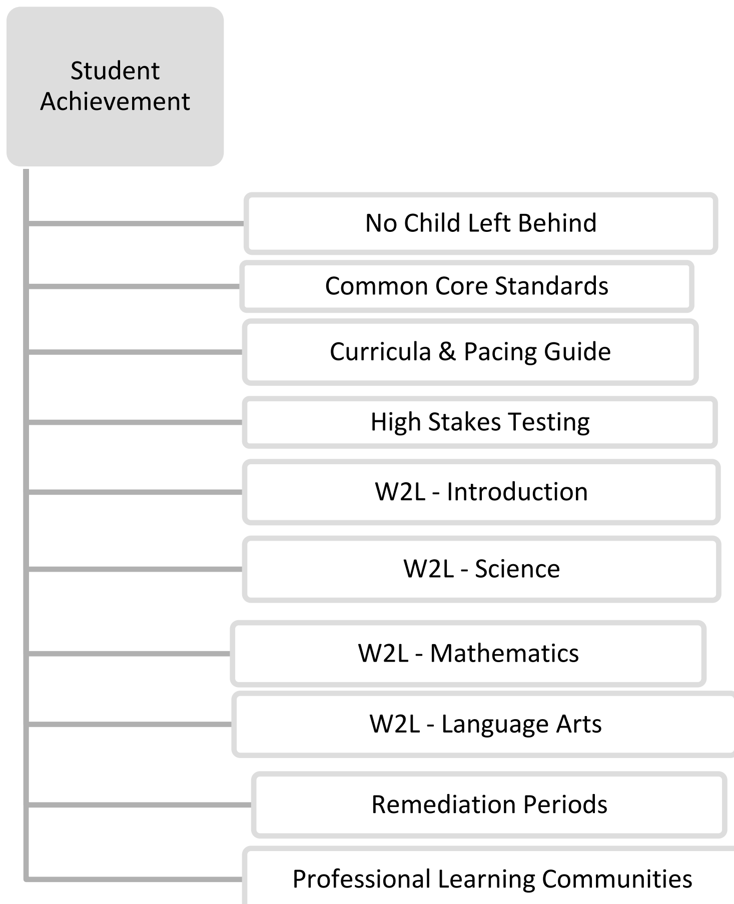

Figure 2. Categorization of the Review of the Literature.

No Child Left Behind

In 2002, the federal government of the United States of America passed and act known as No Child Left Behind (NCLB) that was designed to close the achievement gap amongst diverse learners and disadvantaged students (Cochran-Smith, 2005; Dee and Jacob, 2011).

NCLB was created and implemented with intentions to bring subgroups of students to proficiency in the common core standards measured by standardized exams, however it did not account for diverse learners and students of special needs (Anderson, 2011, Bloomfield and Cooper, 2003; Epstein, 2004). School leaders have the task of making sure students are taught all academic common core standards and that diverse learners are provided with a path of learning that assists with the closure of the achievement gap the Common Core State Standards fails to present.

According to Epstein (2004), the federal government increased their control over education and educational programs dramatically since the late 1960's. The largest of over sixty educational programs funded by the federal government is No Child Left Behind intended to provide resources to students from low socioeconomic backgrounds and students with special needs through Title I funds **(**Knapp, Shields, and Turnbull, 1992). Since its implementation in 2002, No Child Left Behind has placed federal mandates on schools that receive Title I funding through provisions of new standards, state assessments, and school district accountability (Cochran-Smith, 2005; Epstein 2004). Epstein (2004) points out that "like other laws, NCLB will be one creature on paper and quite another in practice. If the past is any guide, the measure will not be implemented as written, and the specter of unprecedented new federal domination may remain more illusory than real" (p. 141).

School Districts themselves control the daily operation of schools and appear to run on their own volition. However, as Title I districts depend heavily upon federal funds for their daily operation, they give up some control because in order to continue receiving those funds, students must meet adequate yearly progress on state exams (Anderson, 2011). The progression of the NCLB act led to the implementation of new common core state standards which forced school districts to rewrite their curriculum and implement a new pacing guide for teachers to follow. This would enable teachers to test students accordingly with respect to the content covered on state standardized exams. However, for teachers to be successful there would need to be a dexterity among federal, state and local agencies and municipalities (Anderson, 2011; Epstein, 2004). Anderson (2011) points out that "for many national policies, such as NCLB, successful implementation requires coordination and cooperation among a web of national, state, and local governments and agencies" (p.216). NCLB has placed additional stress on teachers linking teaching evaluations to student performance (Mertler, 2011). Mertler (2011) in his study about teachers' perceptions of the influence on the MCLB legislation on classroom practices concluded that teachers believe that the implementation of NCLB has decreased the effectiveness of classroom instruction and effective delivery of curriculum. The intent of No Child Left Behind was to improve instruction through creation of standards within the curriculum that created a pacing guide for subject matter areas. The standards are known as the Common Core State Standards.

Common Core State Standards

In addition to the adoption of NCLB, states were required to adopt very challenging standards in mathematics, language arts and science known as the Common Core State Standards (CCSS). The CCSS are a set of standards that outline goals and measurements of student knowledge per grade level from kindergarten through twelfth grade (McDonnell and Weatherford, 2013; McLaughlin and Overturf, 2012). The Common Core State Standards (CCSS), adopted in 2010, stemmed from NCLB where there was a designed congruency for pedagogy through standards based learning and all school districts within the state were mandated to teach subject matter through the use of the common core standards (Elmore, 2002). Students would then be tested with state standardized exams that were created to embody the common core standards. Epstein (2004) stated "clearly NCLB's standards, assessment, and accountability provisions pose challenges for states. They offer considerable less flexibility than previous law and require states to make important policy changes" (p. 141). Since the inception of NCLB, greater than eighty percent of the states in the Unites States of America have adopted the common core state standards (McLaughlin and Overturf, 2012). The common core state standards call for accountability of all stakeholders including lawmakers, superintendents, principals, and teachers. All states that adopted the common core were required to abide by these standards and design their curricula based upon federal mandates of the CCSS. (McDonnell and Weatherford, 2013).

The common core state standards held teachers to a greater accountability due to the amount of standards covered within the common core. Teachers were required to expose students to all standards that were outlined in their content area. Teachers, due to the CCSS were no longer able to be complacent with their pedagogy or content area because the CCSS held them to a new degree of accountability that was in direct correlation to student standardized test scores (Terrie, 2012). Teacher accountability was measured through the use of standardized test scores of their respective students. The student score was a direct measure of the rigor within the classroom (Williamson, Fitzgerald, and Stenner, 2013). This accountability was then transferred up the ladder and reflected on principals and superintendents as well.

The common core dictates how curriculum is written in individual districts. The design is an equivalence in curriculum in all subject areas amongst all school districts within the state (Shapiro and Stefkovich, 2011). No Child Left Behind's CCSS are one size fits all mandates that were created to pressure school leaders to act in a state of government dependence especially if outcomes were not satisfactory to the federal government (Hess, 2013). Hess (2013) points out "the ensuing problems are well documented in the case of No Child Left Behind, where well intentioned policy makers managed to create a slew of perverse incentives, while tarnishing sensible ideas. Though NCLB has some real virtues, many school and system leaders are justifiably frustrated by its crude level based measures of Adequate Yearly Progress" (p. 204). In a study conducted by McDonnell and Weatherford (2013) it was concluded that the Common Core State Standards established from No Child Left Behind would benefit from more evidence gathered form educational professionals in order for the standards to reach their maximal educational potential. To accomplish this task, local school districts rewrote their curriculum and created pacing guides within the curriculum with the undertaking of covering every standard that pertained to that subject matter (Stecker, Fuchs, and Fuchs, 2005).

Curricula and Pacing Guide

School curricula needed to be changed to accommodate the CCSS per NCLB legislation. This caused a change the individual school curriculum from broad and general to highly detailed and specific. The federal government attempted to take a scientific approach to the creation of a common curriculum and pacing guide for grade levels and subject areas through the implementation of the common core content standards following the initial Elementary and Secondary Education Act (ESEA) or NCLB. This was made with the intentions to help all children grow equally in academics, however, it was unknowingly made to accommodate children from the traditional American household (Ornstein et. al., 2007). Ornstein et. al. (2007) point out that "less than one in four students comes to a school from a home occupied by both biological parents. Single parent households account for about one quarter of all American families: about one of every two African American children (one of every four Caucasian children) lives with a lone parent" (p. 388). The NCLB/ESEA connection is much deeper than single parent households, it was meant to improve education for the general population and underprivileged students. According to Bloomfield and Cooper (2003), NCLB and ESSA began with President Lyndon Johnson's "War on Poverty," was revisited by President Ronald Reagan's "A Nation at Risk" leading to "No Child Left Behind" during President George W. Bush's administration. No Child Left Behind and the past initiatives arose from persistent low standardized test scores in minority students and students from disadvantaged economic areas (Bloomfield and Cooper, 2003; Stecker, Fuchs and Fuchs, 2005).

The NCLB mandate, founded on research that was scientifically based, did not account for these educational challenges that were very evident in Title I school districts. The school curriculum and its pacing guide needed to account for the diverse learners that were present within the school district and community (Ornstein et. al., 2007; Williamson, Fitzgerald, and Stenner, 2013). NCLB integrates curriculum implemented through the incorporation of the common core. Through this model, students are targeted to grow academically, emotionally and rationally as students if the CCSS are incorporated properly by individual school districts (Flinders & Thornton, 2009). After the implementation of the common core, all districts needed to rewrite their curriculum in order for alignment, and if curriculum was rewritten, then all assessments were rewritten as well. Common assessments needed to be developed per grade level and subject area, in addition to those common assessments being in direct line with standardized state assessments (Harris, 2009; Ornstein et. al., 2007). Harris (2009) stated "there are 3 legs to viable curriculum: what is tested, what is taught, and what is written. All three areas need to be determined collaboratively" (p. 101). No Child Left Behind directly influenced curriculum, which directly influenced pacing guide of the curriculum (Bloomfield and Cooper, 2003; Williamson, et. al., 2013). The speed and efficiency the curriculum was delivered to students had a direct impact on high stakes standardized test scores of students (Elmore, 2002, McDonnell and Weatherford, 2013) (Figure 3). The proper pacing guide ensured the entire curriculum was covered in a subject area, thereby appropriately preparing students for a standardized exam.

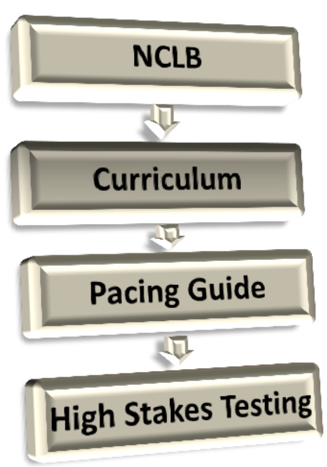

Figure 3. NCLB to High Stakes Testing.

High Stakes Testing

Nichols, Glass, and Berliner, (2006) point out "the goal of NCLB is ambitious—to bring all students to a level of academic proficiency within a 15-year period through a system of accountability defined by sanctions and rewards that would be applied to schools, teachers, and students in the event they did not meet predefined achievement goals. States that did not comply with the law were threatened by the loss of billions in Title I funding" (p. 5). The academic proficiency of students is measured by high stakes standardized testing. High stakes testing measures the performance of all stakeholders within the school district. This includes students, teachers and administration. High stakes standardized testing applies accountability measures to all stakeholders within the district (Cizek, 2001; Nichols, Glass, and Berliner, 2006).

Shapiro and Stefkovich (2011) point out that "high stakes, standardized test results are most often used for accountability purposes to determine how successful an educational institution or district has been in educating its young people" (p. 138). Through the execution of NCLB and the CCSS, there was a mandate that all states that received federal Title I funding participate in high stakes testing where students would be labeled either Partial Proficient (PP), Proficient (P), or Advanced Proficient (AP).

All students in grades three through eight are required to take these high stakes standardized exams in the subjects of science, mathematics, and language arts. Score reports would then be disaggregated for all students and subgroups of students within each school district (Bond, 1995; Epstein, 2004). District performance on standardized exams allocate data for struggling schools to understand where students lack in their achievement of the standards and curriculum which then allow school leaders to implement initiatives and programs to target student subgroups (Harris, 2009; Shapiro & Stefkovich (2011). High stakes testing required new pedagogy that was centered around the common core standards chiefly because state standardized exams were written to test student knowledge of the CCSS. This was mandated from the No Child Left Behind Act (Au, 2007; Bloomfield and Cooper, 2003; Bond, 1995).

Teaching to the test left teachers unable to get through the pacing guide of the curriculum and new teaching strategies needed to be implemented in order to assist students in closing the achievement gap (Herman and Golan, 1993). Herman and Golan (1993) conducted a study of the influence of standardized testing in primary students in eleven school districts comparing standardized testing and pedagogy of teachers within each district. Bond (1995) reflected the importance of possible bias within standardized exams amongst minorities and the equality of standardized tests amongst all students with potential consequences for high stakes testing. A tool for enhanced learning among all students was needed to promote academic growth and enhanced critical and analytical thinking skills needed for educational success. Writing to learn strategies, according to the literature, seemed to be that tool to allow for academic growth in all subject areas (Zinsser, 1988).

Writing to Learn - Introduction

Significant studies that have contributed to writing to learn strategies influencing education in my research are Moore's (1992) work on writing to learn strategies in biology and science; Kurtz and Quitadamo's (2007) research on using writing to increase critical thinking performance in general education biology; Holliday, Yore, and Alvermann's (2006) work on the reading-science learning-writing connection; Graham and Perin's (2007) research on writing instruction for adolescent students; Fulwiler's (2007) research detailing writing in science and the idea of scaffolding instruction in order to support learning; Countryman's (1992) work on writing to learn in mathematics; Zinsser's (1988) early work on writing to learn; Shellard and Prothero's (2004) research on writing across the curriculum; Prain's (2006) research on writing to learn in science with theoretical and practical implications; and Willis's (1993) research on how writing directly correlates to learning.

Analysis is important in the learning process and encourages thinking of students at all levels and in all subject areas, especially science, mathematics and language arts. Studies of student reaction to writing to learn strategies indicated the experience of students to be positive. Studies report that writing to learn strategies in subject areas promoted critical thinking skills and learning support throughout the curriculum (Fulwiler, 2007; Holliday, Yore, and Alvermann 2006; Kurtz and Quitadamo 2007; Shellard and Prothero, 2004). In a study conducted by Prain (2006) various associations in writing were linked to content knowledge and subject clarification in different learning environments. Writing will continuously engage student thinking through clarity of concepts and familiarity with new information (Moore, 1992).

Zinsser's (1988) work on writing to learn strategies played a vital role in the marriage of writing and thinking processes. The generation of creative ideas that enhance the views of confusing issues are better solved through extensive and consistent writing practices created by the instructor. These practices vary for the student population, and allow for resourcefulness and creativity which encourages thinking among students. Thinking breeds inquiry which allows for discovery (Moore, 1992). Kurtz and

Quitadamo (2007) point out that “although academics and business professionals consider critical thinking skill to be a crucial outcome of higher education, many would have difficulty defining exactly what critical thinking is. Historically, there has been little agreement on how to conceptualize critical thinking” (142). Kurtz and Quitadamo’s (2007) research brings about the effects of writing on critical thinking skills through improved student learning in the course of enhanced higher order thinking ability. Through writing, students attain the ability to learn content of a discipline such as mathematics, science and language arts, however, the content learned is not the extent of the benefit attained through writing to learn strategies.

Thinking skills that allow students to successfully navigate through their education and learning subject content is a secondary benefit associated with these strategies (Kurtz and Quitadamo, 2007). Silver's (2010) research focuses on an increase in critical and analytical thinking skills through comparing and contrasting information. This maximizes the effectiveness of student learning, growth and subject mastery. Student aptitude in curricula grows through comparative analysis and critical thinking skills in writing strategies (Sliver, 2010). Studies used in this research specify growth of content knowledge through enhanced analytic ability triggered by witting to learn strategies (Kurtz and Quitadamo , 2007; Moore, 1992; Silver, 2010). A study performed by Moore (1992) revealed that writing can build neurological connections between the subject or content area and the learning process.

Schmoker (2006) discusses the importance of writing in purposeful reading. Writing helps students focus, prioritize and evaluate information that is beneficial in the learning process. Writing strategies permit the learner to interpret information more clearly which facilitates improvement in content area knowledge and assessment performance (Schmoker, 2006). Marzano's (2007) research on four learning principles that assist in the cognition of student learning involved the writing exercises of comparison, classification, creation of metaphors, and creation of analogies. Writing to learn strategies was recommended to close the achievement gap of students through the enhancement of critical and analytical thinking skills of students. While the studies used in this research indicate that writing to learn strategies are beneficial for students in primary and secondary education, writing to learn strategies are also indicated to provide additional support for sustainability of knowledge during the learning process (Kurtz and Quitadamo, 2007; Moore, 1992; Prain, 2006; Zinsser, 1988). Writing to learn strategies can be used to enhance academic subject area content areas as well and the next section focuses on these strategies in science.

Writing to Learn - Science

There is a connection between reading, learning, interpretation and evaluation. These connections are critical in science (Bransford, Brown, and Cocking, 2000). The connection or link between these four principles is writing (Fulwiler, 2007; Holliday, Yore, and Alvermann, 2006). This link identifies successful writing to learn strategies and highlights what has worked for students and instructors in subject or discipline based instruction such as biological science, physical science and earth science (Moore,1994; Prain and Hand, 1999; Tessier, 2006). These strategies include journal writing, test writing, word problem formation, resource copying and multiple other strategies that highlight writing as the core learning principle in student understanding (Holliday, Yore, and Alvermann, 2006). In order for the strategies to be totally beneficial for student growth, there must be writing instruction offered by the teacher that pinpoints successful writing to learn practices (Graham & Perin, 2007).

Applications of different writing to learn strategies enable students to retain and reorganize information as a useful and instructive activity. This creates student ability to engage subject matter and gain an understanding of a science discipline such as biology (Hohenshell and Hand, 2006). The greater the understanding of writing to learn strategies, the better the student will be able to gain further insight into scientific content area ultimately increasing student knowledge pertaining to science curricula (Prain, 2006). In a study conducted by Tessier (2006), students were asked to write about specific topics covered in an ecology class in order to gage the efficiency of writing strategies and enhancing their knowledge of scientific issues. This study reported that students grew in their ecological science knowledge through the initiation of writing strategies.

In a study conducted by Fulwiler (2007) in the Seattle School District, students were given writing notebooks in science. Due to the initiation of writing programs in the district, teachers were able to increase student scientific inquiry, higher level thinking skills, along with qualitative and quantitative writing ability (Fulwiler, 2007). Researchers believe that more students would critically and analytically benefit from consistent writing within science content area and instructors could use writing as a teaching tool that would support learning and growth (Fulwiler, 2007; Prain and Hand, 1999; Prain, 2006; Tessier, 2006).

Writing to Learn - Mathematics

Depending on the dynamics in a classroom, writing or the lack thereof could be detrimental to the success of the students within the content area of mathematics (Burns, 2004; Pugalee, 2005). Through writing to learn strategies, the problem solving success of students grows substantially and is a valuable contribution to the overall learning process in mathematics (Burns, 2004; Countryman, 1992; Zinsser, 1988). Solving mathematics problems requires a flexibility in thinking and requires more than traditional problem solving techniques (Zinsser, 1988). The use of writing strategies in math allows students to assess skills required for computation in numerous ways including assessment and review (Burns, 2004; Pugalee, 2005). In her research, Countryman (1992) reflected on the importance of journal writing, free writing, and test writing strategies in mathematics along with its underlying significance in primary and secondary education. The consistency in utilizing these strategies was a main factor that allowed the constant growth of the students performing these writing to learn strategies, the researcher's reflection on these recording tools such as journals, which allowed growth to be seen in critical thinking skills, test taking ability and writing ability.

In her research, Countryman points out that through writing to learn strategies, students become more interactive in the learning process, which increases collaboration between students and teachers. Student participation in the writing to learn process increase their knowledge, understanding, and comprehension of mathematics in content areas such as algebra, geometry and arithmetic (Burns, 2004; Countryman, 1992; Winograd, 1992; Zinsser, 1988). In her study, Burns (2004) suggested writing in mathematics can yield critical and analytical thinking skills needed for students to be successful in mathematics assessment. Through writing to learn strategies, teachers also grow in successful pedagogy practices that enhance their performance as educators, which, in turn will enhance student performance as scholars (Burns, 2004; Chapin, O'Connor and Anderson, 2003). Mathematics courses all require students to write, however the use of writing to learn strategies such as journals, dialectical notebooks and summary responses enhance a student's ability to grow in assessment and mathematical concepts (Burns, 2004; Pugalee, 2005; Russek, 1998). Researchers believe that writing to learn in mathematics will succumb to enhanced critical thinking skills of students, assist in the discovery of mathematics concepts and will assist students in the link between assessment and instruction (Burns, 2004; Chapin, O'Connor and Anderson, 2003; Countryman, 1992; Pugalee, 2005; Russek, 1998).

Writing to Learn - Language Arts

Factors that influence proper learning and pedagogy are the writing ability of students. Student growth in any subject area or discipline generally is parallel to their writing ability. This is especially true in language arts (Harvey, 1998; Urqahart and McIver, 2005). In her research, Harvey (1998) found that teaching students writing strategies to convey meaning from text allow students to analyze and comprehend readings in order to better solve problems related to a passage. Students with enhanced writing competence are at an academic advantage and students with underdeveloped writing capability are at a disadvantage in a subject area such language arts in addition to reading comprehension ability (Burns, 2003; Graham & Perin, 2007). More to the point, Graham and Perin (2007) point out that "Adolescents who do not learn to write well are at a disadvantage. In school, weaker writers are less likely than their more skilled classmates to use writing to support and extend learning in content classrooms...despite the importance of writing, too many youngsters do not learn to write well enough to meet the demands of school or the workplace" (p. 445).

Willis (1993) and Zinsser's (1988) research advocate for the importance of writing to learn in subject and content areas including language arts. Students begin the writing process by imitating what they see, and this continues throughout their education (Zinsser, 1988). Zinsser (1988) suggests "writing is learned by imitation. I learned to write by reading writers who were doing the kind of writing I wanted to do...the essence of writing is rewriting" (p. 15). The consistencies of the research are writing to learn strategies show growth in student learning and achievement, and the lack of the ability of students to write affect all content areas in education, primarily language arts as language arts is embedded throughout all curricula (Graham and Perin 2007; Harvey, 1998; Urqahart and McIver, 2005; Zinsser 1988).

Through writing to learn strategies, students are able to compare and contrast information along with summarizing results of what they have learned. As stated, language arts through the use of writing to learn strategies need to be embedded throughout the entire curriculum regardless of content area. Writing to learn strategies cause growth in student reading comprehension and story writing capability which is needed in all academic subject areas (Danoff, Harris and Graham, 1993). In a study conducted by Danoff, Harris, and Graham (1993) students exposed to writing to learn strategies grew in their comprehension of literature and continued their growth in story writing efficacy. Writing in language arts allow students to see textual clues that enable comprehension of the main objective of the lesson and grasp the careful observation needed for erudition and intellectual growth (Burns, 2003; Harvey, 1998).

Writing to learn strategies are extremely beneficial at the middle school level in all content areas due to subject area specialization that begins in secondary education. Opportunities to write, especially in language arts increase student achievement and assessment levels (Graham and Perin, 2007; Wills, 1993; Zinsser, 1988). Students will thrive and grow as learners through enhanced writing skills which mirror their growth in standards based curriculum (Danoff, Harris and Graham, 1993; Shellard and Prothero, 2004). Jacobs (2010) points out that "every school district in the United States has some form of initiative that focuses on literacy" (p. 203). The literacy should embed creative writing, collaborative writing, and interactive writing that will focus on engaging students in making strong connections, these connections enhance the writing process and stimulate authentic assessment performance (Jacobs, 2010). Researchers believe that writing in language arts and literacy shows improvement of student educational development and writing to learn increases student achievement in all subject curricula (Danoff, Harris and Graham, 1993; Graham and Perin, 2007; Shellard and Prothero, 2004; Wills, 1993; Zinsser, 1988). Writing to learn strategies can be offered in remediation periods in order to give students access to this type of pedagogy in order align these strategies to instruction and standards. Remediation periods allow student academic growth through additional educational time offered to students in small group settings and peer instruction offered to students (Marzano, Pickering, and Pollock, 2001; Saint-Laurent, Dionne, Giasson, Royer, Simard, and Piearard, 1998).

Remediation Periods

Remediation periods are alternative educational programs where students are placed in a nontraditional educational setting such as a twilight or zero period in order to initiate academic progression in students that have been unsuccessful in the general education setting (Torgesen, Alexander, Wagner, Rashotte, Voeller, and Conway, 2001). In a 2004 study performed by Cole, Waldron, and Majd, students were placed in a inclusive remediation setting to assess their performance in mathematics and language arts. The study showed that students placed in the remediation setting performed better on mathematics and language arts assessments than when placed in their general education classroom environment.

If a student is placed in an alternative learning setting, their physical and social demeanor could change allowing for growth in knowledge, comprehension and understanding. The alternative setting is essential depending upon the educational history of certain students and expectations cannot be the same for all students due to their background (Rogoff, B. (2003; Vygotsky, 1978). In a study performed by Taub, White, Ryndak (2014), students with complex instructional needs were placed in an inclusive setting and received standards based instruction within a general education environment. In this setting, students were shown to achieve more positive outcomes when standards aligned instruction occurred within a general education situation.

Studies show students educated in inclusive settings including remediation periods, will make significantly greater academic progress in testable areas including mathematics, language arts and science (Taub,White, and Ryndak, 2014). Students of special needs placed in a atmosphere of general education will show growth in standards based instruction aligned to the common core state standards (Cole, Waldron, and Majd, 2004); Taub,White, and Ryndak, 2014). Remediation periods allow students to show cognitive advancement through an active learning process, students are assessed in different content areas in a manner that supports learning (Bransford, Brown and Cocking 2000). Remediation periods support learning as they are environments that clarify expectations of students based upon academic deficiencies and establish a timeline of goal completion (McLaughlin, Veale, Mcilwrick, De Groot, and Wright, B., 2013). McLauglin et. al. (2013) suggest "not all learners will be successful in their remediation, but providing mentorship and an organized approach to remediation can at least improve their chances." Researchers believe remediation periods provide opportunity for enhanced academic growth of all students through additional support and erudition (McLauglin et. al., 2013; Torgesen et. al., 2001). Remediation periods are dependent upon instructors and the collaboration of educators through professional development such as professional learning communities. Professional learning communities can improve teacher understanding of best practices that enhance student learning through content oriented pedagogy (DuFour and Eaker, 1998; Taub et. al., 2014).

Professional Learning Communities

DuFour and Eaker (1998) describe professional learning communities as an avid group of educators committed to the improvement of the educational process and stakeholder involvement. Professional learning communities (PLCs) are designed to allow collaboration amongst teachers and administrators in order to close the achievement gap amongst students within school districts. The PLC model enables instructors to work in partnership in the alignment of the common core standards within the curriculum and formulate conversations on the successes and failures of the pacing guide in their student population (Guskey, 1997; Harris, 2009). Although not the only use of PLCs, PLC effectiveness can be measured directly by student achievement on standardized exams and grades which are directly impacted by the curricula and pacing guide (Guskey, 1997). Under the NCLB guidelines, students are expected to continue with the alignment of the pacing guide regardless of the type of learner in the classroom. PLC collaboration has allowed teachers to discuss the ineffectiveness of NCLB and why diverse learners require additional support (Epstein, 2004; Harris, 2009; Ornstein et. al., 2007). In a study of twenty four primary and secondary schools designed to evaluate teacher pedagogy and academic quality of student work, Newmann (1996) concluded that organization should not be the focal point of schools, rather the community of educators and their collaboration.

Attaining results such as an increase in high stakes standardized test scores can be effectively addressed through the PLC process. More to the point DuFour and Eaker (1998) stated "the very reason to engage in the PLC process is to improve results, therefore, it is incongruous to argue that the process should be inattentive to results" (p. 147). In a study of the implementation of professional learning communities in the Wales Public Education System, Harris and Jones (2010) concluded that professional learning communities positively contribute to positive school climate and student educational development. Researchers deduce that the focus of professional learning communities should be student centered education and the continuous educational growth of students (Guskey, 1997; Louis and Marks, 1998; Newmann, 1996).

Vescio, Ross and Adams (2008) suggest "participation in learning communities impacts teaching practice as teachers become more student centered. In addition, teaching culture is improved because the learning communities increase collaboration, a focus on student learning, teacher authority or empowerment, and continuous learning; when teachers participate in a learning community, students benefit as well, as indicated by improved achievement scores over time" (p. 88). Researchers believe that PLCs assist teachers with alignment to the standards, pacing guide, curricula and NCLB guidelines (DuFour and Eaker, 1998; Guskey, 1997; Louis and Marks, 1998; Newmann, 1996).

Conceptual Framework

The conceptual framework, shown in Figure 4, was formulated using the initial research problem, which was the impact of mathematics, science and language arts writing to learn strategies on student knowledge and standardized test scores, namely the NJ ASK & PARCC. The research problem consisted of the advantages and disadvantages of writing to learn strategies in three content areas: mathematics, science, and language arts. In addition, how the writing to learn strategies could enhance student knowledge, content understanding, and standardized test performance (Pugalee, 2005; Shellard and Protheroe, 2004; Zinsser, 1988) Researcher assumptions and beliefs is that there is a direct positive relationship between student content knowledge, standardized test scores and writing to learn strategies (Burns, 2003; Hohenshell and Hand, 2006; Prain and Hand, 1999). As the researcher my experiential considerations came from experience as an instructor and administrator. I was a science teacher with experience in the primary, secondary and post-secondary levels and through my experience and research, I theorized that writing to learn strategies enhance test taking ability, theoretical knowledge, and critical thinking skills (Kurtz and Quitadamo, 2007; Zinsser, 1988).

Theoretical considerations and prior research regarding writing to learn strategies had a great impact on education but there has been very little research on the effects of writing to learn strategies on standardized testing. Prior researchers have argued the positive impact writing to learn strategies had on content and subject area and education (Countryman,1992; Zinsser, 1988; Shellard and Prothero, 2004 and Prain, 2006). These researchers further hypothesized that an increase in writing to learn activities assist students in the ability to process information and assist in the ability to attain information and learn new subject matter (Zinsser, 1988). Ritchie et. al. (2010) point out "diversified writing tasks, including more imaginative writing, have been shown to assist students' learning processes, improve learning outcomes, have strong motivating effects, and impact positively on students' attitudes and engagement" (p. 5).

The assumptions of the research are the writing to learn strategies would increase test scores in students in all three exams; the NJ ASK, PARCC, and tests created in the twilight and zero periods for mathematics and language arts, which mirror the NJ ASK and PARCC. These remediation periods were used target the achievement gap in proficiency of students with academic deficiencies. (McLauglin, Veale, Mcilwrick, De Groot, Wright, 2013; Saint-Laurent, Dionne, Giasson, Royer, Simard, Piearard, 1998). The methodological assumptions that were used in this research study were action research methodology (Dick, 2006; Elliott, 1991; Mills, 2014; Stringer, 2014). The research performed contained both a quantitative and qualitative component (Flick, 1998; Creswell, 2014).

Through researcher planning and teacher instruction, student evidence on writing to learn strategies was generated through quantitative and qualitative data synthesis (Stringer, 2014). Students test scores were not the only measure of validity in the experiment to see if the writing to learn strategies were successful. Evidence was generated through quantitative and qualitative data collection. Quantitative data included state standardized exams, simulated exams, pretest and posttests. The qualitative component consisted of field notes, observations, and focus groups. (Creswell, 2014; Gilflores and Alonso, 1995; Krueger and Casey 2015). Both quantitative and qualitative data was disseminated and translated to the teachers involved in the study and findings were explained and reflected upon in collaboration with the teachers as well. Academic remediation of students with performance deficiencies were remedied with writing to learn strategies by teachers in order to bring about growth in standardized test performance (Au, 2007; Elmore, 2002; Taub, White, and Ryndak, 2014). Through action research, both quantitative and qualitative findings were explained and related to the strengths and weaknesses of specific writing to learn strategies (Dick, 2006; Mills, 2014).

Summary of Literature Review

The researchers that have impacted writing to learn strategies and their success and failures in prior studies which had a theoretical impact on this study were Hohenshell and Hand (2006), Holliday, Yore, and Alvermann, (2006), and Zinsser (1988). Hohenshell and Hand (2006) reported science students that received writing strategies outperformed students that did not receive writing strategies in the areas of explanation of learned content, responding to theoretical questions and analytical thinking. Holliday, Yore, and Alvermann, (2006) reported a connection between writing strategies and growth in science knowledge and understanding, Zinsser's (1988) findings describe the influence of writing to learn strategies on all content area and critical thinking skills.

Procedures for identification of relevant literature and selection of criteria for this research was formulated through the use of related literature that had implications on the success of writing to learn strategies of students and the contributions of researchers on the writing to learn theory in education. Research posits that teachers need to be directed on proper pedagogy techniques and the positive effects of the writing to learn theory when incorporated properly into a lesson (Burns, 2003; Urqahart and McIver, 2005). The research further posits that writing to learn pedagogy techniques can improve critical and analytical thinking skills of students that positively impact student performance (Lipman, 1988; Willis, 1993; Zinsser, 1988).

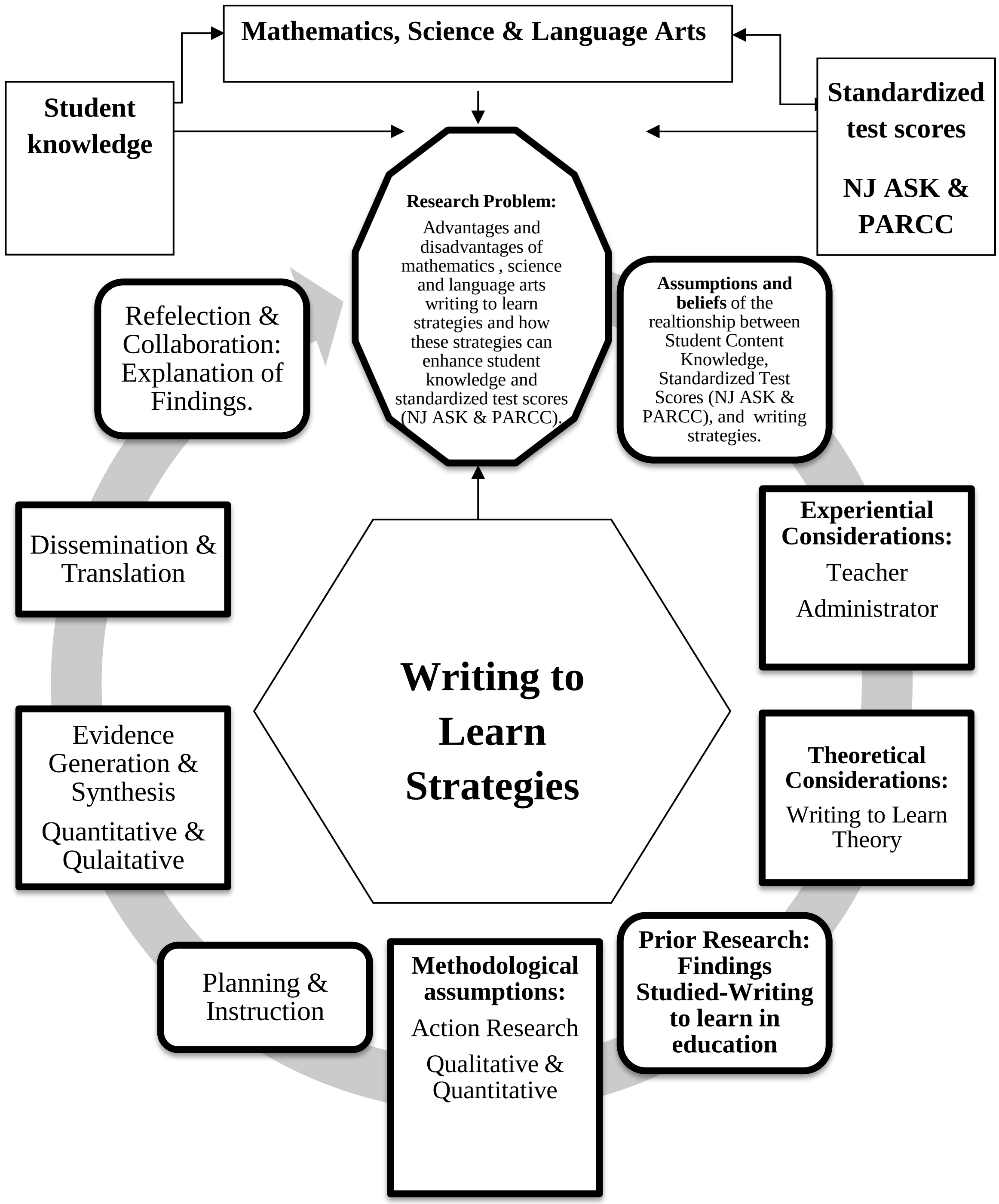

Figure 4. Writing to Learn Conceptual Framework.

Chapter III

Methodology

Introduction

The use of writing to learn strategies in education has not gained popularity with the influx of technology at the root of the common core standards (Davis, Fisher, & Forde, 2009; Jacobs, 2010). However, writing to learn strategies provide students with ability to convey routine information through routine writing in order to attain clarity, logic and critical thinking (Kurtz & Quitadamo, 2007; Zinsser, 1988). The use of writing to learn strategies in order to increase standardized test scores in New Jersey students has not been explored and aside from this study the effects of these strategies on the New Jersey Assessment of Skills and Knowledge (NJ ASK) and Partnership for Assessment of Readiness for College and Careers (PARCC) exam in primary and secondary students is unknown. The literature lacks connections between writing to learn strategies and standardized testing, therefore, this study explored the correlation between writing to learn strategies and the standardized test taking performance of primary and secondary students.

This chapter discusses the research design and methodology used in the research study. The chapter begins with the research questions that will guide the study. The remaining sections of this chapter provide a greater understanding of the organization and the reason for the research design and methodology chosen.

The following research questions guided the study:

1. How can writing to learn strategies be used to enhance student achievement?

2. What were the different writing to learn strategies that could be offered to students of the Wood School District that could be used as a learning tool for student growth and achievement?
3. How did writing to learn strategies offer the additional instructional advantage needed for students of the Wood School District to close the achievement gap?
4. What impact did teacher and administration collaboration have on delivery of writing to learn strategies?

Research Design and Data Collection Strategies

Action research. Action research methodology was chosen to achieve the research objectives of this study. This study involving writing to learn strategies involved several cycles. The first cycles included planning the study, putting the action (writing to learn strategies) in place, observing the writing to learn strategies and reflecting upon the action (Dick, 2004; Kemmis and McTaggart, 1988; Stringer, 2014). The action research process in this study began with the organization of the study through a focus on observing student test scores. Writing to learn strategies were then planned by the research team through the use of a Professional Learning Community (PLC) model. After the planning, writing to learn strategies were implemented and observations were conducted. The observations were analyzed which led to writing to learn strategies being revised by the research team. Additionally, semi-structured interviews, focus groups and interviews were conducted to triangulate data. This assisted the research team in the understanding of the impact of writing to learn strategies on student test performance and which strategies were most beneficial (Corey, 1953; Dick, 2006). Action research was used in this study because this was a collaborative process amongst educators who were looking for a way to improve instruction, which would enhance standardized test scores and student achievement (Stringer, 2014). Action research allowed us to address low standardized test scores through the implementation of writing to learn strategies (Corey, 1953; Dick, 2004; Elliot, 1991).

Action research cycles used in this study consisted of implementing multiple writing to learn strategies after they were planned in a PLC by the research team. As the researcher, I observed the students and how they reacted to certain strategies in addition to how they would use the strategy. Students were tested using a post-test that mirrored the NJ ASK or PARCC exam and after the exams were graded and data inputted, the PLC reflected on the most effective writing to learn strategies (Biggs, 1987; Elliott, 1991). Figure 5 depicts the steps of the action research cycles implemented in this study. This study was completed in a two-year time frame (2013-2015).

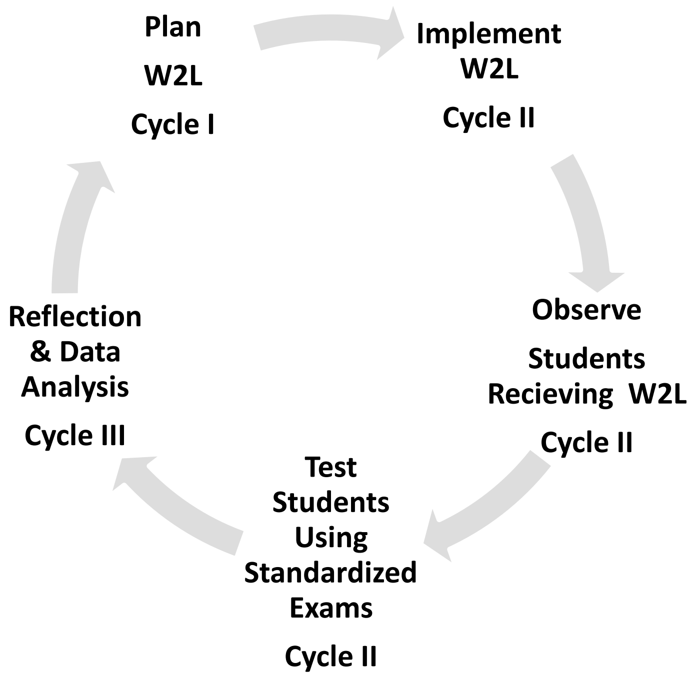

Figure 5. Writing to Learn Action Research Cycle.

This study had two main objectives, the primary being school improvement through increased standardized test scores and the secondary is organizational change of the Wood School District through writing to learn strategies. Test scores needed to increase in the Wood School District or the district would have been turned over to the state of New Jersey Department of Education. Through action research, my intent was to get educators to feel the need for change within the district (Kotter, 1996). Improved test scores were needed to realize the success of the district.

This study entailed multiple cycles of action research that necessitated a qualitative component including special programs, class projects, and instructional processes (Stringer, 2014). Qualitative components included teacher interviews, focus groups, and observations/field notes. Teacher interviews addressed which strategies were most successful for which discipline whether it was mathematics, science or language arts. Semi-structured interviews were conducted where teachers were asked base questions regarding writing to learn strategies with follow up questions that enriched the research team's understanding of which writing to learn strategies were most beneficial to students (Leedy and Ormrod, 2005; Mertler, 2009).

Focus groups employed gathering the required data, information, and perspectives about specific writing to learn strategies and their strengths and weaknesses when applied to standardized testing. Focus groups provided the study with formative and summative data on specific writing to learn strategies (Krueger and Casey, 2015; Mertler, 2009). Stringer (2014) points out that "focus groups provide another means of acquiring information and might be characterized as a group interview. Participants in a focus group should each have opportunities to describe their experience and present their perspective on the issues discussed" (p. 111).

Observations and field notes were used to integrate reflection into the action research process as I observed students performing the different writing to learn strategies. This became a daily routine of the research process (Edmonds and Kennedy, 2015; Johnson, 2011). Observations conducted were semi-structured enabling me as the researcher to observe the writing to learn strategy while taking notes and shifting the focal point from one group to another (Mertler, 2009). In addition, a class journal was kept in one classroom in order to allow students a venue to describe which strategy they felt was most efficient (Johnson, 2011; Mills, 2014). The class journal was not effective in this study as students did not utilize the journal. The perspectives of the teachers allowed a deeper understanding of the complete influence of the writing to learn strategies that quantitative data could not provide.

Pretest/posttest design. Embedded is the action research study was a pretest/posttest design that mirrored experimental designs. I used Creswell's (2013) research on experimental designs where there was a pretest and posttest measure the correlation between writing to learn strategies and standardized test scores. The research methods included predetermined instruments which were the NJ ASK and PARCC exams which ultimately determined the performance data of students. This experimental theory was tested using unbiased approaches, employing statistical procedures and using standards of validity and consistency according to the NJ ASK and PARCC standardized exams (Borg, Gall and Gall, 2003; Creswell, 2013).

This study employed writing to learn strategies as a theoretical framework to address the problem of low standardized test scores within the Wood School District (Luse et. al., 2012). Luse, et. al. (2012) point out that "one choice to be made when developing a theoretical base for a problem is the type of theory development methodology to utilize. A theoretical basis can be intricate in detail and pertain to an area that is already established or it can be completely novel and address new or emerging domains" (p. 146).

Instrumentation

Data collection strategies included specific research instruments. The research instruments that were used were the standardized exams including the 2013 NJ ASK, Pre-tests (consisting of NJ ASK & PARCC simulated exams), Post-tests (consisting of NJ ASK & PARCC simulated exams), and 2014 NJ ASK exam. In addition, the 2015

PARCC exam was also used as a research instrument for this study. As stated, the qualitative data collection strategies included teacher interviews, focus group interviews, and observations/field notes.

The section will discuss the instruments used to achieve the research goals:

Quantitative. Initial 2013 NJ ASK exam scores of students in grades four through seven were used in the subject areas of Mathematics, Language Arts, and Science. According to the New Jersey Department of Education, the purpose of the NJ ASK exam is to assess knowledge and application skills of Mathematics, Language Arts, and Science. These exams were used as a baseline data for students in the study. There were three sections on the NJ ASK including Language Arts, Mathematics and Science with different types of questions asked per section. The Language Arts section contained multiple choice and open ended questions. Students were asked to read passages and respond to multiple choice questions to test reading comprehension skills. In addition, there was also writing section embedded where students were asked to write a story and composition explaining a personal experience. The mathematics section contained mainly multiple choice questions and short constructed response questions. Much like the mathematics section of the exam, the science section contained multiple choice questions and open ended questions.

Simulated NJ ASK exam (Appendix E) scores for grades four through seven were used in the subject areas of Mathematics, Language Arts, and Science. These simulated exams were developed to mirror the NJ ASK exam. All sections contained the same type of questions as the state standardized exam and the exams were not timed. Three simulated exams were given in the 2013-2014 school year and three exams were given in the 2014-2015 school year.

PARCC exam scores of students in grades four through seven were used in the subject areas of Mathematics and Language Arts. The Partnership for Assessment of Readiness for College and Careers (PARCC) exam were given in the Spring of 2015. The exam sections were much like the NJ ASK where the Language Arts section contained multiple choice and open ended questions. Students were asked to read passages and responded to multiple choice questions to test reading comprehension skills. There was also writing section embedded where students were asked to write a story and composition explaining a personal experience. The mathematics section contained multiple choice questions and short constructed response questions. There was no science section of the PARCC exam.

Simulated PARCC exam (Appendix F) scores of students in grades four through seven were used in the subject areas of Mathematics and Language Arts. I Ready which is an electronic testing tool used to prepare students for electronic standardized exams, was the instrument used to create the simulated PARCC exams. I Ready, created by Curriculum Associates, is a teaching tool used for educational development and analytical measurement of students through the use of current technology. I Ready uses the common core standards to develop their assessments similarly to the NJ ASK and PARCC standardized exams. Five diagnostic simulated exams were given in the 2014-2015 school year before the PARCC exam offered in the Spring of 2015. The exams were not timed.

Qualitative. Teacher interviews (Appendix A) were conducted to see which writing to learn strategies were perceived to be most influential for students by the instructors. These interviews were semi structured and included questions that enhanced the research team's understanding of student success regarding specific strategies and enhanced standardized test scores (Mertler, 2009). The interview protocol included a script of twelve questions, notes to myself as the interviewer, and administration instructions. There was space allotted between questions to record responses of interviewees along with my notes (Creswell, 2014; Krathwohl, 1998).

Focus group interviews (Appendix C) were used in this study in order to gather specific information about writing to learn strategies applied to standardized testing. Teachers had the opportunity to describe the experience of teaching specific writing to learn strategies and their perception of the successes or failures of the strategies. (Krueger and Casey, 2015; Stringer, 2014; Mertler, 2009). Through interviews conducted in focus groups, I was able to acquire the qualitative information needed to better comprehend the quantitative data. The use of focus groups assisted with the debriefing of the evaluation of students using pre and post exams. The focus groups called attention to the expectation and effect of certain writing to learn strategies, practicability of certain strategies, along with teacher implementation of specific writing to learn strategies (Gilflores and Alonso, 1995). The interview protocol included the specific writing to learn strategy used with four follow up questions posed to the interviewees with notes to myself as the interviewer and administration instructions. There was space allotted between questions to record responses of interviewees along with my notes (Creswell, 2014; Krathwohl, 1998).

Class journals were also used in this study. Students were told when the study began that they would have the opportunity to write down, anonymously if preferred, specifics about writing to learn strategies. Students could document which strategies they thought were valuable and which strategies were not as useful. Students were permitted to write whatever they felt about the writing to learn strategies, specific or vague generalities about the study itself. The class journals were not used by the students (Johnson, 2011). Students were continuously reminded about the ability to use the class journals; however, the students never used them.

Participant observation/field notes (Appendix D) were taken as a form of data in two different settings, primarily in the PLCs where writing to learn strategies were introduced and continuously discussed amongst the educators. All instructors knew they were being observed and there were detailed field notes on all aspects of their reactions to writing to learn strategies and student performance. Secondly, students were observed in classrooms where writing to learn strategies were being taught and students were working independently or in a group. Through participant observation and field notes, I was able to formulate better information and data of which writing to learn strategies were more conducive to standardized exam preparation for both the student and teacher. The protocol included the date and time of the observation, the number of students present and their grade, and the writing to learn strategy covered. In addition, the protocol included the general observation with a narrative description and a reflection of the observation.

Context of the Study

The central purpose of the study was to utilize writing to learn strategies to affect standardized test scores of students in The Wood School District. This was an action research study with a focus on testing, instruction, and teacher collaboration. In addition, this study centered on strategic planning principles which incorporated managing sustainable change, managing the processes of change and development, creating a unified vision amongst the staff, students, and stakeholders, enacting the vision and reviewing the plans once incorporated. There are multiple reasons for the rationale of this action research study. The study yielded results during the 2013-2014 and 2014-2015 school year. The specific issue or problem was a lack of proficient test scores in the district on the NJ ASK exam.

Historically, the Wood School had a culture of poor standardized test scores and a strong unionized culture in the building. Teachers refused change in the building whether they were positive or negative. As the leader of the organization and the researcher, I reinforced and continue to reinforce the benefits to the change regarding the writing to learn strategies in order to overcome any type of skilled incompetence amongst staff (Argyris, 1990). These benefits were reinforced through sharing success stories of writing to learn strategies within the PLC.

The Wood School District had been a repetitively failing school district in all measurements of academic performance. According to the 2012-2013 New Jersey School Report Card, the No Child Left Behind (NCLB) progress targets for Mathematics and Language Arts subgroups were not met for any subgroups for several years. Subgroups included: Black, Hispanic, students with disability, and economically disadvantaged students. The district had been named a priority school in the state due to the consistency of low NJ ASK test averages. Standardized testing was how the district and most districts were measured in the state of New Jersey and most other states in the country. The pedagogy in classes were not working and a new initiative needed to take place in order to put Wood back in good standing with the State of New Jersey Department of Education. In addition to rewriting the curriculum and moving teachers to new locations in the building, there needed to be assistance offered to students beyond the school day.

According to the 2014 New Jersey School Report Card, the Wood School District was a Title I Pre-K through District with approximately 400 students. The language diversity of students included English (55.5%), Spanish (36%) and Vietnamese (6.2 %). The percent of enrollment breakdown of students with disability (24%), economically disadvantaged students (93.5%) and limited English proficiency (6%). The ethnic racial subgroups included were Hispanic (53.8%), Black (28.8%), White (5.7%), and Asian (9.2%). There was an increasing number of students in district with limited English proficiency, limited parental involvement, in addition to students who had not been instructed with the use of the common core standards and proper curriculum by past instructors and administration (Figure 6).

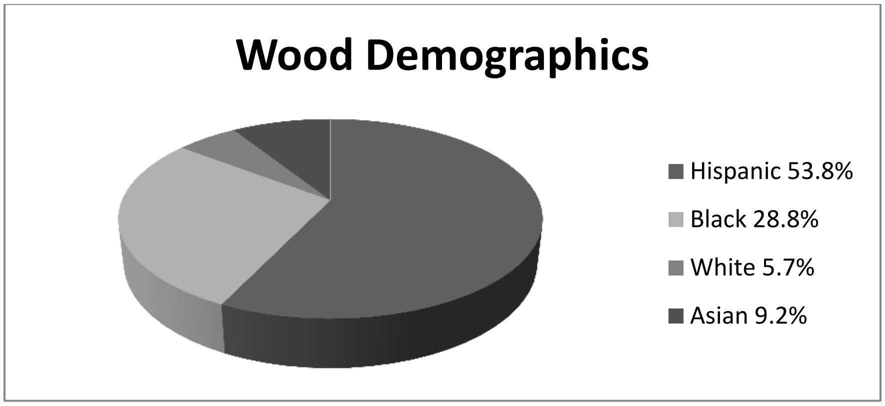

Figure 6. Wood Demographics.

The Wood School District had approximately a 16:1 student to teacher ratio. The ratio of students to teachers was never the issue for the poor standardized test scores in this district. The instructors became complacent and refused to comply to the State of New Jersey's prescribed teaching formula. The formula was simple, all instruction was based upon the common core standards, which is the primary tool used for writing district curricula.

A plan was defined where a definite course of action had been taken with the creation of the twilight and the zero periods along with the incorporation of writing to learn strategies embedded in those periods. A plan was implemented where the five teachers in charge of the zero period and two twilight periods implemented writing to learn strategies.

Writing to learn research studies provided further insight to the success or failure of certain aspects of the study (Kurtz and Quitadamo, 2007; Moore, 1994; Prain and Hand, 1999; Prain, 2006). Raising standardized test scores became a collective vision for teachers involved in the study and for a multitude of teachers and stakeholders in the district. Wood grew to have a unified vision and began to understand the reasons which brought them to a situation where change was necessary. Stringer (2014) stated "as people work toward a collective vision that clarifies the nature of the problems that have brought them together, they gain greater understanding of the complexities of the situation in which they are enmeshed" (p. 192).

The Wood School District needed a transactional leader who would influence stakeholders to participate in group learning to improve student achievement. Through transactional leadership, teacher performance was enhanced and so was student standardized test taking performance. More to the point, Yuki (1999) stated "charismatic leadership theories are usually conceptualized at the dyadic level, and group processes do not receive enough attention. Group processes are important not only because they are necessary to explain how a leader can influence the performance of an interacting group, but also because attributions of charisma are unlikely to be the same for all group members" (p. 292).

An example of the skilled incompetence of certain instructors is not teaching students based upon research or the common core, but teaching the students what they think they can handle based upon demographics of the area students reside (Argyris 1990). This became common practice with too many teachers that had been tenured in the Wood School District. Transactional leadership was needed in Wood and far outweighed the need for emotional intelligence due to the advanced state of decline of the standardized test scores of the school and its standing with the Department of Education. Top down leadership was needed and a staff buy in was essential. However, staff compliance outweighed buy-in due to the state of the district scores (Bass, 1990; Howell and Avolio, 1993; Odumero and Ogbonna, 2013). Odumero and Ogbonna (2013) pointed out that "transactional leadership, also known as managerial leadership, focuses on the role of supervision, organization, and group performance; transactional leadership is a style of leadership in which the leader promotes compliance of his followers through both rewards and punishments" (p. 358).

A necessary change in the Wood School District was needed for the success of the students and overall success of the district. A sense of urgency was needed amongst the staff which trickled down to the students as the urgency was realized amongst the entire district (Kotter, 1996). Multiple leaders had come to Wood and tried to invoke change based upon transformational or charismatic leadership, however, that was unsuccessful. The Wood School District needed transactional leadership, which brought specific goals and structure to the institution through top down leadership in order to input corrective educational measures to achieve student performance. Goals were set for teachers and the progress of students was monitored in order to achieve the standardized testing expectations of the New Jersey Department of Education (Bass, 1990; Odumero and Ogbonna, 2013).

A vision to change the Wood School District needed to incorporate a new model that acknowledges and addresses the importance of standardized exams for the student body. Student success in standardized exams required administrative curricular guidelines for teachers, which altered the pacing guide of instruction (Au, 2007; Herman and Golan, 1993). The vision needed to incorporate accountability for administrators and teachers for student standardized test scores, which increased the pressure for all stakeholders involved in the school (Nichols, Glass, and Berliner, 2006). This research had created the needed vision within the school, which was imperative for the future of the Wood School District. If the school remained on the course it was on, the Department of Education would take the school over in a matter of a few years. Writing to learn strategies created a learning model that would enhance critical thinking skills of students and overall growth in specific content needed for improvement of standardized test scores (Kurtz and Quitadamo, 2007; Zinsser, 1988). Writing to learn strategies assisted students with reasoning techniques, developing understanding, and strategies that working in learning subject matter (Burns, 2003; Countryman, 1992; Pugalee, 2005) (Figure 7).

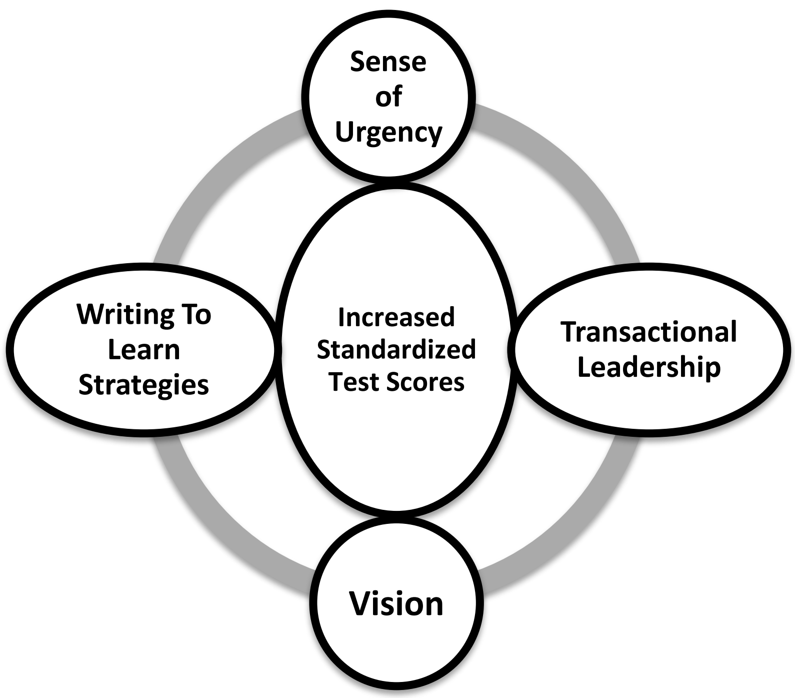

Figure 7. Necessary Change.

Sampling and Selection of Participants

Non-probability sampling was used for this study with an embedded purposive sampling design. Non-probability sampling is a selection process within a population that does not allow all within a population equal selection (Doherty, 1994; Guarte & Barrios, 2006). Purposive sampling is information based random selection within a population pertaining to a topic of concentration (Guarte & Barrios, 2006). In this study, non-probability sampling did not involve random sampling and did not allow all students within the Wood School District equal chances of being selected (Collins, Onwuegbuzie, and Jiao, 2007; Onwuegbuzie and Leech, 2007). The participants chosen were students in grades four through seven who scored below proficiency in the NJ ASK exam. This was a pre-specified group of students that emerged due to a lack of proficiency on the NJ ASK. Students were placed in five groups assigned to all teachers. There were two groups of students in grades four and five, and two groups of students in grades six and seven in the twilight period. There was also one group of students assigned to the zero period. There were 52 students in the twilight period and 24 students in the zero periods making up the five classes. There were 20 - 4th grade students, 22 - 5th grade students, 18 - 6th grade students, and 16 - 7th grade students. Of the 76 students, 45 students were female and 31were male. There were 38 Hispanic students, 27 African American students, 9 Asian students, and 2 Caucasian students.

Students were divided into homogeneous groups, which alleviated teachers of the potential problem of teaching students with significant learning gaps. Students were divided into separate groups based upon their baseline NJ ASK score. Within each separate group or strata, a sample of students was selected to participate in writing to learn strategies (Flick, 1998; Miles and Huberman, 1994). The teachers are assigned one of five teaching responsibilities. The teachers along with their assignments included: (JW) Zero Period Language Arts and Zero Period Mathematics, (CS) Twilight Period Language Arts, (RF) Twilight Period Language Arts, (ES) Twilight Period Mathematics, and (KV) Twilight Period Mathematics (Letters in parenthesis identify the teacher) (Table 1). JW was a 5th grade Caucasian female teacher who had been in the district for six years, CS was a middle school Caucasian female social studies and language arts teacher who was in the district for eleven years, RF was a African American teacher of students with disabilities in kindergarten through 2nd grade, ES was a Caucasian female middle school language arts and mathematics teacher who was in the district for four years, and KV was a Caucasian male middle school teacher of students with disabilities in science, mathematics and language arts who was in the district for two years.

Table 1

Study Participants and Teachers

Total Subjects =76	**Students**	**Period**	**Teacher**
4th Grade	20	Twilight/Zero	ES, RF, JW
5th Grade	22	Twilight/Zero	ES, RF, JW
6th Grade	18	Twilight	CS, KV
7th Grade	16	Twilight	CS, KV
Total	**76**	**5**	**5**

As stated, there were a total of five teachers for these initiatives, one in the zero period, and four in the twilight period. The zero period followed a block scheduling model where students would take Mathematics one day and Language Arts the next.

This cycle rotated for the remainder of the school year. The twilight period offered a 45 minute Language Arts period and a 45 minute Mathematics period daily. Science was embedded within the mathematics and language arts periods. Students were methodically placed in either the zero or twilight period based on their level of partial proficiency in Mathematics and Language Arts on the NJ ASK standardized exam. Teachers were assigned to one of three positions: zero period language arts and mathematics, twilight period language arts, or twilight period mathematics. Students rotated to each teacher depending on the teacher's assignment. Teachers were selected based upon their application for the position and their instructional certification. Teachers were paid their contractually hourly rate for their service. The compliance of the teachers and students warranted the benefit of the writing to learn strategies and were directly correlated to the top down leadership I employed in the building. Transactional leadership guided me in providing the rewards needed for the instructors if my administrative expectations were met regarding standardized test scores of students (Bass, 1990).

The twilight and zero period were stipend positions in the Wood School District providing extra income for teachers. Although, I needed to be a transactional leader in the district, I did not want to alienate myself so I needed to also be a democratic leader and listen to the concerns of a few of the teachers. Their concern was that they did not mind putting the extra work in to get Wood where it needed to be, but they needed to be compensated. Teachers, like other professionals need to make a living and some teachers of the Wood School District were driven by financial means. Goleman et. al (2002) pointed out how important listening was for a leader when he said "the best communicators are superb listeners-and listening is the key strength of a democratic leader. Such leaders create the sense that they truly want to hear employees' thoughts and concerns and that they're available to listen" (p. 69). Teachers wanted their voice heard in regards to the research and so we collaborated and came up with the idea of housing the research within the district.

Worldview and the Role of the Researcher

This study was based on a pragmatic worldview. Creswell (2014) points out the focus of a pragmatic worldview when he stated "instead of focusing on methods, emphasize the research problem and use all approaches available to understand the problem" (p. 10). This worldview was essential for this study and was a very important aspect of this research because it could bring about an educational practice that would increase standardized test scores in the district. The pragmatic worldview directly related to my role as the researcher. The role of myself as the researcher was to select the students who participated in 5 sections of the zero and twilight period. Students were selected based on their partial proficiency of both mathematics and language arts. As the researcher, my role was also to train the teachers in writing to learn strategies and implementation. I also collected the writing to learn strategies the teachers implemented on a biweekly basis. If there was any confusion on a writing to learn theory or premise, I provided clarification to the instructors.

As the researcher, I guided the research process, continuously made decisions, supported and monitored the change, and lastly evaluated the change (Stringer, 2014). This enabled teachers and students to develop criteria for coming up with their own ideas for growth and scholarship. In turn, this enabled students to increase their level of proficiency on the NJ ASK and PARCC exams while assisting teachers in creation of pedagogy that allowed student growth, scholarship and positive performance on standardized exams.

Outline of Action Research Cycles

The importance of action research and its cycles is the connection between the researcher's hypothesis, the literature and current practices (Johnson, 2011). The cycles of action research allow the researcher to test a hypothesis using various participatory techniques for data collection, analysis and interpretation and allows for reflection on applicable research practices (Mills, 2014; Stringer, 2014).

The management of this study included a timeline of major activities. Students were placed in groups according to their May 2013 NJ ASK test scores. There was an initial pretest offered to students in both the Twilight and Zero Periods in September of 2013. Students were then assigned to the experimental group that offered writing to learn strategies in addition to work that was assigned in their respective periods. In October 2013 and December 2013 along with February 2014 students were post-tested. Students then took the NJ ASK in May 2014. All pre-tests and post-tests of the 2013-2014 school year were based upon the NJ ASK.

Students were Pre-Tested again in September 2014, and post-tested in October 2014, December 2014 and February 2015. All pre and post exams in the 2014-2015 school year were based upon the NJ ASK Standardized Exam and the PARCC standardized exam. As stated, students were also scheduled to take the 2015 PARCC performance based assessment offered in March of 2015 which was used as data in this study. This piece was imperative for future research as all standardized testing in the state of New Jersey would be based around the PARCC exam.

The research was conducted in the following 3 cycles:

Cycle 1 - planning the study. The first cycle included students being selected for the study based upon NJ ASK scores of the 2013 standardized exam. In this cycle, writing to learn strategies were introduced to five different teachers' classes. There was an experimental group and a control group for every instructor. The experimental group received writing to learn strategies initially when the period began. There were five experimental groups consisting of four groups of students in the twilight periods and one group of students in the zero period. The five control groups did not receive writing to learn strategies in their respective classes. Initially students pre-tested on exams that mirrored the NJ ASK and PARCC. Writing to learn strategies were then introduced to five different teachers' classes.

Cycle II - implementing the study. The second cycle included pre-testing and post-testing students on exams that mirror the NJ ASK created by the instructors and PARCC simulated exams grated by the I Ready technology used by the district. These were benchmarks made by the instructors that mimicked the actual standardized exam. Students then took the NJ ASK exam in May 2014 and 2015 and the PARCC exam in May 2015. Teachers were trained on proper writing to learn strategies and implementation in the classroom and reported two separate writing to learn activities used in their periods biweekly. Instructors met bi-monthly with the me in professional learning communities to discuss the success and failures of the writing to learn strategies and their correlation to standardized exams.

Regardless of being in the experimental or control group, students received the same general pedagogy from their instructors, however during class group work, students in the experimental group received writing to learn strategies, that supplemented their instruction. The study was designed according to realistic limits. Krathwohl and Smith (2005) stated “even as the design is first being considered, you must make tentative decisions on what level of resources you can practically employ” (p. 80). Evidence generation and data synthesis along with dissemination and translation of data was obtained from the pretesting and post-testing of students. Through test scores, I was able to discuss generalities, associations and their significance obtained through collected data. Moore (1992) points out that when analyzing data, researchers should “clearly discuss generalizations, relationships, principles, and the significance of your results” (p. 249). The data generated from this study had determined the effect and/or result of the writing to learn theory and its effectiveness on the NJ ASK and PARCC exam.

Cycle III - data analysis. The third cycle included analyzing quantitative data from test scores and qualitative data from observations and interviews. Observations/field notes were collected through an observational protocol including descriptive notes and reflective notes. Interviews were conducted with teachers before, during or after PLCs. All observations/field notes and interviews were collected and stored in a file database dedicated to the study (Creswell, 2013). The outcome of the quantitative data yielded statistical information as to how writing to learn strategies correlate with mathematics and language arts test scores of students in grades 4 through 7 on the NJ ASK and PARCC exams. The study was a group comparison where there was a normal distribution of scores and the statistical test used was a T test (Creswell, 2014). I wanted to test for significance between the students that received writing to learn strategies versus the students in the control group. The one-tailed T test allowed me to calculate a P Value which unveiled of significance was attained in comparison of the experimental and control groups (Blake, 2003). Stringer (2014) points out that "the outcomes of research presented as statistical information, can often provide clear evidence to either support or reject the veracity of such ascertations" (p. 121). The data collection was expected to show growth of the students and assess the effectiveness of the actions taken through this study (Stringer, 2014). Table 2 outlined the action research cycles in this study.

Table 2

Outline of Action Research Cycles

Cycle	Planning	Implementation	Data Collection
One	X		
Two		X	
Three			X
Conclusion	Logistics & Recruitment	Collection & Analysis of Data	Production & Presentation of Study

Conclusion

This chapter concentrated on the methodology used to design, execute and assess how writing to learn strategies impacted the culture of learning in the Wood School District mathematics, science and language arts assessment. This study employed action research that focused on both a quantitative and qualitative component. The quantitative component focused on assessment and the qualitative component focused on instructional projects and special programs through participant observation, field notes and focus groups. The utilization of both the qualitative and quantitative components and the applications of action research, writing to learn strategies enhanced school improvement and organizational structure (Stringer, 2014).

This chapter outlined the data collection strategies, analysis, and three action research cycles utilized in the study. Cycle I was the planning and preparation for the study that included selection of students for the study based upon 2013 NJ ASK standardized exam. Writing to learn strategies was introduced to the students. Cycle II was the execution of the study, which included pre-testing and post-testing students on exams that mirror the NJ ASK and PARCC. In addition, teachers met in professional learning communities to discuss the success of writing to learn strategies and their correlation to standardized exams. Cycle III encompassed the analysis of data where quantitative data from test scores and qualitative data from observations and field notes were examined.

Chapter IV

Cycle I – Planning the Study

Introduction

The purpose of this study was to observe the impact of writing to learn strategies on standardized test scores of primary and secondary students in the Wood School District. This project was an inquiry based project based upon the ideology that writing to learn strategies were a powerful tool for enhanced student critical thinking skills that positively impacted standardized testing performance (Kurtz & Quitadamo, 2007; Lipman, 1988). The study addressed the needs identified by the district to enhance standardized test scores of elementary and middle school students. It also addressed the needs of the faculty in finding an educational method and pedagogical practice that would enhance their students critical thinking skills in relation to standardized testing performance (Kurtz & Quitadamo, 2007; Lipman, 1988).

The objective of Cycle I was to plan and design a research study that would become the basis for addressing the research questions. In order to meet the goals of the study, I used an action research design. According to Stringer (2014), "action research envisages a collaborative approach to investigation that seeks to engage subjects as equal and full participants in the research process...its purpose is to assist people to extend their understanding of their situation and to resolve significant issues or problems that confront them" (p. 14).

There was no greater issue of significance to the faculty, students, and stakeholders of the Wood School District than perpetual low standardized test scores. Action research provided the means to address the issue through tangible quantitative and qualitative data. Through this action research study, I observed the impact of writing to learn strategies on the standardized test scores of Wood students. The study also utilized a pre-test and post-test model where the attempt was the determination of learning differences between students who were offered writing to learn strategies in an experimental group and students who received regular remediation instruction in a control group (Gall & Borg, 1996). Cycle I (this cycle) lays out the plan of the study which set the groundwork for the implementation of the writing to learn strategies in Cycle II.

Primarily, the following plan addressed the overview of the action research study. A discussion of the twilight and zero remediation periods took place next in the plan because these periods represented the time and day where students were taught writing to learn strategies. Included in the discussion of the recruitment of students is the data that served as the baseline for grouping students in the study. Data collection constituted the remainder of cycle one as it incorporated the 2013 NJ ASK exam, which served as baseline data for grouping students in the study. The NJ ASK pretest created a further baseline for student subjects in the research. Further baseline data included teacher made simulated PARCC exams, which were administered as pretest instruments. Discussed afterwards is the formation of professional learning communities and teacher training, where teachers learned the importance of the research and the role they would take in the study. Cycle one ended with a discussion of classroom space and the cost of the research.

Plan of Study

This research study had multiple components and data was collected in multiple phases. Primarily the 2013 NJ ASK exam administered in May of 2013 was used as a baseline for selecting students to participate in the study. In September of 2013, students were given a pretest that was identical to the NJ ASK exam that would further serve as baseline data for the study itself. Following the exam, students would participate in a twilight period after school or zero period before school program, where they would receive additional assistance in standardized test preparation in mathematics, science and language arts. This additional assistance included divulging deeper into the curriculum and assisting students in reading comprehension, problem solving for mathematics and general scientific knowledge. Students were split into control and experimental groups at all grade levels including fourth, fifth, sixth, and seventh grades. In fact, all student participants in both the twilight and zero periods were placed in an experimental or control group for the respective twilight and zero periods. The zero period only contained 4th and 5th grade students and those students were placed together in one classroom. The twilight period contained 4th, 5th, 6th, and 7th grade students. The 4th and 5th grade students were grouped together in one classroom and 6th and 7th grade students were placed together in one classroom. All students in experimental groups received writing to learn strategies in order to see if those strategies would have a direct impact on standardized test scores. The control group received the remediation and instruction embedded in the twilight and zero periods, however they did not receive writing to learn strategies.

During the course of the year, students were to take three NJ ASK simulated posttests that led into the May 2014 NJ ASK standardized state exam. Therefore, the pretest took place in September of 2013, and students then took three posttests, one in October of 2013, one in December of 2013 and the other in February of 2014 (Table 3).

The exact cycle was repeated for the 2014-2015 school year with the May 2014 NJ ASK Scores used as baseline.

Table 3

NJ ASK Test Administration: 2013-2015

Time Frame	NJ ASK Pre-Test Sept. 2013	NJ ASK Post-test 1 Oct. 2013	NJ ASK Post-test 2 Dec. 2013	NJ ASK Post-test 3 Feb. 2014	NJ ASK State Exam May 2014
September	X				
October		X			
December			X		
February				X	
May					X

In addition, in the 2014-2015 school year, due to the new PARCC exam, students also took a simulated baseline PARCC exam followed by four more simulated exams that led into the May 2015 PARCC standardized state exam. The PARCC exam was a federal standardized exam adopted by New Jersey and was scheduled to be administered for the first time in the Spring of 2015. The PARCC exam had 2 assessments, the Performance Based Exam (PBA) that takes place in March, and the End of Year Exam (EOY) that takes place in May. The differences in the exams are that the PBA covers material that should have been learned during the first half of the school year and the EOY covers material that should have been learned over the entire school year. The baseline for the PARCC exam was simulated exam one, used as a pretest, followed by four other simulated exams, used as posttests. The End of Year (EOY) PARCC was used as the final post-test before data was analyzed for the school year (Table 4).

Table 4

PARCC Test Administration: 2014-2015

Time Frame	PARCC Pre-test Sept. 2014	PARCC Post-test 1 Oct. 2014	PARCC Post-test 2 Dec. 2014	PARCC Post-test 3 Feb. 2015	PARCC Post-test 4 May 2015	PARCC State Exam May 2015
September	X					
October		X				
December			X			
February				X		
May					X	X

In summary, the NJ ASK and PARCC were used as testing instruments to measure student growth throughout the study. A pre-test was used for each exam along with an end of year state exam given for both the NJ ASK and PARCC. However, three post-test were given for the NJ ASK while 4 post-tests/simulated exams were given for the PARCC exam (Figure 8).

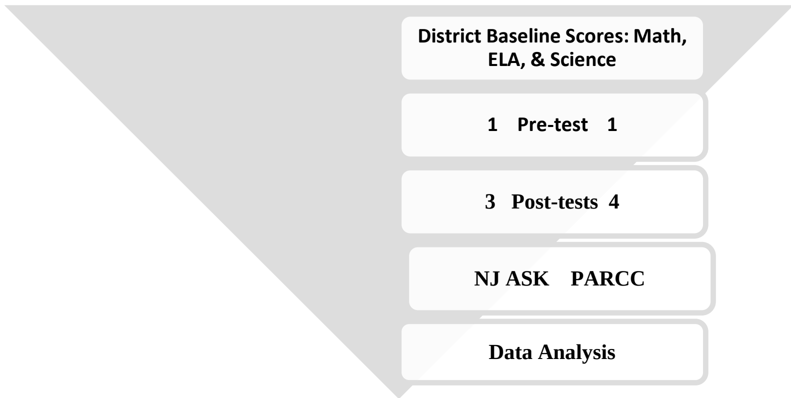

Figure 8. Data Collection: 2013-2015.

Twilight and Zero Periods

The twilight and zero periods were created to offer additional instruction to students for the purpose of increasing the standardized test scores of students. Writing was not an essential part of the curriculum anymore due to the rise of technology and 21st century skills embedded in the common core (Brinkerhoff, 2006; Cochran-Smith, 2005). Writing to learn strategies were a research interest to educators due to the success of the program in Mathematics, Language Arts and Science (Countryman, 1992; Holliday, et. al., 2006; Prain & Hand, 1999; Prain, 2006). The research phenomenon I wanted to study was the impact of writing to learn strategies on standardized test taking performance. The hypothesis was that writing to learn strategies would positively impact the standardized test scores in mathematics, language arts, and science of students in primary and secondary education. In order to accomplish this, I used the twilight and zero periods as a place to test my hypothesis.

I developed one zero period, which was a 30 minute morning remediation period that took place directly before school four times a week. Students were offered ten minutes of language arts remediation, ten minutes of mathematics remediation, and ten minutes of science remediation four days a week. The twilight period was a 90 minute afternoon remediation period that took place directly after school. Students were offered thirty minutes of language arts remediation, thirty minutes of mathematics remediation, and thirty minutes of science remediation daily. The experimental group yielded 38 students who were in both the twilight and zero remediation periods. The control group also yielded 38 students who were in both the twilight and zero remediation periods. The experimental and control group had students represented from all grade levels, four through seven (Table 5). Students were placed in either period dependent upon fluctuations of partial proficiency in their NJ ASK score, parent preference and availability. There were students whose parents did not want them to attend after school activities and other students whose parents preferred them in after school activities which dictated placement of students. In addition, students whose scores were lower needed more remediation and were placed in the twilight period in order to receive more academic remediation. Students who scored in a range from 190 – 200 were placed in the zero period. Students that scored in the 160 – 180 range and 159 and below were placed in the twilight period. These scores represent levels of partial proficiency, with 199 being the highest possible partial proficiency rating.

Table 5

Study Participant Breakdown

Total Subjects =76	**Students**	**Period**	**Group**
	Experimental		
4th Grade	10	twilight	Elementary
5th Grade	10	twilight	Elementary
6th Grade	9	twilight	Middle
7th Grade	8	twilight	Middle
	Control		
4th Grade	10	zero	Elementary
5th Grade	12	zero	Elementary
6th Grade	9	twilight	Middle
7th Grade	8	twilight	Middle
Total	**76**	**8**	**8**

Zero period class took place on the 2nd floor, Room 200 taught by one instructor. Zero period was held between 7:55AM and 8:25AM. Twilight period classes took place on the 1st floor in rooms 100, 101, 103 and 114. Twilight period was held between

3:30PM and 5:00PM. The first remediation period ran from 3:30 to 4:15. The second remediation period was directly followed by the first and ran from 4:15 to 5:00. Depending upon the class, either mathematics, science or language arts was offered in one either remediation period.

Much like other Title I Districts, a great deal of the students in the Wood School District were starting at a level of disadvantage due to their socioeconomic status and lack proficiency of the English language. Teachers and administrators needed to work at an increased level to bring students up to level and enhance their academic ability despite any independent or dependent variables involved in the research. Higher education critical thinking skills are developed in early education and for the Wood students to be successful test takers, the zero and twilight period coupled with writing to learn strategies acted as a catalyst to increase standardized test scores (Quitadamo & Kurtz, 2007).

Baseline Data Analysis

NJ ASK 2013. Student scores from the 2013 NJ ASK were recorded and those scores were used to place student participants in the twilight and zero periods for the 2013-2014 and the 2014-2015 school year. The NJ ASK scores from 2013 contained a wide range of students in grades four through seven that scored below the 200 point proficiency mark. There was a disparity between scores in all three content areas: Mathematics, Science and Language Arts. However, all scores were similar amongst groups regardless of content area. For example, if a student scored a 180 in mathematics, they generally scored similarly in science and language arts (Table 6; Table 7). Tables 4.4 and 4.5 provide the raw data from the 2103 NJ ASK exam for all students who scored below proficient. Table 4.4 highlights the twilight period and table 4.5 highlights the zero period. The experimental groups are shaded in both tables.

Table 6

NJ ASK 2013 Baseline Data: Twilight Period

Twilight Period	NJ ASK			2012-2013 Score - Baseline			
Student Name	**Grade**	**English/LA**		**Science**		**Mathematics**	
		Score	**Level**	**Score**	**Level**	**Score**	**Level**
4TA	4	154	PP	159	PP	151	PP
4TB	4	168	PP	172	PP	160	PP
4TC	4	171	PP	171	PP	165	PP
4TD	4	182	PP	188	PP	184	PP
4TE	4	145	PP	155	PP	140	PP
4TF	4	148	PP	179	PP	196	PP
4TG	4	181	PP	185	PP	181	PP
4TH	4	162	pp	166	pp	161	pp
4TI	4	164	PP	161	PP	162	PP
4TJ	4	166	PP	171	PP	168	PP
5TA	5	181	PP	182	PP	180	PP
5TB	5	175	PP	176	PP	172	PP
5TC	5	180	PP	182	PP	182	PP
5TD	5	184	PP	186	PP	183	PP
5TE	5	182	PP	184	PP	181	PP
5TF	5	161	PP	165	PP	160	PP
5TG	5	175	PP	173	PP	172	PP
5TH	5	168	PP	170	PP	167	PP
5TI	5	158	PP	159	PP	157	PP
5TJ	5	186	PP	182	PP	190	PP
6TA	6	190	PP	192	PP	193	PP
6TB	6	181	PP	184	PP	182	PP
6TC	6	183	PP	188	PP	181	PP
6TD	6	189	PP	186	PP	186	PP
6TE	6	182	PP	185	PP	182	PP
6TF	6	163	PP	163	PP	160	PP
6TG	6	165	PP	166	PP	164	PP
6TH	6	169	PP	175	PP	168	PP
6TI	6	150	PP	154	PP	152	PP
6TJ	6	191	PP	196	PP	192	PP
6TK	6	186	PP	182	PP	189	PP

Table 6 (continued)

Twilight Period	NJ ASK	2012-2013 Score - Baseline					
Student Name	Grade	English/LA		Science		Mathematics	
		Score	Level	Score	Level	Score	Level
6TL	6	181	PP	186	PP	182	PP
6TM	6	180	PP	188	PP	181	PP
6TN	6	161	PP	167	PP	166	PP
6TO	6	166	PP	169	PP	168	PP
6TP	6	163	PP	165	PP	162	PP
6TQ	6	155	PP	157	PP	153	PP
6TR	6	152	PP	154	PP	155	PP
7TA	7	190	PP	192	PP	190	PP
7TB	7	181	PP	186	PP	180	PP
7TC	7	184	PP	185	PP	183	PP
7TD	7	161	PP	165	PP	160	PP
7TE	7	163	PP	166	PP	165	PP
7TF	7	164	PP	168	PP	163	PP
7TG	7	172	PP	177	PP	169	PP
7TH	7	177	PP	177	PP	201	PP
7TI	7	180	PP	181	PP	180	PP
7TJ	7	184	PP	186	PP	185	PP
7TK	7	172	PP	176	PP	170	PP
7TL	7	165	PP	171	PP	166	PP
7TM	7	170	PP	172	PP	169	PP
7TN	7	143	pp	148	pp	147	pp
7TO	7	154	PP	154	PP	156	PP
7TP	7	158	PP	155	PP	157	PP

Table 7

NJ ASK 2013 Baseline Data: Zero Period

Zero Period	NJ ASK						
Student Name	Grade	English/LA		Science		Mathematics	
		Score	Level	Score	Level	Score	Level
4ZA	4	191	PP	194	PP	193	PP
4ZB	4	193	PP	197	PP	191	PP
4ZC	4	190	PP	191	PP	198	PP
4ZD	4	198	PP	195	PP	194	PP
4ZE	4	194	PP	196	PP	199	PP
4ZF	4	191	PP	193	PP	200	PP
4ZG	4	201	PP	199	PP	192	PP
4ZH	4	193	PP	191	PP	194	PP
4ZI	4	190	PP	191	PP	189	PP

Table 7 (continued)

Zero Period Student Name	NJ ASK Grade	English/LA Score	Level	Science Score	Level	Mathematics Score	Level
4ZJ	4	198	PP	203	PP	192	PP
5ZA	5	190	PP	194	PP	196	PP
5ZB	5	194	PP	196	PP	190	PP
5ZC	5	191	PP	190	PP	199	PP
5ZD	5	199	PP	193	PP	201	PP
5ZE	5	194	PP	192	PP	191	PP
5ZF	5	196	PP	191	PP	193	PP
5ZG	5	199	PP	201	PP	195	PP
5ZH	5	194	PP	193	PP	191	PP
5ZI	5	190	PP	195	PP	192	PP
5ZJ	5	193	PP	199	PP	190	PP
5ZK	5	190	PP	196	PP	194	PP
5ZL	5	194	PP	190	PP	196	PP

Students were recruited for the twilight and zero periods based upon the 2013 NJ ASK scores. The criteria was simple, students needed to score partial proficient on the N JASK and had to be in grades four through seven. Proficiency for the NJ ASK in the Mathematics, Science, and Language Arts sections began at 200. The twilight periods served as remediation periods for the students and the platform where these writing to learn initiatives were offered in addition to the pre and post-testing of students. There were four categories of students recruited based upon proficiency. As previously stated, the four categories (sub groups) were students that scored (1)190-200, (2)180-189, (3)160-179, and (4)159 and below and those categories varied in every grade level meaning scores of students varied in grades four through seven. The study had a total of 76 students with 20 fourth grade students, 22 fifth grade students, 18 sixth grade students, and 16 seventh grade students (Table 8). Writing to learn strategies were expected to enhance growth in scores, they were not aimed at immediately bringing students to a proficient status on the NJ ASK. The same students that were selected for the NJ ASK exam were also used as subjects for the PARCC exam. The reason was that both exams were similar in content, both based on core content standards which was designed to test similar strengths and weaknesses of students. The similarities and variations amongst the two standardized exams was an essential inquiry regarding the writing to learn theory and critical thinking skills (Lipman, 1988).

Table 8

Student Sub Groups

Sub Group	4th Grade	5th Grade	6th Grade	7th Grade	Total
190-200	10	12	2	1	25
180-189	2	5	7	4	18
160-179	5	4	6	7	22
159 & Below	3	1	3	4	11
Total	20	22	18	16	76

Students at each grade level were divided into an experimental group and a control group (Table 9). Again, the experimental group received the treatment which was writing to learn strategies and the control group received general remediation instruction.

Table 9

Subject Groups

Group	Subjects
Experimental	**38**
4th Grade	10
5th Grade	12
6th Grade	9
7th Grade	8
Control	**38**
4th Grade	10
5th Grade	12
6th Grade	9
7th Grade	8
Combined	**76**

There were 76 students who participated in the study with 38 students in the experimental group and 38 students in the control group. The experimental group contained 10 4th grade students, 11 fifth grade students, 9 sixth grade students, and 8 seventh grade students. The control group contained 10 fourth grade students, 12 fifth grade students, 9 sixth grade students, and 8 seventh grade students.

One simulated NJ ASK pretest was offered to students in the twilight and zero periods in the subject areas of mathematics, science and language arts. This exam was offered to students in September of 2013. The scores of the pretest offered in September of 2013 were very similar to the scores of the NJ ASK state exam given to the students in May of 2013. In addition, the scores of the pretest offered in September of 2014 were very similar to the scores of the NJ ASK state exam given to the students in May of 2014. In fact, in some cases students' scores decreased on the pretest in comparison to the NJ ASK given to students 4 months prior.

Three different simulated NJ ASK post-tests were offered to students in the twilight and zero periods in the subject areas of mathematics, science and language arts. Post-tests were all different, however they contained the same content offered on both the pretest and state standardized exam. More to the point, posttests contained the exact number of questions as the pretest and state standardized exam, covered the same content, and was based on the common core standards. These exams were offered to students in the October, December and February. The posttests were followed by the state standardized exam given to students in May. In order to maximize the potential of writing to learn strategies, professional learning communities were created to train teachers on effective pedagogical techniques and to collaborate on effective strategies.

Formation of Professional Learning Community/Teacher Training

Teachers needed to be trained on the pedagogy of writing to learn strategies which was the foundation of the PLC research team. According to Harvey (1998) "research teams provide built-in opportunities for peer response and facilitate smooth classroom management in the classroom" (p. 199). I led the PLC which included five teachers that were assigned to grades four through seven. Teachers were assigned based upon teacher certification and instructional experience. The teachers (team leaders) and I had weekly meetings to not only train their colleagues on the implementation of writing to learn strategies, but the meetings also consisted of a discussion of successfully implemented strategies, unforeseen issues, and student data. The roles and objectives of students and teachers were made clear at the beginning of the study. The students were engaged in writing to learn strategies as instructed by their teachers. The ultimate goal of the study was enhanced standardized test scores through the development of enhanced critical thinking skills (Lipman, 1988). Therefore, students were assigned to the zero and twilight periods where they would receive test preparation from a teacher participating in the PLC.

PLC meetings began in September and went through May for both the 2013-2014 and 2014-2015 school years. There were eighteen meetings held per school year as meetings would generally be held on a bimonthly basis. There were a total of 15 writing to learn strategies implemented over a 12 week period. Weeks one through three covered (1) focused free writing, (2) entry and exit slips, (3) reader/response writing, and (4) summary response. Weeks four through six covered (5) clarification letters, (6) group writing activities, (7) dialectical notebooks, and (8) writing notebooks. Weeks seven through nine encompassed (9) compacts, (10) concept metaphors, (11) writing definitions, and (12) paraphrase assignments. Finally, weeks ten through twelve discussed (13) writing interruptions, (14) response paper, and (15) synthesis paper (Table 10). It was very important that we discussed these strategies throughout the year to give teachers the opportunity to implement the strategies with follow up and discussions about which strategies worked and which strategies did not work so well. Teachers that taught the twilight period met in weekly and/or biweekly professional learning communities with the researcher in order to learn and discuss writing to learn strategies, their successes and failures. The researcher recorded field notes of these meetings with instructors in addition to field notes of observations as students were embedded in the twilight period learning new writing to learn strategies.

Table 10

Writing to Learn Strategy Implementation

Writing To Learn Strategy	Week 1-3	Week 4-6	Week 7-9	Week 10-12
1. Focused Free Writing	X			
2. Entry and Exit Slips	X			
3. Reader/Response Writing	X			
4. Summary Response	X			
5. Clarification Letters		X		
6. Group Writing Activities		X		
7. Dialectical Notebooks		X		
8. Writing Notebooks		X		
9. Compacts			X	
10. Concept Metaphors			X	
11. Writing Definitions			X	
12. Paraphrase Assignments			X	
13. Writing Interruptions				X
14. Response Paper				X
15. Synthesis Paper				X

There was an agenda for every meeting (Appendix B). The meetings took on the form of training modules where I worked with PLC members on writing to learn strategies, thereby equipping them to turnkey the training into their instruction. The primary role of the teachers in addition to participation in the PLC, was to teach writing to learn strategies to experimental groups, and observe student performance in both experimental and control groups. The objective of the teachers was the evaluation of successful writing to learn strategies and the determination of which writing to learn strategy or strategies were successful teaching tools.

During our PLC meetings we discussed writing to learn strategies previously attempted, their usefulness, and the introduction and implementation of new upcoming strategies that would be implemented. Teachers would notate which strategies benefited which grades and formulated the reasons certain strategies were successful for individual grade levels and which strategies were ineffective. Teachers had a hand in the recruitment of students as they were privy to their work ethic and accomplishments within their classroom. They were involved in the recruitment process as I created a master list of students based upon their 2013 NJ ASK exam, and the teachers would add or remove students based upon their knowledge of student academic work.

Classroom Space

Due to the number of students recruited for the study and the number of teachers selected to participate I had to acquire classroom space to accommodate the experiment. Obtaining classroom space for the zero periods was not an issue as it was 30 minutes before school started and teachers were generally already in their classrooms. However, the acquisition of classroom space presented somewhat of a challenge for the twilight periods. Teachers had collaboration after school and the teacher who was generally in the classroom all day wanted to collaborate in the classroom that was appointed for the twilight program. In addition, this was resolved through moving teacher collaboration to classrooms that did not participate in twilight or zero period. Teachers needed to move regardless of what their position was because space was needed for student erudition and growth. More to the point, a cooperating teacher KV stated "we need these room, teachers can double up in their cooperating teacher's room, I don't see what the problem is or why it is even a discussion." It was inevitable that teachers understand that the only suitable block of time to begin the homework help that led into the twilight period was directly after school because we could not send students home and ask them to come back in 30 minutes when teacher collaboration was complete. With this in mind, I revised the study to allow the use of other classroom space, which included the health room and gymnasium. This was not as conducive to learning as a classroom due to the size of the gymnasium and students not being used to doing schoolwork in the gymnasium.

Cost of the Research

The planning process included the cost encumbered by the district. The research took place past contractual hours for instructors, so teachers needed to be paid their contractual hourly wage of $28.00 an hour. There were two instructors for the zero period that worked 30 minutes a day, four days a week for approximately 30 weeks. The zero period total cost to the district was $3,360.00. There were four instructors for the twilight period that worked 90 minutes a day, four days a week for approximately 30 weeks. The twilight period total cost to the district for instructors was $20,160.00. In addition to offer, the twilight period, we also needed to offer a homework help for 30 minutes a day, four days a week. There were two teacher assistants for the homework help that worked 30 minutes a day, four days a week for approximately 30 weeks. The contracted hourly wage for teacher assistants is $15.60 an hour bringing the twilight period total cost to the district for instructional assistants to $1,872.00. The total cost for zero period instructors, twilight period instructors, and twilight period instructional assistants for one year was $25,392.00.

Conclusion and Recommendations

Cycle I concluded with a plan to implement the writing to learn strategies and answer the research questions. During this initial phase, I created the framework for the study by designing the phases, obtaining board approval and classroom space, developing instruments to collect quantitative data from student subjects and designing PLC agendas with writing to learn initiatives for faculty research participants. The formation of the professional learning community assisted in the recruitment of students, which assisted in student assignments into the twilight and zero periods. At the conclusion of Cycle I, research participants, tools and instruments were created, in addition, the logistics of the study was also developed.

Chapter V

Cycle II - Implementing the Study

Introduction

In this study, I examined the advantages and disadvantages of Mathematics, Science and Language Arts writing to learn strategies and how these strategies could enhance student knowledge and standardized test scores. The goal of this study was to increase standardized test scores of students using writing to learn strategies as a catalyst. Marzano et. al. (2001) pointed out that "a teacher must make a commitment to increasing students' understanding of skills and processes and then identifying activities to accomplish this instructional goal" (p. 70). In order to enhance the instructional commitment to the writing to learn initiative, I created professional learning communities (PLCs) to instruct the teachers on writing to learn strategies and enable instructors to share writing to learn successes and failures through collaboration.

As part of cycle II, students were given a pre-test that mirrored the NJ ASK exam, offered writing to learn strategies as an intervention, and given post-tests that mirrored the NJ ASK exam as well. In year one, the test given to students was the NJ ASK. In year two, students were given both the NJ ASK and the PARCC exams. This chapter will show NJ ASK pre-test data and NJ ASK post-tests for both years of the study. The chapter will also discuss writing to learn interventions including the ongoing work of the PLC. The writing to learn interventions were grouped into three week cycles where four interventions were administered to students. In the second year of the study, the PARCC was pre-tested and post-tested with simulated exams along with prescribed interventions used in year one.

Study Design

This study was action research utilizing both qualitative and quantitative data. This study identified a correlation between writing to learn strategies and an increase in student standardized test scores. Low standardized test scores was the commonality that existed between the student subjects and the introduction of the writing to learn strategies served as the intervention.

Two groups of student subjects participated in the experiment: An experimental group that participated in the writing to learn strategies and a control group of students were only offered remediation, not the writing to learn strategies (Table 11). Both groups participated in all standardized testing. Teachers participated in writing to learn training through the PLC process. Data was collected using the study instruments discussed in chapter 3. There were three main forms of data in the study. The first source of data were the results of the of the Pre-Tests and post-tests made by instructors. The second source of data were the state standardized exams (NJ ASK and PARCC) given to students. The third source of data were the observations along with individual and focus group interviews.

Table 11

Twilight and Zero Period

Period W2L	Language Arts	Mathematics	Science
	Experimental		
Zero Yes	11	11	11
Twilight Yes	27	27	27
	Control		
Zero No	11	11	11
Twilight No	27	27	27
Total 2	38	38	38

There was little or no difference in the pre-test, the three post-tests offered after the pre-test, and the resultant NJ ASK of the same year. Pre-tests and post-tests were created in identical correlation to the state exam. The growth of analytic and critical thinking skills are directly correlated to augmented test taking ability. Analytic skills needed to be incorporated in student learning to enable critical thinking skills of study participants which would enhance standardized test taking ability (Lipman, 1988). The study design needed to have these critical and analytical thinking skills at its core, and writing to learn strategies enhance critical thinking skills (Kurtz & Quitadamo, 2007; Zinsser, 1988). The first step after designing an planning the study was to train the teachers in the necessary writing to learn strategies needed to conduct the research amongst the students, which would enhance student achievement (DuFour & Eaker, 1998; Harris and Jones, 2010).

There was a null hypothesis along with an alternative hypothesis. The alternative hypothesis was student subjects that received writing to learn strategies would score higher on standardized exams than student subjects that did not receive writing to learn strategies. However, the control group of students still received remediation. The null hypothesis was student subjects that did not receive writing to learn strategies would score equally as well on standardized exams as students that received writing to learn strategies. Mean standardized test scores for experimental and control groups were compared using a one-tailed t-test. Rejection of the null hypothesis supports the alternative hypothesis that writing to learn strategies increased standardized test taking performance.

Design of NJ ASK Pre-Test, 3 Post-Tests and Simulated PARCC Exam

For the NJ ASK, the design of the pre-tests and 3 post-tests (Appendix C) were based upon the actual exam. The pre-test and 3 post-tests contained the same amount of questions covering identical content and was timed in the exact manner as the state standardized exam. All teachers in the study collaboratively created the exam through the use of a NJ ASK standardized test bank contained in the building. The test bank was used for all subject areas including language arts, mathematics and science.

For the PARCC, the exams were known as simulated because a PARCC exam was never given in the State of New Jersey in the past and there were only a few examples through I READY that the teachers could use as models. The design of the simulated exams (Appendix D) was based upon the few models teachers could collect from I READY. As stated, this is the reason the PARCC exams were called simulated because the exams were manufactured or imitated based upon the little that was known about the test.

I provided administrative approval of all of the pre-test and post-test instruments to ensure they were designed correctly. The design of the tests were dependent upon subject area. In language arts, the test included text dependent constructed-response items in reading and multiple writing prompts in every grade level. It was imperative the language arts portion of the exam contained text complexity with a great emphasis on academic vocabulary and content based informational text. All instructors had the task of creating text-dependent reading questions with answers that would show evidence from the text. In mathematics, the test included operations and algebraic thinking, number and operations in base ten, numbers and operations in fractions, geometry, measurement and data. Both in language arts and mathematics, the pre-tests and post-tests were made for both the NJ ASK and the PARCC standardized exam. In science, the test included biological science, physical science, and earth science. The science pre-test and post-tests were for the NJ ASK exam only.

NJ ASK Year One

Administration of pre-test. The administration of the pre-test for the NJ ASK exam was in September of 2013 and September of 2014. This section compares the scores of the NJ ASK exam that students took in May 2013 to the pre-test they took in September 2013 (Table 5.2). In comparison to the state standardized exam they took in the May 2013 (baseline data), students had minimal growth on the pretest which could be expected because students were out of school for the summer. The comparison of scores is outlined per grade level and the twilight period is discussed in the following section.

Fourth grade. In the twilight period, students had zero growth on the mathematics, and language arts portion of the exam for both control and experimental groups. On the science portion of the exam, students decreased five points. The five point decrease was in the control no growth in the experimental group. The average increase per student in language arts was 0 in the experimental group which mirrored the control group. The average increase per student in science was 0 in the experimental group in comparison to an average decrease of 1.0 in the control group. The average increase per student in mathematics was 0 in the experimental group which mirrored the control group.

Fifth grade. The experimental group showed a six point growth in language arts, a six point growth in science, and an eight point growth in mathematics. The control group showed a zero point growth in all three subject areas. The average increase per student in language arts was 1.2 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in science was 1.2 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 1.4 in the experimental group in comparison to an average increase of 0 in the control group.

Sixth grade. The experimental group showed a sixteen point growth in language arts, a twenty three point growth in science, and an eight point growth in mathematics. The control group showed a two point growth in language arts, a four point growth in science, and a one point growth in mathematics. The average increase per student in language arts was 1.74 in the experimental group in comparison to an average increase of 0.18 in the control group. The average increase per student in science was 2.51 in the experimental group in comparison to an average increase of 0.42 in the control group. The average increase per student in mathematics was 0.91 in the experimental group in comparison to an average increase of 0.09 in the control group.

Seventh grade. The experimental group showed a seven point increase in language arts, a two point increase in science and zero growth in mathematics. The control group had zero growth in language arts, a two point deficit in science, and a one point deficit in mathematics. The average increase per student in language arts was 0.88 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in science was 0.26 in the experimental group in comparison to an average decrease of 0.26 in the control group. The average increase per student in mathematics was 0 in the experimental group in comparison to an average decrease of 0.13 in the control group (Table 5.2).

The pre-test offered in September of 2013 had results very similar to the NJ ASK exam students took in May of 2013 regardless of students being placed in the twilight or zero period (Table 12 & 13). Data for the zero period is discussed next (Table 5.3). Similar to the twilight period, in contrast to the state standardized exam they took in May 2013, students in the zero period had negligible growth on the pretest again which was expected. The comparison of scores is discussed in the same fashion as the twilight period.

Table 12

NJ ASK 2013 Pre-test Data: Twilight Period - Year One

Student Group	LA Base/PreTest	Science Base/PreTest	Math Base/PreTest
Grade 4E (Composite)	820/820	845/845	800/800
Grade 4E (Point Difference)	0	0	0
Grade 4E (Average Difference)	0	0	0
Grade 4C (Composite)	821/821	862/857	868/868
Grade 4C (Point Difference)	0	-5	0
Grade 4C (Average Difference)	0	-1.0	0
Grade 5E (Composite)	902/908	910/916	898/906
Grade 5E (Point Difference)	+6	+6	+8
Grade 5E (Average Difference)	+1.2	+1.2	+1.4
Grade 5C (Composite)	848/848	849/849	846/846
Grade 5C (Point Difference)	0	0	0
Grade 5C (Average Difference)	0	0	0
Grade 6E (Composite)	1572/1588	1580/1603	1568/1576
Grade 6E (Point Difference)	+16	+23	+12
Grade 6E (Average Difference)	+1.74	+2.51	+0.91
Grade 6C (Composite)	1535/1537	1564/1568	1548/1549
Grade 6C (Point Difference)	+2	+4	+1
Grade 6C (Average Difference)	+0.18	+0.42	+0.09
Grade 7E (Composite)	1392/1399	1416/1418	1411/1411
Grade 7E (Point Difference)	+7	+2	0
Grade 7E (Average Difference)	+0.88	0.26	0
Grade 7C (Composite)	1326/1326	1343/1341	1330/1329
Grade 7C (Point Difference)	0	-2	-1
Grade 7C (Average Difference)	0	-0.26	-0.13

Fourth grade. The experimental group showed a one point increase in language arts, zero increase in science, and a two point increase in mathematics. The control group showed a two point decrease in language arts, a one point decrease in science and a one point decrease in mathematics. The average increase per student in language arts was 0.2 in the experimental group in comparison to an average decrease of 0.4 in the control group. The average increase per student in science was 0 in the experimental group in comparison to an average decrease of 0.2 in the control group. The average increase per student in mathematics was 0.4 in the experimental group in comparison to an average decrease of 0.2 in the control group.

Fifth grade. The experimental group showed a one point increase in language arts, a one point deficit in science and two point increase in mathematics. The control group showed no growth in language arts or mathematics along with a two point deficit in science. The average increase per student in language arts was 0.17 in the experimental group in comparison to an average increase of 0 in the control group. The average decrease per student in science was 0.17 in the experimental group in comparison to the average decrease of 0.33 in the control group. The average increase per student in mathematics was 0.33 in the experimental group in comparison to an average increase of 0 in the control group (Table 13).

Table 13

NJ ASK 2013 Pre-test Data: Zero Period - Year One

Student Group	**LA Base/PreTest**	**Science Base/PreTest**	**Math Base/PreTest**
Grade 4E (Composite)	966/967	973/973	975/977
Grade 4E (Point Difference)	+1	0	+2
Grade 4E (Average Difference)	+0.2	0	+0.4
Grade 4C (Composite)	973/971	977/976	967/966
Grade 4C (Point Difference)	-2	-1	-1
Grade 4C (Average Difference)	-0.4	-0.2	-0.2
Grade 5E (Composite)	1164/1165	1156/1155	1170/1172
Grade 5E (Point Difference)	+1	-1	+2
Grade 5E (Average Difference)	+0.17	-0.17	+0.33
Grade 5C (Composite)	1160/1160	1174/1172	1158/1158
Grade 5C (Point Difference)	0	-2	0
Grade 5C (Average Difference)	0	-0.33	0

Summary of Pre-Test Data Year One

Students ended the 2013 school year with the May NJ ASK (baseline) exam which was used as baseline scores for the study. Students returned in September 2013 and took a pre-test that mirrored the NJ ASK exam. A difference in scores was not expected between the pre-test and the baseline scores because students were out of school for the summer. This is shown in both the zero and twilight periods.

Writing to Learn Interventions

Ongoing work of the PLCs. DuFour and Eaker (1998) in their work of on professional learning communities (PLC) have assisted me as the researcher to enable the five teachers involved in the zero and twilight periods to share a common vision and commitment in an environment that needed academic improvement due to the low test scores of students. A shared vision around the writing to learn strategies enabled all involved to become vested stakeholders which caused an increased gain in the standardized test scores of Wood students (DuFour & Eaker, 1998). The twilight and zero period instructors used the PLC model and shared a common vision and objective for student growth and achievement. The vision was to use writing to learn strategies to enhance student achievement in statewide standardized exams and the strategy was to use the twilight and zero remediation periods to attain the objective in mathematics, science and language arts.

In addition, for the writing to learn strategies to be ultimately effective, andragogy, defined as adult education for adults, needed to be incorporated as I trained the instructors on writing to learn strategies. Supportive leadership amongst the administration and staff was beneficial, but transactional leadership was primarily used because writing to learn strategies were a top down initiative that I decided would be beneficial for students in the Wood School District (Hallinger, Bickman, and Davis, 1996; Odumero and Ogbonna, 2013). This was mainly due to the fact that teachers were reluctant to change and were hesitant due to the culture embedded within the Wood School District (Fullan, 2001). Through andragogy, I instructed teachers on writing to learn strategies and their implementation. Following the training process for instructors, teachers then offered the students instruction by way of the zero and twilight period teachers.

As the instructional leader, I created a change in the building to combat the low standardized test scores. The necessity of the change was imperative within the Wood School District. The change needed to happen because of the repeated low test scores in the district and the state's growing eagerness to make Wood a Department of Education Priority School (Gladwell, 2000). Teachers needed to be on board for the change and students needed to see the teachers on board as stakeholders in order to become fully vested. As the instructional leader, I continuously communicated the importance of the entire district becoming a stakeholder in the proposed changes, especially the writing to learn strategies (Judge and Piccolo, 2004). The zero and twilight periods were basically an extension of the PLC which was the best way for the five teachers to communicate which enhanced student achievement and standardized test scores (DuFour and Eaker, 1998; Louis and Marks, 1998; Schmoker, 2006).

As the researcher, I developed action items to assist the five zero and twilight period teachers to use the common core state standards as well as categorized the focal point of instruction of writing to learn strategies. The action items included the regular review of writing to learn strategies, correlation to pacing guide of the curriculum, recognizing when help was needed for a writing to learn strategy, teaching the material in a different way to ensure understanding, and lastly, including a timeline for each writing to learn strategy to ensure the standards were covered using the pacing guide of the curriculum (Elmore, 2002; Stecker, Fuchs, and Fuchs, 2005). Through these action items, the instructors developed lessons to enhance achievement and understanding (Marzano, 2007).

In addition to these action items, instructors took attendance every day to see how many students fell out of a 90% attendance mandate, reported the two writing to learn strategies that were used biweekly, invoked at least two strategies biweekly that utilized critical thinking skills, met with the PLC for weekly updates of what was working and not working, and reported all information or concerns to administration. PLC meetings with twilight and zero period instructors took place on a bi-weekly basis. During these meetings, not only were writing to learn strategies introduced and discussed, but multiple topics that arose during the duration of the study. Topics included teachers and their work with student participants, successes and challenges of writing to learn topics, students with special needs and their performance, administrative/teacher relationships, NJ ASK pre and post exam student performance and PARCC simulated exam student performance.

The exams would be used as talking points in PLCs when writing to learn strategies would directly correlate to students scoring higher on post-tests. This information was discussed in PLCs in order to identify amongst the instructors and administrator which writing to learn strategies were most beneficial to critical thinking skills needed to increase performance on standardized exams (Darling-Hammond, 1998; Harris and Jones, 2010). DuFour and Eaker (1998) point out that "the best team structure is simple: a team of teachers who teach the same course or grade level. These teachers have a natural common interest in exploring the critical questions of learning" (p. 93).

Meetings with teachers. Writing to learn topics were introduced with examples along with lengthy discussion about the correct way to incorporate these examples. I began meetings with a lecture of a specific writing to learn strategy followed by a question and answer period with instructors. Teachers asked questions regarding the importance of certain strategies in correlation to standardized testing. Teachers understood the intended impact of the writing to learn strategies were to enhance standardized test scores. In addition, teachers discussed working with students, challenges and successes of writing to learn strategies along with their direct correlation to standardized test performance. Teachers discussed the reactions of students to specific writing to learn strategies and asked specific questions to me and to other remediation instructors regarding their successful and most challenging topics. Five teachers including C.S., E.S., J.W., K.V., and R.F. all participated in the PLC and met with me as the lead researcher for the study. C.S. was the teacher that mainly spoke out regarding which strategies were successful and which strategies the students had the most challenges with, this is laid out below in the separation of the 12 weeks in 3-week cycles. All teachers agreed with the opinion of C.S. as she mainly spoke for the teachers. J.W. stated "C.S. is our spokesperson, we'll talk to her to see if a strategy worked and what she did that made it successful" (personal communication, September 26, 2013). C.S was respected by the other teachers as she worked in the Wood School District the longest and held the multiple teaching certifications. The other teachers trusted her opinion and knowledge as a teacher and educator.

Strategies 1-4. All the participants initially understood the importance of the writing to learn strategies and the amount of time spent on each strategy would vary depending on the student. During the first three weeks (weeks one through three) of the twelve week cycle, teachers instructed four main writing to learn strategies which included (1) focused free writing, (2) entry and exit slips, (3) reader/response writing and (4) summary response. C.S. described summary response and reader/response writing strategies as the most successful and easiest to learn amongst the students. C.S. (personal communication, November 4, 2013) stated, "reader/response and summary response are similar and students seem to be very comfortable with their writing after reading a passage." In addition, these strategies seemed to be the most similar to the NJ ASK and PARCC exams, which provided students with the skills better needed to perform at a higher level on the standardized exams. In K.V.'s classroom, students were very fluent performing the reader/response writing to learn strategy and asked minimal questions about the activity (R. Tarchichi, observation, February 13, 2014). In a PLC, teachers discussed the benefit of reader/response writing and summary response writing to learn strategies and how these strategies most closely align with the NJ ASK exam (R. Tarchichi, observation, September 18, 2014).

Strategies 5-8. During the second three weeks (weeks four through six) of the twelve-week cycle, teachers instructed four main writing to learn strategies including (1) clarification letters, (2) group writing activities, (3) dialectical notebooks, and (4) writing notebooks. Teachers described dialectical notebooks and writing notebooks as the most beneficial strategies for students in this cycle. According to the teachers, dialectical notebooks was the strategy that students grew most accustom to and had the greatest impact on their performance. K.V. stated, “dialectical notebooks assist the students with passage and main idea summarization dissection of the facts in the readings” (personal communication, January 16, 2014). This was due to the double entry system of dialectical note taking. According to the teachers, students learned the ideas in reading passage by exploring their own thoughts and insights while reading the text. This was evident in all three content areas: mathematics, language arts, and science. Writing notebooks allowed students to break their reading up into micro themes which enhanced their ability to better depict what the author of the passage's main idea was, which allotted for greater success in answering the multiple choice questions associated with the passage. E.S. said “after students learned dialectical and writing notebooks, they seemed to do better on their tests, even the students who don’t do homework or participate as much” (personal communication, January 22, 2014). In E.S.'s classroom, students enjoyed the process of using dialectical notebooks. They were at ease with the strategy and asked questions that showed understanding of the activity (R. Tarchichi, observation, March 6, 2014). In a PLC, teachers K.V. and C.S discussed how beneficial dialectical notebooks were and how comfortable students were with the strategy. J.W. and E.S pointed out how students struggled with clarification letters and the students could not grasp the strategy as efficiently as dialectical notebooks or group writing activities (R. Tarchichi, observation, December 11, 2014).

Strategies 9-12. During the third three weeks (weeks seven through nine) of the twelve-week cycle, teachers instructed four main strategies including (1) compacts, (2) concept metaphors, (3) writing definitions, and (4) paraphrase assignments. According to C.S. “students had a great deal of issues with all of these strategies with the exception of writing definitions due to summarizing information they had never read before. It seemed to be too difficult for them” (personal communication, March 18, 2014). Students grew in their critical thinking skills because the topic in the passage would be related to a synonym that the students would be instructed to create a definition for which then would enhance their understanding of the original topic. Writing definitions would then be directly related to concept metaphors as students would be asked to think through an idea in the passage and create a metaphor in order to better understand the main idea of the text. According to E.S., concept metaphors was a difficult task for our students and did not assist them in understanding the main idea of a passage because some students could not grasp what a metaphor actually was and how to apply the strategy" (personal communication, March 18, 2014). In a PLC, J.W. and K.V. were discussing the difficulty with compacts and paraphrase assignments due to condensing material, however, writing definitions was a strategy they enjoyed although their definitions weren't always accurate (R. Tarchichi, observation, March 5, 2015).

Strategies 13-15. During the last three weeks (weeks ten through twelve) of the twelve week cycle, teachers instructed three main strategies including (1) writing interruptions, (2) response papers, and (3) synthesis papers. Teachers had little success with the writing interruptions strategy. C.S. stated "writing interruptions was too hard for them and it took them away from trying to grasp the main idea of the reading because it was far too difficult for students to stop what they were currently doing and write a summary on another topic" (personal communication, April 17, 2014). However, according to According to R.F. “students grew in their wring ability with the response papers, and synthesis papers due to the fact they were allowed to write freely and gather their thoughts on their own” (personal communication, April 17, 2014). Teachers went over their writing in detail and students grew in their ability to put coherent paragraphs together, with each paragraph beginning a new thought. Students in the experimental group in K.V.'s classroom working in groups continuously stated to one other that each paragraph has to start a new thought, they repeated it because K.V. continuously said it in the beginning of the period (R. Tarchichi, observation, April 17, 2014). These strategies enabled teachers to work with students with greater efficacy regarding writing to learn strategies. J.W. pointed out “synthesis and response papers assisted students in their ability to write which enhanced their post-test scores” (personal communication, May 8, 2014). In a PLC, all the teachers discussed the benefit of synthesis and response papers, however all teachers agreed, students could not grasp writing interruptions as it was too difficult to academically change tasks and continue to focus (R. Tarchichi, observation, May 14, 2015). All strategies were discussed in a professional learning community and teachers were trained on new strategies during these PLCs. During our meetings, I was in the center of the room and teachers surrounded me as I went over each strategy in detail and then discussed success and failures of certain strategies (Figure 9).

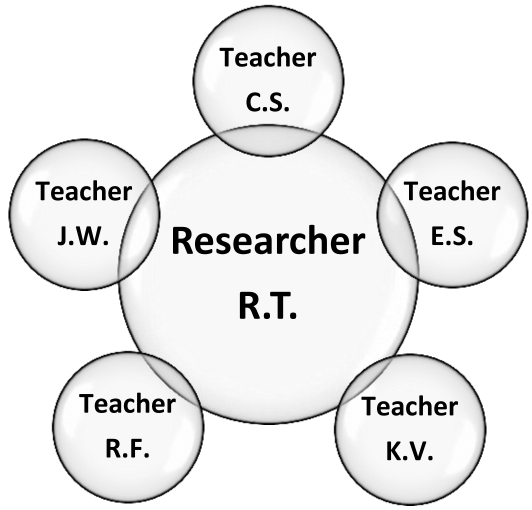

Figure 9. PLC: Teacher Training.

Administration of Post-Test

The administration of the NJ ASK post-test occurred three times during the year following the administration of the pre-test occurring in the beginning of the school year. The administration of year one of the post-tests for the NJ ASK exam were in October of 2013, December of 2013 and February of 2014. The post-tests were identical to the NJ ASK in content and ability. The growth is reported as an average amongst the groups and is measured as growth from the September pre-test of 2013 to the February post-test of 2014. The growth is outlined per grade level (Table 14):

Post-Test Data: Twilight Period Year One

Fourth grade. In the twilight period, the experimental group increased nineteen points in language arts, twenty four points in science, and twenty five points in mathematics. In the control group, there was zero increase in language arts, a one point decrease in science and a one point decrease in mathematics. The average increase per student in language arts was 3.8 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in science was 4.8 in the experimental group in comparison to an average decrease of 0.2 in the control group. The average increase per student in mathematics was 5.0 in the experimental group in comparison to an average decrease of 0.2 in the control group.

Fifth grade. In the twilight period, the experimental group increased thirteen points in language arts, ten points in science, and sixteen points in mathematics. In the control group, there was a four point increase in language arts, a one point increase in science and a seven point increase in mathematics. The average increase per student in language arts was 2.6 in the experimental group in comparison to an average increase of 0.8 in the control group. The average increase per student in science was 2.0 in the experimental group in comparison to an average increase of 0.4 in the control group. The average increase per student in mathematics was 3.2 in the experimental group in comparison to an average increase of 1.4 in the control group.

Sixth grade. The experimental group showed a nineteen point increase in language arts, a twenty three point increase in science, and a twenty five point increase in mathematics. The control group reported zero increase in language arts and science, and a three point increase in mathematics. The average increase per student in language arts was 2.16 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in science was 2.57 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 2.79 in the experimental group in comparison to an average increase of 0.34 in the control group.

Seventh grade. The experimental group showed a twenty four point increase in language arts, a thirty point increase in science, and a thirty three point increase in mathematics. The control group had a seven point increase in language arts, a six point increase in science, and a seven point increase in mathematics. The average increase per student in language arts was 3.07 in the experimental group in comparison to an average increase of 0.83 in the control group. The average increase per student in science was 3.7 in the experimental group in comparison to an average increase of 0.78 in the control group. The average increase per student in mathematics was 4.1 in the experimental group in comparison to an average increase of 0.9 in the control group.

Summary. Year one's NJ ASK post-test data showed numerical growth of students receiving writing to learn strategies in standardized test scores at a greater caliber than students that were in control groups. This was evident in all grade levels regardless if students were in the twilight or zero periods. Therefore, writing to learn strategies seemingly enhanced the test scores of students in the experimental group based on the results of the three post-tests administered in year one.

Table 14

NJ ASK 2013 Post-test Data: Twilight Period - Year One

Student Group	LA PreTest/PostTest	Science PreTest/PostTest	Math PreTest/PostTest
Grade 4E (Composite)	820/839	845/869	800/825
Grade 4E (Point Difference)	+19	+24	+25
Grade 4 E (Average Difference)	+3.8	+4.8	+5
Grade 4C (Composite)	821/821	857/856	868/867
Grade 4C (Point Difference)	0	-1	-1
Grade 4C (Average Difference)	0	-0.2	-0.2
Grade 5E (Composite)	908/921	916/926	906/922
Grade 5E (Point Difference)	+13	+10	+16
Grade 5 E (Average Difference)	+2.6	+2	+3.2
Grade 5C (Composite)	848/852	849/850	846/853
Grade 5C (Point Difference)	+4	+1	+7
Grade 5C (Average Difference)	+0.8	+0.4	+1.4
Grade 6E (Composite)	1588/1607	1603/1626	1576/1601
Grade 6E (Point Difference)	+19	+23	+25
Grade 6E (Average Difference)	+2.16	+2.57	+2.79
Grade 6C (Composite)	1537/1537	1568/1568	1549/1552
Grade 6C (Point Difference)	0	0	+3
Grade 6C (Average Difference)	0	0	+0.34
Grade 7E (Composite)	1399/1423	1418/1448	1411/1444
Grade 7E (Point Difference)	+24	+30	+33
Grade 7E (Average Difference)	+3.07	+3.7	+4.1
Grade 7C (Composite)	1326/1333	1341/1347	1329/1336
Grade 7C (Point Difference)	+7	+6	+7
Grade 7C (Average Difference)	+0.83	+0.78	+0.9

Post-Test Data: Zero Period Year One

Identical to the twilight period, the growth of the zero period is reported as an average amongst the groups and is measured as growth from the September pre-test of 2013 to the February post-test of 2014. The growth is outlined per grade level (Table 15):

Fourth grade. In the zero period, the experimental group increased twenty one points in language arts, twenty three points in science, and thirteen points in mathematics.

In the control group, there was a nine point increase in language arts, a seven point increase in science and a nine point increase in mathematics. The average increase per student in language arts was 4.2 in the experimental group in comparison to an average increase of 1.8 in the control group. The average increase per student in science was 4.6 in the experimental group in comparison to an average increase of 1.4 in the control group. The average increase per student in mathematics was 2.6 in the experimental group in comparison to an average increase of 1.8 in the control group.

Fifth grade. In the zero period, the experimental group increased twenty one points in language arts, eighteen points in science, and twenty two points in mathematics. In the control group, there was a eleven point increase in language arts, an eight point increase in science and a seven point increase in mathematics. The average increase per student in language arts was 4.2 in the experimental group in comparison to an average increase of 1.9 in the control group. The average increase per student in science was 3.0 in the experimental group in comparison to an average increase of 1.4 in the control group. The average increase per student in mathematics was 3.7 in the experimental group in comparison to an average increase of 1.4 in the control group.

Summary. Similar to the twilight period, year one's NJ ASK post-test data for the zero period showed numerical growth of students receiving writing to learn strategies in standardized test scores at a greater caliber than students that were in control groups. This was evident in all grade levels regardless if students were in the twilight or zero periods. Therefore, writing to learn strategies seemingly enhanced the test scores of students in the experimental group based on the results of the three post-tests administered in year one.

Table 15

NJ ASK Post-test Data: Zero Period - Year One

Student Group	**LA PreTest/PostTest**	**Science PreTest/PostTest**	**Math PreTest/PostTest**
Grade 4E (Composite)	967/988	973/996	977/990
Grade 4E (Point Difference)	+21	+23	+13
Grade 4 E (Average Difference)	+4.2	+4.6	+2.6
Grade 4C (Composite)	971/980	976/983	966/975
Grade 4C (Point Difference)	+9	+7	+9
Grade 4C (Average Difference)	+1.8	+1.4	+1.8
Grade 5E (Composite)	1165/1186	1155/1173	1172/1194
Grade 5E (Point Difference)	+21	+18	+22
Grade 5 E (Average Difference)	+4.2	+3.0	+3.7
Grade 5C (Composite)	1160/1171	1172/1180	1158/1165
Grade 5C (Point Difference)	+11	+8	+7
Grade 5C (Average Difference)	+1.9	+1.4	+1.4

NJ ASK Year Two

The pre-test offered to students in September of 2014 showed results that differed greatly from the results in September of 2013. There was a great deal of growth due to a second year of remediation for all students. However, the students that received writing to learn strategies showed significantly more growth than students in the control groups. Similar to year one pre-test data, the growth is reported as an average amongst the experimental and control groups. The growth is outlined per grade level (Table 16):

Pre-Test Data: Twilight Period Year Two

Fourth grade. In the twilight period, the experimental group reported a twenty six point increase in language arts, a twenty nine point increase in science, and a thirty point increase in mathematics. The control group showed a two point increase in language arts, a seven point increase in science, and a three point increase in mathematics. The average increase per student in language arts was 5.2 in the experimental group in comparison to an average increase of 0.4 in the control group. The average increase per student in science was 5.8 in the experimental group in comparison to an average increase of 1.4 in the control group. The average increase per student in mathematics was 5.9 in the experimental group in comparison to an average increase of 0.6 in the control group.

Fifth grade. In the twilight period, the experimental group showed an eighteen point increase in language arts, a fourteen point increase in science and a nineteen point increase in mathematics. The control group showed a five point increase in language arts, a two point increase in science, and a three point increase in mathematics. The average increase per student in language arts was 3.6 in the experimental group in comparison to an average increase of 1.0 in the control group. The average increase per student in science was 2.8 in the experimental group in comparison to an average increase of 0.4 in the control group. The average increase per student in mathematics was 3.8 in the experimental group in comparison to an average increase of 0.6 in the control group.

Sixth grade. The experimental group showed an twenty seven point increase in language arts, a thirty three point increase in science and a thirty four point increase in mathematics. The control group showed a eleven point decrease in language arts, an eighteen point decrease in science, and a six point decrease in mathematics. The average increase per student in language arts was 3.04 in the experimental group in comparison to an average decrease of 0.54 in the control group. The average increase per student in science was 3.7 in the experimental group in comparison to an average decrease of 1.98 in the control group. The average increase per student in mathematics was 3.8 in the experimental group in comparison to an average decrease of 2.76 in the control group.

Seventh grade. The experimental group showed an twenty one point increase in language arts, a twenty eight point increase in science and a thirty four point increase in mathematics. The control group reported a four point decrease in language arts, a two point decrease in science, and a seven point decrease in mathematics. The average increase per student in language arts was 2.6 in the experimental group in comparison to an average decrease of 0.50 in the control group. The average increase per student in science was 3.45 in the experimental group in comparison to an average decrease of 0.26 in the control group. The average increase per student in mathematics was 2.98 in the experimental group in comparison to an average decrease of 0.88 in the control group.

Summary. Year two's NJ ASK post-test data showed numerical growth of students receiving writing to learn strategies in standardized test scores at a greater caliber than students that were in control groups. This was evident in all grade levels, but especially within the sixth grade. Students in the sixth grade control group of the sixth grade reported decreases in all content areas, these students were the most withdrawn from the remediation period. More to the point, writing to learn strategies seemingly enhanced the test scores of students in the experimental group based on the results of the three post-tests administered in year one.

Table 16

NJ ASK 2014 Pre-test Data: Twilight Period - Year Two

Student Group	LA PreTest 2013/PreTest 2014	Science PreTest 2013/PreTest 2014	Math PreTest 2013/PreTest 2014
Grade 4E (Composite)	820/846	845/874	800/830
Grade 4E (Point Difference)	+26	+29	+30
Grade 4 E (Average Difference)	+5.2	+5.8	+5.9
Grade 4C (Composite)	821/823	857/864	868/871
Grade 4C (Point Difference)	+2	+7	+3
Grade 4C (Average Difference)	+0.4	+1.4	+0.6
Grade 5E (Composite)	908/926	916/930	906/925
Grade 5E (Point Difference)	+18	+14	+19
Grade 5 E (Average Difference)	+3.6	+2.8	+3.8
Grade 5C (Composite)	848/853	849/851	846/849
Grade 5C (Point Difference)	+5	+2	+3
Grade 5C (Average Difference)	+1	+0.4	+0.6
Grade 6E (Composite)	1588/1615	1603/1636	1576/1610
Grade 6E (Point Difference)	+27	+33	+34
Grade 6E (Average Difference)	+3.04	+3.7	+3.8
Grade 6C (Composite)	1537/1526	1568/1550	1549/1543
Grade 6C (Point Difference)	-11	-18	-6
Grade 6C (Average Difference)	-0.54	-1.98	-2.76
Grade 7E (Composite)	1399/1420	1418/1446	1411/1435
Grade 7E (Point Difference)	+21	+28	+34
Grade 7E (Average Difference)	+2.6	+3.45	+2.98
Grade 7C (Composite)	1326/1322	1341/1339	1329/1322
Grade 7C (Point Difference)	-4	-2	-7
Grade 7C (Average Difference)	-0.5	-0.26	-0.88

Pre-Test Data: Zero Period Year Two

Similar to the twilight period, students in the zero period that received writing to learn strategies showed significantly more growth than students in the control groups. Results were reported comparing the September 2013 baseline to the September 2014 baseline. The growth is reported as an average amongst the experimental and control groups. The growth is outlined per grade level (Table 17):

Fourth grade. In the zero period, the experimental group showed a twenty four point increase in language arts, a one point decrease in science, and a seventeen point increase in mathematics. The control group showed a eleven point increase in language arts, a one point increase in science, and an eleven point increase in mathematics. The average increase per student in language arts was 4.8 in the experimental group in comparison to an average increase of 2.2 in the control group. The average decrease per student in science was 0.2 in the experimental group in comparison to an average increase of 0.2 in the control group. The average increase per student in mathematics was 3.4 in the experimental group in comparison to an average increase of 2.2 in the control group.

Fifth grade. In the zero period, the experimental group showed twenty four point increase in language arts, a six point increase in science and a twenty six point increase in mathematics. The control group showed a nine point increase in language arts, a one point increase in science, and a one point increase in mathematics. The average increase per student in language arts was 4.0 in the experimental group in comparison to an average increase of 1.53 in the control group. The average increase per student in science was 1.0 in the experimental group in comparison to an average increase of 0.2 in the control group. The average increase per student in mathematics was 4.37 in the experimental group in comparison to an average increase of 0.2 in the control group.

Table 17

NJ ASK 2014 Pretest Data: Zero Period - Year Two

Student Group	LA PreTest 2013/PreTest 2014	Science PreTest 2013/PreTest 2014	Math PreTest 2013/PreTest 2014
Grade 4E (Composite)	967/991	973/972	977/994
Grade 4E (Point Difference)	+24	-1	+17
Grade 4 E (Average Difference)	+4.8	-0.2	+3.4
Grade 4C (Composite)	971/982	976/977	966/977
Grade 4C (Point Difference)	+11	+1	+11
Grade 4C (Average Difference)	+2.2	+0.2	+2.2
Grade 5E (Composite)	1165/1189	1155/1161	1172/1198
Grade 5E (Point Difference)	+24	+6	+26
Grade 5 E (Average Difference)	+4.0	+1.0	+4.37
Grade 5C (Composite)	1160/1169	1172/1173	1158/1159
Grade 5C (Point Difference)	+9	+1	+1
Grade 5C (Average Difference)	+1.53	+0.2	+0.2

Post-Test Data: Twilight Period Year Two

As stated, year one's NJ ASK post-test data showed numerical growth of students receiving writing to learn strategies in standardized test scores at a greater caliber than students that were in control groups. This was evident in all grade levels regardless if students were in the twilight or zero periods. The administration of year two of the post-tests for the NJ ASK exam were in October of 2014, December of 2014 and February of 2015. The post-tests were identical to the NJ ASK in content and ability. The growth is reported as an average amongst the groups and is measured as growth from the September pre-test of 2014 to the February post-test of 2015. The growth is outlined per grade level (Table 18):

Fourth grade. In the twilight period, the experimental group increased twenty six points in language arts, twenty five points in science, and thirty four points in mathematics. In the control group, there was a nine point increase in language arts, a seven point increase in science and a eleven point increase in mathematics. The average increase per student in language arts was 5.2 in the experimental group in comparison to an average increase of 1.8 in the control group. The average increase per student in science was 5.0 in the experimental group in comparison to an average increase of 1.4 in the control group. The average increase per student in mathematics was 6.8 in the experimental group in comparison to an average increase of 2.2 in the control group.

Fifth grade. In the twilight period, the experimental group increased twenty one points in language arts, twenty two points in science, and twenty seven points in mathematics. In the control group, there was a six point increase in language arts, no increase in science and a three point increase in mathematics. The average increase per student in language arts was 4.2 in the experimental group in comparison to an average increase of 1.2 in the control group. The average increase per student in science was 4.4 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 5.4 in the experimental group in comparison to an average increase of 0.6 in the control group.

Sixth grade. The experimental group showed a thirty seven point increase in language arts, a fifty four point increase in science, and an forty nine point increase in mathematics. The control group showed a twenty two point increase in language arts, a twenty one point increase in science, and a twenty one point increase in mathematics. The average increase per student in language arts was 4.16 in the experimental group in comparison to an average increase of 2.4 in the control group. The average increase per student in science was 5.98 in the experimental group in comparison to an average increase of 2.36 in the control group. The average increase per student in mathematics was 5.43 in the experimental group in comparison to an average increase of 2.36 in the control group.

Seventh grade. The experimental group showed a thirty seven point increase in language arts, a thirty five point increase in science and a forty three point growth in mathematics. The control group had a seventeen point growth in language arts, a twelve point growth in science, and a thirteen point growth in mathematics. The average increase per student in language arts was 4.63 in the experimental group in comparison to an average increase of 2.13 in the control group. The average increase per student in science was 4.33 in the experimental group in comparison to an average increase of 1.48 in the control group. The average increase per student in mathematics was 5.35 in the experimental group in comparison to an average increase of 1.58 in the control group (Table 18).

Summary. Year one's NJ ASK post-test data showed numerical growth of students receiving writing to learn strategies in standardized test scores at a greater caliber than students that were in control groups. Students in control groups also grew at a greater caliber in year two of remediation in comparison of year one because they were remediated an additional year and their academic skills advanced due to the supplementary education. This was evident in all grade levels regardless if students were in the twilight or zero periods. However, the second year showed greater growth for students receiving the writing to learn strategies than students in the control groups (Table 18 & 19).

Table 18

NJ ASK Post-test Data: Twilight Period - Year Two

Student Group	**LA PreTest 2014/PostTest 2015**	**Science PreTest 2014/PreTest 2015**	**Math PreTest 2014/PreTest 2015**
Grade 4E (Composite)	846/872	874/899	830/864
Grade 4E (Point Difference)	+26	+25	+34
Grade 4 E (Average Difference)	+5.2	+5.0	+6.8
Grade 4C (Composite)	823/832	864/871	871/882
Grade 4C (Point Difference)	+9	+7	+11
Grade 4C (Average Difference)	+1.8	+1.4	+2.2
Grade 5E (Composite)	926/947	930/952	925/952
Grade 5E (Point Difference)	+21	+22	+27
Grade 5 E (Average Difference)	+4.2	+4.4	+5.4
Grade 5C (Composite)	853/859	851/851	849/852
Grade 5C (Point Difference)	+6	0	+3
Grade 5C (Average Difference)	+1.2	0	+0.6
Grade 6E (Composite)	1615/1652	1636/1690	1610/1659
Grade 6E (Point Difference)	+37	+54	+49
Grade 6E (Average Difference)	+4.16	+5.98	+5.43
Grade 6C (Composite)	1526/1548	1550/1571	1543/1564
Grade 6C (Point Difference)	+22	+21	+21
Grade 6C (Average Difference)	+2.4	+2.36	+2.36
Grade 7E (Composite)	1420/1457	1446/1481	1435/1478
Grade 7E (Point Difference)	+37	+35	+43
Grade 7E (Average Difference)	+4.63	+4.33	+5.35
Grade 7C (Composite)	1322/1339	1339/1351	1322/1335
Grade 7C (Point Difference)	+17	+12	+13
Grade 7C (Average Difference)	+2.13	+1.48	+1.58

Post-Test Data: Zero Period Year Two

Identical to the twilight period, the growth is reported as an average amongst the groups and is measured as growth from the September pre-test of 2014 to the February post-test of 2015. The growth is outlined per grade level (Table 19):

Fourth grade. In the zero period, the experimental group increased twenty six points in language arts, fifty three points in science, and twenty six points in mathematics. In the control group, there was no increase in language arts, a thirteen point increase in science and a four point increase in mathematics. The average increase per student in language arts was 5.2 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in science was 10.6 in the experimental group in comparison to an average increase of 2.6 in the control group. The average increase per student in mathematics was 5.2 in the experimental group in comparison to an average increase of 0.8 in the control group.

Fifth grade. In the zero period, the experimental group increased twenty seven points in language arts, forty nine points in science, and twenty six points in mathematics. In the control group, there was an eight point increase in language arts, a fifteen point increase in science and a twelve point increase in mathematics. The average increase per student in language arts was 4.47 in the experimental group in comparison to an average increase of 1.37 in the control group. The average increase per student in science was 8.17 in the experimental group in comparison to an average increase of 2.5 in the control group. The average increase per student in mathematics was 4.3 in the experimental group in comparison to an average increase of 1.97 in the control group

Summary. Similar to the twilight period, the second year of remediation for the zero period showed greater growth for students receiving the writing to learn strategies than students in the control groups. Similar to the twilight period students in the zero period control groups also grew at a greater caliber in year two of remediation in comparison of year one because they were remediated an additional year and their academic skills advanced due to the supplementary education.

Table 19

NJ ASK Post-test Data: Zero Period - Year Two

Student Group	LA PreTest 2014/PostTest 2015	Science PreTest 2014/PostTest 2015	Math PreTest 2014/PostTest 2015
Grade 4E (Composite)	991/1017	972/1025	994/1020
Grade 4E (Point Difference)	+26	+53	+26
Grade 4 E (Average Difference)	+5.2	+10.6	+5.2
Grade 4C (Composite)	982/982	977/990	977/981
Grade 4C (Point Difference)	0	+13	+4
Grade 4C (Average Difference)	0	+2.6	+0.8
Grade 5E (Composite)	1189/1216	1161/1210	1198/1224
Grade 5E (Point Difference)	+27	+49	+26
Grade 5 E (Average Difference)	+4.47	+8.17	+4.3
Grade 5C (Composite)	1169/1177	1173/1188	1159/1171
Grade 5C (Point Difference)	+8	+15	+12
Grade 5C (Average Difference)	+1.37	+2.5	+1.97

Results/NJ ASK Teacher Made Pre/Post-Tests

The data of pre and post-test of the NJ ASK was separated by experimental and control groups. The general theme of the data was that across grades four through seven, the students that received writing to learn strategies grew in their post-tests as more strategies were implemented. Pre-test scores generally correlated with the prior year's NJ ASK exam because that was the first standardized exam students took since the state exam. When comparing the language arts, mathematics and science pre and post-test data for the NJ ASK, both the 2013-14 and 2014-15 school year were analyzed. In addition, all grades (four through seven) were accounted for in comparison to their control and experimental groups. In all three content areas, comparing the growth in the pre-test and the post-test exams, the students in the experimental group grew to a greater degree than students in the control.

NJ ASK language arts. In Language Arts, all experimental groups grew more significantly on their post-tests scores than the control groups. This was measured by comparison of September pre-test data to February post-test data. The largest growth of scores was the fifth grade students followed by sixth grade, then seventh grade, and finally fourth grade (Figure 10).

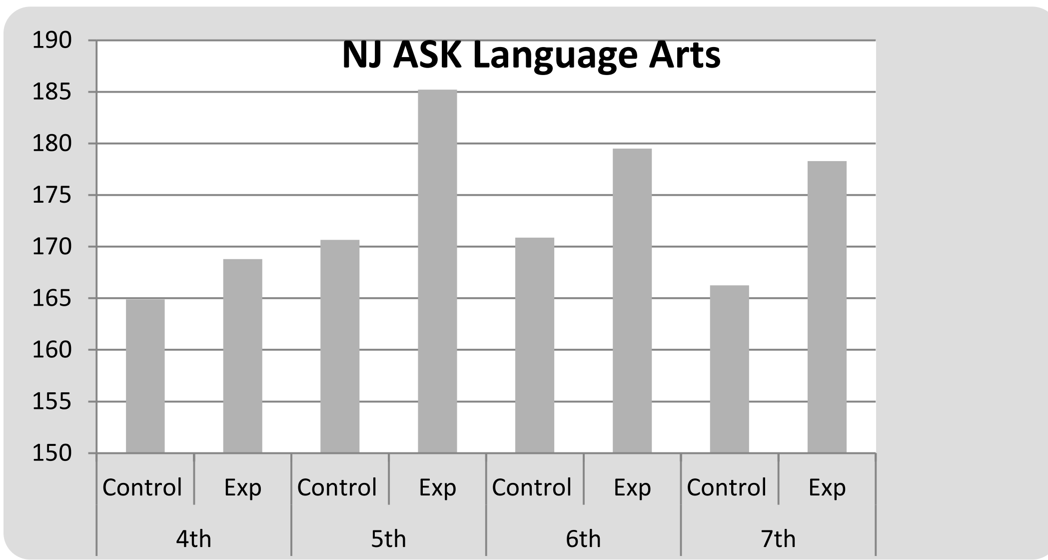

Figure 10. NJ ASK Language Arts.

NJ ASK mathematics. In Mathematics, all experimental groups grew more significantly on their post-tests scores than the control groups. Identical to language arts, this was measured by comparison of September pre-test data to February post-test data. Much like language arts, the largest growth of scores was the fifth grade students, followed by seventh grade, then fourth grade and finally sixth grade (Figure 11).

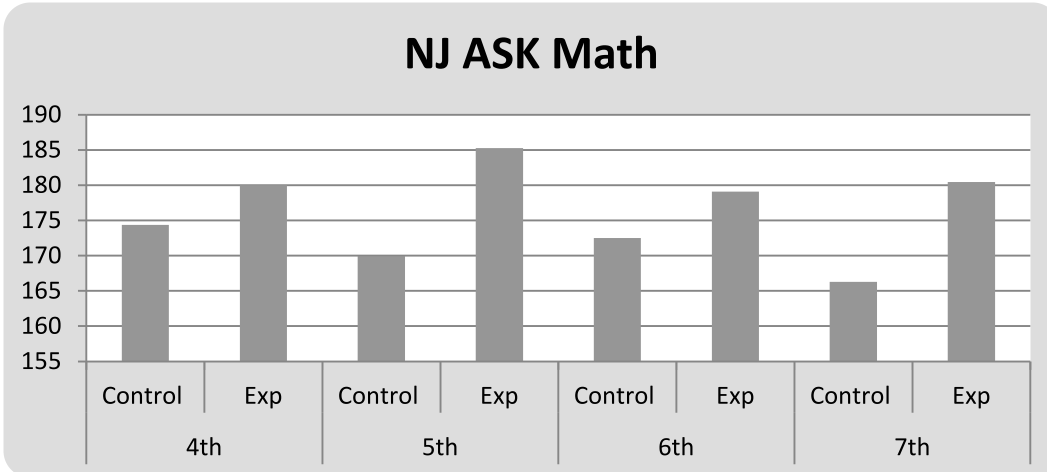

Figure 11. NJ ASK Mathematics.

NJ ASK science. In science, all experimental groups grew more significantly on their post-tests than the control groups. Identical to language arts and science, this was measured by comparison of September pre-test data to February post-test data. Identical to language arts and mathematics, the largest growth of scores was the fifth grade students followed by sixth grade, than seventh grade and finally fourth grade (Figure 12).

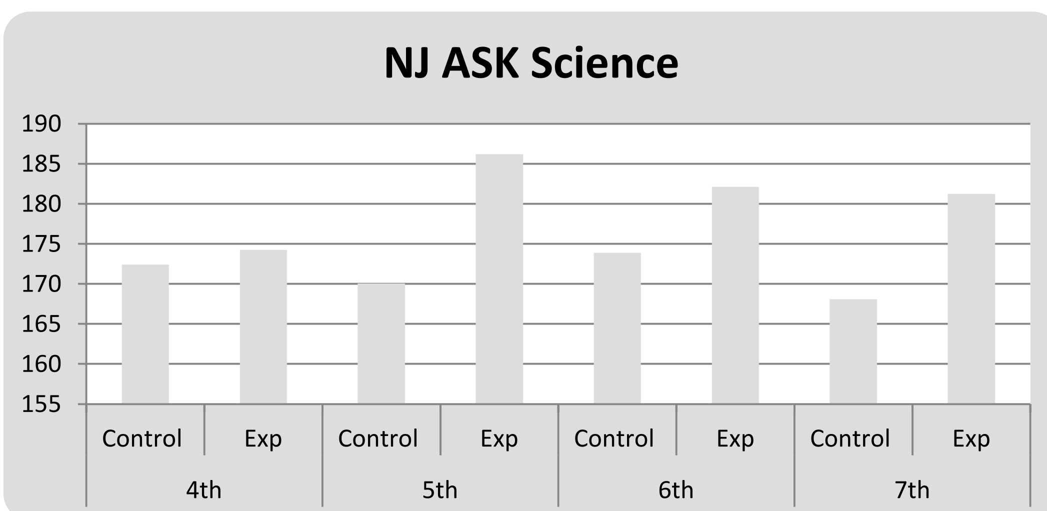

Figure 12. NJ ASK Science.

Summary. In both twilight and zero periods, students in the experimental groups showed greater growth in their post-test scores. This was evident in all grade levels in mathematics, science and language arts. Students that received the writing to learn strategies grew more significantly on their post-test scores than students that did not receive the writing to learn strategies.

PARCC Year Two

PARCC was accepted as the standardized exam for the State of New Jersey and the first year it was to be given to the students was the Spring of 2015. There were 2 different exams that were offered to students. The Performance Based Assessment (PBA) was offered in March of 2015 and End of Year Assessment (EOY) was offered in May of 2015. The EOY was used as the culminating post-test for the PARCC exam in this study. The format of the PARCC is completely technology based, students must complete this exam on the computer. Students did not use standardized exams offered in this format, they used paper and pencil exams that resembled the format of the NJ ASK. Pre and post simulated PARCC exams were created and administered to students in the same design of the actual exam. This format included duration, amount of questions and type of questions asked that imitated the state exam.

Simulated Exams

Five different simulated PARCC post-tests were offered to students in the twilight and zero periods in the subject areas of mathematics and language arts. The initial PARCC exam given to students in the twilight and zero period was a pretest using I READY simulated PARCC exams. Me and the teachers chose I READY as it directly correlated to the practice PARCC exam that was put on the New Jersey Department of

Education's website in September 2014. The administration of the pre-test for the PARCC exam was in 2014 and was identical to the PARCC in content and ability. The New Jersey Department of Education placed a practice PARCC exam on their website which allowed the teachers a baseline to create simulated exams. Much like the NJ ASK, students generally had a very small growth on the exam, were stagnant or lost points depending upon if writing to learn strategies were offered to students. Administration of the PARCC exam pre-test was in September of the 2014-2015 School Year.

After the initial pretest, four more simulated exams were offered to students before they took the PARCC in May of 2015 (Table 20). The writing to learn strategies were still being offered to students in May along with simulated exams. In addition, the first time students and school district would see the PARCC exam would be during the PBA and there would be too many variables to consider using the PBA in this study.

Table 20

Quantitative Data Collection Strategies - PARCC

Instrument	Pre-Test	Post-test	State Exam
	2015		
PARCC	1	4	2
Math	1	4	1
LA	1	4	1
Total	2	8	2

Results/PARCC Teacher Made Simulated Exams

The data for PARCC simulated exams began with the first simulated exam (considered a Pre-Test) created by instructors. There were four simulated exams that followed before the PARCC standardized state exam that was administered in May of 2015. The administration of the simulated PARCC exams were in September of 2014, October of 2014, December of 2014, February of 2015, and May of 2015. The growth was reported as an average amongst the groups and was measured as growth from the September simulated exam of 2014 to the May simulated exam of 2015. Much like the NJ ASK pre and post-tests, the PARCC simulated exams showed greater growth in students that participated in writing to learn strategies. The growth is outlined per grade level:

Fourth grade. In the twilight period, the experimental group increased four points in language arts and two points in mathematics. In the control group, there was no growth in language arts and a one point increase in mathematics. The average increase per student in language arts was 0.8 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 0.4 in the experimental group in comparison to an average increase of 0.2 in the control group.

Fifth grade. In the twilight period, the experimental group increased three points in language arts and one point in mathematics. In the control group, there was no growth in language arts or mathematics. The average increase per student in language arts was 0.6 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 0.2 in the experimental group in comparison to an average increase of 0 in the control group.

Sixth grade. The experimental group showed a four point increase in language arts and a six point growth in mathematics. The control group had a one point growth in language arts and a one point growth in mathematics. The average increase per student in language arts was 0.44 in the experimental group in comparison to an average increase of 0.11 in the control group. The average increase per student in mathematics was 0.67 in the experimental group in comparison to an average increase of 0.11 in the control group.

Seventh grade. The experimental group showed a two point increase in language arts and a four point growth in mathematics. The control group had no growth in language arts and a one point growth in mathematics. The average increase per student in language arts was 0.25 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 0.5 in the experimental group in comparison to an average increase of 0.13 in the control group.

As stated, administration of the PARCC simulated exams occurred five times in the 2014-15 school year and students were then given the official PARCC End of Year State Exam in May of 2015. All of these exams resembled the PARCC test in time, content, and complexity. Students that received the writing to learn strategies grew to a greater degree than students in the control groups (Table 21).

Table 21

PARCC Simulated Test Data: Twilight Period

Student Group	**LA** **Sim Exam 1 2014/Sim Exam 5 2015**	**Math** **Sim Exam 1 2014/Sim Exam 5 2015**
Grade 4E (Composite)	5/9	5/7
Grade 4E (Point Difference)	+4	+2
Grade 4 E (Average Difference)	+0.8	+0.4
Grade 4C (Composite)	5/5	5/6
Grade 4C (Point Difference)	0	+1
Grade 4C (Average Difference)	0	+0.2
Grade 5E (Composite)	5/8	5/6
Grade 5E (Point Difference)	+3	+1
Grade 5 E (Average Difference)	+0.6	+0.2
Grade 5C (Composite)	5/5	5/5
Grade 5C (Point Difference)	0	0
Grade 5C (Average Difference)	0	0
Grade 6E (Composite)	9/13	9/15
Grade 6E (Point Difference)	+4	+6
Grade 6E (Average Difference)	+0.44	+0.67
Grade 6C (Composite)	9/10	9/10
Grade 6C (Point Difference)	+1	+1
Grade 6C (Average Difference)	+0.11	+0.11
Grade 7E (Composite)	8/10	8/12
Grade 7E (Point Difference)	+2	+4
Grade 7E (Average Difference)	+0.25	+0.5
Grade 7C (Composite)	8/8	8/9
Grade 7C (Point Difference)	0	+2
Grade 7C (Average Difference)	0	+0.13

Students in the twilight period that took the PARCC in May showed growth in both the experimental and control groups. However, a greater number of students that received the writing to learn strategies increased in score in comparison to their simulated pre and post-tests than students who did not receive writing to learn strategies. Growth is measured in comparison of the first simulated exam (pre-test) to the PARCC standardized exam (Table 22). The growth is outlined per grade level:

Fourth grade. In the twilight period, the experimental group increased four points in language arts and four points in mathematics. In the control group, there was no growth in language arts and a one point increase in mathematics. The average increase per student in language arts was 0.8 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 0.8 in the experimental group in comparison to an average increase of 0.2 in the control group.

Fifth grade. In the twilight period, the experimental group increased four points in language arts and three points in mathematics. In the control group, there was no growth in language arts or mathematics. The average increase per student in language arts was 0.8 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 0.6 in the experimental group in comparison to an average increase of 0 in the control group.

Sixth grade. The experimental group showed a seven point increase in language arts and a seven point growth in mathematics. The control group had a one point growth in language arts and a one point growth in mathematics. The average increase per student in language arts was 0.78 in the experimental group in comparison to an average increase of 0.11 in the control group. The average increase per student in mathematics was 0.78 in the experimental group in comparison to an average increase of 0.11 in the control group.

Seventh Grade. The experimental group showed a three point increase in language arts and a five point growth in mathematics. The control group had a one point growth in language arts and a two point growth in mathematics. The average increase per student in language arts was 0.38 in the experimental group in comparison to an average increase of 0.13 in the control group. The average increase per student in mathematics was 0.63 in the experimental group in comparison to an average increase of 0.25 in the control group (Table 22).

Table 22

PARCC Test Data: Twilight Period

Student Group	**LA** Sim Exam 1 2014/PARCC 2015	**Math** Sim Exam 1 2014/PARCC 2015
Grade 4E (Composite)	5/9	5/9
Grade 4E (Point Difference)	+4	+4
Grade 4 E (Average Difference)	+0.8	+0.8
Grade 4C (Composite)	5/5	5/6
Grade 4C (Point Difference)	0	+1
Grade 4C (Average Difference)	0	+0.2
Grade 5E (Composite)	5/9	5/8
Grade 5E (Point Difference)	+4	+3
Grade 5 E (Average Difference)	+0.8	+0.6
Grade 5C (Composite)	5/5	5/5
Grade 5C (Point Difference)	0	0
Grade 5C (Average Difference)	0	0
Grade 6E (Composite)	9/16	9/16
Grade 6E (Point Difference)	+7	+7
Grade 6E (Average Difference)	+0.78	+0.78
Grade 6C (Composite)	9/10	9/10
Grade 6C (Point Difference)	+1	+1
Grade 6C (Average Difference)	+0.11	+0.11
Grade 7E (Composite)	8/11	8/13
Grade 7E (Point Difference)	+3	+5
Grade 7E (Average Difference)	+0.38	+0.63
Grade 7C (Composite)	8/9	8/10
Grade 7C (Point Difference)	+1	+2
Grade 7C (Average Difference)	+0.13	+0.25

There were significantly more students in the twilight period than the zero period, however the results were very similar in comparison of both periods 4th and 5th grade students. More students that received writing to learn strategies increased in score in post exams than students in the control groups. This is shown by the comparison of scores of the first simulated exam offered in September of 2014 to the fifth simulated exam offered in May of 2015 (Table 23). The growth is outlined per grade level:

Fourth grade. In the zero period, the experimental group increased two points in language arts and one point in mathematics. In the control group, there was no growth in language arts and a one point increase in mathematics. The average increase per student in language arts was 0.4 in the experimental group in comparison to an average increase of 0.2 in the control group. The average increase per student in mathematics was 0.2 in the experimental group in comparison to an average increase of 0.2 in the control group.

Fifth grade. In the zero period, the experimental group increased three points in language arts and three points in mathematics. In the control group, there was one point growth in language arts and one point growth in mathematics. The average increase per student in language arts was 0.5 in the experimental group in comparison to an average increase of 0.17 in the control group. The average increase per student in mathematics was 0.5 in the experimental group in comparison to an average increase of 0.17 in the control group (Table 23).

Table 23

PARCC Simulated Test Data: Zero Period

Student Group	LA Sim Exam 1 2014/Sim Exam 5 2015	Math Sim Exam 1 2014/Sim Exam 5 2015
Grade 4E (Composite)	5/7	5/6
Grade 4E (Point Difference)	+2	+1
Grade 4 E (Average Difference)	+0.4	+0.2
Grade 4C (Composite)	5/5	5/6
Grade 4C (Point Difference)	0	+1
Grade 4C (Average Difference)	0	+0.2
Grade 5E (Composite)	6/9	6/9
Grade 5E (Point Difference)	+3	+3
Grade 5 E (Average Difference)	+0.5	+0.5
Grade 5C (Composite)	6/7	6/7
Grade 5C (Point Difference)	+1	+1
Grade 5C (Average Difference)	+0.17	+0.17

Student growth on the state PARCC exam was greater in students that received writing to learn strategies. This is shown in the comparison of the scores of the first simulated exam offered in September of 2014 to the state PARCC exam offered in May of 2015 (Table 5.14). The growth is outlined per grade level:

Fourth grade. In the zero period, the experimental group increased three points in language arts and two points in mathematics. In the control group, there was no growth in language arts and a one point increase in mathematics. The average increase per student in language arts was 0.6 in the experimental group in comparison to an average increase of 0 in the control group. The average increase per student in mathematics was 0.4 in the experimental group in comparison to an average increase of 0.2 in the control group.

Fifth grade. In the zero period, the experimental group increased four points in language arts and four points in mathematics. In the control group, there was one point growth in language arts and one point growth in mathematics. The average increase per student in language arts was 0.67 in the experimental group in comparison to an average increase of 0.17 in the control group. The average increase per student in mathematics was 0.67 in the experimental group in comparison to an average increase of 0.17 in the control group (Table 24).

Table 24

PARCC Test Data: Zero Period

Student Group	**LA** Sim Exam 1 2014/PARCC 2015	**Math** Sim Exam 1 2014/PARCC 2015
Grade 4E (Composite)	5/8	5/7
Grade 4E (Point Difference)	+3	+2
Grade 4 E (Average Difference)	+0.6	+0.4
Grade 4C (Composite)	5/5	5/6
Grade 4C (Point Difference)	0	+1
Grade 4C (Average Difference)	0	+0.2
Grade 5E (Composite)	6/10	6/10
Grade 5E (Point Difference)	+4	+4
Grade 5 E (Average Difference)	+0.67	+0.67
Grade 5C (Composite)	6/7	6/7
Grade 5C (Point Difference)	+1	+1
Grade 5C (Average Difference)	0.17	0.17

PARCC language arts. In the language arts portion of the PARCC, student growth was greater in the experimental groups than students in the control groups. This was measured by comparison of the first PARCC simulated exam given in September of 2014 to the fifth simulated exam given to students in May of 2015. The largest growth in the pre and post-test was in the fourth grade students, followed by fifth grade students, then sixth grade students, finally seventh grade students (Figure 13). Students did better in the lower grades and progressively did worse as they got older. This could be attributable to students being use to the NJ ASK test format and switching over to a completely different testing format in the PARCC.

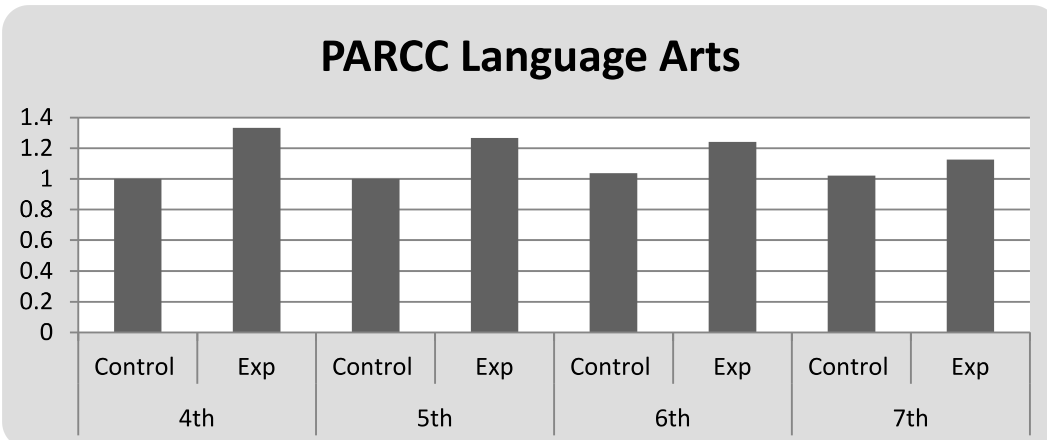

Figure 13. PARCC Language Arts.

PARCC mathematics. In the mathematics portion of the PARCC, student growth mirrored the language arts portion of the PARCC. Identical to mathematics, this was measured by comparison of the first PARCC simulated exam given in September of 2014 to the fifth simulated exam given to students in May of 2015. The largest growth in the pre and post-test was in the fourth grade students, followed by sixth grade students, then fifth grade students, finally seventh grade students (Figure 14).

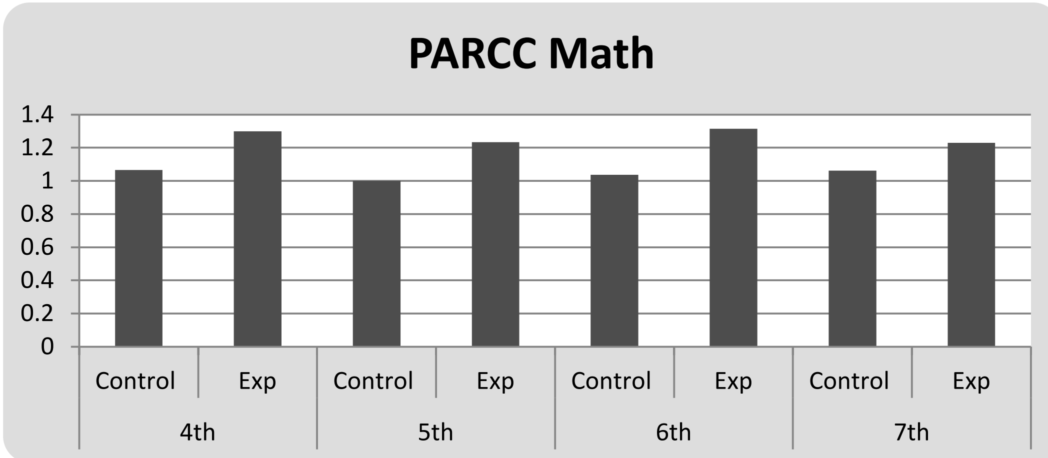

Figure 14. PARCC Mathematics.

Control Group & Final Numbers

The control groups across the board in both the NJ ASK and PARCC exam were not as successful as the experimental group that received writing to learn strategies. Using the NJ ASK pre and post-test exams, the control groups did the best at closing the disparity gap with their corresponding experiential groups were that were fourth, sixth, seventh, and finally fifth grade seemed to do the worst. Using the PARCC pre and post-test exams the control groups did the best at closing the disparity gap with their corresponding experiential groups were seventh, sixth, fifth and fourth grade. The reasons for the disparity of scores between the NJ ASK and PARCC exams were students in the older grades were more use to the NJ ASK style of the exam and seemed to not perform as well as the students in the elementary grades on the PARCC. Students in the elementary grades did not have as much experience taking the NJ ASK, which made it easier for them to transition to a different style exam such as the PARCC. The initial NJ ASK pre-test taken in September of 2013 was compared with the final NJ ASK post-test taken in 2015 to create a total comparison for the pre and post-tests of the experimental and control groups in this study. Total student growth is compared in the subjects of language arts, science, and mathematics. The experimental groups grew a total of 314 points in language arts, 349 points in science, and 359 points in mathematics. The experimental groups grew 4.1% in language arts, 4.6% in science, and 4.7% in mathematics. Individual group growth for the NJ ASK is outlined in Table 5.15. The control groups grew a total of 74 points in language arts, 69 points in science, and 69 points in mathematics. The control groups grew 1% in language arts, 0.9% in science, and 0.9% percent in mathematics. Percent growths were calculated for specific subject matter and grade level. Total growth in the experimental and control groups were divided by total points available on the exams in each group. The number was then multiplied by 100 to attain specific percentile growth (Table 25).

Table 25

NJ ASK Subject Comparison: Experimental V. Control

Grade	Language Arts	Science	Mathematics
	Experimental		
Twilight			
4	52 (5.2%)	54 (5.4%)	64 (6.4%)
5	39 (3.9%)	38 (3.8%)	48 (4.8%)
6	64 (3.6%)	87 (4.8%)	83 (4.6%)
7	58 (3.6%)	63 (3.9%)	69 (4.3%)
Zero			
4	50 (5.0%)	52 (5.2%)	43 (4.3%)
5	51 (4.2%)	55 (4.6%)	52 (4.3%)
Experimental Total	314 (4.1%)	349 (4.6%)	359 (4.7%)
	Control		
Twilight			
4	11 (1.1%)	14 (1.4%)	14 (1.4%)
5	11 (1.1%)	2 (0.2%)	6 (0.6%)
6	11 (0.6%)	3 (0.16%)	15 (0.83%)
7	13 (0.8%)	10 (0.63%)	6 (0.38%)
Zero			
4	11 (1.1%)	24 (2.4%)	15 (1.5%)
5	17 (1.4%)	16 (1.3%)	13 (1.1%)
Control Total	74 (1.0%)	69 (0.9%)	69 (0.9%)
Total Comparison	**314 (4.1%)/74 (0.9%)**	**349(4.6%)/69 (0.9%)**	**359 (4.7%)/69 (0.9%)**

The initial simulated exam taken in September of 2014 was compared to the fifth simulated exam taken in May of 2015 in order to create a total comparison for the PARCC simulated exams of the experimental and control groups in this study. Total student growth is compared in the subjects of language arts and mathematics. The experimental groups grew a total of 18 points in language arts and 17 points in mathematics. The experimental groups grew 9.7% in language arts and 9.2% in mathematics. The control groups grew a total of 2 points in language arts and 5 points in mathematics. The control groups grew 1.1% in language arts and 2.7% percent in mathematics. Percent growths were calculated for specific subject matter and grade level. Total growth in the experimental and control groups were divided by total points available on the exams in each group. The number was then multiplied by 100 to attain specific percentile growth (Table 26).

Table 26

PARCC Subject Comparison: Experimental V. Control

Grade	Language Arts	Mathematics
	Experimental	
Twilight		
4	4 (16%)	2 (8%)
5	3 (12%)	1 (4%)
6	4 (9%)	6 (13%)
7	2 (5%)	4 (10%)
Zero		
4	2 (8%)	1 (4%)
5	3 (10%)	3 (10%)
Experimental Total	18 (9.7%)	17 (9.2%)
	Control	
Twilight		
4	0 (0%)	1 (4%)
5	0 (0%)	0 (0%)
6	1 (2.2%)	1 (2.2%)
7	0 (0%)	1 (2.5%)
Zero		
4	0 (0%)	1 (4%)
5	1	1 (3.3%)
Control Total	2 (1.1%)	5 (2.7%)
Total Comparison	**18 (9.7%)/2 (1.1%)**	**17 (9.2%)/5 (2.7%)**

Themes

Four themes arose from the qualitative data collected. The themes were (1) growth in critical thinking skills, (2) grasping the content, (3) students with special needs, and (4) administrative/teacher relationship. Observations were collected along with field notes of writing to learn strategies and teacher participants of the writing to learn strategies were required to complete interview questions designed to collect information regarding their perceptions of the writing to learn strategies and its impact on standardized testing performance.

Growth in critical thinking skills. Multiple successes occurred with the writing to learn strategies which generally stemmed from which strategy was presented to students and their partiality to that strategy. From field notes taken, my observations were students growing in critical thinking skills from multiple writing to learn strategies (Balachandran, Venkatesaperumal, Clara, and Shukri 2014). On February 25, 2014, I observed students working in groups of three performing dialectical notebooks after reading a passage. Students created Venn diagrams to capitalize on the main points of the passage and I began to watch then analytically dissect the passage (R. Tarchichi, observation, February 25, 2014). Additional successful writing to learn strategies included summarization, sentence combining, dialectical writing, writing notebooks, and pre-writing. C.S. pointed out "growth in sixth grade student post-test scores were mainly due to writing strategies such as prewriting, writing notebooks and dialectical note taking" (personal communication, March 20, 2014), growth is shown in Table 5.6. In an observation on 9/15/13 in J.W.'s class I saw students grow in the above strategies at an incredible rate. Students in the experimental group were given writing notebooks and dialectical writing. All students, both experimental and control groups took a language arts "do now" that consisted of a reading passage and six multiple choice questions that followed the reading. Students in the experimental group completed the "do now" with greater comfort than the students in the control group (R. Tarchichi, observation, September 15, 2013). Summarization, sentence combining, and prewriting were the easiest strategies to learn, students were successful in those strategies but they seemed to get bored with them after a few minutes of attempting them. Writing notebooks and dialectical notebooks took more time to learn but students seemed to love the activities and began the process of peer tutoring. C.S. pointed out that "writing to learn activities like writing notebooks and dialectical notebooks made group work successful in the remediation periods" (personal communication, May 9, 2013).

Students sighed when asked to return to summarization, sentence combining and prewriting. These activities were more straight forward, however the writing notebooks and dialectical notebooks required organization and creativity which seemed to spark the students' interests. Students that participated in the above strategies showed direct growth in their post-tests, shown in Table 5.6 and Table 5.7. In addition, students that received writing to learn strategies showed more vigor and enthusiasm for the lessons as they were being introduced. J.W. stated "students in the experimental group definitely are more passionate about the remediation in both the twilight and zero periods" (personal communication, April 16, 2014). More to the point, students that received these strategies generally led their peers in group work assignments and in class discussions. (R. Tarchichi, observation, April 28, 2014).

Grasping the content. Challenges that occurred in writing to learn much like the successes was dependent upon the students and their ability to perform a strategy and their affection for the writing to learn tactic. For example, the scores of students with special needs generally showed a decreased growth in comparison to regular education students. From field notes taken, my observations were students had multiple issues with particular writing to learn strategies. Those strategies include prewriting, inquiry activities, study of models, process writing approach, paraphrase assignments and writing for content learning. An observation taken 11/20/14 in C.S.'s class, I saw students struggle with the idea of prewriting. At the start of the period, experimental groups were explained prewriting and how to perform the activity. Students did not understand and needed directions and two additional times. Students all struggled with the activity and asked repeated questions. However, although they seemed confused about the strategy, they seemed to learn the concept and its correlation to language arts reading comprehension within a period of ten minutes (R. Tarchichi, observation, April 28, 2014). In a different observation that took place on 12/5/14, I noticed students struggling with the process writing approach and paraphrase assignments. Students had more trouble with paraphrase assignments and continued to question C.S. about the proper way to paraphrase in conjunction with looking for main ideas in the text. Students seemed frustrated and questioned the importance of the strategy. They spent the remainder of the period on this strategy with little improvement (R. Tarchichi, observation, December 5, 2014).

Students with special needs. Students with special needs that participated in the writing to learn strategies showed tremendous growth on their NJ ASK scores in comparison to their peers that did not receive writing to learn strategies. Although, students with special needs generally had a much more difficult time with writing to learn strategies and grasping the content. Students with special needs that received writing to learn strategies not only outscored their peers who also had special learning needs, many of them outscored their peers in general education as well. For example, in assessment of two fourth grade students with special needs comparing post-test one and post-test three, twilight student 4TA showed three points growth in language arts, four points growth in science, and four points growth in science. Twilight student 4TF showed no growth in all three content areas comparing post-test one and post-test three. Additionally in assessment of two fourth grade students with special needs comparing post-test one and post-test three, twilight student 6TI showed one point growth in language arts, one point growth in science, and two points growth in science. Student 6TP showed no growth in language arts, science or mathematics (Table 5.6). This was especially interesting because all students were treated equally, meaning students with special needs normally received services that included one to one instruction or special group assistance performed by an inclusion instructor. No student participating in twilight or zero period received additional services that was mandated by individualized leaning plans (IEPs). All students in experimental and control groups were given equal instruction in this study in this study.

Through observations obtained from field notes, students with special needs seemed to gravitate to these strategies to grasp a concept that escaped them prior to being introduced to writing to learn strategies. Similar to the general education students in these remediation periods, students with special needs gravitated toward dialectical notebooks. In an observation taken 11/20/14 in R.F.'s class, all students worked on dialectical notebooks and after being taught the strategy by their teacher, they spent the period dissecting text and creating their double entry journal. Dialectical note taking slowed down the reading comprehension process for these students and allowed them to reflect on the details and important aspects of the text at their pace (R. Tarchichi, observation, November 20, 2014). The writing to learn strategies, especially dialectical notebooks created a style of learning for these students where they did not rely on additional support to grasp concepts of disciplines. R.F. pointed out "my students have really responded to dialectical notes and it has sped up their learning progression" (personal communication, November 20, 2014).

Administrative/teacher relationship. My relationship with the instructors that participated in the twilight and zero period grew with every PLC. We went over all writing to learn strategies, implemented and talked over which strategies were most beneficial, and those that seemed to make little difference in student performance and critical thinking skills. Through additional PLCs my relationship with the instructors grew. It was mostly positive, but there was negative contention when they felt a particular writing to learn strategy was not beneficial to students. E.S. stated "some of these strategies don't work, so why do we keep asking the students to use them" (personal communication, May 2, 2013). As the administrator, I learned from the teachers and the teacher learned from me. We grew together in the strategies especially after discussions from observations and field notes. Our relationship became teamwork as we discussed the benefits and challenges of the writing to learn strategies in relation to pre and post-test scores of simulated exams.

Conclusion

Writing to learn strategies in this study provided connections for students and instructors to see links in learning, critical thinking skills and standardized test performance. Vygotsky (1978) points out the importance of connections and word meaning when he stated “the last example concerns the analysis of word meaning.

Investigations in this area show that the connections underlying words are fundamentally different in the young child and in the adult" (p. 50). Based on the Pre-Tests our students were not making these connections which are necessary for their success on the NJ ASK, PARCC, and their educational careers. After the post-tests were offered, students that received writing to learn strategies grew in understanding of content and standardized test taking ability. A clear connection was made with the use of writing to learn strategies and standardized test taking performance.

Chapter VI

Cycle III - Data Analysis

Introduction

The purpose of this study was to measure the impact of mathematics, science and language arts writing to learn strategies on the standardized test scores of primary and secondary students and to determine whether or not writing to learn strategies promoted critical and analytical thinking skills in students. In Cycle II, quantitative data was collected on standardized exams using PARCC simulated exams and pre-test and post-test NJ ASK simulated exams. A control group completed all exams without the undertaking of writing to learn strategies that were offered to the experimental group. The simulated exams were instruments used to determine if writing to learn strategies had an impact on standardized test taking. In addition, in cycle II, I collected qualitative data on the perceptions of the successes of writing to learn strategies from instructors in focus group interviews. The qualitative data was used for the purpose of answering research questions regarding the perceptions of faculty during the study. In cycle III, I analyzed quantitative (NJ ASK and PARCC) and qualitative data collected in this cycle. The quantitative data included two exams. Primarily, the data included the 2014 and 2015 NJ ASK exams, both in comparison with the 2013 NJ ASK baseline exam. Secondly, the data included the 2015 PARCC exam in comparison to PARCC simulated exam one and PARCC simulated exam five. The qualitative data included teacher interviews, focus group interviews, and participant observation/field notes.

Quantitative Data Analysis NJ ASK

Quantitative data was collected using the 2013 NJ ASK as a baseline along with the 2014 and 2015 NJ ASK exam in mathematics, science and language arts and the 2015 PARCC exam. Quantitative data was disaggregated by grade, subject area, remediation period and standardized exam taken. Experimental subjects were compared to control subjects that did not receive writing to learn strategies. Quantitative data was analyzed using a one-tailed T test because significance could be calculated best with the number of subjects in this study. There were only 76 subjects in this study and a one-tailed T test necessitates less subjects to attain significance. Additionally, the one-tailed T test was better suited to test the definitive relationship between writing to learn strategies and their impact on standardized test performance. This hypothesis was measured comparing the 2013 NJ ASK baseline data to the 2014 NJ ASK exam and the 2013 NJ ASK baseline data to the 2015 NJ ASK exam. Tables and graphs reported composite scores and differences in points and averages amongst the students in experimental and control groups. The average difference in scores amongst students is the average increase or decrease in scores amongst the students in a group. Scores were compared utilizing the one-tailed T test and P value, which provided the significance of the impact of the writing to learn strategies on NJ ASK standardized test scores.

Fourth Grade Twilight NJ ASK Scores

Language arts. When comparing the 2013 to the 2014 language arts scores, the experimental group had an average difference of 5.2. The average difference in control subjects was 0.4. After a one-tailed T test, the P Value was 2.45E-06. When comparing the 2013 to the 2015 language arts scores, the experimental group had an average difference of 11.2. The average difference in control subjects was 2.8. After a one-tailed T test, the P Value was 3.72E-05 (Table 27; Figure 15). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fourth grade students.

Table 27

NJ ASK Twilight 4th Grade Language Arts

Student Group	LA Baseline 2013/NJ ASK 2014	LA Baseline 2013/NJ ASK 2015
Grade 4E (Composite)	820/846	820/876
Grade 4E (Point Difference)	+26	+56
Grade 4 E (Average Difference)	+5.2	+11.2
Grade 4C (Composite)	821/823	821/835
Grade 4C (Point Difference)	+2	+14
Grade 4C (Average Difference)	+0.4	+2.8

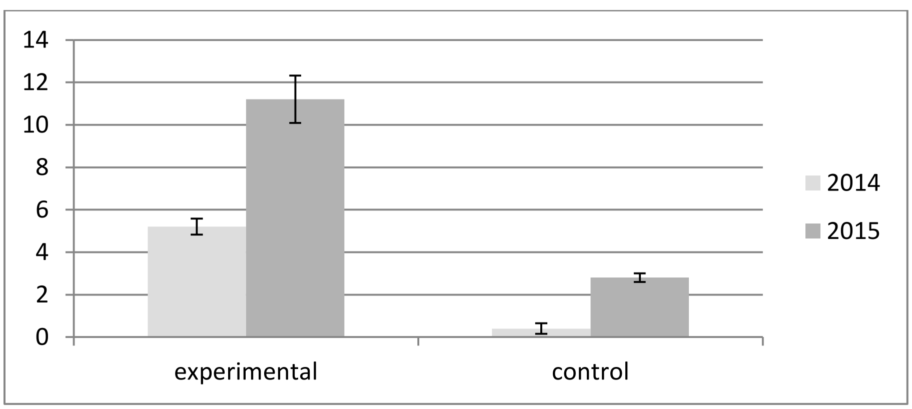

Figure 15. Twilight 4th Grade Language Arts.

Science. When comparing the 2013 to the 2014 science scores, the experimental group had an average difference of 5.8. The average difference in control subjects was

0.4. After a one-tailed T test, the P Value was 1.36E-06. When comparing the 2013 to the 2015 science scores, the experimental group had an average difference of 11.2. The average difference in control subjects was 2.4. After a one-tailed T test, the P Value was 4.79E-05 (Table 28; Figure 16). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fourth grade students.

Table 28

NJ ASK Twilight 4th Grade Science

Student Group	**Science Baseline 2013/NJ ASK 2014**	**Science Baseline 2013/NJ ASK 2015**
Grade 4E (Composite)	845/874	845/901
Grade 4E (Point Difference)	+29	+56
Grade 4 E (Average Difference)	+5.8	+11.2
Grade 4C (Composite)	862/864	862/874
Grade 4C (Point Difference)	+2	+12
Grade 4C (Average Difference)	+0.4	+2.4

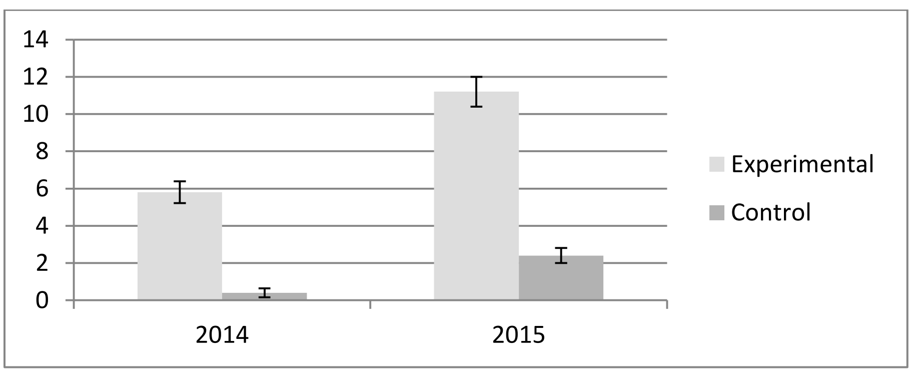

Figure 16. Twilight 4th Grade Science.

Mathematics. When comparing the 2013 to the 2014 mathematics scores, the experimental group had an average difference of 6. The average difference in control subjects was 0.6. After a one-tailed T test, the P Value was 6.70E-04. When comparing the 2013 to the 2015 mathematics scores, the experimental group had an average difference of 13.6. The average difference in control subjects was 3.4. After a one-tailed T test, the P Value was 6.58E-06 (Table 29; Figure 17). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fourth grade students.

Table 29

NJ ASK Twilight 4th Grade Mathematics

Student Group	Math Baseline 2013/NJ ASK 2014	Math Baseline 2013/NJ ASK 2015
Grade 4E (Composite)	800/830	800/868
Grade 4E (Point Difference)	+30	+68
Grade 4 E (Average Difference)	+6	+13.6
Grade 4C (Composite)	868/871	868/885
Grade 4C (Point Difference)	+3	+17
Grade 4C (Average Difference)	+0.6	+3.4

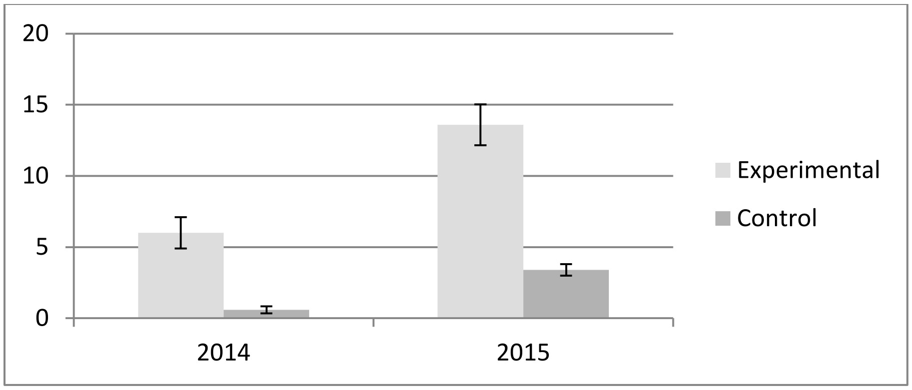

Figure 17. NJ ASK Twilight 4th Grade Mathematics.

Fifth Grade Twilight NJ ASK Scores

Language arts. When comparing the 2013 to the 2014 language arts scores, the experimental group had an average difference of 4.8. The average difference in control subjects was 1.4. After a one-tailed T test, the P Value was 2.46E-06. When comparing the 2013 to the 2015 language arts scores, the experimental group had an average difference of 9.8. The average difference in control subjects was 2.6. After a one-tailed T test, the P Value was 1.60E-06 (Table 30; Figure 18). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fifth grade students.

Table 30

NJ ASK Twilight 5th Grade Language Arts

Student Group	LA Baseline 2013/NJ ASK 2014	LA Baseline 2013/NJ ASK 2015
Grade 5E (Composite)	902/926	902/951
Grade 5E (Point Difference)	+24	+49
Grade 5E (Average Difference)	+4.8	+9.8
Grade 5C (Composite)	848/855	848/861
Grade 5C (Point Difference)	+7	+13
Grade 5C (Average Difference)	+1.4	+2.6

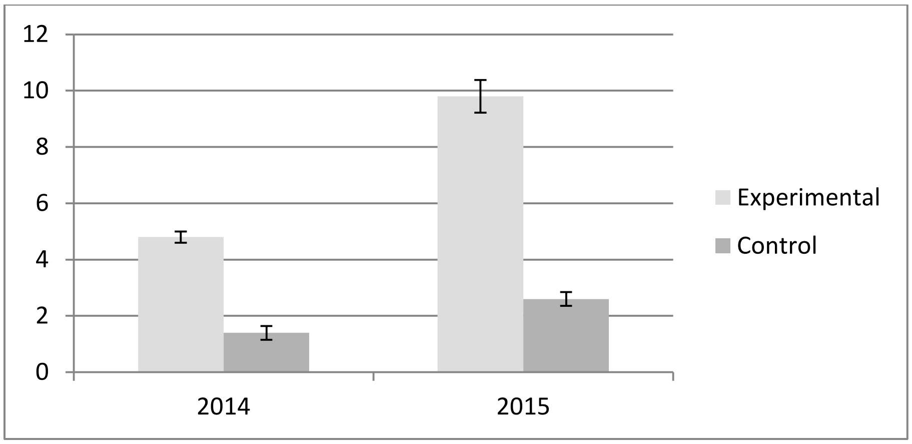

Figure 18. NJ ASK Twilight 5th Grade Language Arts.

Science. When comparing the 2013 to the 2014 science scores, the experimental group had a difference of 4.0. The difference in control subjects was 0.8. After a one-tailed T test, the P Value was 6.57E-04. When comparing the 2013 to the 2015 science scores, the experimental group had a difference of 9.4. The difference in control subjects was 1. After a one-tailed T test, the P Value was 1.78E-06 (Table 31; Figure 19). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fifth grade students.

Table 31

NJ ASK Twilight 5th Grade Science

Student Group	**Science Baseline 2013/NJ ASK 2014**	**Science Baseline 2013/NJ ASK 2015**
Grade 5E (Composite)	910/930	910/957
Grade 5E (Point Difference)	+20	+47
Grade 5E (Average Difference)	+4.0	+9.4
Grade 5C (Composite)	849/853	849/854
Grade 5C (Point Difference)	+4	+5
Grade 5C (Average Difference)	+0.8	+1.0

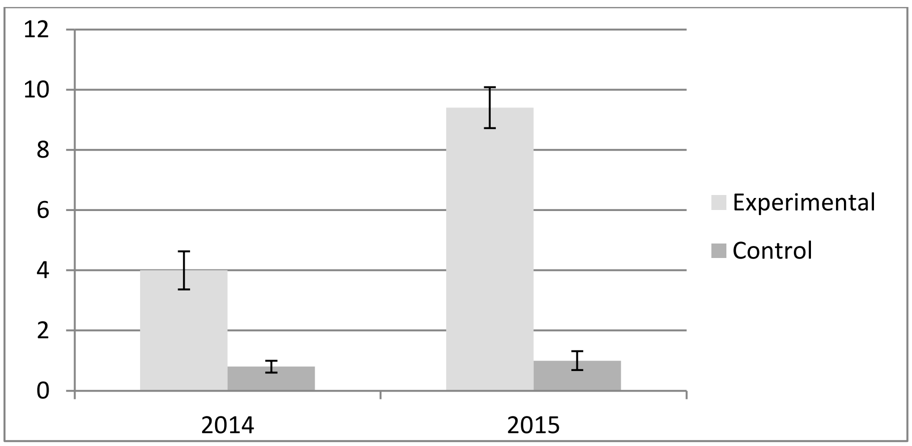

Figure 19. NJ ASK Twilight 5th Grade Science.

Mathematics. When comparing the 2013 to the 2014 mathematics scores, the experimental group had an average difference of 5.4. The average difference in control subjects was 1.8. After a one-tailed T test, the P Value was 2.30E-04. When comparing the 2013 to the 2015 mathematics scores, the experimental group had an average difference of 11. The average difference in control subjects was 2. After a one-tailed T test, the P Value was 2.26E-06 (Table 32; Figure 20). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fifth grade students.

Table 32

NJ ASK Twilight 5th Grade Mathematics

Student Group	**Math Baseline 2013/NJ ASK 2014**	**Math Baseline 2013/NJ ASK 2015**
Grade 5E (Composite)	898/925	898/953
Grade 5E (Point Difference)	+27	+55
Grade 5E (Average Difference)	+5.4	+11
Grade 5C (Composite)	846/855	846/856
Grade 5C (Point Difference)	+9	+10
Grade 5C (Average Difference)	+1.8	+2.0

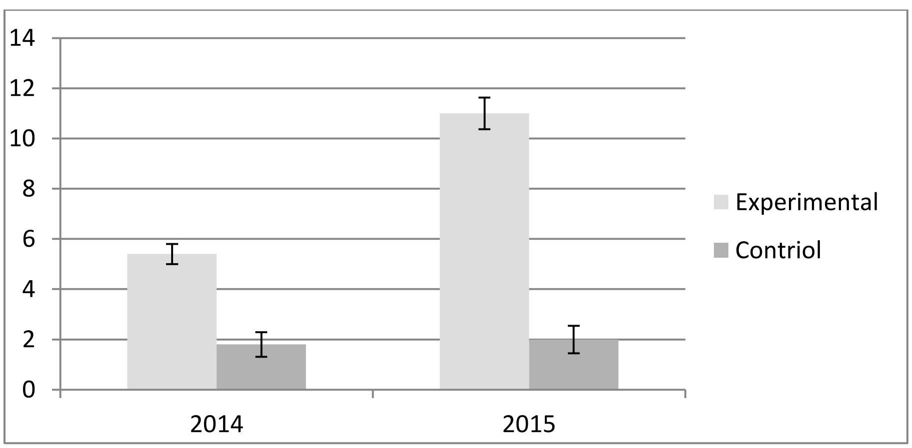

Figure 20. NJ ASK Twilight 5th Grade Mathematics.

Sixth Grade Twilight NJ ASK Scores

Language arts. When comparing the 2013 to the 2014 language arts scores, the experimental group had an average difference of 4.9. The average difference in control subjects was 1.0. After a one-tailed T test, the P Value was 2.64E-07. When comparing the 2013 to the 2015 language arts scores, the experimental group had an average difference of 9.4. The average difference in control subjects was 1.5. After a one-tailed T test, the P Value was 3.14E-10 (Table 33; Figure 21). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of sixth grade students.

Table 33

NJ ASK Twilight 6th Grade Language Arts

Student Group	**LA Baseline 2013/NJ ASK 2014**	**LA Baseline 2013/NJ ASK 2015**
Grade 6E (Composite)	1572/1616	1572/1657
Grade 6E (Point Difference)	+44	+85
Grade 6E (Average Difference)	+4.9	+9.4
Grade 6C (Composite)	1535/1544	1535/1549
Grade 6C (Point Difference)	+11	+14
Grade 6C (Average Difference)	+1.0	+1.5

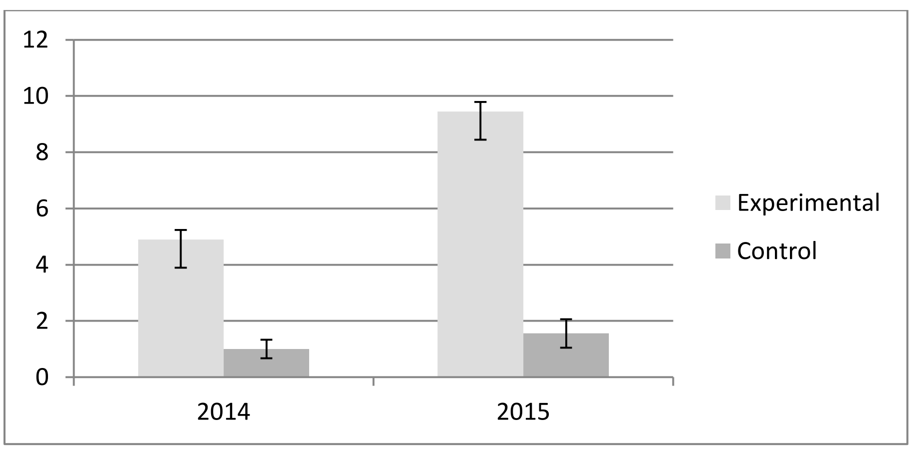

Figure 21. NJ ASK Twilight 6th Grade Language Arts.

Science. When comparing the 2013 to the 2014 science scores, the experimental group had an average difference of 4.9. The average difference in control subjects was 0.67. After a one-tailed T test, the P Value was 1.09E-06. When comparing the 2013 to the 2015 science scores, the experimental group had an average difference of 11.3. The average difference in control subjects was 0.67. After a one-tailed T test, the P Value was 6.17E-08 (Table 34; Figure 22). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of sixth grade students.

Table 34

NJ ASK Twilight 6th Grade Science

Student Group	**Science Baseline 2013/NJ ASK 2014**	**Science Baseline 2013/NJ ASK 2015**
Grade 6E (Composite)	1580/1637	1580/1695
Grade 6E (Point Difference)	+57	+115
Grade 6E (Average Difference)	+4.9	+11.3
Grade 6C (Composite)	1564/1570	1564/1570
Grade 6C (Point Difference)	+6	+6
Grade 6C (Average Difference)	+0.67	+0.67

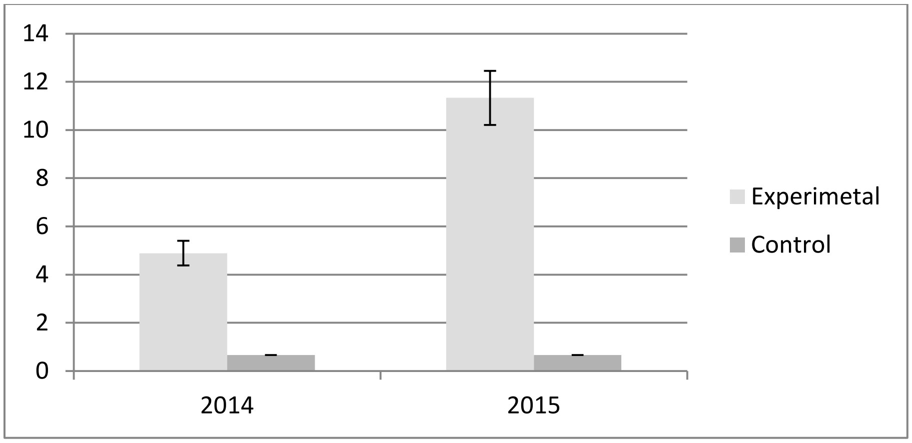

Figure 22. NJ ASK Twilight 6th Grade Science.

Mathematics. When comparing the 2013 to the 2014 mathematics scores, the experimental group had an average difference of 4.7. The average difference in control subjects was 1.3. After a one-tailed T test, the P Value was 1.37E-08. When comparing the 2013 to the 2015 mathematics scores, the experimental group had an average difference of 11. The average difference in control subjects was 1.8. After a one-tailed T test, the P Value was 6.60E-07 (Table 35; Figure 23). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of sixth grade students.

Table 35

NJ ASK Twilight 6th Grade Mathematics

Student Group	Math Baseline 2013/NJ ASK 2014	Math Baseline 2013/NJ ASK 2015
Grade 6E (Composite)	1568/1610	1568/1667
Grade 6E (Point Difference)	+42	+99
Grade 6E (Average Difference)	+4.7	+11
Grade 6C (Composite)	1548/1560	1548/1564
Grade 6C (Point Difference)	+12	+16
Grade 6C (Average Difference)	+1.3	+1.8

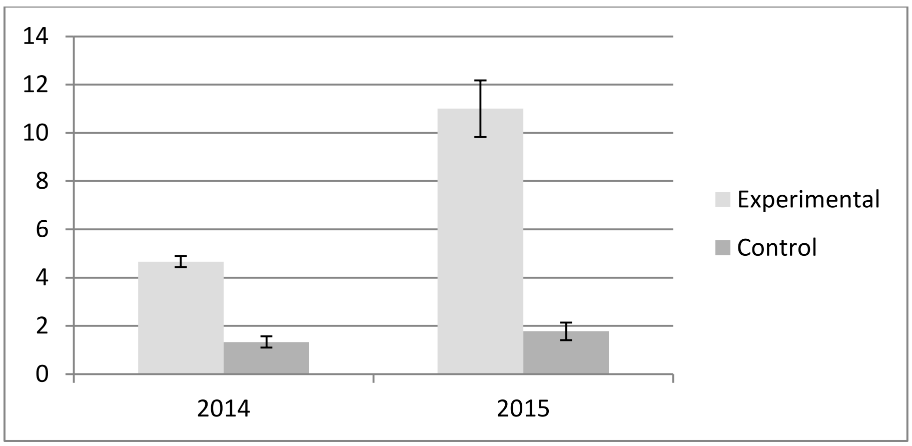

Figure 23. NJ ASK Twilight 6th Grade Mathematics.

Seventh Grade Twilight NJ ASK Scores

Language arts. When comparing the 2013 to the 2014 language arts scores, the experimental group had an average difference of 4.3. The average difference in control subjects was 1.6. After a one-tailed T test, the P Value was 7.07E-05. When comparing the 2013 to the 2015 language arts scores, the experimental group had an average difference of 7.8. The average difference in control subjects was 1.6. After a one-tailed T test, the P Value was 3.86E-04 (Table 36; Figure 24). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of seventh grade students.

Table 36

NJ ASK Twilight 7th Grade Language Arts

Student Group	LA Baseline 2013/NJ ASK 2014	LA Baseline 2013/NJ ASK 2015
Grade 7E (Composite)	1416/1429	1416/1461
Grade 7E (Point Difference)	+13	+45
Grade 7E (Average Difference)	+4.3	+7.8
Grade 7C (Composite)	1326/1339	1326/1339
Grade 7C (Point Difference)	+13	+13
Grade 7C (Average Difference)	+1.6	+1.6

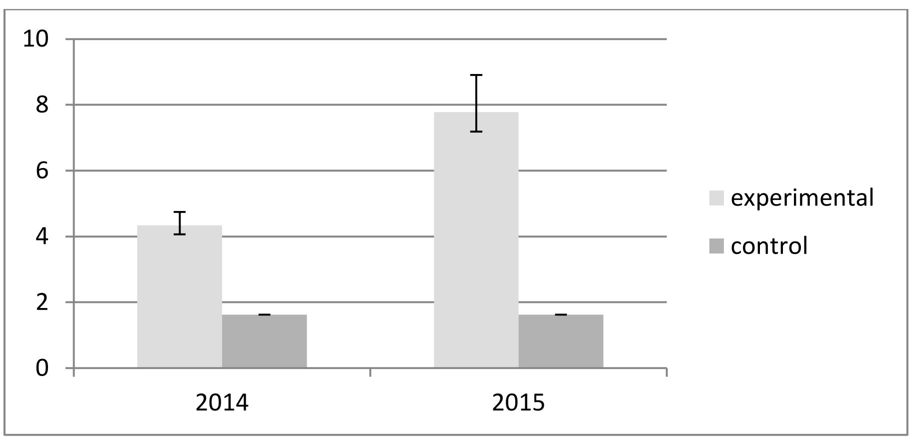

Figure 24. NJ ASK Twilight 7th Grade Language Arts.

Science. When comparing the 2013 to the 2014 science scores, the experimental group had average difference of 4.8. The average difference in control subjects is 1.5. After a one-tailed T test, the P Value was 4.5E-04. When comparing the 2013 to the

2015 science scores, the experimental group had an average difference of 7.8. The difference in control subjects was 1.4. After a one-tailed T test, the P Value was 2.0E-04 (Table 37; Figure 25). The control group's average difference decreased 0.1 from 2014 to 2015 meaning they decreased in their test scores as a whole. The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of seventh grade students.

Table 37

NJ ASK Twilight 7th Grade Science

Student Group	**Science Baseline 2013/NJ ASK 2014**	**Science Baseline 2013/NJ ASK 2015**
Grade 7E (Composite)	1416/1457	1416/1484
Grade 7E (Point Difference)	+41	+68
Grade 7E (Average Difference)	+4.8	+7.8
Grade 7C (Composite)	1343/1355	1343/1354
Grade 7C (Point Difference)	+12	+11
Grade 7C (Average Difference)	+1.5	+1.4

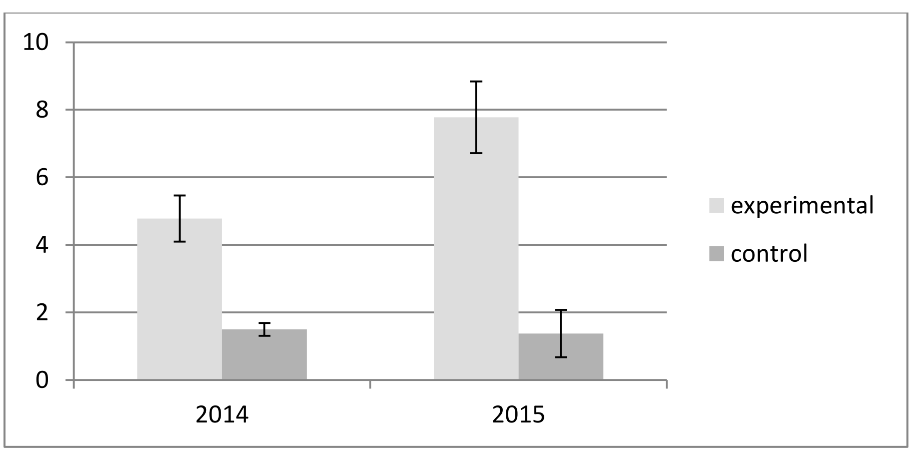

Figure 25. NJ ASK Twilight 7th Grade Science.

Mathematics. When comparing the 2013 to the 2014 mathematics scores, the experimental group had an average difference of 4.7. The average difference in control subjects was 1.5. After a one-tailed T test, the P Value was 7.10E-06. When comparing the 2013 to the 2015 mathematics scores, the experimental group had an average difference of 8.6. The difference in control subjects was 0.63. After a one-tailed T test, the P Value is 1.54E-05 (Table 38; Figure 26). The control group's average difference decreased 0.87 from 2014 to 2015 meaning they decreased in their test scores as a whole. The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of seventh grade students.

Table 38

NJ ASK Twilight 7th Grade Mathematics

Student Group	**Math Baseline 2013/NJ ASK 2014**	**Math Baseline 2013/NJ ASK 2015**
Grade 7E (Composite)	1411/1451	1411/1485
Grade 7E (Point Difference)	+40	+74
Grade 7E (Average Difference)	+4.7	+8.6
Grade 7C (Composite)	1330/1342	1330/1335
Grade 7C (Point Difference)	+12	+5
Grade 7C (Average Difference)	+1.5	+0.63

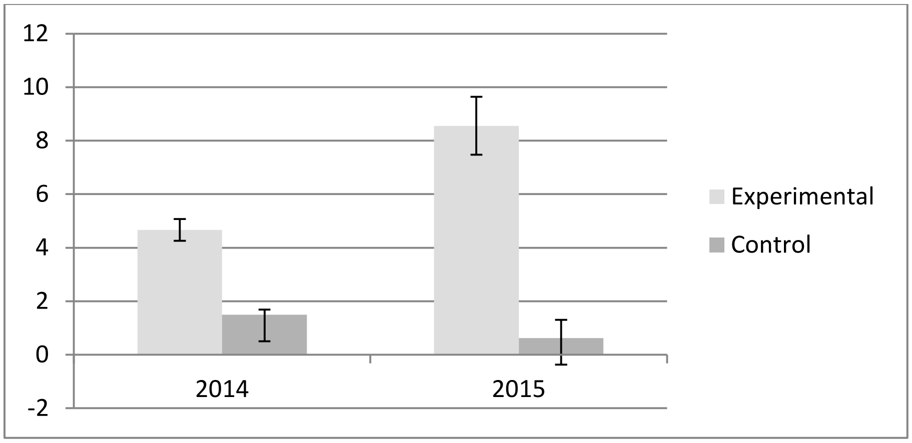

Figure 26. NJ ASK Twilight 7th Grade Mathematics.

Fourth Grade Zero NJ ASK Scores

Language arts. When comparing the 2013 to the 2014 language arts scores, the experimental group had an average difference of 3.8. The average difference in control subjects was 3.0 After a one-tailed T test, the P Value was 2.8E-04. When comparing the 2013 to the 2015 language arts scores, the experimental group had a difference of 6.9. The average difference in control subjects was 4.9. After a one-tailed T test, the P Value was 1.17E-05 (Table 39; Figure 27). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fourth grade students.

Table 39

NJ ASK Zero 4th Grade Language Arts

Student Group	**LA Baseline 2013/NJ ASK 2014**	**LA Baseline 2013/NJ ASK 2015**
Grade 4E (Composite)	966/992	966/1017
Grade 4E (Point Difference)	+26	+51
Grade 4E (Average Difference)	+3.8	+6.9
Grade 4C (Composite)	973/982	973/985
Grade 4C (Point Difference)	+9	+12
Grade 4C (Average Difference)	+3.0	+4.9

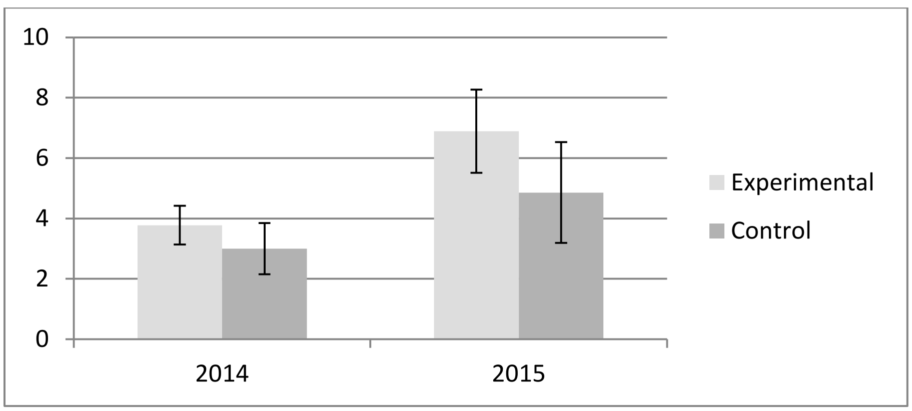

Figure 27. NJ ASK Zero 4th Grade Language Arts.

Science. When comparing the 2013 to the 2014 science scores, the experimental group had an average difference of 4.0. The average difference in control subjects was 2.0. After a one-tailed T test, the P Value was 2.9E-03. When comparing the 2013 to the 2015 science scores, the experimental group had a difference of 7.7. The difference in control subjects was 3.2. After a one-tailed T test, the P Value was 8.09E-06 (Table 40; Figure 28). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fourth grade students.

Table 40

NJ ASK Zero 4th Grade Science

Student Group	Science Baseline 2013/NJ ASK 2014	Science Baseline 2013/NJ ASK 2015
Grade 4E (Composite)	973/1002	973/1030
Grade 4E (Point Difference)	+29	+57
Grade 4E (Average Difference)	+4.0	+7.7
Grade 4C (Composite)	977/987	977/993
Grade 4C (Point Difference)	+10	+16
Grade 4C (Average Difference)	+2.0	+3.2

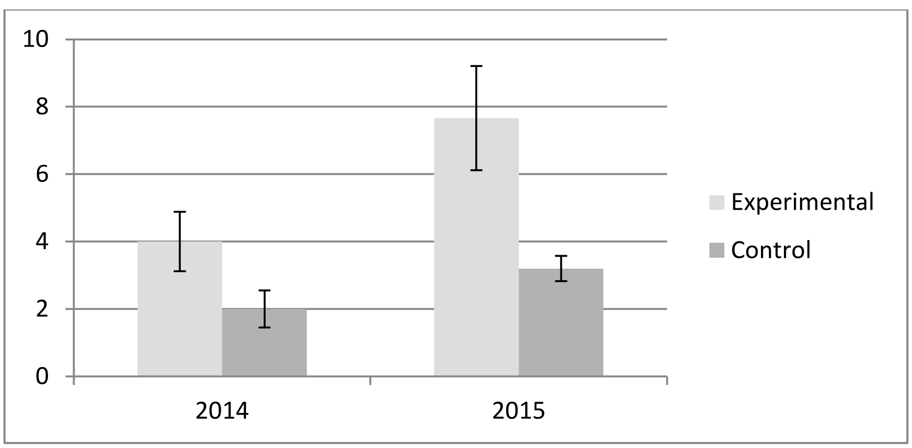

Figure 28. NJ ASK Zero 4th Grade Science.

Mathematics. When comparing the 2013 to the 2014 mathematics scores, the experimental group had an average difference of 3.0. The average difference in control subjects was 2.0. After a one-tailed T test, the P Value was 8.7E-02. When comparing the 2013 to the 2015 mathematics scores, the experimental group had an average difference of 6.8. The difference in control subjects was 3.2. After a one-tailed T test, the P Value was 7.28E-05 (Table 41; Figure 29). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fourth grade students.

Table 41

NJ ASK Zero 4th Grade Mathematics

Student Group	**Math Baseline 2013/NJ ASK 2014**	**Math Baseline 2013/NJ ASK 2015**
Grade 4E (Composite)	975/995	975/1023
Grade 4E (Point Difference)	+20	+48
Grade 4E (Average Difference)	+3.0	+6.8
Grade 4C (Composite)	967/977	967/983
Grade 4C (Point Difference)	+10	+16
Grade 4C (Average Difference)	+2.0	+3.2

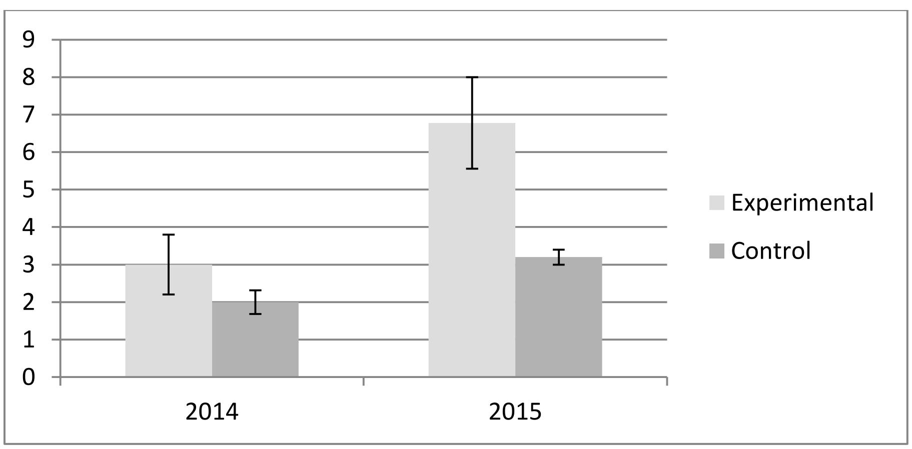

Figure 29. NJ ASK Zero 4th Grade Mathematics.

Fifth Grade Zero NJ ASK Scores

Language arts. When comparing the 2013 to the 2014 language arts scores, the experimental group had an average difference of 4.0. The average difference in control subjects was 2.3. After a one-tailed T test, the P Value was 7.39E-05. When comparing the 2013 to the 2015 language arts scores, the experimental group had an average difference of 7.4. The difference in control subjects was 3.3. After a one-tailed T test, the P Value was 1.41E-05 (Table 42; Figure 30). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fifth grade students.

Table 42

NJ ASK Zero 5th Grade Language Arts

Student Group	LA Baseline 2013/NJ ASK 2014	LA Baseline 2013/NJ ASK 2015
Grade 5E (Composite)	1164/1192	1164/1220
Grade 5E (Point Difference)	+28	+56
Grade 5E (Average Difference)	+4.0	+7.4
Grade 5C (Composite)	1160/1174	1160/1180
Grade 5C (Point Difference)	+14	+20
Grade 5C (Average Difference)	+2.3	+3.3

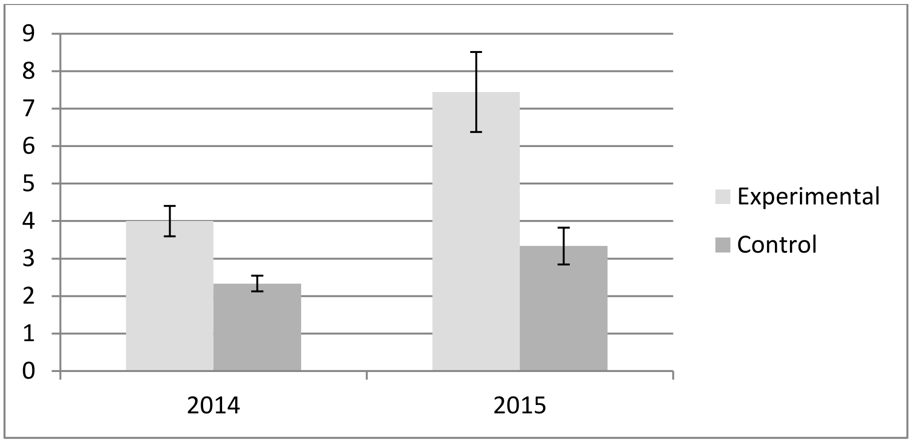

Figure 30. NJ ASK Zero 5th Grade Language Arts.

Science. When comparing the 2013 to the 2014 science scores, the experimental group had an average difference of 3.6. The average difference in control subjects was 1.7. After a one-tailed T test, the P Value was 4.8E-04. When comparing the 2013 to the 2015 science scores, the experimental group had an average difference of 7.1. The average difference in control subjects was 2.5. After a one-tailed T test, the P Value was 9.44E-06 (Table 43; Figure 31). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fifth grade students.

Table 43

NJ ASK Zero 5th Grade Science

Student Group	Science Baseline 2013/NJ ASK 2014	Science Baseline 2013/NJ ASK 2015
Grade 5E (Composite)	1156/1185	1156/1214
Grade 5E (Point Difference)	+29	+58
Grade 5E (Average Difference)	+3.6	+7.1
Grade 5C (Composite)	1174/1184	1174/1189
Grade 5C (Point Difference)	+10	+15
Grade 5C (Average Difference)	+1.7	+2.5

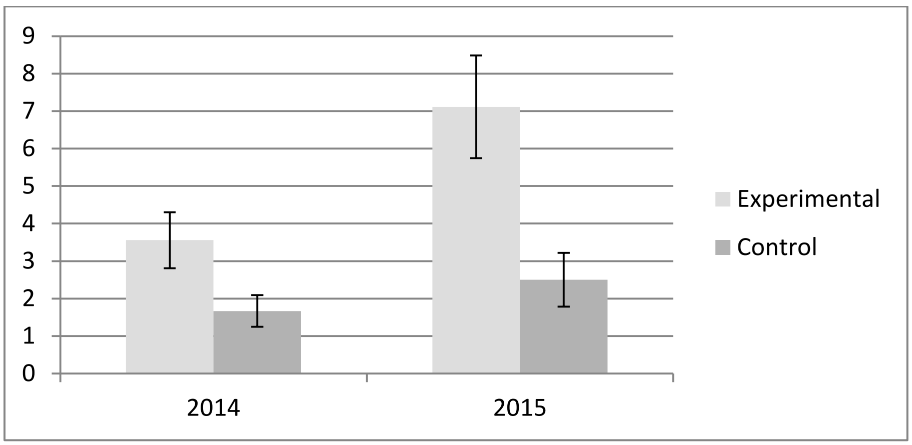

Figure 31. NJ ASK Zero 5th Grade Science.

Mathematics. When comparing the 2013 to the 2014 mathematics scores, the experimental group had an average difference of 4.0. The average difference in control subjects was 1.5. After a one-tailed T test, the P Value was 1.86E-05. When comparing the 2013 to the 2015 mathematics scores, the experimental group had an average difference of 7.3. The average difference in control subjects is 2.2. After a one-tailed T test, the P Value was 5.69E-06 (Table 44; Figure 32). The results reveal small significance, which can be interpreted that writing to learn strategies correlated with the improvement of standardized test scores of fifth grade students.

Table 44

NJ ASK Zero 5th Grade Mathematics

Student Group	Math Baseline 2013/NJ ASK 2014	Math Baseline 2013/NJ ASK 2015
Grade 5E (Composite)	1170/1200	1170/1228
Grade 5E (Point Difference)	+30	+58
Grade 5E (Average Difference)	+4.0	+7.3
Grade 5C (Composite)	1158/1167	1158/1171
Grade 5C (Point Difference)	+9	+13
Grade 5C (Average Difference)	+1.5	+2.2

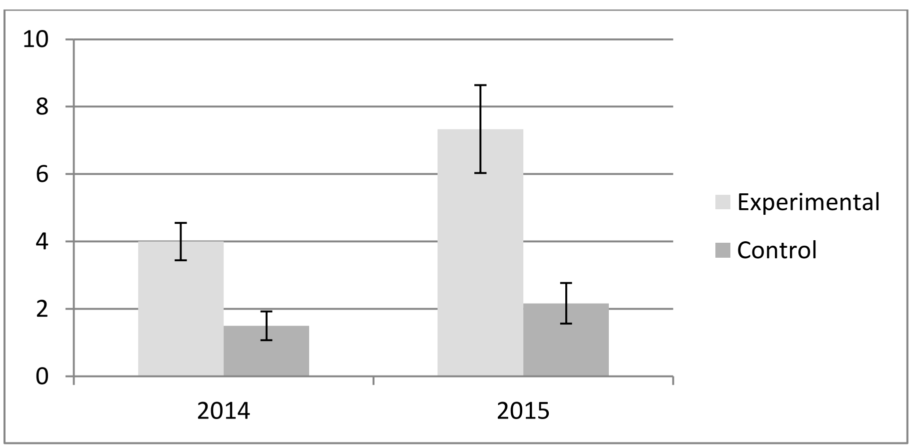

Figure 32. NJ ASK Zero 5th Grade Mathematics.

NJ ASK Summary

Twilight period. The data for the twilight period shows a great variation amongst the experimental and control groups. There is a significant variation in the score averages from 2013 to 2014, however there is much greater significance in the variation of the scores from 2013 to 2015. Results are significant in comparison of the experimental and control groups showing writing to learn strategies enhanced student standardized test performance.

Zero period. The data for the zero period is more comparable for the experimental and control groups. The experimental and control differences are more analogous in these graphs, due to the similarities in pre and post-test assessments offered to the experimental and control groups. The test scores vary greatly from the twilight period due to the decreased amount of time offered in the zero period. Although there was an increased growth comparing scores of 2013-2014 to 2013-2015, as growth was measured over a two year period and more writing to learn strategies were offered to students. There was less growth in the zero period in comparison with the twilight period due to decreased writing to earn strategies offered in the zero period due to less time allotted for this particular remediation. The zero period was only 30 minutes compared to 90 minutes offered in the twilight period.

Quantitative Data Analysis PARCC

PARCC data will be analyzed comparing the initial PARCC Pre-Test scores to the 2015 PARCC Standardized Test scores. Tables and graphs reported composite scores and differences in points and averages amongst the students in experimental and control groups. Scores were compared utilizing the one-tailed T test and P value, which provided the significance of the impact of the writing to learn strategies on PARCC standardized test scores.

Fourth Grade Twilight PARCC Scores

Language arts. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had a difference of 0.56. The difference in control subjects is 0.2. After a one-tailed T test, the P Value is 1.07E-01 (Table 45; Figure 33). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 45

PARCC Twilight 4th Grade Language Arts

Student Group	**LA Sim Exam 1/Sim Exam 5**	**LA Sim Exam 1/PARCC 2015**
Grade 4E (Composite)	5/9	5/9
Grade 4E (Point Difference)	+4	+5
Grade 4E (Average Difference)	+0.44	+0.56
Grade 4C (Composite)	5/5	5/6
Grade 4C (Point Difference)	0	+1
Grade 4C (Average Difference)	0	+0.2

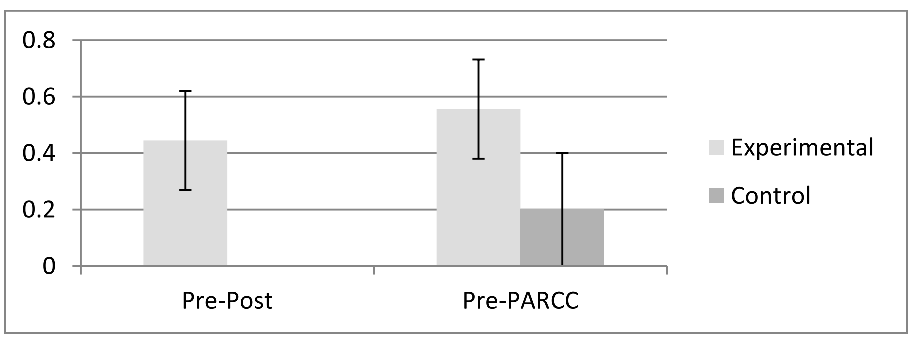

Figure 33. PARCC Twilight 4th Grade Language Arts.

Mathematics. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an experimental difference of 0.56. The difference in control subjects is 0.4. After a one-tailed T test, the P Value is 3.23E-01 (Table 46; Figure 34). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 46

PARCC Twilight 4th Grade Mathematics

Student Group	**Math Sim Exam 1/Sim Exam 5**	**Math Sim Exam 1/PARCC 2015**
Grade 4E (Composite)	5/7	5/9
Grade 4E (Point Difference)	+2	+4
Grade 4E (Average Difference)	+0.33	+0.56
Grade 4C (Composite)	5/6	5/6
Grade 4C (Point Difference)	+1	+1
Grade 4C (Average Difference)	+0.20	+0.20

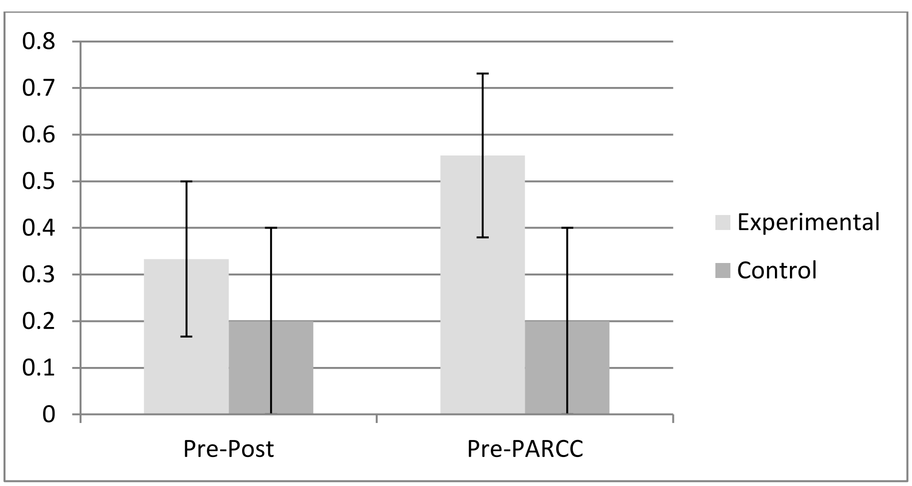

Figure 34. PARCC Twilight 4th Grade Mathematics.

Fifth Grade Twilight PARCC Scores

Language arts. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 0.67. The average difference in control subjects is 0. After a one-tailed T test, the P Value was 3.23E-01 (Table 47; Figure 35). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 47

PARCC Twilight 5th Grade Language Arts

Student Group	LA Sim Exam 1/Sim Exam 5	LA Sim Exam 1/PARCC 2015
Grade 5E (Composite)	5/8	5/9
Grade 5E (Point Difference)	+3	+4
Grade 5E (Average Difference)	+0.33	+0.44
Grade 5C (Composite)	5/5	5/5
Grade 5C (Point Difference)	0	0
Grade 5C (Average Difference)	0	0

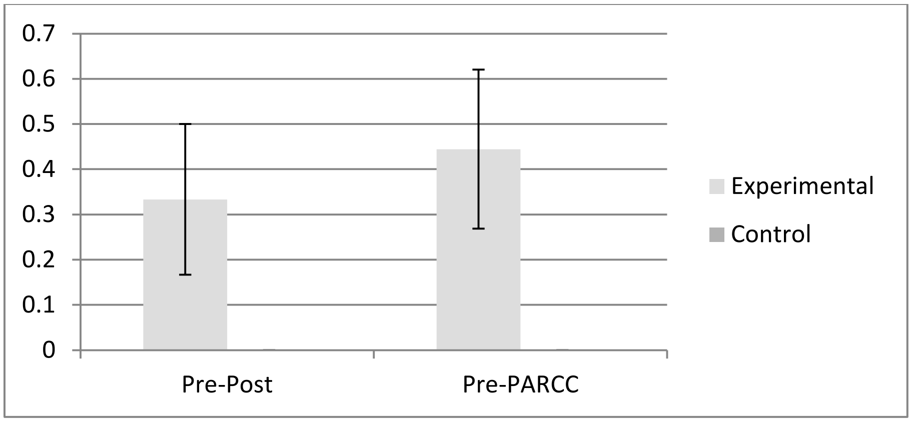

Figure 35. PARCC Twilight 5th Grade Language Arts.

Mathematics. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 0.56. The difference in control subjects was 0. After a one-tailed T test, the P Value is 3.09E-02 (Table 48; Figure 36). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 48

PARCC Twilight 5th Grade Mathematics

Student Group	Math Sim Exam 1/Sim Exam 5	Math Sim Exam 1/PARCC 2015
Grade 5E (Composite)	5/6	5/8
Grade 5E (Point Difference)	+1	+3
Grade 5E (Average Difference)	+0.11	+0.56
Grade 5C (Composite)	5/5	5/5
Grade 5C (Point Difference)	0	0
Grade 5C (Average Difference)	0	0

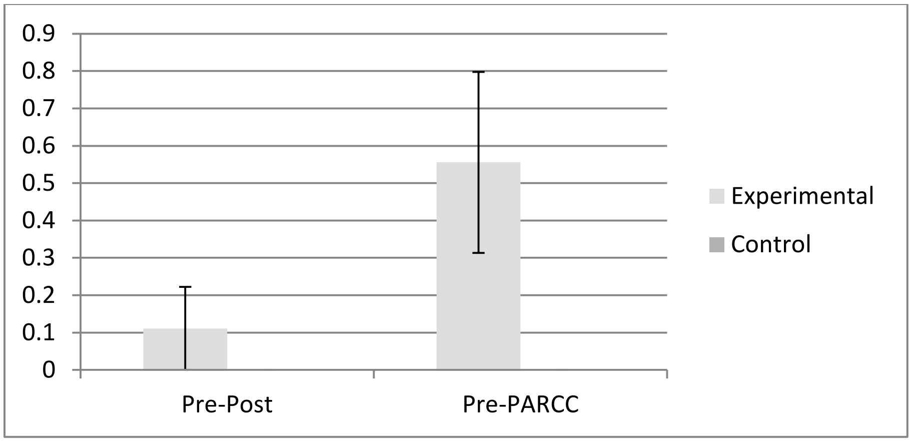

Figure 36. PARCC Twilight 5th Grade Mathematics.

Sixth Grade Twilight PARCC Scores

Language arts. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 1.0. The difference in control subjects is 0.11. After a one-tailed T test, the P Value was 2.5E-01 (Table 49; Figure 37). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 49

PARCC Twilight 6th Grade Language Arts

Student Group	**LA Sim Exam 1/Sim Exam 5**	**LA Sim Exam 1/PARCC 2015**
Grade 6E (Composite)	9/13	9/16
Grade 6E (Point Difference)	+4	+7
Grade 6E (Average Difference)	+0.44	+1.0
Grade 6C (Composite)	9/10	9/10
Grade 6C (Point Difference)	+1	+1
Grade 6C (Average Difference)	+0.11	+0.11

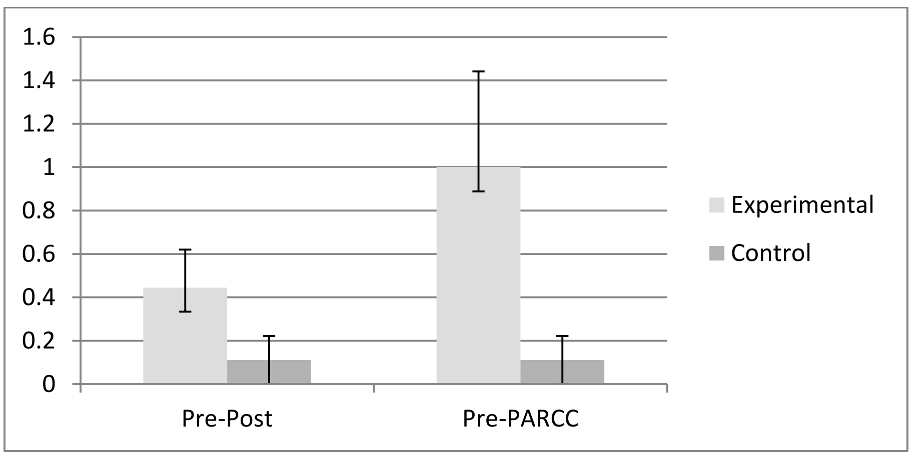

Figure 37. PARCC Twilight 6th Grade Language Arts.

Mathematics. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 1.22. The average difference in control subjects was 0.11. After a one-tailed T test, the P Value is 2.3E-01 (Table 50; Figure 38). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 50

PARCC Twilight 6th Grade Mathematics

Student Group	Math Sim Exam 1/Sim Exam 5	Math Sim Exam 1/PARCC 2015
Grade 6E (Composite)	9/15	9/16
Grade 6E (Point Difference)	+6	+7
Grade 6E (Average Difference)	+0.67	+1.22
Grade 6C (Composite)	9/10	9/10
Grade 6C (Point Difference)	+1	+1
Grade 6C (Average Difference)	+0.11	+0.11

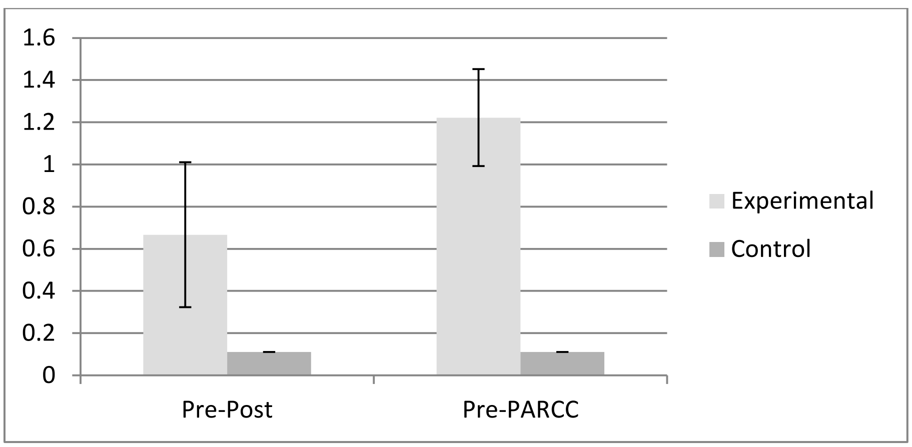

Figure 38. PARCC Twilight 6th Grade Mathematics.

Seventh Grade Twilight PARCC Scores

Language arts. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 1.0. The average difference in control subjects is 0.13. After a one-tailed T test, the P Value is 9.6E-02 (Table 51; Figure 39). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 51

PARCC Twilight 7th Grade Language Arts

Student Group	LA Sim Exam 1/Sim Exam 5	LA Sim Exam 1/PARCC 2015
Grade 7E (Composite)	8/10	8/11
Grade 7E (Point Difference)	+2	+3
Grade 7E (Average Difference)	+0.22	+1.0
Grade 7C (Composite)	8/8	8/9
Grade 7C (Point Difference)	0	+1
Grade 7C (Average Difference)	0	+0.13

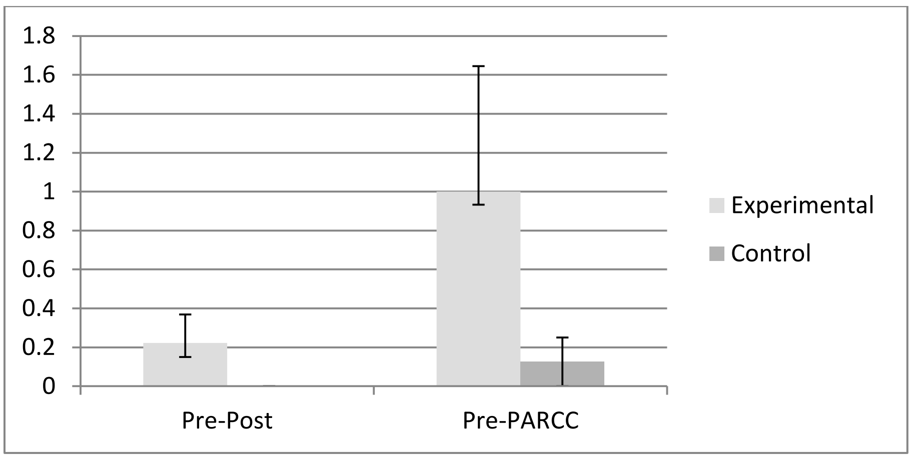

Figure 39. PARCC Twilight 7th Grade Language Arts.

Mathematics. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 1.3. The average difference in control subjects is 0.25. After a one-tailed T test, the P Value is 7.9E-02 (Table 52; Figure 40). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 52

PARCC Twilight 7th Grade Mathematics

Student Group	Math Sim Exam 1/Sim Exam 5	Math Sim Exam 1/PARCC 2015
Grade 7E (Composite)	8/12	8/13
Grade 7E (Point Difference)	+4	+5
Grade 7E (Average Difference)	+0.44	+1.3
Grade 7C (Composite)	8/9	8/10
Grade 7C (Point Difference)	+1	+2
Grade 7C (Average Difference)	+0.13	+0.25

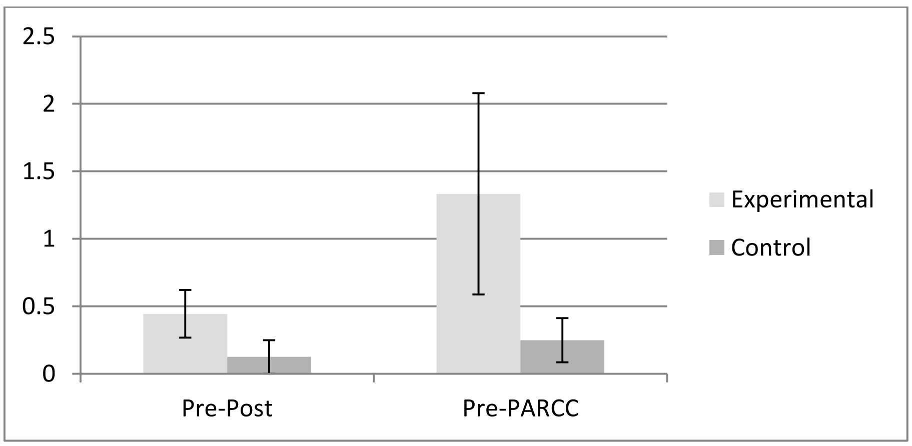

Figure 40. PARCC Twilight 7th Grade Mathematics.

Fourth Grade Zero PARCC Scores

Language arts. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 0.33. The difference in control subjects is 0. After a one-tailed T test, the P Value was 5.57E-02 (Table 53; Figure 41). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 53

PARCC Zero 4th Grade Language Arts

Student Group	LA Sim Exam 1/Sim Exam 5	LA Sim Exam 1/PARCC 2015
Grade 4E (Composite)	5/7	5/8
Grade 4E (Point Difference)	+2	+3
Grade 4E (Average Difference)	+0.22	+0.33
Grade 4C (Composite)	5/5	5/5
Grade 4C (Point Difference)	0	0
Grade 4C (Average Difference)	0	0

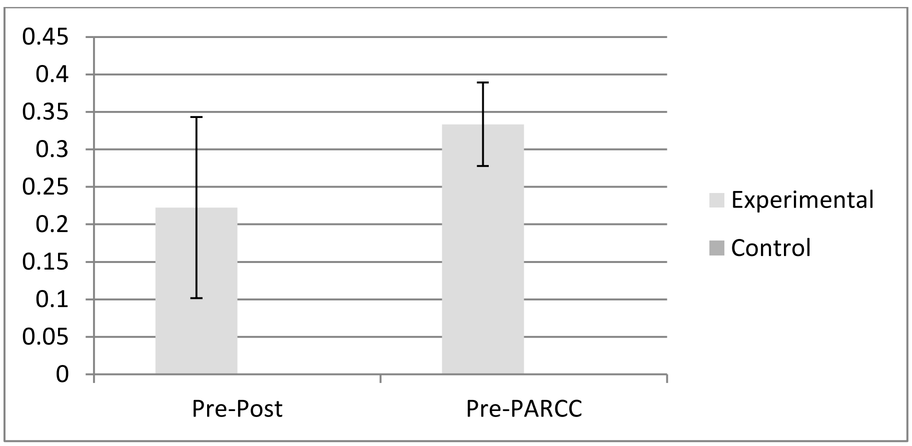

Figure 41. PARCC Zero 4th Grade Language Arts.

Mathematics. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 0.33. The average difference in control subjects was 0.20. After a one-tailed T test, the P Value was 3.04E-01 (Table 54; Figure 42). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 54

PARCC Zero 4th Grade Mathematics

Student Group	**Math Sim Exam 1/Sim Exam 5**	**Math Sim Exam 1/PARCC 2015**
Grade 4E (Composite)	5/6	5/7
Grade 4E (Point Difference)	+1	+2
Grade 4E (Average Difference)	+0.2	+0.33
Grade 4C (Composite)	5/6	5/6
Grade 4C (Point Difference)	+1	+1
Grade 4C (Average Difference)	0.2	0.2

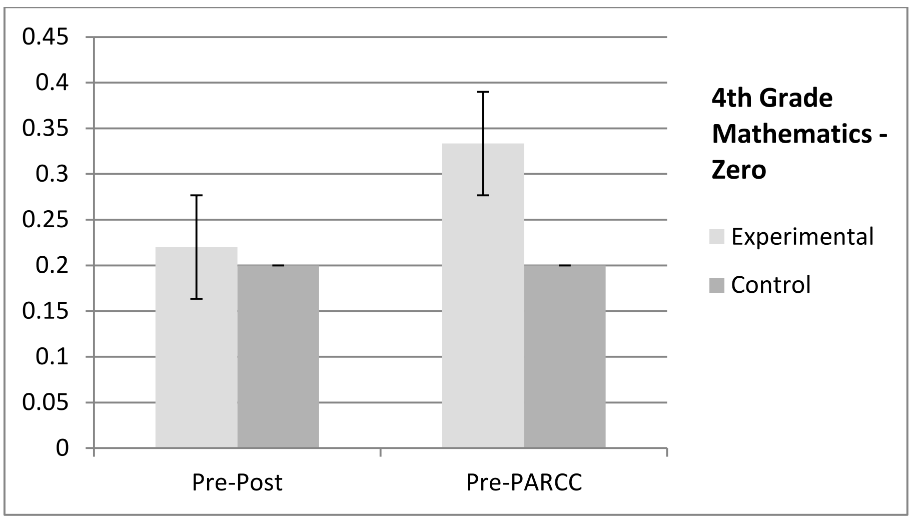

Figure 42. PARCC Zero 4th Grade Mathematics.

Fifth Grade Zero PARCC Scores

Language arts. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had an average difference of 0.44. The difference in control subjects was 0.16. After a one-tailed T test, the P Value is 2.46E-01 (Table 55; Figure 43). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 55

PARCC Zero 5th Grade Language Arts

Student Group	**LA Sim Exam 1/Sim Exam 5**	**LA Sim Exam 1/PARCC 2015**
Grade 5E (Composite)	6/9	6/10
Grade 5E (Point Difference)	+1	+2
Grade 5E (Average Difference)	+0.33	+0.44
Grade 5C (Composite)	6/7	6/7
Grade 5C (Point Difference)	+1	+1
Grade 5C (Average Difference)	0.16	0.16

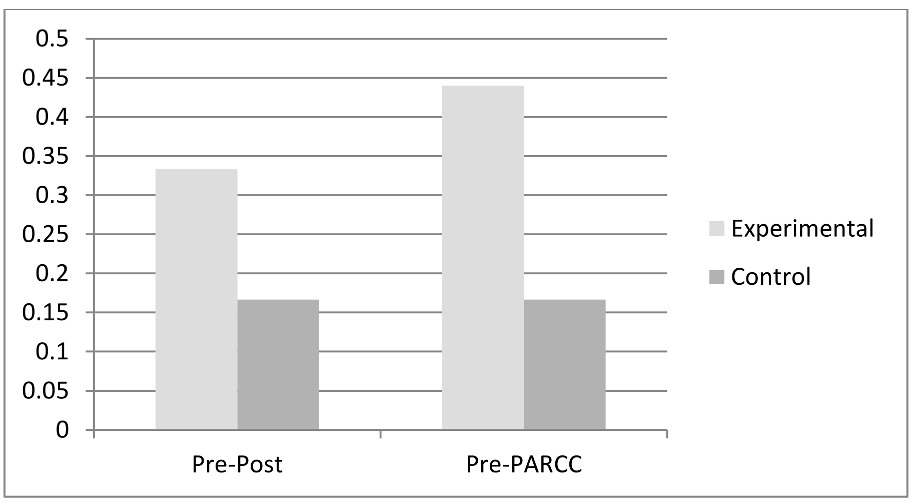

Figure 43. PARCC Zero 5th Grade Language Arts.

Mathematics. When comparing the PARCC pre-test scores to PARCC standardized test scores for language arts, the experimental group had a difference of 0.44. The difference in control subjects was 0.16. After a one-tailed T test, the P Value was 2.46E-01 (Table 56; Figure 44). The small significance of the P Value suggests that there was a correlation between writing to learn strategies and improvement of students' standardized test scores.

Table 56

PARCC Zero 5th Grade Mathematics

Student Group	**Math Sim Exam 1/Sim Exam 5**	**Math Sim Exam 1/PARCC 2015**
Grade 5E (Composite)	6/9	6/10
Grade 5E (Point Difference)	+1	+2
Grade 5E (Average Difference)	+0.33	+0.44
Grade 5C (Composite)	6/7	6/7
Grade 5C (Point Difference)	+1	+1
Grade 5C (Average Difference)	0.16	0.16

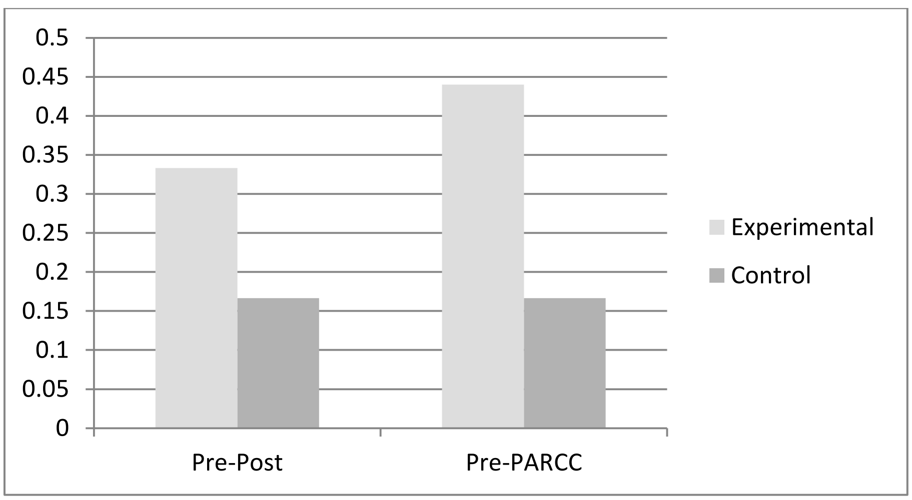

Figure 44. PARCC Zero 5th Grade Mathematics.

PARCC Summary

Twilight period. Similar to the data for the NJ ASK, the data for the twilight period shows a variation amongst the experimental and control groups. There is a variation in the score averages from the initial PARCC pre-test scores to the PARCC standardized exam taken on May 2015. The P Values obtained suggest a correlation between writing to learn strategies and improvement standardized test scores for students. However, the variation amongst PARCC scores is not as significant as the NJ ASK scores, which produced less significant P Values.

Zero period. The data for the zero period is reflects the data for the twilight period for PARCC testing. Due to the 30 minute time limit of the zero period remediation, certain students

reported no growth in pre and post-testing. Twilight remediation was 90 minutes allowing for writing to learn strategies for students, producing more statistical growth for students than zero period.

Discussion

Five themes arose from the qualitative data collected. The themes were (1) impact on critical thinking skills, (2) greatest challenges, (3) effectiveness of writing to learn strategies, (4) culture of learning, and (5) recommendations. Observations were collected along with field notes of writing to learn strategies. Teacher participants of the writing to learn strategies were required to complete interview questions designed to collect information regarding their perceptions of the writing to learn strategies and its impact on standardized testing performance.

Impact on critical thinking skills. Subjects realized that writing to learn strategies enhanced their ability to think about questions differently which led to them being more comfortable with the material. K.V. stated "one thing the writing to learn strategies has helped with is the students problem solve and think more critically about answers to questions" (personal communication, May 18, 2014). Interviews held in focus groups indicate that teachers believe that there is strength in the writing to learn strategies that enhance critical and analytical thinking skills of students. J.W. pointed out "my students think differently about answers to questions after they read a passage, they are more critical and analytical" (personal communication, March 12, 2015). Results indicate that writing to learn strategies impacted critical thinking skills of students in all subject areas, however most instructors believed that the most growth was seen in mathematics. K.V. stated "students think more analytically about answering questions, especially in mathematics. They are more critical of their answers and are not as quick to hand in their work" (personal communication, February 11, 2015). The study showed that completing the tasks embedded within the writing to learn strategies increased students' analytical and critical thinking skills (Silver, 2010; Zinsser, 1988). Writing to learn strategies have a direct effect on critical thinking skills and improved student learning.

More to the point, results from a study performed by Kurtz and Quitadamo (2007) indicated that students within a experimental group that received writing strategies considerably improved their critical thinking skills while the control group that did not receive writing strategies did not improve their critical thinking skills.

Greatest challenges. The interview questionnaire (Appendix A) consisted of twelve questions designed to uncover the teacher's perceptions regarding the greatest challenge presented in writing to learn strategies, what was learned by the students and instructors with the use of the strategies, and what perceived impact writing to learn strategies had on critical thinking, standardized test taking performance and pedagogy style. Interview results from the instructors indicated that writing to learn strategies had a greater impact on the NJ ASK than the PARCC exam. Instructors believed that the PARCC exam material was too difficult for the students and although the writing to learn strategies were beneficial, the test contained more material and presented it in a fashion in which the students were not familiar. E.S. stated "all the kids are more comfortable with the NJ ASK, they don't like working on the PARCC, they are more use to the NJ ASK" (personal communication, March 19, 2014). The students were used to the material on the NJ ASK and how the material was presented, therefore writing to learn strategies had a greater impact. Regarding technology, faculty observed students needing additional assistance with the PARCC as it is a completely computer based exam. This slowed the growth process using wring to learn strategies as students spent a portion of their time learning to navigate the exam as they were unfamiliar with the technical components associated with the test. Writing to learn strategies seemed to benefit the NJ ASK to a greater degree as it is a paper based exam and students did not need to learn more technology concepts to navigate the test. In an observation that took place on February 10, 2014, I noticed students struggling with the PARCC practice material using I READY technology. Student voiced their disinterest and wanted to switch to the NJ

ASK material because the difficult the PARCC material was far too challenging (R. Tarchichi, observation, February 10, 2014).

Effectiveness of writing to learn strategies. Additionally the questionnaire asked instructors to describe the effectiveness of writing to learn strategies for different grade levels, the subject area that wring to learn strategies had the greatest influence on, and which standardized exam, the NJ ASK or PARCC, was most impacted by the writing to learn strategies. Results indicate that instructors believe that the most effective writing to learn strategies in the fourth and fifth grade students were summary responses and concept metaphors. C.S. stated "summary responses are the easiest writing to learn strategy for the fourth and fifth grade students because they sum up the main idea of their reading and when we go over it they can see in the text why they were right or wrong" (personal communication, May 4, 2015). This was believed because in the curriculum for these primary grades, student activities include summary responses and students a sense of familiarity with this concept, which led to increased growth. In addition, the pacing guide of the curriculum introduced metaphors allowing students to grow in this writing to learn strategy though previously introduced concepts. K.V. stated "students in the fourth and fifth grade really enjoyed concept metaphors because it helped them describe the main impression the author was creating in the passage" (personal communication, May 12, 2015).

Results indicate the most effective writing to learn strategy for sixth and seventh grade students was dialectical notebooks. This is because of the dissection of the strategy. Students create two columns during this activity where the first column is text recorded from the lesson and the second column is for response where students record questions or comments that enable students to analyze the text along with develop critical thinking skills for that particular subject area or lesson. As stated in chapter five, C.S. pointed out “growth in sixth grade student post-test scores were mainly due to writing strategies such as prewriting, writing notebooks and dialectical note taking” (personal communication, March 20, 2014), growth is shown in Table 5.6. Also stated in chapter five, C.S. pointed out that "writing to learn activities like writing notebooks and dialectical notebooks made group work successful in the remediation periods" (personal communication, May 9, 2013). Instructor comments centered on the data that indicated student scores in experimental groups increased more exponentially than the scores of students in the control group. Overall, teacher comments indicate writing to learn strategies could be used as a practical means to increase scores on standardized exams if these strategies are infused within the pacing guide of a curriculum. C.S. pointed out “the experimental group of students have definitely shown more growth in their test scores due to the writing to learn strategies” (personal communication, April 23, 2015). Interview questioning procedures for teacher participants were delicate in order to obtain data that is accurate and not embedded with obscure conclusions or analysis. Stringer (2014) points out that "questioning procedures are very delicate because participants are likely to react negatively if there is an implied judgment or criticism embedded in the question (p.107). Interview questions consisted of a constant comparison approach, where data from semi structured interviews were held with five teachers were analyzed (Stringer, 2014).

Secondary growth was seen in language arts and tertiary growth was seen in science. Instructors feel that science saw the least amount of growth because as a whole, less time was spent on science. J.W. pointed out “students are definitely more focused on math and language arts, they care more about the subjects and ask more questions pertaining to them, and they do not really have an interest in learning science” (personal communication, May14, 2015). However, more language arts writing to learn strategies were implemented than mathematics, students as a whole seemed to grasp the mathematics concepts more quickly and were more comfortable with that material. Four out of five teachers believed that the grade level writing to learn strategies had the greatest influence on was sixth grade. C.S. pointed out “sixth grade students are getting the most out of writing to learn strategies in all subjects, but especially in math. They like trying the strategies” (personal communication, January 22, 2015). The reasoning stemmed around the fact that students were able to grasp the writing to learn strategy at a quicker pace than the primary students and seventh grade had less of an interest in the strategies than the sixth grade students. Sixth grade students were more willing to accept assistance and seventh grade students seemed to be more independent learners. One teacher believed that the grade level writing to learn strategies had the greatest influence on was fourth grade because they were more "teachable" and as students increased in their grade level they were less willing to accept new learning strategies. J.W. stated “the fourth grade students are the most teachable students in either the control or experimental groups, so they will try any strategy and not ask why” (personal communication, May 4, 2015).

Culture of learning. The culture of the school district was impacted by the writing to learn strategies in regard to teacher pedagogy through peer communication. Teachers reported in interviews that when a writing to learn strategy was introduced and successful, teachers shared the strategy in collaboration with other teachers and those teachers then tried to implement those strategies in their classrooms. Collaboration then amplified further as teachers included writing to learn strategies in professional developments, which increased communication in the building with teachers. C.S. stated "the collaboration helps us to fine tune the writing to learn strategy which makes students learn more efficiently. We can then try the strategy in creative ways" (personal communication, September 24, 2014). One teacher reported that instructors asked their paraprofessionals to include writing to learn strategies in their "do now" assignments offered to students in the first five minutes of every class. K.V. pointed out "both I and my educational assistant begin our classes with a writing to learn strategy now" (personal communication, November 6, 2014). Overall, teachers believed that writing to learn strategies had a positive impact on the culture of the school district due to increased collaboration amongst the teachers. More to the point, instructors believe that writing to learn strategies impacted the five teachers as educators by assisting them in pedagogy practices which enhanced not only the manner in which they present their curriculum, but it also assisted in the pacing guide of the curriculum. For instance, one teacher pointed out that writing to learn strategies allowed students to understand concepts faster, which enhanced the time needed on a particular topic, this enabled the instructor to spend more time on the topical area which further increased student understanding. J.W. stated "my kids are learning specific topics faster using the writing to learn strategies allowing me to spend more time on specifics within a concept" (personal communication, May 7, 2014). In general, this has helped the teachers' pedagogy style because it allowed for more classroom pedagogy techniques that were successful in enhancing student critical thinking ability and performance.

Recommendations. The recommendations teachers made in enhancing writing to learn strategies in the school district are to introduce the concepts in a school wide professional development, and incorporate the strategies within the curriculum. In addition, teachers' believed that the successes and failures amongst grade levels should be discussed in monthly professional learning communities to discuss the potential of writing to learn strategies incorporation into daily pedagogy. According to the five instructors, the greatest challenges in implementing the writing to learn strategies were creating a bridge between these strategies and the PARCC exam, mainly because students have never taken the PARCC exam before as a state standardized exam. Teachers reported that the strategies were beneficial; however, closing the technology gap that existed in the PARCC exam was very difficult for students. Teachers believe that due to the novelty of the PARCC exam, writing to learn strategies and its impact on the PARCC presents an opportunity for further study, and should be explored in more detail in future research. The greatest successes in implementing writing to learn strategies were the correlation the students made between the strategies and the NJ ASK exam. Teachers reported the experimental group post-tests grew incredibly compared to the control group due to the direct correlation of writing to learn strategies and information presented on the NJ ASK. J.W. pointed out “the writing to learn strategies area helping the students develop academically in the subject areas but they are not comfortable with the PARCC exam, the strategies seem more beneficial to the NJ ASK” (personal communication, March 12, 2014). Teachers reported that due to the style of the exam, being paper/pencil based, there was a direct correlation in writing to learn strategies.

In addition to the themes, the four main categories that emerged from the qualitative data were collaboration amongst teachers, standardized test preference for writing to learn strategies, subject area most impacted by writing to learn strategies and grade most impacted by the writing to learn strategies. The findings highlighted the importance of writing to learns strategy's effect building culture and teacher collaboration, the greater impact of these strategies on the NJ ASK versus the PARCC, the positive effect of writing to lean strategies on all subject areas, especially mathematics, and finally the majority consensus amongst teachers that writing to learn had the greatest impact on the sixth grade students.

Conclusion

Quantitative data was collected using the state exams and simulated assessments made by educators in the Wood School District. The exams were used as a pre and post-test instruments for all subjects, both the experimental and control group, however, the control group did not receive writing to learn strategies. Scores demonstrate that the experimental group scored higher overall than the control group in simulated NJ ASK Scores, PARCC simulated scores, the 2014 NJASK, the 2015 NJ ASK and the 2015 PARCC exam.

Qualitative data obtained from observational field notes and focus group interviews do appear to support quantitative data findings. These qualitative data findings indicate that writing to learn strategies were strongly associated with critical and analytical thinking skills. Teacher comments focused on writing to learn strategies and their direct impact on the change in analytical processing of mathematics, science and language arts content area, specifically reading comprehension critical thinking skills. Teachers believed that the writing to learn strategies helped students change their test taking approach along with an increase in subject matter and content area (Kurtz & Quitadamo, 2007). Teachers believed that the writing to learn strategies provided realistic pedagogy exercises that can be incorporated into the pacing guide of the curriculum. They recognized that writing to learn strategies can be useful as a teaching tool and as a method of preparation for standardized test taking. Due to limitations of the study, further research is recommended to determine if a true correlation does exist between writing to learn strategies and standardized test taking performance.

Chapter VII

Summary, Recommendations, Conclusion

Introduction

Writing to learn strategies can cause academic growth of students in all subject areas but has not been used comprehensively in standardized test preparation, especially the State of New Jersey. The impact of writing to learn strategies on high stakes testing is unrevealed and the purpose of this study was to use writing to learn strategies to improve proficiency on the NJ ASK and PARCC standardized test scores of students in the Wood School District. This study contained three phases which led to the findings. Cycle one was the initiation phase contained the early decision making of the experiment. Cycle one served to design the study where data was collected using the 2013 NJ ASK exam which was a baseline for grouping students. In addition, to the grouping of the students, teachers were selected and professional learning communities were created.

Cycle two was the transition phase where I, as the researcher, along with the teachers involved in the study realized that modifications were needed to obtain the desired outcome. Cycle two served as the implementation of the study where quantitative and qualitative data was collected over a two year period Cycle two also included writing to learn interventions and the ongoing work of the professional learning community. Quantitative data contained the NJ ASK and PARCC pre-test data and post-test data for both years of the study. Qualitative data included the views of the teachers of writing to learn strategies collected in focus group interviews in addition to observations collected throughout the study.

Cycle three was the integration phase of the study where I, as the researcher, along with the teachers involved in the study began to see the desired outcome or findings which were the results of our efforts (Creswell, 2013). Cycle three served to analyze quantitative (NJ ASK and PARCC) and qualitative data collected in this cycle. The quantitative data included the 2014 and 2015 NJ ASK exams, both in contrast to the 2013 NJ ASK baseline exam. Secondly, the data included the 2015 PARCC exam in comparison to the first PARCC simulated exam (pre-test). The qualitative data included teacher interviews, focus group interviews, and participant observation/field notes.

This chapter begins with a summary of the findings from the dissertation study. In the next section of theism chapter I provide answers to the research questions. I then provide a discussion of my conceptual framework and a reflection on my leadership philosophy. Additionally, I provide implications for future research, recommendations, a discussion of rigor and limitations, and finally a conclusion that wraps up this study.

Summary

Writing to learn strategies. The research study examined the impact that writing to learn strategies would have on high stakes standardized test performance of students in the Wood School District. The standardized assessments were the NJ ASK and PARCC exams. In this study, the performance of students was directly measured through student test scores (Bond, 1995; Green, 1995).

Although not the purpose of the study, my performance as the researcher and the administrator was indirectly measured as well because I trained the teachers on writing to learn strategies and the implementation of the procedures (Aarons, 2006). The performance of students was directly linked to the job performance of me as both the researcher and the administrator.

Key variables in the study were teachers willingness to be involved and writing to learn strategies. These strategies were straightforward, informative, and supportive (Holliday et. al., 2006). Writing to learn strategies enhanced the learning of students and their critical thinking skills, which is important for standardized test taking (Vygotsky, 1978; Zinsser, 1988). Wood students became cooperative learners promoting the instructors' pedagogy model and the students' learning model (Lipman, 1988). The study assisted educators in understanding what students knew about proper assessment techniques with the intent to help students learn, and provide explanations as to how they learned. More to the point, Boutz et. al (2012) stated that "to get a better, more nuanced read on what students know, understand, and are able to do, teachers need assessment techniques that ask students to reflect on what they've learned and begin to shape that learning into meaningful forms, such as summaries and explanations" (p.77). The education at the Wood School District needed to be transformed, which in turn, transformed the end product of students in regard to standardized testing and critical thinking skills (Kurtz and Quitadamo, 2007).

The outcomes were successful through the incorporation of writing to learn strategies. Both students and teachers applied writing to learn strategies to the common core standards, which made students more successful in standardized testing (Elmore, 2002).

Primarily, an action research design and PLC served as the framework for altering writing to learn strategies in the Wood School District. Secondly, twilight and zero period served as the learning environment for student growth and achievement through remediation of student academic weaknesses through writing to learn strategies. Thirdly, writing to learn strategies offered the additional instructional advantage needed for students of the Wood School District to close the achievement gap through improvement of standardized test scores (Marzano, Pickering, and Pollock, 2001). Lastly, the impact of teacher and administrative collaboration on the delivery of writing to learn strategies was colossal, meaning without the collaboration of educators, the impact would not have been as successful. This assisted the teachers with delivering strategies that were beneficial to student learning and strategies, although some strategies seemed to have little impact on the academic performance of students. This knowledge led to enhanced standardized test scores as well as critical thinking skills.

PLC model effectiveness. The PLC model in this study differed from a traditional PLC model as it used transactional leadership. Transactional leadership was necessary in this study due to the culture of the Wood School District. I needed to use top down leadership in order to break through the barriers of skilled incompetence embedded in the building culture (Argyris, 1990). Steady redirection of teachers towards a prescribed pedagogy (writing to learn strategies) was necessary to overcome the building culture and a focus on improvement of teaching was essential for growth of the district (Argyris, 1990; Hess, 2013). In order to effectively communicate the change in timely fashion, I needed to influence the PLC through a sense of urgency in effective teaching through the use of writing to learn strategies in a rewards based performance measure (Aarons, 2006; Kotter 1996; Nadler, 1998).

A more traditional PLC model existed amongst the teachers. True collaboration occurred between the teachers through professional development in professional learning communities and student learning (Guskey, 1997). Through the teacher collaboration that took place in the PLC, teachers learned about writing to learn strategies from each other, which supported and positively influenced student learning (Darling-Hammond, 1998). The collaboration amongst teachers in the PLC was a direct measure enhancing student achievement in this study (DuFour and Eaker, 1998). This study incorporated both transactional and transformational leadership within the PLC and was essential to ensure growth of both the teachers and the students.

Conceptual framework. The conceptual framework used in this study was transforming education at the Wood School District through writing to learn strategies incorporated in the zero and twilight periods. The goal was to promote pedagogy and student erudition through writing to learn strategies (Graham and Perin, 2007). The assumptions and beliefs of the study was that writing to learn strategies has a direct relationship with standardized test (NJ ASK and PARCC). This was critical to the outcome of the study because it laid the foundation for the hypothesis of the study. The experiential considerations used in the study were my experiences as a teacher and an administrator which was critical as it guided my knowledge through both student learning and teacher performance. The theoretical considerations and prior research in this study were the writing to learn researchers who set the theoretical groundwork that guided my study. This was a critical component because it guided my research through effective and successful studies performed by educational researchers.

The methodological assumptions were significant to the overall study as action research embedded with both a qualitative and quantitative component provided the correlation between the writing to learn strategies and the improvement of standardized test scores of students. The planning and instruction of the study was a vital component of the study as it embedded the PLC process which caused professional development and growth in writing to learn strategies of the teachers. Planning and instruction was essential because of the placing of students within specific groups (twilight and zero periods) based upon the 2013 baseline NJ ASK scores. The evidence generation and synthesis component of the study was critical as this section collected and compared the 2013 NJ ASK baseline exam, all pre-test scores, all post-test scores , the 2014 standardized exam (NJ ASK) and the 2015 standardized exams (NJ ASK and PARCC). This section also collected and compared qualitative data including teacher interviews, focus group interviews, and participant observation/field notes. The section on dissemination and translation was critical component to the study as it allowed circulation of information regarding writing to learn strategies and the specifics of which strategies were successful for students in direct correlation with high stakes testing.

Finally, there was a reflection, collaboration, and explanation of the findings. Specific writing to learn strategies were reflected upon as teachers collaborated in PLCs and went over specific strategies in relation to student performance on exams. Increases and decreases in test scores were explained in relation to successful or unsuccessful writing to learn strategies through teacher collaboration in professional learning communities. The conceptual framework linked writing to learn strategies to growth in the subjects of mathematics, language arts and science in the NJ ASK and PARCC standardized exams (Figure 45).

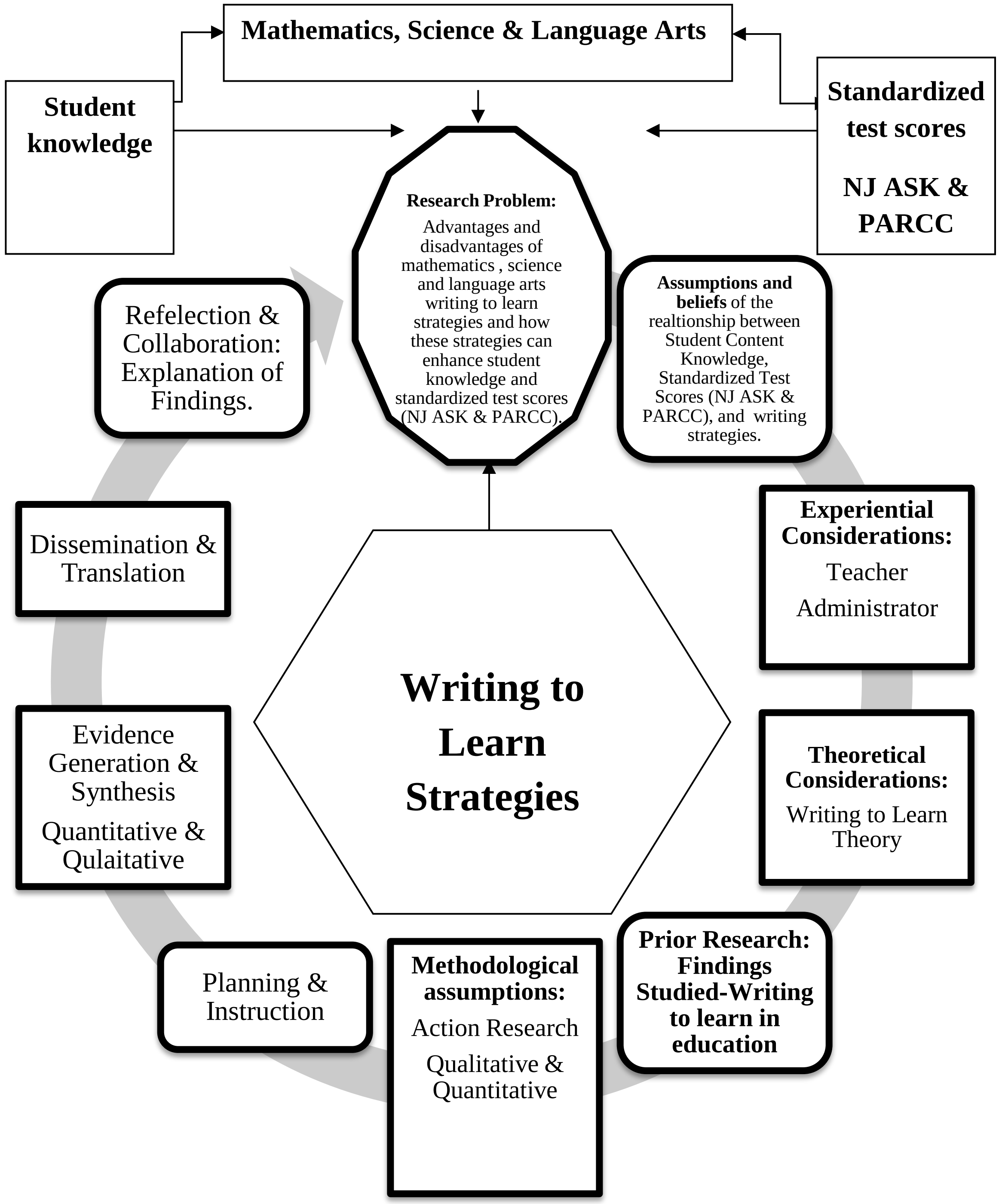

Figure 45. Writing to Learn Conceptual Framework.

Answer to Research Questions

This action research study was designed and implemented to observe the impact of writing to learn strategies on student standardized test performance. The data revealed the correlation between writing to learn strategies and standardized test taking performance. The study yielded sufficient data to address the research questions.

How can writing to learn strategies be used to enhance student achievement? Quantitative data from the NJ ASK and PARCC exams demonstrated increases in scores with the students that participated in writing to learn strategies. Writing to learn strategies were an effective tool for student achievement because it allowed students to think more critically and analytically in mathematics, science and language arts. Writing to learn strategies allowed students to learn more effectively and grow in specific content more efficiently (Wills, 1993; Zinsser, 1988). To enhance student achievement, writing to learn strategies need administrative and teacher support because the strategies need to be applied consistently in order to promote growth in student learning.

What are the different writing to learn strategies that can be offered to students of the Wood School District that can be used as a learning tool for student growth and achievement? There were fifteen writing to learn strategies that were introduced to students in the Wood School District. The writing to learn strategies included focused free writing, entry and exit slips, reader/response writing, and summary response . In addition, students learned clarification letters, group writing activities, dialectical notebooks, writing notebooks, compacts, concept metaphors, writing definitions, and paraphrase assignments. Finally, students learned writing interruptions, response paper, and synthesis paper (Campbell and Fulton, 2003; Countryman, 1992;

Fulwiler, 2007). Writing to learn strategies allowed students to become analytical, promote critical thinking skills and improved current school teaching practices (Corey, 1953; Lipman, 1988). Qualitative data from interviews with teachers indicated strategies such as dialectical notebooks, summary responses and writing notebooks were more successful learning tools that prepared students for learning and scholarly development. This is important because it essential to understand which strategies are appropriate for specific grade levels and which strategies directly correlate to student growth in standardized test scores. Specific strategies were unsuccessful to students to a variety of reasons. For example concept metaphors were difficult for students because they did not totally understand what metaphors were and how to apply them in writing. Writing definitions was complicated for students because they were not taught what specific topics and words were and the strategy asks students to create definitions without being introduced to the topic ort word. Finally compacts were very difficult for students because it was very difficult for them to condense multiple pages into one page, their writing ability was too novice to successfully perform this strategy.

How can writing to learn strategies offer the additional instructional advantage needed for students of the Wood School District to close the achievement gap? Teachers perceived the writing to learn strategies as an advantage for students to understand subject areas taught in either the zero or twilight remediation periods. Qualitative data obtained from teachers within focus groups showed when students received writing to learn strategies, they learned new content with greater simplicity (Saint-Laurent, et. al., 1998). Quantitative data obtained from pre and post-tests of students in both the experimental and control groups showed greater academic growth for students that received the writing to learn strategies, however the majority of students in the zero or twilight remediation periods grew in their scores as well (Torgesen, et. al., 2001). The remediation periods were the instructional advantage given to students to grow in standardized test scores. Students grew based upon more in-depth instruction in mathematics, science and language arts in addition to the writing to learn strategies offered to the experimental group (Torgesen, Alexander, Wagner, Rashotte, Voeller, Conway, 2001). Although all students in remediation periods grew in their scores, the students that received writing to learn strategies grew more significantly than those that did not receive the strategies.

What impact did teacher and administration collaboration have on delivery of writing to learn strategies? Faculty at the Wood School District believed that writing to learn strategies provided students with a distinct advantage in preparation for standardized assessments. Qualitative data collected from teachers during interviews and focus groups was essential in the writing to learn process because it showed growth in collaboration amongst the teachers which benefited the students directly as they communicated the most efficient writing to learn strategies for standardized test scores (Krueger and Casey, 2015; Mertler, 2009). The collaboration during professional learning communities held with teachers allotted for review of specific strategies, comments on implementation of new strategies, and overall evaluation of the writing to learn process (DuFour and Eaker, 1998; Harris, 2009). The collaboration of teachers in professional learning communities enhanced student achievement in test scores through instructional professional development amongst the educators (DuFour and Eaker, 1998; Taub, White, and Ryndak, 2014).

Leadership Reflection

School leadership change. Primarily, due his work in the promotion of positive change in organizations, there was no researcher as influential as Argyris (1990) in his work of overcoming organizational defenses and how it became incredibly beneficial in overcoming the embedded culture in organizations. The importance of relevant literature was instrumental in the contribution of facts to the hypothesis of the impact of detrimental organizational defensive routines could have on the culture and the overall success of an organization. Argyris (1990) discusses the importance of overcoming organizational defenses and the effects it could have on culture and by direct extension, performance of the organization. For organizational success, there needs to be a consistent redirection of instructional staff to overcome historical background of education embedded in the organization (Argyris, 1990).

In order to influence the culture of an organization such as a school district, it was essential to focus on the improvement of teaching and rethinking within the makeup of the organization (Hess, 2013). Leaders must communicate emotional intelligence amongst their staff while generating and enduring positive change, especially where there is a strong amount of skilled incompetence. In an organization that embodies skilled incompetence , transactional leadership is much more suitable, regardless of the importance of staff members seeing the organization in the same manner as their employers or leaders (Argyris, 1990).

A leader coming into an organization must be cautious of influence within the organization that can prevent positive change. The lines of influence must be changed in order to promote the visualized change of the incoming leader. Nadler (1998) stated "it's important to understand the lines of influence running through the organization and to identify the thought leaders that others look to for signals on the appropriate response to change" (p. 146). Through the influence of understanding, a sense of urgency needed to be created within the Wood School District where a vision and strategy for change were put in place. Both the strategy and vision were adequately communicated especially to recognized teachers within the district which empowered others to become both expressively involved within my vision for change as the leader (Kotter, 1996).

Transactional leadership was the leadership employed in this study as it is more geared to job performance (Judge & Piccolo, 2004). Transactional leadership was necessary in recognizing effective pedagogy relating to the standards and rewarding both the students and the instructors (Aarons, 2006). Aarons (2006) stated “transactional leadership is based more on “exchanges” between the leader and follower, in which followers are rewarded for meeting specific goals or performance criteria. Rewards and positive reinforcement are provided or mediated by the leader. Thus, transactional leadership is more practical in nature because of its emphasis on meeting specific targets or objectives” (p. 1163).

Culture. As the leader, I needed to create a vision to direct a change effort where my idea for the district was communicated by teaching new behaviors like writing to learn, encourage risk taking activities and communicate connections between the behavior and potential success or failure. The rational vision that was embedded in the district was critical thinking through writing to learn strategies which created a potential for positive change within the district (Kotter 1996). As the leader, I wanted the vision to manifest itself into the culture of the district, so it was essential for both teachers and students alike to increase their understanding of the writing to learning structure. The learning structure encouraged critical and analytical thinking skills of all students and teachers within the study, in addition to growth in strategies that enhanced knowledge and scholarship in all content within subject areas (Rogoff, 2003). These structural goals were not minimal, these goals changed the dynamic of students that participated in the study, the growth of knowledge and skills of these students promotes a positive change in building culture. The teachers and myself were totally engrossed within the vision, we did not settle for a culture of minimal goals which diminishes growth of students and teachers within the Wood School District (Glasser, 1990). This study promoted cultural change within the district and created goals beyond the minimal level. As the leader, I needed to find a way to make others emotionally engaged in the vision of the study and transfer the accountability to those on the ground floor. A cultural change will not take place if leaders only engage others on an intellectual level, they must become a stakeholder within the vision (Goleman, Boyatzis, and McKee, 2002).

Role of chief school administrator. The Chief School Administrator (CSA) has a direct impact on student effectiveness through the school climate (Hallinger, et. al., 1996). Resilience is essential for the CSA, especially in the wake of change. There will be those who challenge the leadership of the administrator and it is up to the CSA to continue to drive their vision foreword with resolve and tenacity. Regardless of the adversity presented, the CSA must stay centered on core values, accept personal responsibility for decisions made, and engage their vision with resolve and persistence (Harris, 2009).

Glasser (1990) points out "when asked why poor students hate school, they reply that these students do not believe the teachers care about them or what they do. The idea that students who do not work believe that no one cares about them is very strong with all students" (p. 105). The Chief School administrator should understand the difference between accountability and responsibility of the school district and the stakeholders within. Accountability refers to the district's responsibility to the state and federal government with regards to the proficiency of students in high stakes testing, however responsibility refers to placing students within the nucleus of the educational process. A component of responsibility is standardized testing, but it also embodies valid, applicable and alternative pedagogy to ensure student learning (Shapiro & Stefkovich, 2011). The instructional leader has the responsibility of communicating what is important for the school district through the assessment of priorities of the district and the creation of a culture that values those priorities (DuFour & Eaker 1998).

Instructional leadership. Instructional leaders create a vision of teacher leadership and through that vision there is a direct impact on staff empowerment, professional learning and school improvement through classroom improvement and student learning (Murphy,2005). Student learning is the embodiment of education, however in order for true and meaningful pedagogy to take place there must be adequate resources for students. Instructional leaders need to be aware of this process and in addition, should advocate for as many resources as they can in order to ensure erudition of students (Hallinger, et. al., 1996; Harris, 2009). Harris (2009) stated "educational leaders should know that the major challenge confronting twenty first century policy makers is obtaining adequate financial resources to ensure increased student achievement and school performance" (p. 18).

Instructional leaders and administrators should impart on teachers that they are the managers of their classroom. If administrators redistribute power to their instructors, teachers will receive more productivity from their students and consequently administrators will receive more productivity from their teachers. Promotion of teacher collaboration amongst teachers by instructional leaders will promote greater learning amongst student and instructional growth for instructors. Teacher collaboration can take place in professional learning communities (Glasser, 1986). Instructional leaders should take the time to get their faculty involved in strategic planning that will inevitably assist their students in academic growth. More to the point, Mortimer and Sathre (2007) state that "most faculty do not tend to get directly involved in the time consuming process associated with strategic planning, but they want to know that faculty who are involved are given a voice and taken seriously" (p. 104).

The previous culture of the Wood School District was simply a Pre-K to 8 forty minute period class schedule that flowed through switching of homerooms. For example, if a student was in homeroom 8A, they would be with those students all day, every day. The school was tested by way of the NJ ASK standardized test in grades 3 through 8 much like every other school in New Jersey. The school historically has never done well in standardized testing and was scheduled to become a Department of Education Priority School in 2013. Three examples of poor performance on NJ ASK standardized exam were as follows: in the 2010-2011 school year, Wood was 47% partially proficient and 9% advanced proficient. In the 2011-2012 school year, Wood was 46% partially proficient and 8% advanced proficient. Finally, in the 2012-2013 School Year, Wood was 48% partially proficient and 13% advanced proficient. I was then brought to be the Chief School Administrator and began a new initiative for the 2013-2014 school year through the 2015-2016 school year. After a year of writing to learn strategies and changes made in the district, during the 2013-2014 School Year, Wood was only 45% partially proficient and 16% advanced proficient.

I began a new initiative where curriculum was changed; classes were added such as English Test Prep, Algebra, Pre-Algebra, and Geometry. Block scheduling was initiated in the middle school, and teachers were moved around in the building based upon years of stagnant performance in a single grade level or subject area. To combat standardized test taking weaknesses, I created a before school 30 minute period named the Zero Period and a 90 minute after school period known as the Twilight Period where students would be offered additional coursework in Mathematics and Language Arts (Saint-Laurent, et.al., 1998; Torgesen, et. al., 2001). Embedded in the zero and twilight periods were writing to learn strategies in Science, Mathematics and Language arts.

Recommendations

Planning. The planning phase had unexpected challenges related to classroom space, recruiting and retaining students, in addition to funding for transportation. In order to mitigate these unanticipated issues, a twilight and zero period parent/guardian contract is recommended in order to prepare students and their families for the commitment required for these periods.

Recruitment. For this study, subjects were recruited through their performance on the 2013 NJ ASK exam. The challenge was getting parents to agree to participation because included additional time outside the house. This was hard regarding the twilight period it would cause students to miss athletic participation in addition to time with their family. A recommendation would be to recruit students by semester or season so they can participate in both remediation periods and the sport of their choice. The recommendation for family time would be for those students to participate in zero periods only. The twilight and zero period programs are not mandatory remediation for students, so there is little that can be done about removal of students by their parents or guardians, students quitting the program due to lack of interest or whatever reasoning may exist.

Classroom space. Recommendations for the lack of classroom space would be to manipulation of the master schedule in order to accommodate the remediation periods and after school teacher collaboration. Manipulation of teacher collaboration time in the master schedule would be the major factor that contributes to free classroom space before school begins and after school ends.

Funding. Recommendations for funding are to include remediation period transportation costs in the district budget and to include the costs in reorganization board meeting when the budget is approved in April of every school year. If district funding is not available, to reduce the incidence of unanticipated transportation costs, parents of participants should sign a contract for twilight or zero period remediation hours and understand if their children are to participate, the cost of transportation would be solely the responsibilities of the parent and not the district.

Logistics. Time for student homework help should be increased by 30 minutes to give students one hour to complete assigned homework by their teachers. A consistent complaint was due to the time in the twilight period, students were unable to complete their homework mainly because of commitments to athletics and time spent with their family. Additionally, students took more time than expected on pre-test and post-test assessments that mirrored the state standardized exam. This additional time needed on testing allowed for less time on the necessary writing to learn strategies. Teachers need to time the exam more rigorously as the state standardized exam is timed and students will not be afforded extra time on the NJ ASK or PARCC.

Teachers. Teachers had a internal conflict with this study due to the fact they were removing their colleagues from their classrooms in order to offer the twilight remediation period to students. Teachers normally worked in their classrooms after school to prepare for the next day or to collaborate with their colleagues. Their classrooms were needed during the twilight period and they had work in another teacher's classroom. This could be rectified though changes in the master schedule. Additionally, teachers knowledge of writing to learn strategies came exclusively from me as the researcher. The use of teacher mandated research on content area would have provided more strategies on writing to learn pedagogy which would offer a greater percentage increase in student standardized test scores (Zinsser, 1988). This could occur in future professional learning communities where a portion of the PLC was devoted to writing to learn strategies and their use within the classroom.

Students. For the duration of the study, I kept field notes of observations during the pedagogy of writing to learn strategies and kept minimal informal dialog with students. Future studies should entail formal interviews with multiple student participants on a weekly basis. . Interviews would allow the researcher to understand which writing to learn exercises provided the most direct benefit to students for standardized test taking procedures (Kemmis and McTaggart, 1988; Krueger and Casey 2015). Future studies would become more structured and centered around strategies that had a direct benefit to the desired outcome and allow the researcher to discard the teaching tactics that had no benefit. These recommendations will lead to implications for future research which could further determine the impact of writing to learn strategies on standardized test performance.

Implications for Future Research

This research provided direct evidence that a relationship does exist between writing to learn strategies and standardized test taking skills, however further study is required to determine if the findings are reliable and practical. Further research is recommended to examine the details in the relationship between analytic/critical thinking skills and writing to learn theory. More research needs to be directed toward primary and secondary students in writing to learn strategies and high stakes exams. Furthermore, future studies should involve an integrated approach to remediation and writing to learn strategies. For instance, students should be grouped among peers with at least three grades difference in age. This will allot for a peer tutoring element to be brought into the research with the teacher implementing the writing to learn strategies acting as more of a facilitator in the educational process.

A study on professional learning communities and their effectiveness in standardized test score growth of students before and after the formation of the PLC. This study could be held in a primary or secondary setting and the testing tool could be any standardized test used in the kindergarten through twelfth grade. Teacher growth could also be measured qualitatively through focus group interviews and observations/field notes. The study could measure the impact of professional learning communities on student achievement and teacher classroom pedagogy (Louis and Marks, 1998; Vescio, Ross, and Adams, 2008). An additional study using causal comparative design where the researcher strictly controls for variables could be used to study the impact of writing to learn strategies on high stakes testing. In this study two or more groups such as a experimental or control group would be compared with the use of the independent variable, writing to learn strategies (Creswell, 2014).

The theoretical positions of academic researchers regarding the influence of writing to learn strategies is that there should be an increase in academic growth and development of students with an influence on literacy, arithmetic and critical thinking skills (Countryman, 1992; Kurtz & Quitadamo, 2007). The study allowed me and teachers in the district to understand the impact of writing to learn strategies on standardized exams such as the NJ ASK and PARCC exam.

Limitations

This research presented challenges relating to obtaining funds for the study, recruitment of student subjects, recruitment of staff participants, and teacher classroom space. As a result, it was necessary to make adjustments as the study was in progress. For example, due to teacher collaboration periods, the classroom space used of the study needed to be shifted to other classrooms throughout the building or the use of the gymnasium was required. Additionally, due to the lack of daylight past the hour of 5:00 PM, parents of certain students were uncomfortable with their children being out of the house, so arrangements needed to be made with bus companies to have the children dropped off at their home to ease the parents mind of their children walking home in the dark. This unanticipated expense related to transportation resulted in higher overall cost of the research.

However, the students in the zero and twilight periods will be the only students that are offered the additional writing to learn strategies. Additionally, the limitation that is also difficult to control is the attendance of the students in the twilight period and zero period. I am dealing with students in grades 4 through 7 and there are multiple reasons they would not show up in the morning and after school. Lastly, the limitation that is difficult to remedy is recruitment of teachers because the absence of teachers who were a zero period or twilight period instructor due to possible illness, injury or another unforeseeable circumstance created restrictions and constraints on the study.

Delimitations

The delimitations of the study included students that took the NJ ASK and were not in the zero and twilight periods. Only students in grades four through seven were chosen to participate in this study. Students in grades three and eight were also tested with NJ ASK and PARCC standardized exams but they were not included in the study.

Students in grades three were not included because standardized testing is new to them and there was no baseline NJ ASK or PARCC score for these students. Students in grade eight were also not included in the study because this was a two year study and they were leaving the Wood School District after their eighth grade year. Students with 2013 and 2014 NJ ASK scores that ranged between 170 – 199 were asked to participate.

Reliability/Rigor

Reliability and rigor are addressed in this action research study through repetition of the cycle, extended time used to perform the study, persistent observation within the study, and triangulation of data sources and instruments (Mertler, 2009). Fifteen writing to learn strategies were introduced to students on a continuous twelve week cycle over a two year period. Multiple cycles were introduced to students demonstrating the rigor addressed in this study (Mertler, 2009; Stringer, 2011). Constant observations through qualitative and quantitative instruments were used in this study as participants had a extensive chances to experience the writing to learn strategies over a two year period with observations, teacher interviews, pre-tests, post-tests, and standardized exams calculatingly given and performed (Mertler, 2009; Mills, 2014). Triangulation of data existed in this study as there were multiple data sources including the use of both quantitative and qualitative instruments leading to consistency and reliability within the data (Mertler, 2009; Mills, 2014; Stringer, 2011).

In this study, there was a constancy in the findings regarding Pre-Tests and post-tests, dependability as the study was consistent in the writing to learn strategies and standardized assessments to follow. The results were both quantitative and qualitative; however, the quantitative results showed growth in students that received writing to learn strategies. Due to this study's quantitative component and the results, the study was reliable as it can be replicated (Miles and Huberman, 1994). Leung (2015) stated "in quantitative research, reliability refers to exact replicability of the processes and the results" (p. 326).

Quantitative instruments used in this study were the NJ ASK Pre-Tests, NJ ASK post-tests, and PARCC simulated exams. Content validity was measured as the scores gauged the subject matter tested on the state standardized exams. Concurrent validity was measured as the instruments predicted the outcome of students on the state standardized exam. Construct validity was measured as the instruments had positive consequences on the state standardized exams (Creswell, 2014). Quantitative instruments used in this study demonstrated reliability through exam correlation and consistency in scoring (Blaikie, 2003; Creswell, 2014).

Qualitative instruments used in this study were teacher interviews, focus groups, and participant observation/field notes. The qualitative instruments used illustrated in the experiences of the teachers and students in the study. This research was reliable and credible due to the concerns of the educators who were personally involved in this study. Qualitative validity and reliability was ascertained as accuracy in the data was reached with specific methods and resonated with the experiences of other researchers (Creswell, 2014). Creswell (2014) pointed out "qualitative validity means the researcher checks for the accuracy of the findings by employing certain procedures, while qualitative reliability indicates that the researcher's approach is consistent across different researchers and different projects" (p. 201).

The research was conducted in the school environment during remediation periods where there was premeditated and calculated data collection strategies designed to answer the research questions. All assessments and measures were completely documented and recorded to ensure the prevention of human error in dictation and notation (Leung, 2015). Writing to learn strategies impacting student assessment gained transformative value through substantive validation, continuous documentation, and self-reflection (Creswell, 2013; Miles and Huberman; 1984).

Conclusion

In this final chapter, I provided a synopsis of the workings of this research, including the plan of the study, critical/analytical thinking skills mirrored in the writing to learn impact, and observed knowledge obtained through quantitative data. In addition, the chapter was outlined through a summary, where writing to learn strategies were discussed in regards to high stakes standardized test performance of students, professional learning community model effectiveness was discussed in relation to this study and its traditional use incorporating both transactional and transformational leadership, and the conceptual framework was revisited discussing the critical components of the framework along with its overall outcome of increasing standardized test scores through writing to learn strategies. The research questions posed in the beginning of the study were answered and a leadership reflection was provided encompassing school leadership change discussing the leadership used in this study, culture and its impact on the vision of the study, the role of the chief school administrator in relation to accountability and responsibility, and instructional leadership and its direct impact on learning and school improvement. I provided recommendations through the discussion of planning, recruitment, classroom space, funding, logistics, teachers and students.

Implications for future research through specific suggestions such as a study on professional learning communities and a study utilizing a causal comparative design to further investigate the relationship between writing to learn strategies and high stakes testing. Finally I offer limitations, delimitations, a section on reliability/rigor for the action research study and a conclusion. This study, at its culmination, provided adequate information and data in response of the research questions within the restrictions of the study. I believe that writing to learn is a sufficient strategy to increase standardized test scores on the NJ ASK, PARCC or any other standardized exam in primary, secondary or post-secondary education and this study brought about important issues for future educational research.

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Appendix A

Teacher Interview Questions

Semi Structured Interview

1. Can you tell me about the most effective writing to learn strategy in primary students? Why was it most effective?

2. Can you tell me about the most effective writing to learn strategy in secondary students? Why was it most effective?

3. How do you believe writing to learn strategies impacted critical thinking skills of students all subject areas?

4. What subject area or areas do you believe writing to learn strategies had the greatest influence on: Language Arts, Science, or Mathematics? Why?

5. Which grade level did writing to learn strategies have the greatest influence on? Why do you believe this grade level was most successful?

6. Which standardized exam did writing to learn strategies have the greatest impact on, the NJ ASK or the PARCC? Why? Did technology play a role in this impact?

7. Describe the impact writing to learn strategies had on the culture of the school district?

8. How did collaboration impact the overall process of writing to learn strategies?

9. Describe how writing to learn strategies impacted you as an educator?

10. How has writing to learn strategies helped your teaching/pedagogy style?

11. What recommendation would you make to enhance writing to learn strategies in the school district?

12. What were the greatest challenges and successes in implementing writing to learn strategies?

Appendix B

Twilight & Zero Periods Writing To Learn PLC Agenda

1. Baseline Data (NJ ASK Scores)
2. Experimental Group
3. Control Croup
4. Writing To Learn - Introduction
5. Writing to Learn Activities
6. Project Based
7. Curricular
8. Peer to Peer Instruction
9. Benchmarking Students (Pre & Post-tests)
10. Mathematics
11. Language Arts
12. Science
13. Themes and Strategies
14. Documentation of Strategies
15. Data of Pre and Post-tests
16. Types of Writing To Learn Strategies
    a) Focused Free writing
    b) Entry and Exit Slips
    c) Reader/Response Writing
    d) Summary Response
    e) Clarification Letters
    f) Group Writing Activities
    g) Dialectical Notebooks
    h) Writing Notebooks
    i) Compacts
    j) Concept Metaphors
    k) Writing Definitions
    l) Paraphrase Assignment
    m) Writing Interruptions
    n) Response Paper
    o) Synthesis Paper

Appendix C

Focus Group Interviews

Interviewee (Title and Name): ______________________________________

Interviewer: ____

Writing to Learn Strategy used: how valuable was the writing to learn strategy for the pedagogy of the students?

_____ (1) Focused Free writing
_____ (2) Entry and Exit Slips
_____ (3) Reader/Response Writing
_____ (4) Summary Response
_____ (5) Clarification Letters
_____ (6) Group Writing Activities
_____ (7) Dialectical Notebooks
_____ (8) Writing Notebooks
_____ (9) Compacts
_____ (10) Concept Metaphors
_____ (11) Writing Definitions
_____ (12) Paraphrase Assignment
_____ (13) Writing Interruptions
_____ (14) Response Paper
_____ (15) Synthesis Paper

What were your expectations of writing to learn strategies?

How practical were writing to learn strategies?

How did you implement writing to learn strategies?

Were the writing to learn strategies effective?

Appendix D

Participant Observation/Field Notes

Teacher:	Writing to Learn Strategy:
Time:	Date:
Grade:	Number of Students:
Observation	***Reflection***

Appendix E

NJ ASK Pre/Post-tests

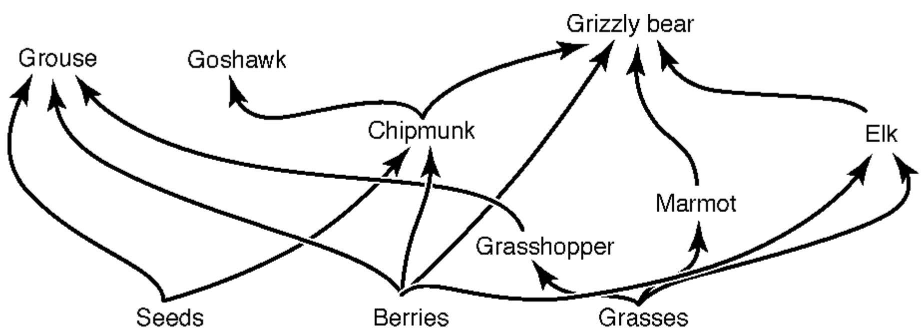
Adapted from the NJ ASK State Exam

NJ ASK Pre-test Science

1. What distinguishes producers from other organisms?
    A. Producers consume a variety of foods.
    B. Producers feed at different trophic levels.
    C. Producers are autotrophs.
    D. Producers are heterotrophs.

2. Most of the minerals within an ecosystem are recycled and returned to the environment by the direct activities of organisms known as
    A. producers.
    B. consumers.
    C. scavengers.
    D. decomposers.

3. Carefully examine the food web in the figure below.



From Exam View test Generator for Modern Biology, Holt, Rinehart, and Winston, 2006.

A drought has caused the producer populations to significantly decrease. Which of the following statements describes an immediate effect caused by the decrease of producers?
    A. The grouse population would increase.
    B. The grasshopper population would decrease.
    C. The seed populations would increase.
    D. The grizzly bear populations would decrease.

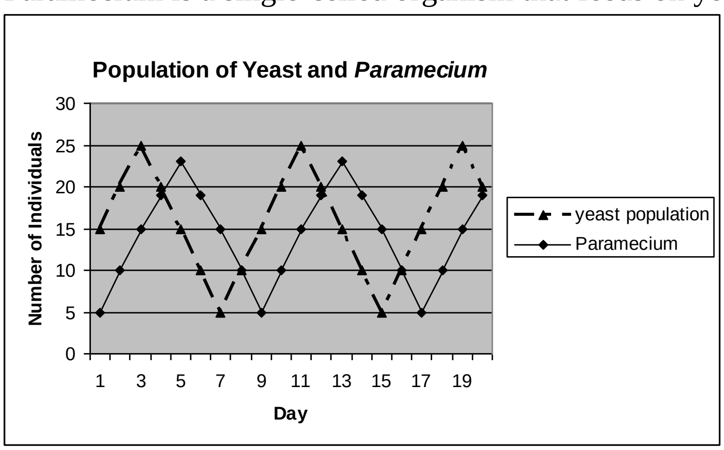
4. A factory has been releasing pollution into a nearby river. A chemical in the runoff has been killing the fungi populations in the nearby forest. In response to the decrease in fungi, the plant growth will
   A. decrease which will in turn decrease competition between herbivores.
   B. increase due to the increased recycling of nutrients back into the soil.
   C. decrease due to decreased recycling of nutrients back into the soil.
   D. increase due to decreased competition with between the plants and fungi.

5. In a forest, two different insect eating birds prefer to nest in different trees. This behavior allows the birds to avoid
   A. predators.
   B. parasites.
   C. competition.
   D. succession.

6. An overpopulation of squirrels in a forest will most likely lead to
   A. a decrease in squirrel predators like fox and owls.
   B. an increase in competition between squirrels.
   C. an increase in the number of acorns available for food.
   D. a decrease in disease transmission between squirrels.

7. Protists are single-celled organisms that feed on bacteria and yeast. In a test tube, a single species of protists grew and flourished. Another test tube had two species of protists, one species died within 16 days, while the other survived. This observation illustrates
   A. competition.
   B. predation.
   C. mutualism.
   D. commensalism.

8. Carefully examine the predator/prey population graph below of Paramecium and yeast. A Paramecium is a single-celled organism that feeds on yeast.



9. What is the most likely reason for the increase in *Paramecium* population between days 9 and 11?
   A. An increasing food supply between days 7 and 9.
   B. An equal sized predator and prey populations between days 7 and 9.
   C. A decreasing prey population between days 5 and 7.
   D. A decreasing food supply between day 11 and 12.

10. Which statement describes all symbiotic relationships? A relationship where both organisms
    A. benefit from the relationship.
    B. have no impact on one another.
    C. live in a close association with one another.
    D. have a negative effect on the other.

11. The Honeyguide, a bird, and the badger both eat honey. The Honeyguide cannot open a bee hive and the badger cannot find the hive. The Honeyguide leads the badger to the hive and the badger breaks open the hive so both can eat the honey. This type of relationship is best described as
    A. competition.
    B. parasitism.
    C. mutualism.
    D. commensalism.

12. The symbiotic relationship between a flower and the insect that feeds on its nectar is an example of
    A. mutualism because the flower provides the insect with food, and the insect pollinates the flower.
    B. commensalism because the insect lives off the nectar but the flower does not benefit.
    C. parasitism because the insect harms the flower by removing the nectar.
    D. predation because the insect feeds on the flower and the flower dies.

13. Some plants form a relationship with bacteria. The bacteria are protected by the roots where they convert nitrogen gas to a usable form of nitrogen needed by the plant. Which of the following statements explains this relationship?
    A. Commensalism because the plant is not harmed or benefited from the relationship but the bacteria is benefited.
    B. Parasitism because the plant is harmed by the bacteria infection in their roots.
    C. Commensalism because the plant benefits by associating with the bacteria but the bacteria is not affected.
    D. Mutualism because the plant derives a benefit by associating with the bacteria and the bacteria also benefits.

14. A lava flow covers a mature forest. Which of the following is most likely to be the sequence of plants that regrow in the area?

A. Lichens, grasses, shrubs, trees
B. Grasses, flowering groundcover, shrubs, trees
C. Flowering groundcover, grasses, lichens, trees
D. Lichens, shrubs, grasses, trees

15. Use the information below to answer the following question.

Location #1: A plowed field→grasses→shrubs→trees
Location #2: Bare rock→lichens→grasses→shrubs→trees

Which of the following are the pioneer species in each location?

A. Grasses and shrubs
B. Shrubs and trees
C. Lichens and grasses
D. Trees and grasses

16. Use the diagram below to answer the following question.

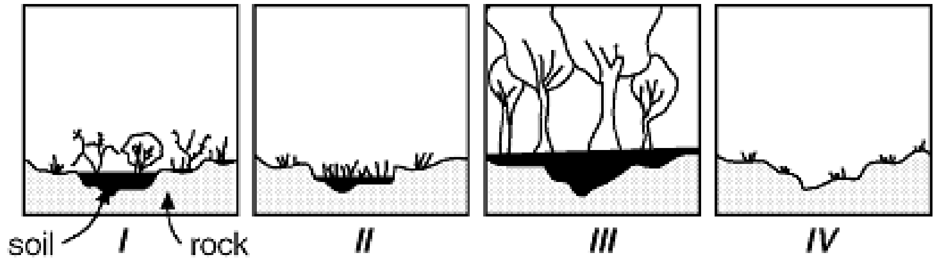


Figure from Examgen test generating program

The boxes above represent a different stage in succession. Put the boxes in order.

A. I, II, III, IV
B. II, IV, I, III
C. IV, II, I, III
D. III, IV, II, I

17. Organisms that are responsible for returning matter back into the environment are the

A. herbivores.
B. carnivores.
C. omnivores.
D. decomposers.

18. Organisms that only eat plants are called

A. herbivores.
B. omnivores.
C. scavengers.
D. carnivores.

19. Read the following passage to answer the question that follows.

In an aquatic environment, river turtles eat duck weed, tape grass and sometimes snails. Leeches are found on these turtles but do not kill them. Alligators have been known to eat river turtles.

The best description of the river turtle would be a(n)

A. decomposer.
B. herbivore.
C. carnivore.
D. omnivore.

20. Read the following passage to answer the question that follows.

In an aquatic environment, river turtles eat duck weed, tape grass and sometimes snails. Leeches are found on these turtles but do not kill them. Alligators have been known to eat river turtles.

Which type of organism is not present in the passage above?

A. Parasite

B. Decomposer

C. Carnivore

D. Producer

21. Read the following passage to answer the question that follows.

Ducks and snails often eat grass and algae in freshwater ponds. The snails are eaten by mice and ducks. Foxes prefer to eat mice, but will eat a duck if the opportunity arises.

Which food chain below is illustrated in the passage?

A. snails → algae → mice → fox

B. fox → ducks → mice → algae

C. algae → snails → mice → fox

D. ducks → mice → snails → grass

22. Read the following passage to answer the question that follows.

Ducks and snails often eat grass and algae in freshwater ponds. The snails are eaten by mice and ducks. Foxes prefer to eat mice, but will eat a duck if the opportunity arises.

What organisms below would be considered secondary consumers?

A. Algae and snails

B. Ducks and mice

C. Snails and ducks

D. Fox and ducks

23. The primary source for all energy used by animals on our planet is

A. the animals they eat.

B. the plants they eat.

C. sunlight absorbed by animals.

D. sunlight absorbed by plants.

24. While most organisms in nature obtain energy directly or indirectly from the sun, some organisms get energy without directly or indirectly using the sun. An example would be

A. acting as decomposers.
B. acting as scavengers.
C. breaking down chemicals.
D. using fossil fuels.

25. Which sequence of terms below best illustrates how energy flows from the sun to an animal cell where it is used for cellular work?

A. Sun → Plants → Sugars → Animal cell → ATP

B. Sun → Plants → Food → Animal cell → Sugar

C. Sun → ATP → Plants → Animal cell → Sugar

D. Sun → Sugars → Plants → Animal cell → ATP

26. Organisms that do **NOT** ultimately use the sun as an energy source are

A. aquatic animals.

B. deep sea bacteria.

C. freshwater algae.

D. earthworms.

27. Plants transform energy from the sun into

A. nuclear energy.

B. solar energy.

C. chemical energy.

D. mechanical energy.

28. In an environment, elements such as carbon are usually

A. converted into nuclear energy.

B. synthesized and remains as fossil fuels.

C. converted into nonrenewable resources.

D. recycled and reused by other organisms.

29. Use the diagram below to answer the next question.

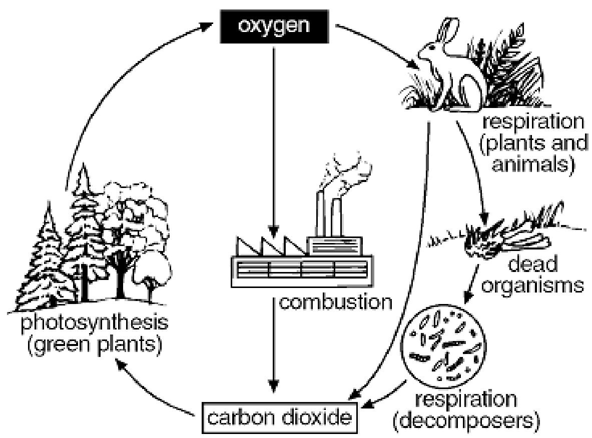


Diagram from Examgen Biology Testbank

Which of the following statements is **NOT** true about the above diagram?

A. Carbon dioxide and oxygen are used by producers in the ecosystem.
B. Living organisms remove and replace oxygen back into the atmosphere.
C. Consumers generate oxygen and consume carbon dioxide.
D. Living organisms generate carbon dioxide which is used by other organisms.

30. Which of the following statements about the flow of energy in nature is **NOT** true?

A. A major portion of the energy from food is used to keep our bodies warm.

B. A large amount of energy in food is needed for bodily functions.

C. Some energy from the food we eat is lost as wastes which are passed from the body.

D. Most of the food energy from one trophic level is passed on to the next trophic level.

31. Which of the following is **NOT** one of the ways energy is lost to other organisms as it passes through a food web?

A. Cellular respiration
B. Growth and repair
C. As heat
D. As waste material

32. What is the average amount of energy that passes from one feeding level to the next in a food chain?

A. 10%
B. 25%
C. 50%
D. 100%

33. If the decomposers were removed from an ecosystem, what would most likely occur?

A. Energy from the sun would not be absorbed by plants.

B. Carnivores would have no source of energy.

C. Essential elements would not be available to plants.

D. Herbivores would lose their source of energy and nutrients.

34. Use the food chain below to answer the next question.

Grass → Prairie dog → Rattlesnake → Hawk

What sequence below best represents how much energy is passed from one organism to the next in the food chain above?

A. 100% → 10% → 1% → 0.1%

B. 100% → 50% → 25% → 12.5%

C. 100% → 75% → 50% → 25%

D. 100% → 90% → 80% → 70%

NJ ASK Post-test Science

Adapted from the NJ ASK State Exam

1. The smallest particle of a compound that still has the properties of that compound is called

    a. An atom
    b. A mixture
    c. A solution
    d. A molecule

2. Which of the following techniques can be used to separate a mixture of salt and water?

    a. Filtering
    b. Settling
    c. Mixing
    d. Boiling

3. Which statement best describes the behavior of most solids?

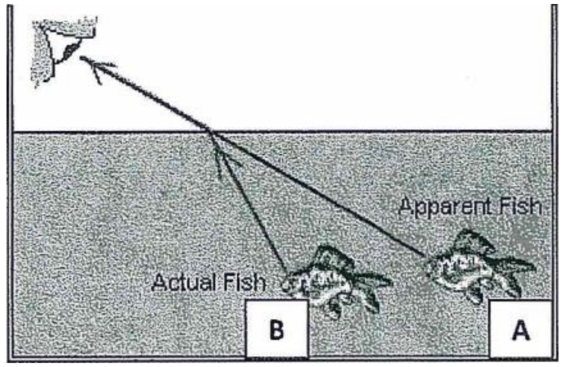
    a. They contract when heated
    b. They expand when heated
    c. They melt when cooled
    d. They expand when cooled

4. A mixture of sugar, sand and water is filtered. What is the composition of the substance that passes through the filter?

    a. Sand, sugar and water
    b. Sand and water only
    c. Sugar and water only
    d. Water only

5. Sound is a form of energy produced by a vibrating object. How does sound travel?

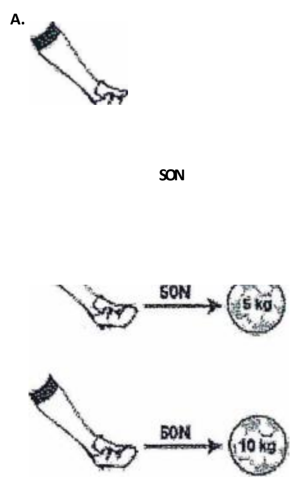
    a. In the form of sound waves, outward in all directions
    b. In the form of sound waves, outward in a single direction
    c. In the form of electromagnetic waves, outward in all directions
    d. In the form of electromagnetic waves, outward in a single direction



6. A boy observes a fish in the pond. He things the
fish is at position A, but it is actually at position B. Why does the fish appear to be at position A?

a. Light is reflected from the fish
b. Light is absorbed by the water
c. Light is refracted when it passes from one medium to another
d. Light is reflected when it passes from one medium to another

7. The illustrations show soccer balls of different masses being kicked with equal force. Which ball will have the greatest acceleration?



8. A solution's pH is a measure of its acidity. The lower the pH, the more acidic the solution. A student wanted to test the effect of pH on the growth of bean plants. He divided his plants into six groups, watering each group with solutions that were identical except for their pH. After three weeks, he recorded the average growth for each group of plants. (Note: **A pH** of 7 is neutral).

pH of	**4**	5	6	7	8	9
Average growth (cm)	None (all plants died)	5 cm	9 cm	8 cm	8 cm	6 cm

- What result would you expect at a pH of 3? Explain your prediction.
- What result would you expect at a pH of 7.5? Explain your prediction.
- What result would you expect at a pH of 10? Explain your prediction.

9. The five most common elements in living organisms are:
A. C, H, O, Na, Cl
B. C, H, O, Na, Ca
C. C, H, O, N, Ca
D. C, N, O, Na, Cl

10. Substances that enter into a chemical reaction are known as:
A. Reactants
B. Products
C. Catalysts
D. Isotopes

11. Which of the following is not a polysaccharide?
A. Sucrose
B. Branched starch molecules
C. Cellulose
D. Glycogen

12. Which of the following connect with 2 hydrogen bonds?

A. Thymine and guanine
B. Adenine and thymine
C. Adenine and guanine
D. Thymine and cytosine

13. The atom sodium contains 11 electrons, 11 protons, and 12 neutrons. What is the mass
number of sodium?
A. 1
B. 11
C. 22
D. 23

14. Fatty acids with double bonds between some of their carbons are said to be:
A. Unsaturated
B. Saturated
C. Triglycerides
D. Completely hydrogenated

15. Enzymes:
A. Function as catalysts
B. Are carbohydrates
C. Are not affected by temperature
D. Are not affected by substrate concentration

16. Genetic information is encoded in the:
A. Quaternary structure of a protein
B. Sequence of nucleotides in DNA
C. Degree of saturation of fatty acids
D. Length of glycogen

17. In the equation $2H_2 + O_2 \pm 2H_2O$,
A. H_2, O_2, and H_2O are all compounds
B. H_2, O_2, and H_2O are all molecules
C. Only H_2O is a compound
D. Both b and c

18. Glucose molecules are to starch as __________ are to proteins.
A. Fatty acids
B. Amino acids
C. Waxes
D. Nucleic acids

19. Characteristics of carbon that contribute to its ability to form an immense diversity of organic molecules include its:
A. Tendency to form covalent bonds

B. Ability to bond with up to four other atoms
C. Ability to bond together to form extensive branched or unbranched “carbon skeletons”
D. All of the above

20. Which list below consists only of molecules that are all polymers?
A. Sugars, amino acids, nucleic acids, lipids
B. Proteins, lipids, nucleic acids, sugars
C. Proteins, lipids, nucleic acids, sugars
D. Proteins, lipids, amino acids, nucleic acids

21. Water molecules stick to other water molecules because
A. Water molecules are neutral, and neutral molecules are attracted to each other
B. Hydrogen bonds form between the hydrogen atoms of one water molecule and the oxygen atoms of other water molecules
C. Covalent bonds form between the hydrogen atoms of one water molecule and the oxygen atoms of other water molecules
D. The hydrogen atoms of adjacent water molecules are attracted to one another

22. Which, if any, of the following choices does not properly pair an inorganic compound with
one of its building blocks (subunits)?
A. Polysaccharide–monosaccharide
B. Fat–fatty acid
C. Protein–nucleic acid
D. All of these are paired correctly

23. Which of the following sequences best describes the flow of genetic information in a eukaryotic cell?
A. RNA ±DNA±RNA±protein
B. DNA±RNA±protein
C. Protein±RNA ±DNA
D. DNA±amino acid±RNA±protein

24. Living organisms are composed of ______________ which is anything that occupies space and & mass (weight).
A. Matter
B. Solar energy
C. Environmental Science
D. Ecoutorism

25. Elements can combine to form ________________ which are substances consisting of two or more different elements combined in a fixed ratio
A. Larger Elements
B. Atoms
C. Compounds
D. Steroids

26. Carbon has_______ protons, ______ neutrons, and _________electrons
A. 6, 7 ,7
B. 6, 6, 6
C. 7, 7, 7

D. 6, 12, 12

27. Isotopes have same numbers of protons & electrons but different numbers of_______________.
A. Neutrons
B. Atoms
C. Electrons
D. Energy

28. Information about the distribution of electrons is found in the____________________
A. periodic table of the elements
B. scientific method of compounds
C. universal law of ions
D. system of units

29. Atoms want to fill their outer electron shells and to accomplish this, the atom can share, donate, or receive electrons, this results in attractions between atoms called_____________________.
A. Chemical bonds
B. Scientific thought
C. Purines
D. Pyrimidines

30. _______________ are atoms or molecules with an electrical charge resulting from gain or loss of electrons
A. Purines
B. Pyrimidines
C. Ions
D. Atoms

31. NaCl is an example of a ______________ which is a substance consisting of 2 or more different elements combined in a fixed ratio.
A. Compound
B. Element
C. Atom
D. Combination

32. DNA contains ________________ which makes it different from RNA.
A. Uracil
B. Cytosine

C. Thymine
D. Guanine

33. RNA contains _______________ which makes it different from DNA.
A. Uracil
B. Cytosine
C. Thymine
D. Guanine

34. Unequal electron sharing creates ___________molecules.
A. Polar
B. Nonpolar
C. Molecular
D. Tension

35. Although all atoms of an element have the same _______________ number, some differ in mass number
A. Atomic
B. Product
C. National
D. Composition

36. Elements that can hydrogen bond are:
A. O, N, F
B. N, O, Cl
C. Ca, Na, Cl
D. F, N, Cl

37. Tritium is an example of an _______________ of hydrogen.
A. Isotope
B. Bond
C. Chemical
D. Androgen

38. Hydrogen bonding causes water molecules to stick together, a property called _______________________
A. Cohesion
B. Adhesion
C. Stickiness
D. Contusion

NJ ASK Pre-test Mathematics

Adapted from the NJ ASK State Exam

Write the correct answer on the line provided.

_____ **1.)** Simplify the expression 4x + 3x + 10x.

A. 7 + 10x **B.** 17x **C.** 120x **D.** 17

_____ **2.)** Simplify the expression 2p + x + 10p + 5x.

A. 12p +6x **B.** 2p + 6x + 10p **C.** 6x +2p **D.** 2p + x + 16

_____ **3.)** Which expression is equivalent to 7(g+ 9)?

A. 7 + 9 x 7 **B.** 8g + 63 **C.** 7g + 63 **D.** 8g + 79

_____**4.)** Which expression is equivalent to 12a + 48?

A. 2(a + 48) **B.** 12(a + 24) **C.** 12(a + 48) **D.** 12(a + 4)

_____**5.)** Which expression is equivalent to 10m -100?

A. 10(m – 10) **B.** 2(5m – 50) **C.** 5(2m – 20) **D.** Not enough information.

_____**6.)** Which expression is equivalent to 6(p + 5)?

A. 6p + 30 **B.** 30p **C.** 30 + p **D.** 11p

_____**7.)** Which expression is equivalent to m + m + m + m?

A. m + 4 **B.** 4m **C.** m^4 **D.** m ÷ 4

_____**8.)** What is the coefficient in the expression 4x + 8?

A. 4x **B.** 8 **C.** 4 **D.** x

_____**9.)** What expression represents *the quotient of 8 and a number*?

A. n ÷ 8 **B.** n – 8 **C.** 8n **D.** 8 ÷ n

_____**10.)** What expression represents *six less than a number*?

A. 6n **B.** n – 6 **C.** 6 – n **D.** n ÷ 6

_____**11.)** What is the value of the expression 3a + b when a = 2 and b = 4?

A. 9 **B.** 10 **C.** 18 **D.** 24

_____**12.)** What is the value of the expression $^{20}/_{n}$ + f when n= 2 and f = 4?

A. 22 **B.** 20 **C.** 14 **D.** 24

_____**13.)** r + 22 = 23

A. 23 **B.** 2 **C.** 23 **D.** 1

_____**14.)** 12 = x – 18

A. x = 18 **B.** x = 0 **C.** x = 30 **D.** x = 12

_____**15.)** 4x = 12

A. x = 48 **B.** x = 16 **C.** x = 9 **D.** x = 3

_____**16.)** x ÷ 5 = 5

A. x = 0 **B.** x = 1 **C.** x = 10 **D.** x = 25

17.) Draw a factor tree in the box below then write the prime factorization on the line.

150

18.) What is the *coefficient* in the expression below? Write your answer in the box.

$$10x + 195$$

The coefficient in the expression is __________.

19.) What is the *coefficient* in the expression below? Write your answer in the box.

$$abc$$

The coefficient in the expression is __________.

20.) How many *terms* are in the expression below? Write your answer in the box.

$$7m + 8p + 108$$

There are _______ terms in the expression.

21.) How many *terms* are in the expression below? Write your answer in the box.

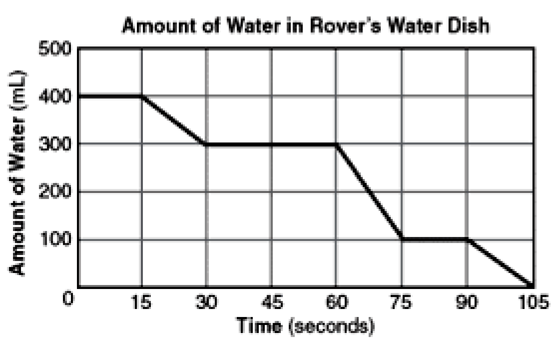
$$12 \cdot d$$

There are _______ terms in the expression.

_____**13.)** Given the equation y = –x – 6, what is the initial value?

A. – 6 **B.** –1 **C.** –x **D.** not enough information

_____**14.)** A bowl of water was filled for a dog named Rover. He waited 15 seconds before he started drinking ¼ of it. Then he stopped. When Rover started again he was very thirsty and quickly drank a lot of water. He took another short break before finishing the rest of the bowl.



What is the total amount of time Rover was actually drinking the water from his bowl?

A. 400 seconds **B.** 105 seconds **C.** 15 seconds **D.** 45 seconds

NJ ASK Post-test Mathematics

Adapted from the NJ ASK State Exam

Multiple Choice Questions

Write the correct answer on the line provided.

_____**1.)** What is the reciprocal of 4?

A. –4 **B.** 0 **C.** $\frac{1}{4}$ **D.** $|4|$

_____**2.)** Kristina rides her bicycle 13.25 miles to and from her job each week. How many miles does she bike in all to and from her job in 29 weeks?

A. 3.8425 miles **B.** 38.425 miles **C.** 384.25 miles **D.** 3,842.5 miles

_____**3.)** Mr. Farmer has a greyhound horse that can run 37.35 miles per hour. He also has a quarter horse that can run 47.5 miles per hour. How much faster can the quarter horse run than the greyhound?

A. 9.2 miles per hour **B.** 10.15 miles per hour

C. 11.45 miles per hour **D.** 11.85 miles per hour

_____**4.)** Maxim raised $890.88 for charity. He divided the amount equally among his sixteen favorite charities. How much did each charity receive?

A. $41.61 **B.**$54.16 **C.** $55.18 **D.** $55.68

_____**5.)** 5,425 ÷ 25 =

A. 215 **B.** 217 **C.** 217 R1 **D.** 217 R5

_____**6.)** Which number is equivalent to 4 hundreds, 2 tens, 5 ones and 3 thousandths?

A. 425.03 **B.** 425.003 **C.** 425.0003 **D.** 425.3000

_____**7.)** $\frac{7}{9} \div \frac{7}{27} =$

A. $\frac{49}{243}$ **B.** $\frac{1}{3}$ **C.** 3 **D.** $\frac{3}{7}$

_____**8.)** 5.56 + 3.7 =

A. 5.93 **B.** 8.2 **C.** 8.63 **D.** 9.26

_____**9.)** 24 – 8 x 2 + 9 =

A. 1 **B.** 17 **C.** 33 **D.** 41

_____**10.)** What is the median in the following set of data? 47, 51, 52, 54, 55, 55

A. 52 **B.** 53 **C.** 54 **D.** 55

_____**11.)** What is the mode in the following data set? 84, 92, 68, 79, 94, 84, 92, 79, 84, 68

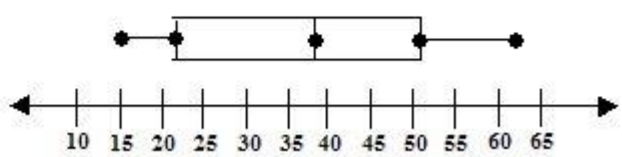
A. 68 **B.** 79 **C.** 84 **D.** 92

_____**12.)** What is the mean in the following set of data? 8, 4, 7, 10, 9, 3, 6, 0 and 7?

A. 9 **B.** 54 **C.** 6.75 **D.** 6

_____**13.)** What does 50 represent in the box plot?

A. median



B. lower quartile

C. upper quartile

D. upper extreme

<u>**EXTENDED CONSTRUCTED RESPONSE**</u>

14.) Complete each part of the question and explain your answer completely.

(HINTS – Organize your work and answer, use math vocabulary, give a detailed explanation of what, why and how you got your answer)

The weights of Ann's chickens are shown in the table.

Use the table to answer the questions below.

Chicken Weights (lb)											
14	6	5	7	7	5	6	7	6	6	4	5

- What are the mean, median, mode and range of the data? Describe how to find each of these measures.
- Is there an outlier in the data? Explain how to identify an outlier.
- Which measure is the best description of the center of this data set? Explain.

_____**15.)** Simplify the expression $7(-w - 3) - 5w + 6$

A. $-12w - 15$ **B.** $12w - 27$ **C.** $2w + 15$ **D.** $-2w + 27$

_____16**.)** What is the value of *n* in the equation $27 - 15n = -48$?

A. $n = 3$ **B.** $n = 5$ **C.** $n = -6$ **D.** $n = -5$

_____**17.)** What is the value of *f* in the equation $12f - 8 = -3f - 21$?

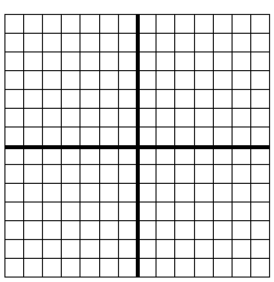
A. $f = -\frac{13}{15}$ **B.** $f = 1\frac{14}{15}$ **C.** $f = -1\frac{14}{15}$ **D.** $f = -13$

_____**18.)** Which of the following is a nonlinear equation?

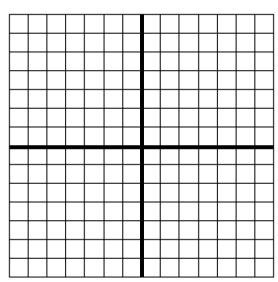
A. $y = \frac{1}{2}x + 5$ **B.** $y = -0.75x$ **C.** $y = 4x^2 + 1$ **D.** $x = 7$

_____**19.)** Which graph shows a nonlinear function?

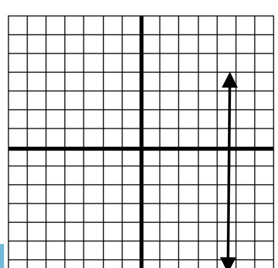
A.



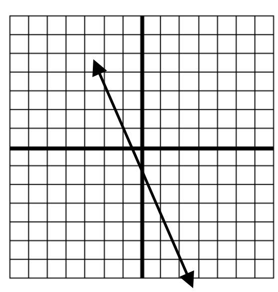
B.



C.



D.



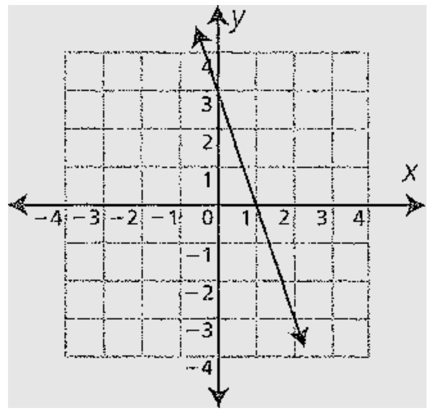
_____20.) Use the graph to find the rate of change.

A. 3

B. –3

C. $\frac{1}{3}$

D. $-\frac{1}{3}$

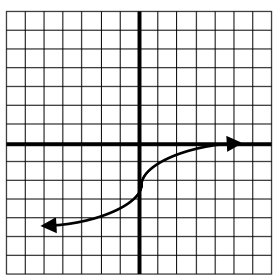


_____21.) What is the slope of a line that passes through points (5, –4) and (–3, 2)?

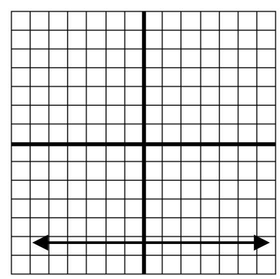
A. $\frac{1}{5}$ **B.** –1 **C.** $-\frac{3}{4}$ **D.** 2

_____22.) Which graph shows an undefined slope?

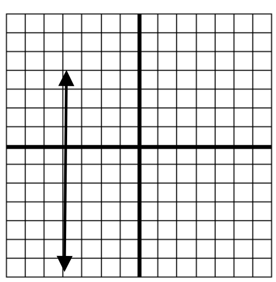
A.



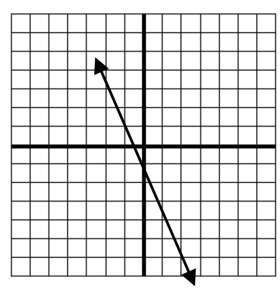
B.



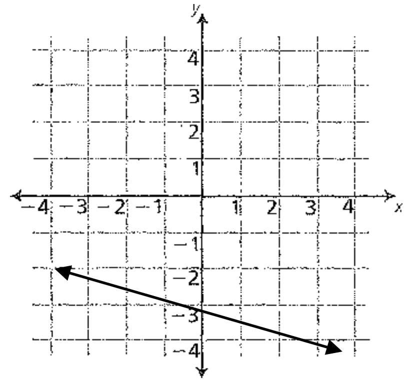
C.



D.



_____**23.)** What is the y-intercept of this line?



A. –3 **B.** $-\frac{1}{3}$

C. –1 **D.** 3

_____**24.)** Which equation shows a line with a y-intercept of 0?

A. y = x + 3 **B.** y = x – 9 **C.** y = 2 – x **D.** y = –4x

NJ ASK Pre-test Language Arts

Adapted from the NJ ASK State Exam

Until 1978, visitors to the Jersey shore could watch horses, diving from great heights into pools of water below. Author and historian Ernest Buck recalls New Jersey's famous diving horses in this article.

The Diving Horse

By Ernest Buck

When I was seven, I saw something amazing fall from the sky. It wasn't a star, it wasn't a man in a parachute, and it wasn't one of those flying saucers that everyone was talking about. It was the world famous high diving horse of Atlantic City: Dimah the Wonder Horse! I remember it like yesterday: the cool Atlantic breeze beating at my arms, the music blaring from a brass band, and the thousands of people who had traveled to Steel Pier to see Dimah leap from a platform sixty feet high into the water below. I'll admit I was nervous that day.

A diving horse was the craziest thing I'd ever heard of. I was ready for disaster. Then came the drum roll, the clashing cymbals, and the sound of hooves beating down the platform (clop, clop, clop!). Then, silence. Time stopped. Dimah remained frozen in the sky, looking like a large painting. The moment ended with a giant splash. The crowd went wild. Dimah the Wonder Horse stepped out the pool and took a bow.

That was fifty years ago. I still have pictures from the day I saw Dimah the Wonder Horse. I also have pictures of John the Baptist, another famous horse who would only jump if the audience cheered loudly. Then there's Red Lips, the most famous horse diving horse of all, who has been mentioned in books and movies. I have many pictures and artifacts from these shows, but guess what? You can't see any of them. It's not that I'm a greedy man. I'm proud of my memorabilia and I'd be the first to invite you to my Diving Horse Museum in Margate, New Jersey. But I was forced to shut down. "Out of Business!" the signs in my window say. Closed to the world.

In 1978, horse diving was made illegal, thanks to those pesky animal rights activists who don't know the facts. And with horse diving gone, businesses on the Jersey shore suffered. Well, just like Dimah bravely dove into the water, I too am on a brave mission. Horse diving has been described as "the icon of the New Jersey shore," and I intend to bring it back!

I don't have anything against animal right activists. In fact, I own two golden retrievers, and I'd hate to see any harm done to them . What bothers me is that activists make quick judgments without examining the facts. In 1978, animal activists accused trainers of using trapdoors and electric shocks to get a horse to dive. Not true! The horses dove on their own accord, and if a horse didn't want to jump, the horse didn't jump. Just ask the owners of the Magic Jungle, an amusement park in Lake George, New York, that still trains horses to dive. These trainers' main goal is to ensure the horses' safety. For example, water on the horse's body. The horses of the Magic Jungle never have to dive more than two times a day, and their "diving" season only lasts three months.

I've also heard horror stories about horses being taken to the slaughterhouse once they're unwilling to dive. Whichever one of those pesky animal rights activists is spreading this rumor obviously hasn't heard about the Fund for Animals. This organization made sure that Shiloh, one of the last of the New Jersey diving horses, retired peacefully to the Black Beauty Ranch, where he still lives today. As a pet lover, this makes me smile. After all, I'd never wish any harm on Rocco and Jocko, my two golden retrievers, even if they refused to play fetch.

I visited the Magic Jungle with my wife last summer, and we caught a show. (With my Horse Museum closed, I have lots of time on my hands.) I was amazed at the care provided for the horses. Even the ramp leading up to the platform was safe. It was a gradual incline with wooden cleats every six inches, so the horse wouldn't lose its footing. There were also windows along the entire ramp for ventilation. That's like five-star hotel! One horse didn't want to make the climb, so the trainer simply walked it to the stables, where it feasted on oats. These are the facts, people! Let's learn from the example of the trainers of Lake George and bring "the icon of the New Jersey shore" back to its rightful place.

Once upon time, the Jersey shore was described as '"The Show Place of the Nation." The Steel Pier was actually reopened in 1993 in hopes that it would bring back business. Unfortunately, bumper cars and Ferris wheels don't cut it these days. It seems that if a park doesn't have the word Disney in front of it, then it's not worth visiting. Well, forget the bumper cars and Ferris wheels. Bringing back horse diving is the first step in bringing back the magic of the Jersey shore.

So I'm calling out to the people of New Jersey, to the animal rights activists, and to any child who has ever been awed by a truly amazing sight: Let's bring back the world famous high-diving horse. Let's pay tribute to the joy of Dimah John the Baptist, and Red Lips. Let's hold our breath once again as the drums roll, the cymbals clash, and a horse's hooves rattle the platform. Let's watch the horse take its glorious bow. The let's all stop at the smile----open for business.

The purpose of this passage is to

1. Entertain readers with a funny story about a diving horse.
2. Teach readers about the life of Dimah the Wonder Horse.
3. Persuade readers to support making horse diving legal.
4. Inform readers about thing to see and do on the Jersey shore.

Which statement is an opinion?

- "In 1978, horse diving was made illegal…."
- "I own two golden retrievers….."
- "I visited the Magic Jungle with my wife last summer, and we caught a show."
- "……if a park doesn't have the word Disney in front of it, then it's not worth visiting."

The author's attitude toward animal rights activists could <u>best</u> be described as

1. Annoyed.
2. Appreciative.
3. Friendly.
4. Hateful.

When the author says "That's like a five-star hotel!" in paragraph 7, he is using

1. A metaphor.
2. A simile.
3. Hyperbole.
4. Personification.

The author is <u>most</u> knowledgeable on the topic because he

1. saw Dimah the Wonder Horse of age seven.
2. Owns two golden retrievers.
3. Visited the Magic Jungle with his wife.
4. Owned the Diving Horse Museum.

In paragraph 5, the word **accord** means

1. Protest.
2. Agreement.
3. Health.
4. Realization.

Which statement is a fact?

1. A diving horse was the craziest thing I'd ever heard of."
2. "…activists make quick judgments without examining the facts."
3. 'Even the ramp leading up to the platform was safe."
4. "it was a gradual incline with wooden cleats every six inches…"

Suppose the author decides to write a letter to the animal rights activists explaining why horse diving is a safe activity for the animals, and he can only use facts.

- What facts would support his opinion?
- Is the author likely to be successful in convincing animal right activists using these facts? Why or why not?

Use specific information from the passage and any additional insight to support your response.

NJ ASK Post-test Language Arts

Adapted from the NJ ASK State Exam

In this classic tale, writer Edgar Allan Poe tells about a man whose madness has led him to commit a terrible crime.

Adapted from

The Tell-Tale Heart

By Edgar Allan Poe

True!-nervous-very dreadfully nervous! But why would you say I am mad? The disease only sharpened my senses, above all my sense of hearing. I hear all things in heaven and earth, and many things in hell. So how am I mad? Listen to my story, how calmly I tell it.

I loved the old man. He had never wronged me or given me insult. I had no desire for his gold. I think it was his eye! The eye of vulture, pale blue, with a film over it. Whenever it fell on me, my blood ran cold. I had to take the life of the old man, and thus rid myself of that eye forever.

You fancy me mad. But you should have seen me. I proceeded with caution and foresight. I was never kinder to the old man than the week before I got rid of him. And every night about midnight, I'd look in on him, sneak into his chamber thinking to do my deed. But his eye would be closed. It was impossible to do the work, for it was not the old man who vexed me, but his Evil Eye.

On the eighth night, I was more than usually cautious. I could scarcely contain my feelings. I moved into his room, little by little. He moved on the bed suddenly as if he heard me. Did I move back? No, I kept pushing on steadily.

The old man sprang up and cried out-"Who's there?" I said nothing. For a whole hour, I didn't move a muscle. I heard him groan and knew it was a groan of mortal terror. Not pain or grief, but the low stifled sound that arises from the bottom of the soul. I knew that sound well. Did I move back? No, I kept pushing on steadily.

I chuckled inwardly. He was saying to himself, "It is only the wind, a cricket," trying to comfort himself. But his efforts were all in vain. Death stalked him like a black shadow, and he could feel the presence of that shadow in his room.

When I had waited a long time, I opened the shutter of my lantern until a single dim ray, like the thread of a spider, shot out and fell full upon the vulture eye. It was open wide! I grew furious as I gazed upon it – dull blue, with hideous veil over it that chilled me to my bones. I could see nothing of the rest of his face, just that cursed eye.

Haven't I told you that what you call madness is just an over-acuteness of the senses? What entered my ears at this point was a dull, quick sound which increased in fury. It was the beating of the old man's heart!

His terror must have been extreme. The sound grew louder by the minute. I've told you I'm nervous. At that hour, in dreadful silence, to hear such a strange sound excited me to uncontrollable terror. The beating grew louder, louder. I thought the heart would burst.

The old man's hour had come. I dropped the lantern and leaped at him. He shrieked only once. That eye would trouble me no more.

If you still think me mad, consider the wise precautions I took to conceal the body. As the night waned, I worked hastily, but in silence. I hid the old man under the flooring of the chamber. I replaced the boards so cleverly that no human eye-not even his-could detect anything wrong.

At four o'clock in the morning, still dark as midnight, there came a knock at the street door. Three men introduced themselves as police officers. My heart was light-what did I have to fear? A shriek had been heard by a neighbor. Could they search the building?

I smiled. I didn't worry. The shriek, I said, was my own in a dream. The old man, I added, was absent in the country. I asked them to do a thorough search. I led them throughout the house. In my confidence, I placed chairs over the spot where the old man lay, and we sat and chatted.

The officers were satisfied. My manner had convinced them. I was at ease. We talked of familiar things. But soon I felt pale and wished them gone. My head started to ache, and I fancied a ringing in my ears. I kept chatting, hoping the noise would leave. The noise, I soon realized, was not coming from within my ears.

Now I grew truly pale. It was a low, dull, quick sound. I gasped for breath and talked more quickly, but the noise only increased. I arose and argued about trifles. The noise would not go away, kept getting louder. Why would they not be gone?

I began to pace the floor, foaming and raving and swearing. I took my chair and banged it on the floor, under which lay the old man with the cursed eye. Louder-louder-louder! And still the men chatted pleasantly. Hadn't they heard it? Of course they had. They knew. They were making a mockery of my horror.

I could bear to see their hypocritical smiles no longer. I must scram or die! And now-again!-louder!louder!louder!louder!-

"Villains!" I shrieked. "Play with me no more! I admit the deed!-tear up the planks! here, here!-it is the beating of his hideous heart!"

Answer the following questions related to the text:

1. What kind of writing is this passage?

   A. Narrative
   B. persuasive
   C. expository
   D. technical

2. Why might someone read "The Tell-Tale Heart"?

   A. to find information for solving a problem
   B. to learn how to do an everyday task
   C. to be entertained by a spooky tale
   D. to learn about being a police officer

3. When the author writes that "the officers were satisfied, "he means that they
   A. were not disturbed by the evil eye.
   B. did not think anything was wrong.
   C. enjoyed their visit with the narrator.
   D. were sure they heard a heart beating.

4. What is the best way to find out why the old man says "It is only the wind, a cricket"?
   A. List all unfamiliar words in the passage.
   B. Reread the passage from beginning to end.
   C. Skim the passage for the phrase in question.

D. Reread the first and last paragraphs of the passage.

5. Why does the narrator become nervous around the officer?
   A. The old man is not really dead and is hiding in the house.
   B. The police want to search the house
   C. The police pretend not to hear the man's heartbeat.
   D. His guilt makes him image the old man's heartbeat.

6. What does the title "The Tell-Tale Heart" reveal about the story?
   A. The story is about a sane man who kills a madman who is having a nightmare.
   B. The story is about someone who kills an older man for his money.
   C. The story is about someone who shines a light upon an older man's vulture eye.
   D. The story is about a man who kills his housemate but imagines the old man's heart still beats.

7. In paragraph 3, vexed means
   A. forced.
   B. helped
   C. pleased
   D. annoyed

8. When the narrator says "a single dim ray, like the thread of a spider, shot out" in paragraph 7, the author is using
   A. an idiom
   B. a smile
   C. personification
   D. a metaphor

9. Thing about how the narrator change throughout the story.

   - Explain how the narrator's behavior shifts the longer the policeman stay in his house.
   - Predict how the narrator will behave after he confesses.

Use specific information from the passage to support your response.

Appendix F

PARCC Pre/Post Tests

Adapted from the PARCC Exam

PARCC - Pre-test Mathematics

Multiple Choice Questions

Write the correct answer on the line provided.

_____ **1.)** Which expression is equivalent to 25 – 38?

A. 25 + 38 **B.** –25 + 38 **C.** –25 + (–38) **D.** 25 + (–38)

_____ **2.)** –3 + (–9) =

A. –12 **B.** 12 **C.** –6 **D.** 12

_____ **3.)** –5 – (– 17) =

A. –12 **B.** –22 **C.** 12 **D.** 22

_____ **4.)** 3 – (–6) =

A. –9 **B.** –3 **C.** 9 **D.** 3

_____ **5.)** What is the value of (–7)(–5)(–4)?

A. –140 **B.** –16 **C.** 16 **D.** 14

_____ **6.)** $^4/_5$ x (– $^7/_{12}$) =

A. $^4/_{15}$ **B.** – $^3/_{60}$ **C.** $^4/_{30}$ **D.** – $^7/_{15}$

_____ **7.)** –3.5 x (–0.2) =

A. –0.07 **B.** –0.7 **C.** 0.07 **D.** 0.7

_____ **8.)** Find the difference. –9.6 + (–7.3) =

A. 2.3 **B.** – 2.3 **C.** 16.9 **D.** –16.9

_____ **9.)** Which of the following is *three less than twice a number n*?

A. 3 – 2n **B.** 2n – 3 **C.** 3 – n^2 **D.** 2 x 3 – n

_____ **10.)** Which of the following is *the quotient of a number x and four added to twelve*?

A. $12 + x - 4$ **B.** $4x + 12$ **C.** $12 + {}^{x}\!/_{4}$ **D.** ${}^{4}\!/_{x} + 12$

_____ **11.)** When $d = -2$, what is the value of $d^3 + 1$?

A. 7 **B.** –5 **C.** 9 **D.** –7

_____ **12.)** When $m = 6$, what is the value of $5 - 3m$?

A. –13 **B.** –2 **C.** 8 **D.** 23

_____ **13.)** What is the value of x in the following equation? $-5w = 45$

A. $w = 9$ **B.** $w = -9$ **C.** $w = -40$ **D.** $w = 40$

_____ **14.)** What is the value of x in the following equation? $-{}^{1}\!/_{3}z = 9$

A. $z = -3$ **B.** $z = 3$ **C.** $z = -27$ **D.** $z = 27$

Simplify each expression in the boxes below.

15.) $3(2f - 5)$

16.) $5g + g + 2g + 4$

17.) $-7h + 3 - 5h + 10$

18.) $6(2 + 4m) - 10m$

_____ **18.)** Solve for x. $-\frac{1}{2}x + 5 > 15$

A. $x < -5$ **B.** $x < -20$ **C.** $x > -5$ **D.** $x > -20$

PARCC Post-test Mathematics

Adapted from the PARCC Exam

Multiple Choice Questions

Write the correct answer on the line provided.

_____ **1.)** $-3 + (-9) =$

A. -12 **B.** 12 **C.** -6 **D.** 6

_____ **2.)** The temperature in the morning was -2^{o}F. By the afternoon, the temperature had risen 7^{o}F. What was the afternoon temperature?

A. -9^{o}F **B.** -5^{o}F **C.** 5^{o}F **D.** 9^{o}F

_____ **3.)** $-5 - (-17) =$

A. -12 **B.** -22 **C.** 12 **D.** 22

_____ **4.)** What is the value of $(-5)(3)(-4)$?

A. 60 **B.** -12 **C.** 12 **D.** -60

_____ **5.)** Which temperature is less than -5^{o} Fahrenheit ?

A. 4^{o}F **B.** -8^{o}F **C.** 0^{o}F **D.** -3^{o}F

_____**6.)** What is the opposite $-\frac{7}{8}$?

A. $\frac{7}{8}$ **B.** $-\frac{7}{8}$ **C.** $-\frac{8}{7}$ **D.** $\frac{8}{7}$

_____**7.)** Simplify the expression. $2d + 7e - 5d - 3e$

A. $3e + 4d$ **B.** $-3e + 4d$ **C.** $-3d + 4e$ **D.** $-3d - 4e$

_____**8.)** Simplify the expression. $7(-w - 3) - 5w + 6$

A. $-12w - 15$ **B.** $12w - 27$ **C.** $2w + 15$ **D.** $-2w + 27$

_____**9.)** Factor the expression $12x - 28$.

A. $4(3x - 7)$ **B.** $12(x - 28)$ **C.** $2(6x - 28)$ **D.** $-4(3x\ 7)$

_____**10.)** $27 - 15n = -48$

A. n = 3 **B.** n = 5 **C.** n = – 6 **D.** n = – 5

_____**11.)** 12f – 8 = –3f – 21

A. f = – $^{13}/_{15}$ **B.** f = 1 $^{14}/_{15}$ **C.** f = – 1 $^{4}/_{15}$ **D.** f = – 13

_____**12.)** When x = –6, what is the value of 5 + 3x?

A. –13 **B.** –2 **C.** 8 **D.** 23

_____**13.)** Evaluate the expression $a^2b - 2b$ *when a = 3 and b = 7*?

A. 28 **B.** 33 **C.** 49 **D.** 54

_____**14.)** Which expression represents *25 more than double a number*?

A. 25 x 2 + n **B.** 25 + n^2 **C.** 2n + (–25) **D.** 2n + 25

_____**15.)** If three times a number is decreased by 8, the result is 34. What is the number?

A. 8 $^{2}/_{3}$ **B.** 11 $^{1}/_{3}$ **C.** 14 **D.** 18

_____**16.)** Simplify the expression –7x – 3 – 5x + 10 by collecting like terms.

A. 12x + 7 **B.** –12x + 7 **C.** 12x + 13 **D.** –12x +13

_____**17.)** Simplify the expression. 7(–w – 3) + 5w + 6

A. –2w – 15 **B.** 4w + 10 **C.** 28w + 21 **D.** –2w + 3

_____**18.)** Solve for x: $9x - 27 \leq -63$

A. $x \leq 4$ **B.** $x \leq -4$ **C.** $x \geq 36$ **D.** $x \geq -4$

PARCC Pre-test Language Arts

Adapted from the PARCC Exam

In this story, writer J.M. Wasson describes an encounter between a panther and a heron

The Panther and the Heron

Retold by J.M. Wasson

In a steamy jungle, a sleek black panther prowled through the thick undergrowth searching for his evening meal. His dark fur hid him from his prey as he padded softly on the jungle floor. He was a mighty hunter, feared by the other animals for his sharp teeth and long dangerous claws.

Later that evening, as Panther was eating his supper, a splinter of bone became stuck between his teeth. He howled in pain throughout the night. He couldn't eat, and see couldn't sleep.

At daybreak, Panther saw Heron standing in the shallow water at the river's edge. Panther called to him.

"Help me, brother Heron, for I am in great pain. Your long beak can quickly remove the cause of my suffering."

Heron, being a good-hearted fellow, took pity on Panther. He flew over to Panther's side.

The big cat carefully opened his swollen jaw to let Heron remove the painful splinter. The sight of those long, sharp teeth gave Heron a start. But even so, the kind-hearted bird quickly pecked the bone from between Panther's teeth. Panther cried out in relief and gratitude.

Finally free from pain, a grateful Panther promised always to be kind to Heron in the future. "Thank you, brother Heron. In times of drought when there are few fish to be found,"
he said, "I will share my food with you to repay your good deed."

But it wasn't long until Panther allowed selfish thoughts to push his promise aside. *Why should I share with that twig of a bird?* he thought. I'm large, powerful, and muscular. I need all the food I can get to keep in this fine form. He admired his reflection in a still pool of water before taking a long, satisfying drink. Then and there, he decided never to give any food to Heron.

Drought came to the jungle. The rains stopped, and the river began to dry up. Fish were hard to find, and Heron grew hungry. His empty stomach reminded him of Panther's promise. He went to Panther and said, "Do you remember the good deed I did for you by pecking the bone from between your teeth?"

Panther snarled at him and tuned his head away.

But Heron continued. “You promised me in times of drought that you would share your meals with me. I am hungry, Panther. Please give me some food to eat today.”

Panther growled loudly, “Go away, you miserable bird.”

Heron was furious. He cried, “Panther, are you not grateful for what I did?”

Panther said, “Foolish little twig, don’t you know that I eat other animals? I did you a favor by not eating you when your head was in my mouth.” Then he snapped his jaws at Heron, flashing his long, white teeth in warning.

Shocked and frightened, Heron decided the jungle was no longer a good place to live. So he flew south along the river to a new home far, far away.

Several days later, Panther was eating his dinner when he let out a cry. Once again, a piece of bone had become stuck between his teeth. Frantic, Panther looked around for Heron. “Where are you, my feathery friend? Come help me remove this terrible bone and I will reward you handsomely,” he cried.

But Heron was nowhere to be found, and Panther was left alone with his terrible pain.

Answer the following questions related to the text:

1. What is the central idea of this story?

    A. A heron removes a bone from a panther’s teeth.

    B. A drought makes food hard to find in the jungle.

    C. A sleek, black panther prowls through the jungle.

    D. A panther refuses to help a Heron who helped him.

2. In paragraph 1, why is Panther prowling through the jungle?

    A. He is trying to find Heron.

    B. He is looking for something to eat.

    C. He is taking a walk after his evening meal.

    D. He wants to scare the other animals.

3. Which theme <u>best</u> fits this story?

A. Always try to do your best.

B. Work is easier when more people help.

C. Courage means taking action even when you are afraid.

D. Treat others as you want to be treated.

4. Which detail is <u>most</u> important to the theme of this story?

A. Panther breaks his promise to Heron.

B. Panther's dark fur hides him from his prey.

C. Panther admires his reflection in a pool of water.

D. The rains stop, and the river began to dry up.

5. When does Panther first ask Heron for help?

A. at daybreak

B. as soon as he is hurt

C. during a drought

D. the middle of the night

C. why Heron pretends not to hear Panther's call for help.

6. Heron asks Panther for help because Heron is

A. thirsty.

B. hurt.

C. sad.

D. hungry.

7. Paragraph 16 and 17 are <u>mostly</u> about

A. why Heron flies away to find a new home far away.

B. how Panther finds food to eat
during a time of drought.

C. why Heron pretends not to hear Panther's calls for help

E. how Panther gets hurt again but has no one to help him.

8. Think about how Panther and Heron treat each other in the story.

- What does Panther promise to Heron? Explain.
- Does Panther help Heron when drought comes to the jungle? Why or Why not?

Use specific information from the story and any additional insight to support your response.

PARCC Post-test Language Arts

Adapted from the PARCC Exam

Read the passage. Answer the following questions.

From An Autumn Flood
By Harriet Myrtle

1. "I am going," said Mary's mamma, on another evening, "to tell you a story about Scotland, and about some children who went there by sea, in a large steamship."

2. Their names were Charlotte, Helen, and Robert, and they went with their papa and mamma to visit their uncle and aunt. They went in August, when the weather is fine, and the days are long. They left home in the evening, for the steamer was to start at ten o'clock at night. There was a great bustle when they came to the place where the ships lie in the River Thames. Many people were getting their trunks and boxes in, and hurrying about. They liked to see all this bustle, and to see their own trunks and boxes put in. Then they stepped on board, across a wide, firm plank, and jumped for joy to find themselves really in the ship, and going to Scotland.

3. It was such a large steamer! They were surprised to see what a length it was. Then they were surprised to see what a length it was. Then they went into a handsome cabin, called the saloon, beautifully lighted, with a great many people in it; and after being there a little while they grew very tired, and their mamma took them to the cabin where they were to sleep. When they saw their beds, they all began to laugh. They looked just like beds made on shelves, one above another. Two were on one side and two on the other, of a kind of closet. But they soon crept in, Charlotte and Helen one above another, and little Robert opposite. The fourth bed was for their nurse, who was going with them. They were all soon asleep. They never knew when the steamer began to go fast down the river towards the sea.

4. In the morning when they awoke, first one and then another heard a constant " thump, thump! Bump, bump!" going on. This noise was made by the great engine that turned the paddle-wheels , and moved the ship on. And they felt the ship shaking, and trembling, and rocking, and then they were surprised to hear that they were already out of the River Thames, and had got into the salt sea. They were in a great hurry to be dressed, and when they ran up on the deck they saw the land on one side of them, and number of ships all round them, with their white sails shining in the sun, for it was a very fine morning. They tried to count them, but it was very difficulty; Charlotte counted a hundred, and Helen a hundred and ten. As to little Robert, he was too delighted to keep steady enough to count, and after trying once or twice, declared that there must be a thousand.

5. Very soon they were called to breakfast in the saloon, and sat by their papa and mamma very happily; but they ran away before they had finished, to see a town called Yarmouth, by which they passed so closely that they could see the houses, and bathing machines [a roofed cart on the beach where people changed into swimwear], and people. All the morning they had plenty to look at. They met other steamers, and fishing-boats, and ships, and saw different places on the coast. But before dinner-time they had lost sight of land, and saw nothing all round them but sea, and did not meet so many ships boats. Their papa then took them to see the engine, and the great fires down in the engine-room, and made them look at the paddle-wheels, that go foaming round and round. Then came dinner-time, and they were very hungry; and afterwards they amused themselves with running about on the deck and reading story books. Soon after tea they went to bed and fell fast asleep.

1. This question has two parts. Answer Part A first. Then answer Part B.

Part A Which of the following statements about Charlotte, Helen, and Robert is true?

A Traveling by sea is their favorite thing to do.
B This is their first trip on a large steamship.
C They would rather play than spend time with their parents.
D They have never been to Scotland before.

Part B Which sentence from the passage supports the answer to Part A?

A They were surprised to see what a length it was.
B All the morning they had plenty to look at.
C They never knew when the steamer began to go fast down the river towards the sea.
D They liked to see all this bustle, and to see their own trunks and boxes put in.

2. This questions has two parts. Answer Part A first. Then answer Part B.

Part A Read these sentences from the passage.

When they saw their beds, they all began to laugh. They looked just like beds made on shelves, one above another.

Why do the children laugh?
A They are relieved that the beds are arranged in this way.
B They have never seen beds like this before.
C They are making fun of the design of their cabin.

D They are nervous about sleeping in such a crowed space.

Part B Which character trait of the children is shown by these lines?
A cheerfulness
B kindness
C snobbishness
D timidity

3. This question has two parts. Answer Part A first. Then answer Part B.

Part A Read this sentence from the passage.

Their papa then took them to see the engine, and the great fires down in the engine room, and made them look at the paddle-wheels, that go foaming round and round.

To what does the foaming refer?
A the sound that the wheels make
B the delicate material from which the wheels are made
C the rough edges of the wheels
D the way the wheels move through the water

Part B What impression is conveyed by the use of the word foaming?
A The wheels are moving the ship powerfully through the sea.
B The children are excited as they watch the wheels.
C Parts of the ship are moving dangerously and recklessly.
D The ocean waves are coming up into the engine room.

4. This question has two parts. Answer Part A first. Then answer Part B.

Part A What is the **most** exciting part of the trip for the children?

A time spent with their parents
B sailing down the river
C the idea of going to Scotland
D the many new things to see

Part B Which detail form the passage supports the answer to Part A?

A The children happily eat breakfast with their parents.
B The children are overjoyed to be going to Scotland.
C The children spend the day on deck looking at the coast.
D The children are surprised that they are no longer on the Thames./3

5. Which detail form the text tells the reader that the excerpt from *An Autumn Flood* takes place in the past?

A The children are taking a trip to Scotland.
B The children are traveling by steamship.
C The children see many ships in the water.
D The children are leaving at night.

6. Based on the passage, decide which paragraph each of the following inferences can be drawn from. Then write the paragraph number next to the related inference.

Inference	Paragraph
Robert is the youngest of the children.	
The ship is powered by a flammable material.	
The children's parents sleep in s separate cabin.	
The children want to visit Scotland.	

7. Chose four statements that should be included in a summary of the excerpt form *An Autmn Flood* number them in the correct order.

__ The children are brave when the ship shakes and trembles.

__ The family travels to Scotland by steamship.

__ The children try to count all the ships they see.

__ The children eat breakfast on the boat.

__ The children sleep on the boat.

__ The children spend the next day exploring the ship watching the coast.

__ They are traveling in August because the weather is nice.

__ Three children, their parents, and their nurse are taking a trip to Scotland.

8. What is a theme of the passage? Use details from the passage to support your answers.

Appendix G

2013/2014 Pre-test Data

Twilight Period Student Name	NJ ASK Grade	2013-2014 Pretest LA	Sci	Ma
4TA	4	154	159	151
4TB	4	168	172	160
4TC	4	171	171	165
4TD	4	182	188	184
4TE	4	145	155	140
4TF	4	148	178	196
4TG	4	181	183	181
4TH	4	162	165	161
4TI	4	164	161	162
4TJ	4	166	170	168
5TA	5	182	183	181
5TB	5	177	177	174
5TC	5	181	183	184
5TD	5	186	187	184
5TE	5	182	186	183
5TF	5	161	165	160
5TG	5	175	173	172
5TH	5	168	170	167
5TI	5	158	159	157
5TJ	5	186	182	190
6TA	6	191	192	193
6TB	6	182	186	183
6TC	6	185	189	182
6TD	6	190	187	186
6TE	6	184	186	183
6TF	6	165	164	162
6TG	6	166	167	165
6TH	6	170	176	168
6TI	6	155	156	154
6TJ	6	191	196	192
6TK	6	186	182	189
6TL	6	181	186	182
6TM	6	180	188	181
6TN	6	161	167	166
6TO	6	166	169	168
6TP	6	163	165	162
6TQ	6	155	157	153

6TR	6	152	154	155
7TA	7	191	193	190
7TB	7	182	187	180
7TC	7	186	185	183
7TD	7	162	165	160
7TE	7	163	166	165
7TF	7	165	168	163
7TG	7	173	177	169
7TH	7	177	177	201
7TI	7	180	182	180
7TJ	7	184	186	185
7TK	7	172	176	169
7TL	7	165	170	166
7TM	7	170	172	169
7TN	7	143	148	147
7TO	7	154	154	156
7TP	7	158	153	157
Zero Period Student Name	**NJ ASK Grade**	**2013-2014 Pretest**		
		LA	**Sci**	**Ma**
4ZA	4	191	194	194
4ZB	4	193	197	191
4ZC	4	191	191	198
4ZD	4	198	195	195
4ZE	4	194	196	199
4ZF	4	191	193	199
4ZG	4	200	199	192
4ZH	4	193	191	194
4ZI	4	190	191	189
4ZJ	4	197	202	192
5ZA	5	190	194	196
5ZB	5	195	195	190
5ZC	5	190	190	200
5ZD	5	200	194	201
5ZE	5	194	192	192
5ZF	5	196	190	193
5ZG	5	199	201	195
5ZH	5	194	193	191
5ZI	5	190	194	192
5ZJ	5	193	199	190
5ZK	5	190	196	194
5ZL	5	194	189	196

Appendix H

2013/2014 Post-test Data

Twilight Period Student Name	NJ ASK Grade	Post - 1 LA	Post - 1 Sci	Post - 1 Ma	Post - 2 LA	Post - 2 Sci	Post - 2 Ma	Post - 3 LA	Post - 3 Sci	Post - 3 Ma
4TA	4	155	160	152	157	163	153	158	164	156
4TB	4	167	172	162	169	175	164	172	178	165
4TC	4	172	172	166	173	173	167	174	176	169
4TD	4	183	189	184	184	190	186	186	192	187
4TE	4	146	155	142	148	157	145	149	159	148
4TF	4	148	178	196	149	178	197	148	178	196
4TG	4	181	182	181	181	183	181	181	182	180
4TH	4	162	165	160	162	165	161	162	164	162
4TI	4	164	161	162	164	161	160	164	161	160
4TJ	4	166	171	168	166	170	168	166	171	169
5TA	5	184	184	182	184	184	183	185	184	184
5TB	5	178	178	175	179	178	176	179	179	177
5TC	5	182	184	185	183	185	186	184	186	188
5TD	5	187	188	185	188	188	186	188	188	187
5TE	5	184	187	184	184	188	185	185	189	186
5TF	5	162	165	161	162	165	162	163	165	163
5TG	5	176	173	172	176	173	173	176	173	174
5TH	5	168	170	167	168	170	167	168	170	167
5TI	5	158	159	157	158	159	158	158	159	158
5TJ	5	186	182	190	186	183	190	187	183	191
6TA	6	192	192	195	193	192	196	193	194	197
6TB	6	184	187	184	184	187	185	185	188	186
6TC	6	185	190	183	186	191	184	186	191	184
6TD	6	191	187	187	192	188	188	192	189	189
6TE	6	184	186	184	184	187	185	185	188	185
6TF	6	166	166	162	167	167	162	167	169	164
6TG	6	167	168	165	168	169	166	169	170	167
6TH	6	171	178	169	172	178	170	174	178	172
6TI	6	155	158	155	155	159	156	156	159	157
6TJ	6	190	194	192	190	195	192	191	196	192
6TK	6	186	182	189	186	182	189	186	182	189
6TL	6	181	186	183	181	186	183	181	186	183
6TM	6	180	188	182	180	188	182	180	188	182
6TN	6	162	167	166	162	167	166	162	167	167
6TO	6	166	169	168	166	169	167	166	170	169
6TP	6	163	165	162	163	165	161	163	165	162

6TQ	6	155	158	153	155	158	153	156	159	153
6TR	6	152	154	155	152	154	155	152	155	155
7TA	7	192	194	192	193	195	193	194	196	194
7TB	7	183	188	181	183	189	182	183	189	183
7TC	7	187	186	184	187	187	185	188	187	186
7TD	7	163	166	163	164	167	164	164	168	165
7TE	7	165	168	167	166	168	168	167	169	170
7TF	7	166	170	164	167	171	165	169	173	167
7TG	7	174	179	171	175	181	173	176	182	174
7TH	7	179	180	202	181	182	204	182	184	205
7TI	7	181	182	180	182	182	181	182	183	181
7TJ	7	184	186	186	184	187	186	185	187	186
7TK	7	172	176	169	172	176	169	172	176	170
7TL	7	165	170	166	165	170	167	166	170	167
7TM	7	170	173	169	170	173	170	170	173	170
7TN	7	143	148	148	144	149	148	145	149	148
7TO	7	154	154	156	154	154	156	154	154	156
7TP	7	158	153	157	159	154	157	159	155	158
Zero Period	**NJ ASK**									
Student Name	**Grade**	**Post - 1**			**Post - 2**			**Post - 3**		
		LA	**Sci**	**Ma**	**LA**	**Sci**	**Ma**	**LA**	**Sci**	**Ma**
4ZA	4	192	195	195	194	197	197	195	198	198
4ZB	4	194	198	192	196	200	193	198	203	193
4ZC	4	193	193	198	196	193	198	196	193	198
4ZD	4	199	196	197	200	198	199	201	200	201
4ZE	4	195	198	199	198	201	200	198	202	200
4ZF	4	192	193	200	191	193	200	193	193	202
4ZG	4	201	199	192	202	200	192	203	200	192
4ZH	4	193	192	194	193	192	194	194	193	196
4ZI	4	191	191	190	191	191	191	191	192	191
4ZJ	4	197	204	192	198	205	192	199	205	194
5ZA	5	191	195	196	193	195	197	194	195	199
5ZB	5	196	197	190	197	197	192	199	197	194
5ZC	5	192	191	201	193	192	202	193	192	203
5ZD	5	201	194	202	203	195	204	203	197	205
5ZE	5	195	193	193	196	195	194	198	198	195
5ZF	5	196	190	193	198	191	195	199	194	198
5ZG	5	200	201	196	201	202	196	202	203	196
5ZH	5	195	192	192	196	192	193	196	192	193
5ZI	5	190	195	192	191	194	192	192	196	192
5ZJ	5	193	199	191	194	200	191	195	200	192
5ZK	5	190	196	194	191	196	194	191	198	195
5ZL	5	194	191	196	195	191	196	195	191	197

Appendix I

2014/2015 Pre-test Data

Twilight Period Student Name	NJ ASK Grade	2014-2015 Pretest LA	Sci	Ma
4TA	4	159	164	157
4TB	4	174	180	166
4TC	4	175	176	169
4TD	4	188	193	188
4TE	4	150	161	150
4TF	4	148	179	196
4TG	4	182	185	181
4TH	4	162	167	162
4TI	4	164	162	163
4TJ	4	167	171	169
5TA	5	186	185	184
5TB	5	180	179	178
5TC	5	185	187	188
5TD	5	189	189	188
5TE	5	186	190	187
5TF	5	163	166	161
5TG	5	176	172	172
5TH	5	168	170	167
5TI	5	159	160	158
5TJ	5	187	183	191
6TA	6	193	196	198
6TB	6	186	189	187
6TC	6	187	192	185
6TD	6	193	190	190
6TE	6	186	188	186
6TF	6	168	170	165
6TG	6	170	170	168
6TH	6	175	179	173
6TI	6	157	162	158
6TJ	6	190	195	190
6TK	6	183	179	187
6TL	6	178	183	181
6TM	6	179	186	181
6TN	6	160	168	165
6TO	6	165	169	169
6TP	6	164	163	160

6TQ	6	155	155	155
6TR	6	152	152	155
7TA	7	194	197	195
7TB	7	184	190	184
7TC	7	189	188	187
7TD	7	165	169	166
7TE	7	168	170	170
7TF	7	169	174	168
7TG	7	177	183	175
7TH	7	174	175	190
7TI	7	179	181	179
7TJ	7	182	183	184
7TK	7	171	174	169
7TL	7	164	173	164
7TM	7	169	172	167
7TN	7	146	150	149
7TO	7	152	151	154
7TP	7	159	155	156
Zero Period	**NJ ASK**	**2014-2015**		
Student Name	**Grade**	**Pretest**		
		LA	**Sci**	**Ma**
4ZA	4	196	194	199
4ZB	4	197	197	194
4ZC	4	197	190	199
4ZD	4	202	195	202
4ZE	4	199	196	200
4ZF	4	193	193	202
4ZG	4	204	199	193
4ZH	4	194	191	196
4ZI	4	192	191	191
4ZJ	4	199	203	195
5ZA	5	194	194	199
5ZB	5	199	196	195
5ZC	5	194	189	204
5ZD	5	203	193	205
5ZE	5	198	192	196
5ZF	5	201	190	199
5ZG	5	199	201	195
5ZH	5	197	193	194
5ZI	5	193	194	191
5ZJ	5	194	198	190
5ZK	5	192	197	193
5ZL	5	194	190	196

Appendix J

2014/2015 Post-test Data

Twilight Period Student Name	NJ ASK Grade	Post - 1 LA	Post - 1 Sci	Post - 1 Ma	Post - 2 LA	Post - 2 Sci	Post - 2 Ma	Post - 3 LA	Post - 3 Sci	Post - 3 Ma
4TA	4	160	166	159	162	167	161	163	169	162
4TB	4	176	183	169	177	184	171	178	186	173
4TC	4	176	178	171	178	179	174	179	180	176
4TD	4	190	195	191	192	197	193	193	198	194
4TE	4	153	163	154	157	165	157	159	166	159
4TF	4	149	180	197	150	179	198	150	180	199
4TG	4	183	185	182	182	185	182	183	186	182
4TH	4	163	168	162	164	168	164	165	168	164
4TI	4	164	162	164	165	163	165	165	164	166
4TJ	4	167	172	169	168	173	170	169	173	171
5TA	5	187	185	184	189	187	188	190	189	189
5TB	5	181	181	180	183	184	183	185	186	184
5TC	5	186	188	190	187	189	192	188	190	193
5TD	5	191	190	190	193	192	192	194	193	194
5TE	5	187	191	189	189	193	191	190	194	192
5TF	5	163	166	162	163	166	162	164	166	161
5TG	5	177	173	171	177	173	171	177	173	172
5TH	5	169	169	167	169	169	167	171	169	167
5TI	5	160	160	159	160	160	159	160	160	160
5TJ	5	188	183	191	188	183	191	187	183	192
6TA	6	194	197	200	196	199	201	198	201	202
6TB	6	187	191	189	188	193	190	189	195	190
6TC	6	188	194	187	189	196	189	191	198	191
6TD	6	194	191	192	196	193	194	198	194	196
6TE	6	188	193	190	190	199	196	190	203	200
6TF	6	169	171	166	171	173	168	172	174	170
6TG	6	171	172	169	173	173	171	173	174	172
6TH	6	176	181	174	178	182	175	180	184	176
6TI	6	158	163	159	160	165	161	161	167	162
6TJ	6	191	196	193	193	196	192	194	197	193
6TK	6	186	181	190	186	181	190	186	181	190
6TL	6	182	186	182	182	186	184	182	186	184
6TM	6	181	189	183	181	189	183	181	188	183
6TN	6	163	168	166	163	168	167	163	169	167
6TO	6	164	170	170	165	170	169	166	170	170
6TP	6	165	166	162	165	166	162	165	166	163

6TQ	6	156	159	154	156	159	156	156	159	157
6TR	6	154	155	155	154	155	157	155	155	157
7TA	7	196	199	197	198	201	198	199	202	198
7TB	7	185	190	186	187	192	187	188	193	188
7TC	7	191	190	189	193	190	191	195	191	192
7TD	7	167	171	168	168	172	170	168	173	171
7TE	7	170	173	172	171	174	174	172	175	174
7TF	7	171	176	170	174	178	172	174	179	173
7TG	7	178	185	177	180	187	178	181	187	179
7TH	7	178	178	195	179	180	200	180	181	203
7TI	7	180	182	181	181	183	182	182	183	183
7TJ	7	182	184	184	183	184	185	184	185	186
7TK	7	172	175	169	173	175	170	173	175	171
7TL	7	165	174	164	166	174	164	168	175	164
7TM	7	170	172	167	170	173	166	171	173	167
7TN	7	147	151	149	146	151	150	147	151	151
7TO	7	153	151	154	154	152	154	154	152	155
7TP	7	160	156	157	160	156	158	160	157	158

Zero Period	**NJ ASK**									
Student Name	**Grade**	**Post - 1**			**Post - 2**			**Post - 3**		
		LA	**Sci**	**Ma**	**LA**	**Sci**	**Ma**	**LA**	**Sci**	**Ma**
4ZA	4	197	197	200	199	200	201	200	203	203
4ZB	4	199	200	195	201	205	197	202	208	199
4ZC	4	197	193	201	199	198	204	201	199	205
4ZD	4	204	200	202	207	201	205	208	207	206
4ZE	4	201	199	201	204	206	206	206	208	207
4ZF	4	192	194	202	193	195	203	192	195	202
4ZG	4	205	201	194	205	202	195	205	203	195
4ZH	4	193	192	196	194	193	197	193	193	198
4ZI	4	193	192	192	193	193	192	193	193	192
4ZJ	4	199	204	194	199	206	194	199	206	194
5ZA	5	195	197	200	198	202	201	200	205	202
5ZB	5	200	198	196	202	201	198	203	204	199
5ZC	5	195	192	205	197	196	207	197	199	208
5ZD	5	204	196	206	206	201	209	207	201	210
5ZE	5	199	195	198	203	198	200	204	202	201
5ZF	5	202	193	200	205	197	203	205	199	204
5ZG	5	200	202	195	201	204	196	200	204	197
5ZH	5	197	194	195	198	195	195	199	196	196
5ZI	5	193	195	192	194	195	193	193	194	193
5ZJ	5	194	199	191	195	200	192	196	200	192
5ZK	5	193	198	193	194	200	194	194	201	195
5ZL	5	195	191	196	196	192	197	195	193	198

Appendix K

2014/2015 PARCC Simulated Exam Data

Twilight Period Student Name	PARCC Grade	Sim Test 1		Sim Test 2		Sim Test 3		Sim Test 4		Sim Test 5	
		LA	Math	LA	Math	LA	Math	LA	Math	LA	Math
4TA	4	1	1	1	1	1	1	2	2	2	2
4TB	4	1	1	1	1	1	1	1	2	1	1
4TC	4	1	1	1	1	1	1	1	1	2	1
4TD	4	1	1	1	1	1	1	2	1	2	1
4TE	4	1	1	1	1	1	1	1	2	2	2
4TF	4	1	1	1	1	1	1	1	1	1	1
4TG	4	1	1	1	1	1	1	1	1	1	1
4TH	4	1	1	1	1	1	1	1	1	1	2
4TI	4	1	1	1	1	1	1	1	1	1	1
4TJ	4	1	1	1	1	1	1	1	1	1	1
5TA	5	1	1	1	1	1	2	1	1	2	1
5TB	5	1	1	1	1	1	1	1	1	2	1
5TC	5	1	1	1	1	1	2	1	1	1	1
5TD	5	1	1	1	1	1	1	2	2	2	1
5TE	5	1	1	1	1	1	1	1	1	1	2
5TF	5	1	1	1	1	1	1	1	1	1	1
5TG	5	1	1	1	1	1	1	1	1	1	1
5TH	5	1	1	1	1	1	1	1	1	1	1
5TI	5	1	1	1	1	1	1	1	1	1	1
5TJ	5	1	1	1	1	1	1	1	1	1	1
6TA	6	1	1	1	1	1	1	2	1	2	1
6TB	6	1	1	1	1	1	1	1	2	2	2
6TC	6	1	1	1	1	1	1	1	2	1	3
6TD	6	1	1	1	1	1	1	1	1	1	1
6TE	6	1	1	1	1	1	1	1	1	1	1
6TF	6	1	1	1	1	1	1	1	1	1	2
6TG	6	1	1	1	1	1	1	1	2	1	2
6TH	6	1	1	1	1	1	1	1	1	2	1
6TI	6	1	1	1	1	1	1	2	2	2	2
6TJ	6	1	1	1	1	1	1	1	1	1	1
6TK	6	1	1	1	1	1	1	1	1	1	2
6TL	6	1	1	1	1	1	1	1	1	1	1
6TM	6	1	1	1	1	1	1	1	1	1	1
6TN	6	1	1	1	1	1	1	1	1	1	1
6TO	6	1	1	1	1	1	1	1	1	2	1
6TP	6	1	1	1	1	1	1	1	1	1	1
6TQ	6	1	1	1	1	1	1	1	1	1	1

6TR	6	1	1	1	1	1	1	1	1	1	1
7TA	7	1	1	1	1	1	1	1	2	1	2
7TB	7	1	1	1	1	1	1	1	1	1	1
7TC	7	1	1	1	1	1	1	2	1	2	2
7TD	7	1	1	1	1	1	1	1	1	1	1
7TE	7	1	1	1	1	1	1	1	1	1	2
7TF	7	1	1	1	1	1	1	2	2	2	2
7TG	7	1	1	1	1	1	1	1	1	1	1
7TH	7	1	1	1	1	1	1	1	1	1	1
7TI	7	1	1	1	1	1	1	1	1	1	1
7TJ	7	1	1	1	1	1	1	1	1	1	1
7TK	7	1	1	1	1	1	1	1	1	1	1
7TL	7	1	1	1	1	1	1	1	1	1	1
7TM	7	1	1	1	1	1	1	1	1	1	1
7TN	7	1	1	1	1	1	1	1	1	1	2
7TO	7	1	1	1	1	1	1	1	1	1	1
7TP	7	1	1	1	1	1	1	1	1	1	1
Zero Period	**NJ ASK**										
Student Name	**Grade**	**Sim Test 1**		**Sim Test 2**		**Sim Test 3**		**Sim Test 4**		**Sim Test 5**	
		LA	**Math**	**LA**	**Math**	**LA**	**Math**	**LA**	**Math**	**LA**	**Math**
4ZA	4	1	1	1	1	1	1	1	1	1	1
4ZB	4	1	1	1	1	1	1	1	1	2	1
4ZC	4	1	1	1	1	1	1	1	1	2	1
4ZD	4	1	1	1	1	1	1	1	1	1	1
4ZE	4	1	1	1	1	1	1	1	1	1	2
4ZF	4	1	1	1	1	1	1	1	1	1	1
4ZG	4	1	1	1	1	1	1	1	1	1	1
4ZH	4	1	1	1	1	1	1	1	1	1	1
4ZI	4	1	1	1	1	1	1	1	1	1	1
4ZJ	4	1	1	1	1	1	1	1	1	1	2
5ZA	5	1	1	1	1	1	1	2	2	2	2
5ZB	5	1	1	1	1	1	1	1	1	2	1
5ZC	5	1	1	1	1	1	1	2	1	2	1
5ZD	5	1	1	1	1	1	1	1	2	1	2
5ZE	5	1	1	1	1	1	1	1	1	1	1
5ZF	5	1	1	1	1	1	1	1	2	1	2
5ZG	5	1	1	1	1	1	1	1	1	1	1
5ZH	5	1	1	1	1	1	1	1	1	1	1
5ZI	5	1	1	1	1	1	1	1	1	1	1
5ZJ	5	1	1	1	1	1	1	1	1	1	1
5ZK	5	1	1	1	1	1	1	1	1	2	2
5ZL	5	1	1	1	1	1	1	1	1	1	1

Appendix L

2015 PARCC Exam Data

Twilight Period Student Name	NJ ASK Grade	PARCC English/LA Score	Level	Mathematics Score	Level
4TA	4	2	PP	2	PP
4TB	4	1	PP	2	PP
4TC	4	2	PP	1	PP
4TD	4	2	PP	2	PP
4TE	4	2	PP	2	PP
4TF	4	1	PP	1	PP
4TG	4	1	PP	1	PP
4TH	4	1	pp	2	pp
4TI	4	1	PP	1	PP
4TJ	4	1	PP	1	PP
5TA	5	2	PP	1	PP
5TB	5	2	PP	2	PP
5TC	5	2	PP	1	PP
5TD	5	2	PP	2	PP
5TE	5	1	PP	2	PP
5TF	5	1	PP	1	PP
5TG	5	1	PP	1	PP
5TH	5	1	PP	1	PP
5TI	5	1	PP	1	PP
5TJ	5	1	PP	1	PP
6TA	6	2	PP	1	PP
6TB	6	3	PP	2	PP
6TC	6	1	PP	3	PP
6TD	6	1	PP	1	PP
6TE	6	1	PP	1	PP
6TF	6	1	PP	2	PP
6TG	6	2	PP	2	PP
6TH	6	2	PP	1	PP
6TI	6	3	PP	3	PP
6TJ	6	1	PP	1	PP
6TK	6	1	PP	2	PP
6TL	6	1	PP	1	PP
6TM	6	1	PP	1	PP
6TN	6	1	PP	1	PP
6TO	6	2	PP	1	PP
6TP	6	1	PP	1	PP
6TQ	6	1	PP	1	PP

6TR	6	1	PP	1	PP
7TA	7	1	PP	2	PP
7TB	7	1	PP	1	PP
7TC	7	2	PP	2	PP
7TD	7	1	PP	1	PP
7TE	7	1	PP	2	PP
7TF	7	2	PP	3	PP
7TG	7	1	PP	1	PP
7TH	7	1	PP	1	PP
7TI	7	1	PP	2	PP
7TJ	7	1	PP	1	PP
7TK	7	1	PP	1	PP
7TL	7	1	PP	1	PP
7TM	7	1	PP	1	PP
7TN	7	1	pp	2	pp
7TO	7	1	PP	1	PP
7TP	7	2	PP	1	PP
Zero Period	**PARCC**				
Student Name	**Grade**	**English/LA**		**Math**	
		Score	**Level**	**Score**	**Level**
4ZA	4	1	PP	2	PP
4ZB	4	2	PP	1	PP
4ZC	4	2	PP	1	PP
4ZD	4	1	PP	1	PP
4ZE	4	2	PP	2	PP
4ZF	4	1	PP	1	PP
4ZG	4	1	PP	1	PP
4ZH	4	1	PP	1	PP
4ZI	4	1	PP	1	PP
4ZJ	4	1	PP	2	PP
5ZA	5	2	PP	2	PP
5ZB	5	2	pp	1	pp
5ZC	5	3	PP	1	PP
5ZD	5	1	PP	2	PP
5ZE	5	1	PP	1	PP
5ZF	5	1	PP	3	PP
5ZG	5	1	PP	1	PP
5ZH	5	1	PP	1	PP
5ZI	5	1	PP	1	PP
5ZJ	5	1	PP	1	PP
5ZK	5	2	pp	2	pp
5ZL	5	1	PP	1	PP