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Walden University

College of Education

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Kelly Speed

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Walden University
2020

Abstract

Relationship Between Computer-Assisted Instruction and Student Achievement in Elementary Schools

by

Kelly Speed

MS, Walden University, 2010

BA, Rider University, 2007

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

August 2020

Abstract

Previous studies indicated that computer-assisted instruction (CAI) is a valuable educational tool at all school levels. However, in a school district located in northern New Jersey, educators do not know which aspect of student engagement in CAI is relevant for students' reading achievement. The purpose of this study was to determine which aspect of the students' engagement in CAI improved reading achievement of 4th- and 5th-grade students. This study was guided by the engagement theory because it is an adequate framework for technology-based instruction and learning. Student engagement was operationalized as "time on task', 'number of CAI assignments', and 'average scores on CAI comprehension tasks". Reading achievement was measured through scores on the Partnership Assessment of Readiness for College and Careers (PARCC). Deidentified archival data from 134 4th- and 5th-grade students were retrieved from the district's records. A multiple regression model was conducted where student engagement was hypothesized to predict reading achievement. The results showed that only "average scores" were a statistically significant predictor for PARCC scores, whereas the other two predictor variables were not significant. The findings informed the development of a professional development session for teachers and administrators focusing on the CAI comprehension tasks. Improved reading skills would benefit students by allowing them to access complex learning in other subjects and thus, promoting positive social change.

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Dedication

I dedicate this study to my first-born child, Robert Hobbs, who has always inspired me to keep working in every capacity. I love you to the moon and back times infinity. I also dedicate this study to my second born child, Ava, who has reminded me how expansive love is. Thank you to my husband for being on the adventure and supporting me. Thank you to my family and friends who supported me in any way during this journey. I love you all, with all of my heart.

Acknowledgments

First, I must thank God for giving me the strength to work through this journey. I am incredibly blessed to have had the support of my husband, mother, and sister throughout this journey. Your love, encouragement, and pep talks were most appreciated. Thank you to my friends for encouraging words and listening ears. Sister-friends, Reverend M. Biggins, and Reverend Williams, your prayers were always timely.

This study would not be possible without the committee members, Dr. Jazzar and Dr. Hough. Also, Dr. Jameson—an unofficial committee member—you were indeed a Godsend in this process. Thank you all for timely feedback, phone conferences, and guidance. I hope this study, which has made a significant impression upon my life, will impact the lives of students and educators.

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Section 1: The Problem

The Local Problem

Computer-assisted instruction (CAI) is an evidence-based instruction method that improves reading outcomes for students (Khezrlou, Ellis, & Sadeghi, 2017). CAI was implemented at a local district in northern New Jersey to improve the reading achievement of fourth and fifth graders because the Partnership for Assessment of Readiness for College and Careers (PARCC) test scores and student coursework did not reflect high levels of achievement. A lack of student engagement is deemed as problematic; yet, it is unclear if CAI specifically improves reading achievement for fourth- and fifth-grade students. The study site curriculum trainer reported students in the CAI program lack engagement. Further research on CAI and reading achievement is needed to ascertain the reasons for the gaps in the data, especially for elementary school and beginning readers (Dorris, 2014; Kunkel, 2015; Bennett, Gardner, Cartledge, Ramnath, & Council, 2017).

Twenty-first century technology teaching practices and learning modalities allow for blended learning environments, which can provide students the opportunity to improve their reading achievement outcomes, build self-efficacy (Jozwik & Douglas, 2016; Schechter, Macaruso, Kazakoff, & Brooke, 2015; Shannon, Styers, Wilkerson, & Peery, 2015; Wijekumar, Meyer, & Lei, 2017), and address issues that affect overall reading achievement (Chatterjee & Kothari, 2014). According to the curriculum trainer, 21st-century skills are a focus for the northern New Jersey school district where the current study took place. The local school study site uses CAI instructional practices to

teach students the use and applicability of 21st-century skills. These 21st-century skills encompass core competency skills such as learning, collaboration, critical thinking, and problem-solving (Qian & Clark, 2016). The study site curriculum trainer reported that student proficiency in content areas—specifically reading achievement—is implemented through CAI usage. The implementation of CAI programs at the local school district, in conjunction with guided reading instruction, was established to address low reading achievement. Achieve3000 (2018b), the CAI program used by the school district, offers differentiated instruction and accelerated learning as well as monitors students' Lexile levels and forecasts students' grade-level achievement. Lexile level refers to an algebraic equation used to evaluate word frequency, sentence length, and difficulty of reading text used to provide an outcome of person's reading ability (Lennon & Burdick, 2004).

CAI can have a modest but positive effect on reading achievement (Khezrlou et al., 2017; Lysenko & Abrami, 2014; Tingir, Cavlazoglu, Caliskan, Koklu, & Intepe-Tingir, 2017). Data showed a gap in practice between the CAI usage documented in the published studies and CAI usage in the local setting of a northern New Jersey school (NNJS) district. In this study, I addressed the gap in practice at the NNJS district and contributed to the body of knowledge surrounding CAI by identifying whether a corollary relationship exists between student engagement with CAI and student reading achievement.

It is paramount that instructional practices serve students' needs and develop healthy engagement practices to improve students' reading achievement. Teachers must infuse various participation techniques in their teaching methods to ensure that students

remain engaged and participatory (Dillon, 2017). It is vital to monitor student engagement and usage while students work independently with CAI programs to ensure adequate student progress (McTigue & Uppstad, 2019). Educators who monitor student engagement further ensure that instructional practices and desired student outcomes are aligned, especially as progress monitoring is a priority in today's classrooms.

Rationale

The NNJS district invested in CAI in 2007 to improve reading achievement by creating more varied opportunities for student engagement with the reading curriculum. Computer-assisted programs were implemented in the NNJS district in conjunction with guided reading instruction. Multiple studies and meta-analyses have shown CAI to have a modest but positive effect on reading achievement (Khezrlou et al. 2017; Lysenko & Abrami, 2014; Regan, Berkeley, Hughes, & Kirby, 2014; Tingir et al., 2017). The study site curriculum trainer reported the achievement gap between proficient and nonproficient readers is still present; therefore, it is essential to identify the CAI factors that lead to a difference in achievement.

The purpose of this quantitative predictive study was to test whether student engagement variables (i.e., time on task, number of CAI completed assignments, and students' average scores on CAI tasks) accurately predicted differences in reading achievement for fourth- and fifth-grade students in the NNJS district. Data on the relationship between student engagement with CAI (as measured by time spent logged in, number of CAI assignments completed, and students' average scores from CAI tasks) and improved reading achievement can provide more information for researchers,

educators, and practitioners on how to best use CAI to improve student learning outcomes. With this study, I aimed to identify which of these variables predicts differences reading achievement.

Definition of Terms

Behavior engagement: The observation of behaviors in a student through participation in tasks, attention to tasks, and completion of tasks (Wang, Bergin, & Bergin, 2014).

Computer-assisted instruction (CAI): A teaching and learning tool with the information presented to a student by a computer (Şeker & Kartal, 2017)

Lexile level: The algebraic equation that measures the word frequency, sentence length, and difficulty of an analyzed text. The outcome is a Lexile measurement that measures a person's reading ability and text difficulty (Lennon & Burdick, 2004).

The Significance of the Study

The findings of this study will be valuable to educational researchers who seek additional ways to improve reading achievement in classrooms by supporting students' reading practices. Appropriate usage of CAI can raise student achievement in reading (Khezrlou et al., 2017; Lysenko & Abrami, 2014; Regan et al., 2014; Tingir et al., 2017); however, this was not the case in the NNJS district. Over the course of this study, I examined the amount of time students needed to spend engaging with CAI to increase their reading achievement. The findings will be useful to the NNJS district because the study results can be used to improve reading achievement by reevaluating and adjusting CAI usage in the classroom. Professional development (PD) programs and training

sessions can be developed and implemented to support the integration of CAI programs into existing instructional practices at the NNJS district. Educators can also use the study results to identify whether a relationship exists between CAI usage and reading achievement for the students in the NNJS district.

Appropriate implementation of CAI can raise student achievement in reading (Khezrlou et al., 2017; Lysenko & Abrami, 2014; Regan et al., 2014; Tingir et al., 2017). Increasing engagement with CAI may result in an increase in reading achievement; however, the effectiveness of CAI through Achieve3000 is not known in depth in current literature. For instance, students who spend more hours logged in (i.e., students who are on task during CAI) may have higher reading achievement; however, students' reading achievement may not correlate with their scores on CAI assignments. Therefore, administrators should provide teachers with instructional strategies to keep students interested in the technological curriculum while also ensuring instructional alignment.

Research Questions and Hypotheses

In this study, I determined whether engagement in CAI can predict reading achievement. The overarching research question for this study was as follows: Does CAI engagement predict reading achievement? CAI engagement was operationalized by three variables: (a) time logged in to CAI, which was measured by the number of minutes the student is logged in to the CAI program; (b) the number of CAI assignments as measured by number of assignments completed on CAI program; and (c) the average cumulative score on CAI as measured by average cumulative score a student recieves on CAI tasks. Reading achievement was determined by changes in student scores on the PARCC

assessment from 2017 to 2018 and are referred to as difference in reading achievement. I tested the following three pairs of hypotheses using a multiple regression analysis to address the overarching research question:

$H_0$1: There is no significant relationship between time logged in to CAI and reading achievement.

$H_1$1: There is a significant relationship between time logged into CAI and reading achievement.

$H_0$2: There is no significant relationship between the number of CAI assignments completed and reading achievement.

$H_1$2: There is a significant relationship between the number of CAI assignments completed and reading achievement.

$H_0$3: There is no significant relationship between the students' average cumulative scores from CAI tasks and reading achievement.

$H_1$3: There is a significant relationship between the students' average cumulative score from CAI tasks and reading achievement.

Review of the Literature

This literature review includes a synthesis of empirical studies about student achievement, engagement, self-efficacy, and technical literacy. In this literature review, I also elaborate on studies related to the usage of Achieve3000 in the elementary school setting. Although prior studies have focused on engagement as a predictor of reading achievement in the classroom, research on engagement as a predictor of reading achievement with CAI is limited (Guo, Sun, Breit-Smith, & Morrison, 2014). In this

section, I synthesize extant research on how teachers provide a foundation for the usage of CAI through attitudes and competency. The literature review also includes an analysis of student usage and how engagement influences students' ability to spend sufficient time on task, complete the task, and achieve satisfactory scores that measure reading achievement. Additionally, this section contains a brief discussion of students' self-efficacy and the role self-efficacy has on students' scholastic achievement. Technical literacy as a 21st-century literacy skill is discussed as it pertains to reading skills, monitoring student progress, and the usage of CAI programs. Lastly, Achieve3000 and its methodology to support readers is reviewed.

I used the term, *computer- assisted instruction* interchangeably with the terms *computer-based technology*, *computer-assisted program*, *computer-assisted learning*, *computer-assisted technology*, *ITSs (intelligent tutoring systems*), and *ICT* (*information communication technology*) when searching for peer-reviewed articles. The terms were critical in intertwining the breadth and depth of the literature regarding the use of computer instruction to determine how the predictor variables predict changes in reading achievement. I also used keywords, such as *achievement, blended learning, computer-assisted instruction, computer-based technology, engagement,* and *self-efficacy,* to gather sufficient research articles. EBSCOHost, ERIC, and ProQuest databases were used to complete an exhaustive search for resources on the aforementioned concepts. From these searches, I collected and analyzed resources to review to connect the concepts.

Theoretical Framework

This study was based on the theory of student engagement for technology-based learning (see Kearsley & Schneiderman, 1998). I used the theory of student engagement to identify which engagement variables accurately predict the reading achievement of fourth and fifth grade students in a NNJS district. Engagement theory states that students learn better when their tasks are meaningful to them and the others with whom they are engaged (Kearsley & Schneiderman, 1998). Technology-facilitated engagement is improved upon with tasks that would otherwise prove challenging to accomplish. Student engagement theory promotes innovative learning methods and facilitates content learning (Sung, Chang, & Liu, 2016). Authentic learning, along with active student participation, leads to high achievement outcomes (Machumu, Zho, & Almasi, 2018). Educators use student engagement theory to promote opportunities to differentiate instruction and effectively address the needs of individual learners. Students in the NNJS district engage in CAI learning within an allocated time frame while being provided with authentic learning activities catered to their individual needs. Students have the ability to complete an optimal number of activities beyond the preassigned articles for each reading task.

The behavioral aspect of engagement is defined as a students' persistence, effort, attention, and participation during a task (Fredricks, Blumenfeld, & Paris, 2004; Sinatra, Heddy, & Lombardi, 2015; Wang, Frederics, Ye, Hofkens, & Linn, 2017). Behavioral engagement can be conceptualized into two subcomponents: academics, which includes time on task, credits earned, and scores on assignments and behavior, which includes attendance, class participation, and extracurricular participation (Appleton, Christenson,

Kim, & Reschly, 2006). The quality of involvement is salient to achievement and the engagement aspects relate to one another, contributing to the academic outcome (Wang et al., 2017).

In this study, I focused on academic components of behavioral engagement as a catalyst for learning. The theory of engagement supports the hypotheses that a significant relationship exists between the predictor variables and asserts that the strength of the relationships is demonstrated among the variables. Additionally, the theory of engagement provides the study with alignment related to student-centered engagement for personal academic achievement by addressing the engagement variables (i.e., time on task, number of CAI completed assignments, and students' average score on CAI tasks) included in the research question and subquestions. Learners are able to use the theory of engagement to promote personalized learning experiences. Educators can also apply the theory of engagement to expand differentiated instruction to address individual learners' needs. CAI assignments are springboards that can lead to greater proficiency in reading and provide opportunities for students to demonstrate academic achievement as it relates to 21st-century skills.

Review of the Broader Problem

Reading achievement. Sixty-nine percent of fourth graders read "at or above the basic level" (U.S. Department of Education, National Center for Educational Statistics, 2017, p. 156) .Data from 2013 indicated that at least 31% of students are reading at or above grade level (U.S. Department of Education, National Center for Educational Statistics, 2017). Intervention programs are embedded within the classroom to combat

reading achievement concerns and build academic literacy skills (Torgesen et al., 2017). School-level instructional practices are developed to foster achievement and assist with closing the reading gap (Torgesen et al., 2017). Intervention programs include explicit reading instruction, guided reading, the response to intervention model, fluency, and phonics (Harrison, 2017). Today's classrooms use blended instruction to meet the needs of the individual learners and meet 21st-century skills standards, including technology (Morgan & Spies, 2020). Technological reading interventions became a trend beginning in 1987; today, technological reading interventions are in massive demand in many K–12 classrooms (Jamshidifarsani, Garbaya, Lim, Blazevic, & Ritchie, 2019).

Attitudes. The way teachers introduce and use CAI and monitor progress makes a difference in how CAI is received and used by student learners. A teacher's motivation for student engagement will be impacted if the teacher is uninterested, intimidated, or lacks competency in technology (Baturay, Gökçearslan, & Ke, 2017; Uluyol & Sahin, 2016). Students will not engage or have a positive learning experience when teacher competency and attitudes do not reflect positivity or motivation (Baturay, Gökçearslan, & Ke, 2017). Uluyol and Şahin (2016) found that teachers were motivated to use ICT because ICT increased the retention of skills and students' motivation to learn. Students' impression of the level of fun, frustration, and other emotions contributes to their experience using CAI; hence, it is pertinent to properly train teachers to effectively launch CAI in the classroom. Student buy-in is of the utmost importance to improve student achievement.

Trends to support developing readers. Academic literacy is reading proficiency and the ability to comprehend text (Torgesen et al., 2017). A reader must master the invisible skills of decoding, phonics, fluency, and comprehension to be a competent reader and become academically literate (Wolff, 2017). The reader can become frustrated and develop an aversion to reading tasks if these skills are not mastered (Torgesen et al., 2017). Certain tools and instructional plans can assist emerging readers with creating structure and sustainable, positive learning habits. The landscape of reading instruction has shifted from single teacher-led instruction to guided reading and workshop models, book studies, and individualized learning experiences (Coffey, 2017). These shifts have been intentional in creating effective reading instruction.

Remedial and technology-assisted instruction. Technology serves as remedial assistance, as a research tool, and as a daily instructional tool to meet each students' learning path (Chatterjee & Kothari, 2014). Reading interventions have helped bridge the gap in literacy deficiencies. Adaptations in instructional delivery help to eradicate increasing high school dropout rates because at-risk students are more inclined to participate in nonjudgmental learning opportunities (National Dropout Prevention Center, 2018). Dropout rates declined from 2000 to 2015, and this decline correlates with the influx of blended learning opportunities in the classroom (National Center for Educational Statistics, 2019). Technology-assisted instruction in particular has aided students with the development of self-esteem, independent pacing, and academic integration with both positive and negative information (Willmann, 2017). Pate (2016) postulated the importance of teachers aiding students with discerning information and

producing new ways to challenge students. Today, technology assistance offers a variety of learning experiences for all learners through various modalities; it is the instructor's top priority to ensure students are using technology in a positive and constructive matter that aids in academic growth.

Computer- assisted Instruction

CAI is a teaching and learning tool that presents information to a student through a computer (Seker & Kartal, 2017). CAI has been a leading instructional adaptation resource used to support traditional instructional practices. The adaptation of CAI has led schools to adjust best practices to include technological instruction to better meet diverse student learning needs (Jozwik & Douglas, 2016). The computer-driven society has generated an educational system that requires computer literacy for college and career readiness (Jozwik & Douglas, 2016). Educators must understand student needs as well as classroom adaptations to increase achievement in diverse learning environments (Jozwik & Douglas, 2016). The two most important features of CAI are (a) students have multiple opportunities to practice a skill and (b) students receive immediate feedback (Regan et al., 2014). The best practices needed to support students' diverse needs include data-driven instruction, progress monitoring, and individualized educational models that mirror best practices for student engagement (Jozwik & Douglas, 2016).

Implementation. Teachers are provided PD opportunities to increase engagement during reading workshops. It takes preparation and training to introduce new programs for instructional practice and optimize the program's outcomes and overcome integration barriers (Baturay et al., 2017; Uluyol & Şahin, 2016). Teacher competence in technology

fosters technology acceptance (Baturay et al., 2017). Using regression and correlation to analyze 476 teacher surveys, Baturay et al. (2017) examined whether preparedness correlates with attitudes toward computer-assisted education. Baturay et al. found that the number of minutes a student spends using the computer-based program contributed to the significant positive regression and showed a higher competency level with program usage, which correlated to positive attitudes towards computer-assisted education. Their findings indicated that competency influences attitudes. Teachers' attitudes are the first impressions of any computer-based program, so the way teachers introduce, implement, and use CAI programs greatly impacts the level to which students interact with CAI (Vanderlinde, Aesaert, & Van Braak, 2014). Teachers influence students' ability to navigate challenges encountered on CAI programs.

Vanderlinde et al. (2014) measured how ICT factors influence teaching and learning. Vanderlinde et al. surveyed 433 teachers and their usage intentions and found that ICT skills, such as information and innovation usage, consistently affected classroom integration in primary schools. These findings suggest that basic skills for technology use can impact the outcome of CAI. Mirzanjani, Mahmud, Fauzi Mohd Ayub, and Wong (2016) investigated the impact of competence and acceptance on classroom integration. Using interviews and surveys, Mirzanjani et al. concluded that positive attitude correlates to positive experiences and asserted that inexperienced or ill-equipped teachers do not successfully integrate ICT. Teachers are the first defense against challenges with regards to student implementation outcomes. CAI programs can thrive when used in conjunction

with scaffolded instructional practices that support student achievement (Mirzanjani et al., 2016).

The success of CAI relies upon consistency and frequency in use (Hill, Lenard, & Page, 2016). The challenge of integration is partly due to insufficient PD (Zinger, Naranjo, Amador, Gilbertson, & Warschauer, 2017). Teachers with adequate PD experiences can improve student learning outcomes through explicit instruction and technology preservice. Teachers learn how to navigate instructional tools, use devices for optimal outcomes, monitor student progress, and read the reports for effective implementation and competency through proper PD, administrative motivation, and support (Hill et al., 2016). Through surveying 384 students in Grades 4, 5, and 6 to examine whether ICT skills had a direct impact on students' reading abilities. Liu and Ko (2016) investigated which perspectives were best for describing online reading. Their findings revealed that ICT skills have a minor role as a predictor of online reading ability. Paper reading comprehension had the strongest significant predictor of students' ICT skills, revealing that traditional readings skills, along with technological competency skills, empower students' online reading ability.

Utilization. Most CAI programs improve achievement through using drill and practice or game design (Regan et al., 2014; Seker & Kartal, 2017; Stultz, 2017). CAI programs used in instructional settings for drill and practice provide students with additional ways to engage in skills that will improve their reading achievement. Many educators, school districts, and the Department of Education prioritize the need to cultivate achievement opportunities in the classroom (Jacques et al., 2017). CAI provides

schools with the opportunity to strategically monitor progress and adjust students' learning path with daily computer-assisted activities (Hill et al., 2016). Skill and drill through the use of computers offers students an individualized opportunity to participate in learning activities at their own pace. Students' flexibility of computer usage during instructional time provides each student with the chance to control his or her productivity and engagement levels.

Drill-and-practice is useful for the retention of skills. Prior studies used a quantitative analysis that examined the effect of CAI in math and science education (Nkemdilim & Okeke, 2014; Seker & Kartal, 2017; Skryabin, Zhang, Liu, & Zhang, 2015). Seker and Kartal (2017) investigated the effects of CAI on seventh-grade students. Seker and Kartal evenly dispersed 46 seventh-grade students into experimental and control groups and found that student mastery with the use of both traditional and CAI methods significantly increased after teaching concepts for 8 weeks. The use of drill positively impacted achievement.

Nkemdilim and Okeke (2014) studied 66 senior secondary students who used ANCOVA. Nkemdilim and Okeke revealed that CAI students scored better than students who were only exposed to the modified lecture method. Modified lectured students had no significant increase in scores; this was partly attributed to students' lack of opportunity to immerse themselves in concepts at their own pace. Ownership in the learning process provides a more significant chance for achievement.

Skryabin et al. (2015) investigated how math, science, and reading subjects influence achievement. Skryabin et al. found that fourth grade and eighth-grade students'

performance on assessments illustrated a positive achievement indicator with individual usage through the hierarchical linear model. Across all three subjects, national-level ICT usage showed positive effects; however, a negative relationship was found with the increasing rate of change, except for in fourth-grade reading (Skryabin et al., 2015). These findings revealed that students who spent more time using ICT achieved more than those who did not use ICT.

Alternatively, studies have found that computer usage adversely affects achievement (Comi, Argentin, Gui, Origo, & Pagani, 2017; Falck, Mang, & Woessmann, 2018; Li & Wang, 2014). Falck et al. (2018) asserted that student achievement declines when students use computers for practicing skills. Falck et al. addressed the contrary impact computers have on fourth grade and eighth-grade student achievement when students use computer technology for practicing skills as opposed to gathering information using other nontechnological methods. Comi et al. (2017) investigated whether ICT teaching practices impact student achievement in math and Italian language subjects. Comi et al. used quantitative descriptive statistics to conduct a study of 1,466 students and 47 teachers. Comi et al. found that ICT practices positively impacted student achievement when students have adequate technological skills. It is pertinent to acknowledge that the PD training received at the current study site allowed teachers to implement the CAI program and work with students individually.

Unlike Falck et al. (2018), Li and Wang (2014) found that computer-based activities did not yield significant achievements in all areas investigated. Li and Wang found that computer usage and achievement are negatively associated; however, a further

examination of the scope of the integration of instruction revealed that computers have positively provided students with opportunities to individually thrive. CAI is used at the study site as a tool for academic intervention that offers students the chance to succeed independently. Chambers et al. (2018) investigated how iPads are used in classrooms to support learning. iPads are used at all grade levels and with a variety of purposes; to increase student effectiveness, PD is needed to build teacher confidence when working with students who use iPads.

Student Engagement

Engaged students are able to absorb information and improve academic skills that create meaningful connections and promote learning. Engagement is a crucial contributing factor to learning and academic success (Fredricks, Filsecker, & Lawson, 2016). Educators at the study site use the CAI reading intervention to provide students with the opportunity to absorb information, make meaningful connections, and improve learning. Teachers must engage learners in impactful and meaningful ways (Heflin, Shewmaker, & Nguyen, 2017; Henrie, Halverson, & Graham, 2015; Hong, Hwang, Tai, & Lin, 2017; Shannon et al., 2015). The challenge with measuring engagement is the lack of consistency with terminology.

Henrie et al. (2015) reviewed the challenges of engagement through the lens of learning through digital technology. Consistent terminology is lacking regarding student engagement; this lack of terminology is the most significant challenge when using self-reports and surveys to measure student engagement (Henrie et al., 2015). The current study aimed to determine the level of student engagement in the CAI reading

intervention. Teachers gain insight into student attention, student focus, student effort, persistence, and emotional response to reading activities through assessing students' engagement levels (Guthrie & Klauda, 2015). Engagement as an indicator provides stakeholders with opportunities to identify trends with achievement growth and decline in relation to CAI program usage. The current study could potentially aid educators at the study site in assessing student growth or a lack of growth in achievement in conjunction with CAI usage.

Engagement can be categorized as active, passive, or not engaged. The amount of student engagement leads to a successful or unsuccessful outcome (Rienties, Lewis, McFarlane, Nguyen, & Toetenel, 2018). Wijekumar et al. (2017) explored seventh-grade students' comprehension when using ITS. The findings indicated that students using ITS as a substitute to standard curriculum performed an average of 2 points higher than students who did not use ITS (Wijekumar et al., 2017). Although minuscule, the increase in achievement was due to the successfully engaged participant. Heflin et al. (2017) investigated the impact of technology used in two first-year college student collaborative learning groups. Heflin et al. found that students associated more with disengagement and production of less satisfactory learning artifacts. Students were less thoughtful in responses, which prompted student distraction. Heflin et al. concluded that the use of technology can be a limitation to achievement. Ayçiçek, Yanpar, and Yelken (2018) investigated the effects of the flipped classroom on student engagement. The application of the flipped classroom model enabled student opportunity to increase achievement. No

significant difference was found amongst the research groups; however, the flipped classroom model supported individual learning and increased the success of students.

Games. Technology fosters learning; therefore, technology is an essential building block for the classroom (Chauhan, 2017). Game-like learning catches students' attention. Looyestyn, Kernot, Boshoff, Ryan, Edney, and Maher (2017) concluded that gaming is an effective strategy in increasing engagement in online programs. Engagement fosters a greater willingness for students to participate in student-centered activities in meaningful ways. Game-like learning activities increase student engagement (Çakıroğlu, Başıbüyük, Güler, Atabay, & Memiş, 2017; Chen, Chen, & Chien, 2017; Hong et al., 2017; Lai, Luo, Zhang, Huang, & Rozelle, 2015; Ortiz-Rojas, Chiluiza, & Valcke, 2017). Students' willingness to participate improves the self-learning environment and students' ability to grow due to increased self-efficacy. Students' self-efficacy is enhanced with each opportunity to interact with CAI. Cognitive constructivists argue that student-centered learning provides time for students to expand their learning experiences (Nugroho, 2017). Students can use CAI to engage at their own pace because CAI programs are focused on the individual student's performance.

Çakıroğlu et al. (2017) investigated the gamified instructional tool and its influence on student engagement and academic performance. This investigation included 37 undergraduate participants between the ages 18 and 24. Çakıroğlu et al. only found a moderate correlation between engagement and academic achievement; however, gamifying the experience had a positive effect on student engagement and overall

academic performance. The study participants responded positively to the leaderboard and the gamified experience in particular.

Similarly, Ortiz-Rojas et al. (2017) investigated a larger quantity of undergraduate students. With 137 participants, Ortiz-Rojas et al. explored the impact of gaming badges on learner performance. Ortiz-Rojas et al. found that the level of engagement proved effective in increasing achievement through gamification. This study examined the gamification methodology by awarding students with badges to boost students' learning performance. The digital badges served as a sense of accomplishment for students; students were awarded one badge with the successful completion of a reading task (Ortiz-Rojas et al., 2017). The badges served as a positive reinforcement for the student, which helped build students' self-esteem. Additionally, students can develop at their own pace because gaming badge programs are designed to encourage progress. Students can monitor and track their badges, see their achievements, and self-monitor their skill development. Ortiz-Rojas et al. found that the badges led to a significant impact on engagement; however, the badges did not have a significant impact on learner performance.

Lai et al. (2015) examined CAL on student academic and nonacademic outcomes. The researchers of the study found that CAL increased student interest but did not significantly increase Chinese language scores. Lai et al. focused on migrant schools where students are relatively economically disadvantaged and exposed to Chinese language and math interventions. The outcome for students engaged in CAL did not increase significantly; yet, students' interest in learning did increase.

Chen et al. (2017) also investigated game-based learning scenarios. Chen et al. studied 96 second-year university participants and found no significant increase in learning performance. Despite student engagement, student academic performance revealed little to no significant improvement in learning performance. Chen et al.'s findings shed light on the separation between engagement and performance; not all student interest leads to academic achievement.

Hong et al. (2017) posited that learners with higher self-efficacy put forth more considerable effort with tasks upon experiencing difficulty. Hong et al. explored learning progress as it correlates to self-efficacy to conceptualize the experience in which students make learning progress. Relative to engagement, students' flow experience can predict learning progress along with online self-efficacy due to the number of correct answers a student achieves. When challenged, students with a higher sense of intrinsic motivation will persevere through challenges.

CAI engages students through providing various types of information. Students engage with learning through processing leveled text, visual graphics, and audio. CAI programs increase student engagement by presenting information using more than one singular model, allowing students to engage their brains in multiple ways. Students focus on personal engagement and exploration when the pressure of public performance is relieved (Schechter et al., 2015).

Blended learning and self-efficacy. With the influx of blended classrooms on the rise, teachers are further implored to monitor student progress with tools that generate data reports. These data reports include, but are not limited to, the number of minutes

students use programs, the completion of questions, how students spend their time while engaged in the program, as well as progress monitoring for teacher-directed instruction. CAI in a blended learning environment uses digital content to deliver instruction as well as teacher-led instruction (Schechter et al., 2015). The blended instructional learning environment is beneficial because it triangulates data for all learners to best meet a learner's diverse needs for achievement.

Schechter et al. (2015) investigated the efficacy of students in a blended learning environment. Schechter et al. examined two first-grade and second-grade low socioeconomic status classrooms. The study findings illustrated significant gains in both the control and treatment group; however, a more substantial increase was found through a *t* test with $p = .02$. The findings revealed that the blended learning environment bolstered students' comprehension abilities, suggesting a positive connection between students' self-efficacy and academic achievement. Bryant et al. (2015) asserted that CAI provides useful tools for students with learning disabilities because it provides students with fun intervention time. CAI programs support struggling readers and increase engagement while students practice reading skills (Bryant et al., 2015; Regan et al., 2014). CAI helps students believe in their abilities, promotes achievement, and develops reading strategies while also building self-efficacy.

Shannon et al. (2015) examined the efficacy of students using Accelerated Reader. Shannon et al. found that student participants who used Accelerated Reader demonstrated more significant reading gains. Furthermore, student performance revealed a strong correlation between CAI and achievement.

Technical literacy as a 21st-century skill. Computer skills impact achievement in various ways. Researchers have investigated the impact of digital abilities and competencies on academic achievement revealing stronger abilities to navigate programs have greater achievement outcomes (Mirzanjani et al., 2016; Pagani, Argentin, Gui, & Stanca, 2016). Technical literacy is required to navigate the 21st century. Technical literacy has become pertinent to prepare users for successful usage to gain better achievement outcomes. Students can gain technical literacy through direct technical instruction or blended instructional practices.

Pagani et al. (2016) posited that CAI has a more significant effect on students who attend vocational or technical schools. Pagani et al. surveyed 2,025 Italian students and conducted a national assessment of reading and math tests. Pagani et al. found that CAI let to a .38 increase in reading skills. A gender gap was present in the results on the subject of mathematics, with male students ranging between a 6.3–2.3 coefficient.

Schneider et al. (2016) studied the effects of MindPlay Virtual Reading Coach on 209 second-grade students, of which 107 received treatment. Schneider et al. found a significant difference with detection of $p < .10$, showing the behavioral engagement over 90%. The gains revealed the positive effect CAI has on learners. Overall, Schneider et al. found that the impact of digital skills is higher for low-performing students regardless of gender. Competency of 21st-century skills and attitudes does impact achievement, and a student's competency level can detract from the CAI.

Disabilities and disadvantages. It is essential for educators to meet the specific needs of students with disabilities. Scholars have investigated whether CAI improves the

achievement of students with disabilities and those from disadvantaged economic backgrounds revealing many advantages for students using CAI with disabilities (Bryant et al., 2015; Flower, 2014; Jozwik & Douglas, 2016; Larabee, Burns, & McComas, 2014; Regan et al., 2014; Shamir, Feehan, & Yoder, 2017). Students spend at least 30% of a school day working independently; iPads and other mobile technology devices provide students with increased confidence about their ability to successfully complete assigned tasks.

Flower (2014) investigated the effects of iPads and time-on-task for independent practice for three second-grade, third-grade, and fourth-grade students with behavioral and emotional disorders. Flower found that these three students had challenges with aggressive behaviors and below-average reading, writing, and math skills. The findings implicated that students' time on task was productive, showing an increase in completion rates. The use of iPads was deemed "fun for learning new skills" (Flower, 2014, p. 443). These findings support a correlation between student engagement and student achievement.

Larabee et al. (2014) investigated decoding performance using iPads with three participants from a first-grade class. The results did not show an increase in decoding skills while using an iPad; however, time on task for the participants was high. The study findings illuminated a lack of consistent retention of skills in decoding performance. Lucas (2015) investigated the implementation of an iPad usage-based program on improving the reading skills of students. Lucas indicated that significant progress with an increase in decoding skills was not likely while using an iPad; however, students engaged

in the lesson with more accurate responses to stimuli by the end of the week. Consistent retention of skills is lacking in regard to decoding performance.

Regan et al. (2014) examined technology as part of daily instruction to facilitate achievement for students with learning disabilities using the Lexia SOS program. The instruction used drill-and-practice methods and focused on decoding skills. Regan et al. studied five upper elementary students receiving special education support services. The study did not used timed probes; rather, audio feedback was generated for students based on student performance. The input provided immediate responses to students such as "good job" and "try again." The program also provided duration and frequency reports to monitor activities in a kid-friendly bar graph at the end of each session (Regan et al., 2014). Study findings implicated that students retained skills at an average of 92.6%.

Shamir et al. (2016) investigated the impact of CAI with African American kindergartners and first graders. The *t*-test findings revealed that students who used the Waterford program had higher gains than those who did not. Students who used the Waterford program score had a higher mean score of .86 in the Star Grade Placement and the Scaled Score significance of 118.24. Shamir et al. illustrated students' willingness to learn through computer software instruction and revealed a significant gain in achievement as a result of using the program. Keane (2018) investigated the effects of Achieve3000 on 15 high school students with learning disabilities. From the single-subject ABAB phases, the investigation revealed the intervention of the seven consenting participants. Keane found that students made significant gains in critical reading; however, the data revealed a negative trend in transferable knowledge. These results

suggest that CAI usage may positively impact immediate critical reading assessments but may lead to a disconnection between CAI assessments and text-based assessments.

Achieve3000. The current landscape of CAI offers a plethora of programs to aid in student achievement. One such program is the Achieve3000 program. The Achieve3000 program has been studied by scholars and data analysis teams, who revealed that consistent use of the program builds and increases students' Lexile level (Achieve3000, 2011). Achieve3000 improves student reading levels by providing students with their tested reading level. Achieve3000 adjusts students' Lexile levels upon the completion of activities. Students who completed 40 or more program articles throughout the academic year students improved their reading skills by 54 Lexile points on average (Achieve3000, 2012). *What Works Clearinghouse* reviewed the Achieve3000 online literacy program. No studies meet the requirements without reservation (U.S. Department of Education, Institute of Education Sciences, 2018). Only two Achieve3000 studies met the *What Works Clearinghouse* group design standards.

Hill et al. (2016) investigated whether students who used Achieve3000 had higher reading achievement than those who did not. Hill et al. found that of the 32 elementary schools, approximately 35,000 students with 745 participating classrooms across Grades 2–5 used Achieve 3000. Students engaged with the Achieve3000 program twice weekly for an average of 30 minutes to reach the goal of 80 completed activities. The students completed the initial assessment and followed the program's 5-step procedure. First, students responded to a Before Reading Poll. Secondly, students read an article. Thirdly, students answered activity questions. Fourth, students responded to an After Reading

Poll. Finally, students answered a Thought Question. The results did not reveal a significant impact on reading achievement contrary to the findings of Hill et al. The National Lexile Study revealed student growth was double the amount illustrated by Hill et al. Achieve3000 (2018a) conducted a study with a sample size of over 70,000 students. The findings of the National Lexile Study for 2016–2017 exceeded student growth for students in Grades 2–12. MetaMetrics measured the growth but did not disclose the formula for calculating the expected growth number; the findings illustrated consistent increases across all grade levels (Achieve, 2018a).

Borman, Park, and Min (2015) investigated the effects of Achieve3000 on students through a quasi-experiment. Borman et al. used 16 elementary schools and identified two 625 Achieve users. Borman et al. analyzed five groups. The first group consisted of students who completed one activity per week on average. The second group consisted of students who completed two activities per week on average. The third group included students scored 75% or higher on the multiple-choice activity. The fourth group completed one activity per week on average and scored 75% or higher on the multiple-choice activity. The fifth group performed two activities per week on average and scored 75% or higher on the multiple-choice activity. The results were favorable in Grades 4, 7, and 8. Borman et al. suggested that student participation measures are essential to predictor differences. Instructional reading practices designed to increase reading achievement was used as a literacy classroom intervention at the study site.

Raulerson (2018) explored the impact of the Achieve3000 program on students with learning disabilities and analyzed the significance of self-esteem and self-efficacy.

Within Raulerson's study, Achieve3000 was a means of explicit intervention and instruction was implemented three times a week. Raulerson found that the group receiving the program instruction showed statistically significant increases in reading achievement and reading comprehension. The study revealed statistical insignificance in regard to increasing motivation of students with learning disabilities. Raulerson's findings further revealed that the scope of CAI programs has an inconsistent ability to impact student motivation; however, the programs are effective in enhancing reading achievement and comprehension of the students participating in the study.

Shannon and Grant (2015) conducted a mixed-methods comparative analysis of students who used Achieve3000 and those who did not. Shannon and Grant found a statistically significant impact on Gates-MacGinitie Reading Test-4 Reading Comprehension Assessment scores. Shannon and Grant also concluded that CAI affects reading achievement.

Implications

The study results were used to identify which CAI variables affect student reading achievement. This information will provide schools and district-level stakeholders with pertinent information to assist with decisions about integrating programs that provide more significant gains in student achievement. This study aimed to identify which CAI engagement variables predict reading achievement. The study results will help district administrators address the implementation of CAI in the literacy classroom. Kearsley and Schneiderman's (1998) engagement theory was used to investigate which engagement variables influence reading achievement. The knowledge of these engagement variables

will influence educators' instructional decisions. The study results have the potential to reinforce the premise that successful CAI implementation occurs when students are engaged.

Study findings can be used to analyze the predictors of CAI effectiveness that lead to student reading achievement. An additional implication may include insight into teacher awareness of student engagement with nonteacher-directed instruction. The study may lead to positive social change, including training school leaders and administrators on how to properly engage teachers and students in the CAI integration process. Possible recommendations include 3-day PD sessions that focus on integration of CAI and strategies for reading achievement. Specifically, PD should encompass micro and macro discussions about the relationship between a student's engagement with CAI and his or her reading achievement.

Summary

In this section, I identified the local problem for educators and included a rationale and discussion about the significance of the current study. The review of literature included prior studies that are pertinent to the current study, along with implications of the current study. Educators and administrators who use CAI do not know which variable of student engagement improves the reading achievement of fourth and fifth grade students in a NNJS district. A gap in the literature exists regarding the relationship between engagement variables with CAI and reading achievement for K–12 students.

In this section, I also addressed the purpose of the study, which included the investigation of engagement of CAI and reading achievement. Furthermore, the literature review provided scholars, researchers, and practitioners with an opportunity for a more nuanced discussion surrounding the impact of CAI and student achievement. This information will be used to create concluding professional development training.

Section 2: The Methodology

Introduction

I conducted this quantitative, predictive study to test whether the student engagement variables of time on task, number of CAI completed assignments, and students' average score on CAI tasks can be used to predict reading achievement. Through doing so, the predictor variable of CAI that is most relevant for determining the reading achievement of fourth- and fifth-grade students located in the NNJS district was identified. In this section, I address the research methods, research design, sample, data collection, and data analysis approaches that are pertinent to this study.

Research Design

Quantitative research involves investigating trends and collecting numerical data using instruments that provide quantifiable data of one or more groups of people (Creswell, 2012). Quantitative research is a methodology that uses numerical data to test a theory or explanation about relationships among variables (Creswell, 2012). Quantitative research uses experimental and nonexperimental approaches; the experimental design requires that one or more variables be manipulated, whereas the nonexperimental design does not require variable manipulation (Creswell, 2012; Lodico, Spaulding, & Voegtle, 2010).

In this study, I used a nonexperimental, correlational design to collect and analyze data to assess whether the level of engagement in CAI (as measured by the variables of time on task, number of CAI assignments completed and average score on CAI assignments) can predict differences in reading achievement for fourth- and fifth-grade

students. Random assignment is often not possible in the educational setting; this makes experimental research challenging to conduct (Lodico et al., 2010). The nonexperimental research design has three classifications: comparative, correlational, and longitudinal (Lodico et al., 2010). The comparative classification is used to explain differences amongst a group by examining differences in the experiences of the members (Lodico et al., 2010). The correlational classification is used to examine the relationship or pattern between variables and abridges the relationship found using the correlation coefficient (Lodico et al., 2010). The longitudinal classification is used to examine trends of a population over time (Creswell, 2012).

The correlational research design allowed me to investigate which engagement variables of CAI predict reading achievement. Correlational studies explore continuous relationships and determine patterns among two or more variables (Lodico et al., 2010; Creswell, 2012). A predictive study forecasts changes in a criterion variable and is used to examine whether a significant relationship exists between the predictor and criterion variables (Creswell, 2012; Lodico et al., 2010). Additional nonexperimental designs, such as the causal-comparative design, were not suitable for this study because I was not seeking to explain differences amongst groups; all participating students used the CAI program. The longitudinal design, which focuses on analyzing trends of a population over time, was not in alignment with the aims of the current study. The predictive, correlational, quantitative method was appropriate for the current study because I used a combination of variables to identify predictions in reading achievement. A multiple regression analysis was conducted to model the relationship between the variables and

identify if a significant relationship was found among the predictor variables and the achievement variable (see Creswell, 2012).

Setting and Sample

The setting for this study was an urban elementary school located in a low socioeconomic community in northern New Jersey comprised of 503 kindergarten through fifth grade students. The population for this study were the 213 fourth- and fifth-grade students enrolled there. Purposive sampling was the most appropriate sampling strategy for this study because it allowed me to consider all available students who were enrolled in fourth and fifth grade and for whom 2017 and 2017 PARCC scores existed. Random sampling is difficult to use in educational research (Creswell, 2012). PARCC test scores existed for a total of 134 of these fourth and fifth grade students, and these test scores made up the sample. Ninety-five percent of the sample was African American, 5% was Hispanic students, and .3% was European American or White. Eight percent of the sample was special education students.

I collected de-identified test score data from the 134 fourth and fifth grade students. Information was collected with permission from the district superintendent. All data obtained for this study were obtained from the data coordinator in the form of a Microsoft Excel data file. The file included de-identified test scores, the number of minutes each student spent logged in to CAI, the number of completed reading comprehension assignments, and the average scores of those assignments. The data spanned from September 2017 through May 2018. The de-identified data encompassed scores from 68 fourth-grade students and 66 fifth-grade students. The sample size (N =

134) for the study consisted of fourth- and fifth-grade student scores; this sample size was large enough to detect a small to moderate correlation at an alpha level of .05 and a power of .80 (see Bujang & Baharum, 2016).

Instrumentation and Materials

Using PARCC Scores as the Dependent Variable

The PARCC (2018) assessment, which was developed in 2010 by educators, researchers, and psychometricians, has served as an instrument to measure students' readiness for college and careers in alignment with the Common Core State Standards. In this study, I used increases or decreases in students' PARCC scores as the dependent variable. The students' raw scores from two consecutive years, 2017 and 2018, were used to calculate this variable. The difference in scores of the two years were calculated by subtracting each student's 2017 score from their 2018 score.

Reliability of PARCC. In PARCC, an internal-consistency measure is used across test items and decision consistency and interrater reliability are used for the constructed-response items (New Jersey Department of Education, 2017). The first index of reliability is Cronbach's coefficient alpha, which measures internal consistency of the variance total score (New Jersey Department of Education, 2017). The second index of reliability is the standard error of measurement (SEM), which reports stratified alpha due to the PARCC assessment having both dichotomous and polytomous test items (New Jersey Department of Education, 2017). The SEM was used to quantify the amount of error in the test scores and ranged from .90 to .93 for Grades 3–11 in English language and literacy (New Jersey Department of Education, 2017). The scale score SEMs for

computer-based technology were higher for Grade 6 and Grades 8–10, and the scale score SEMs were highest for Grade 3 (New Jersey Department of Education, 2017). The SEM identifies the extent to which test-takers' scores tend to differ from the scores test-takers would receive if the test were perfectly reliable (New Jersey Department of Education, 2017). Wide SEMs create challenges in the valid interpretation of a test score.

Validity of PARCC. States use PARCC data to establish the validity of the assessments. A rigorous test development phase took place to establish the PARCC (2018) test validity. Field tests of the PARCC assessment items were conducted, and students, administrators, and classroom teachers provided feedback about the assessment (PARCC, 2018). The PARCC assessment uses evidence statements that provide the aligned standard, performance-level descriptors, grade-level knowledge descriptors, and demonstration of skills and practices of particular achievement levels. Additionally, postsecondary educator judgment studies and a benchmark studies of the SAT, ACT, National Assessment of Educational Progress, Trends in International Mathematics and Science Study, Programme of International Student Assessment, and Progress in International Reading Literacy Study determined how the test items measured by the PARCC assessment compared to the rigor of other assessments (New Jersey Department of Education, 2017). The findings revealed that the PARCC assessment accurately measured readiness for college and careers in comparison to the Programme of International Student Assessment, National Assessment of Educational Progress, ACT, and SAT. External examiners reviewed the PARCC assessment and determined that PARCC meets nationally recognized technical standards for assessments in content and

academic achievement standards, technical quality, alignment, scoring, and reporting (New Jersey Department of Education, 2017).

Instruments to Obtain Predictor Variables

The predictor variables in this study were continuous variables obtained from reports generated by Achieve3000. Achieve3000 aids students in advancing their nonfiction reading skills (U.S. Department of Education, Institute of Education Sciences, 2018). Achieve3000 (2018a) is a computerized reading intervention program that publicizes its ability to improve students' reading and writing skills to prepare students for college and career readiness. Students who participate in the Achieve3000 program receive recognition for their daily achievements per class as well as grade level and state program achievements. The predictor variables used in this study were comprised of data compiled by the intervention program, such as time on task, number assignments completed, and average scores.

Time on task is the number of minutes the student is logged into the program during each CAI session that took place between September 2017 through May 2018 and was numerical, continuous variable. After each CAI session, the student usage report is updated to include students' minutes spent logged in and score. The program does not provide a distinction between active and nonactive time on task.

The number of CAI assignments is the number of assignments the student completes each school year and is a numerical, continuous variable. Students develop key comprehension strategies through multiple exposures to CAI that caters to each student's

reading level. Each completed task is tallied, scored, and updated within the CAI program providing updated averages after the completion of each activity.

The average score is the students' cumulative average score of all activities obtained by adding each completed activity score and dividing the total by the number of completed assignments. This variable is a numerical, continuous variable.

Procedures for Gaining Access

In order to use this school site as a research site, I met with the school principal to provide an introduction and overview of the study. This meeting allowed me to address any formal questions or concerns about the study. Individual consent was not required to conduct research at this site because individual student interactions were not needed with only de-identified data being requested. The use of the study site required the formal consent of the site administrator. The consent was required for submittal to the Walden University Institutional Review Board to complete the application process for the study to take place.

Data Collection and Analysis

Data Collection Plan

After receiving approval from the Walden University Institutional Review Board, approval number 12-11-19-0089491, I met with the principal of the school to review the protocol for gathering data. Data collection commenced after receiving approval from the school district. The technology coordinator served as the designee for the study and created a document that included PARCC assessment scores, information on the Achieve3000 predictor variables (i.e., time on task, completed assignments, and average

score), and intervention program reports for each student from the 2017–2018 academic year on the de-identified data collection spreadsheet. The data were provided to me (and I kept them) on one spreadsheet on a flash drive. The testing data are organized yearly and documented by grade level and classroom teachers. The technology designee matched the desired data of the predictor variables for each student before submitting the de-identified data file for collection. A singular report was generated to provide information for the PARCC scores along with each predictor variable, which was included in the identified columns. The letter of informal cooperation for data collection can be found in Appendix B. In the letter, I requested de-identified data from the identified district designee.

Procedures for Data Analysis

Next, data that were obtained from the district were prepared for analysis. The excel spreadsheet was imported to a Statistical Package for Social Sciences (SPSS) file, where the appropriate dependent and independent variables were created. The dependent variable difference in reading was created by subtracting each student's 2017 score from their 2018 score. Next, analyses were conducted to test the assumptions associated with a multiple regression. Bivariate Pearson Spearman correlations were conducted to see how intercorrelated the predictor variables were. Next, scatterplots between each predictor variable and the dependent variable were generated to see whether a linear relationship existed between each predictor and the dependent variable.

A regression analysis was conducted using the predictor variables as the independent variables and the increase in reading achievement variable as the dependent variable. This analysis determined whether predictions of student reading achievement

can occur from the predictor variables. A scatter plot of residuals versus predicted values was plotted to illustrate that data points are equally distributed across all values of the independent variables (homoscedasticity). A P-P plot was generated to test the normality of the residual.

The SPSS regression analysis generated an *F* statistic that tested the significance of the linear relationship between the independent and the dependent variables. An R^2 value gauged the amount of variance in the dependent variable that was accounted for by the predictor variables.

Limitations

I sought to gather a consensus for fourth-grade and fifth-grade students' academic achievement as a result of participating in CAI; however, a sample size of this capacity does not allow the results to be generalized. The first limitation of the study was that the predictor variables were specific to the Achieve3000 program and cannot be generalized with other CAI programs. Additionally, the number of predictor variables may not provide sufficient insight into the level of engagement that results in reading achievement. In addition to the previously mentioned limitations, the program's inability to decipher active work time from the total login time and the student's ability to use the program outside of allocated classroom time can impede the validity of the study findings. This limitation may threaten the accuracy of the findings related to engagement and CAI usage. All three limitations are connected to the predictor variables.

Data Analysis

Data analysis was conducted to investigate whether the variables of student engagement could predict differences in the reading achievement of fourth-grade and fifth-grade students located in this NNJS district. Prior to running an analysis, I ran descriptive analyses in SPSS and determined if the assumptions for a multiple regressions test were met. I created the dependent variable difference scores in reading by subtracting each student's 2017 score from his or her 2018 score. Bivariate Pearson Spearmen correlations were conducted to see how intercorrelated the predictor variables were. The individual scatterplots between each predictor variable and the dependent variable were generated. The scatterplots suggest a linear relationship exists between each predictor variable and the dependent variable (see Figures 1, 2, and 3). A regression analysis was conducted to test whether the engagement variables (time on task, number of completed assignment and average scores) could be used to predict differences in reading achievement. Subsequently, the following three hypotheses were addressed: (a) there is a significant relationship between the number of minutes a student logs into CAI and improvement in reading achievement as measured by students' PARCC scores, (b) there is a significant relationship between the number of CAI assignments completed and improvement in reading achievement as measured by students' PARCC scores, and (c) there is a significant relationship between the students' average scores from CAI tasks and improvement in reading achievement as measured by students' PARCC scores. The regression analysis tested the significance of the linear relationship between the predictor variable and the dependent variable.

Data Analysis Results

I used archived data from the 2017 and 2018 years provided to me by the district data coordinator for the analysis. The data was de-identified data via an Excel file. The data were comprised of the sample as previously mentioned in the sample section of the study. The file was inclusive of the predictor variable data and PARCC scores. I uploaded the data into the SPSS system prior to analyzing the data. I created the appropriate dependent and independent variables once the Excel spreadsheet was imported to an SPSS file. I identified the dependent variable and difference in reading by subtracting each student's 2017 score from their 2018 score. Next, I conducted analyses to test the assumptions associated with a multiple regression. I conducted Bivariate Pearson Spearmen correlations to see how intercorrelated the predictor variables were. Next, I generated scatterplots between each predictor variable and the dependent variable to see whether a linear relationship existed between each predictor and the dependent variable. Table 1 depicts the descriptive statistics: the mean, standard deviation, and range of the variables used in the study.

Table 1

Descriptive Statistics

	Mean	Std. deviation	Minimum	Maximum	*N*
Difference in reading scores	13.47	37.50	-181	129	134
Time on task (minutes)	475.07	314.28	35	1648	134
Number of activities	51.28	34.69	3	206	134
Average score	60.20	13.62	21	87	134

Assumptions. A multiple regression test rests on four assumptions (Osbourne & Waters, 2002). Multiple regression test results may not be trustworthy if the data violates these assumptions. Hence, I determined if the assumptions for a multiple regressions test were met before an analysis was run.

Assumption 1 states that a linear relationship must exist between the outcome variable and the independent variables. Individual scatter plots were constructed to examine if a linear relationship between each engagement variable and the dependent variable existed. Figure 1, Figure 2, and Figure 3 illustrate the relationship between each

engagement variable and the dependent variable.

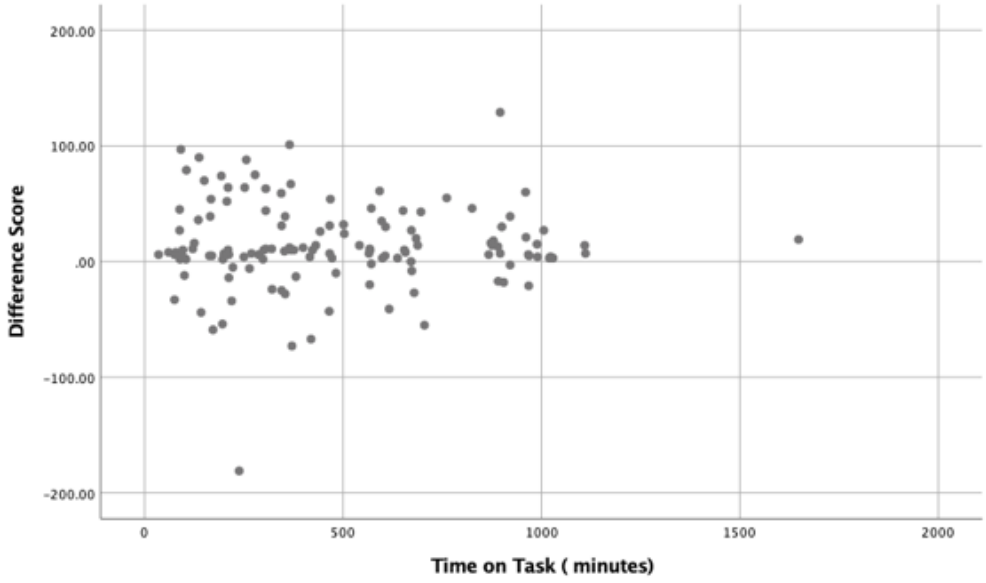

Figure 1. Scatter plot of the time on task variable plotted against the difference in reading scores.

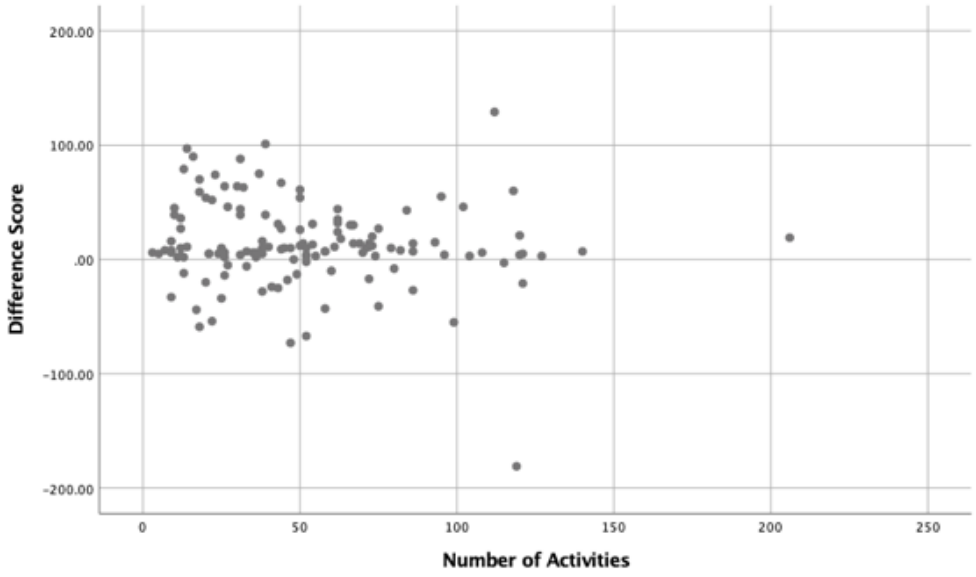

Figure 2. Scatter plot of the number of activities variable plotted against difference in reading scores.

Figures 1 and 2 indicate a possibly negative linear relationship between both number of activities with increase in reading scores and time on task with the difference reading scores.

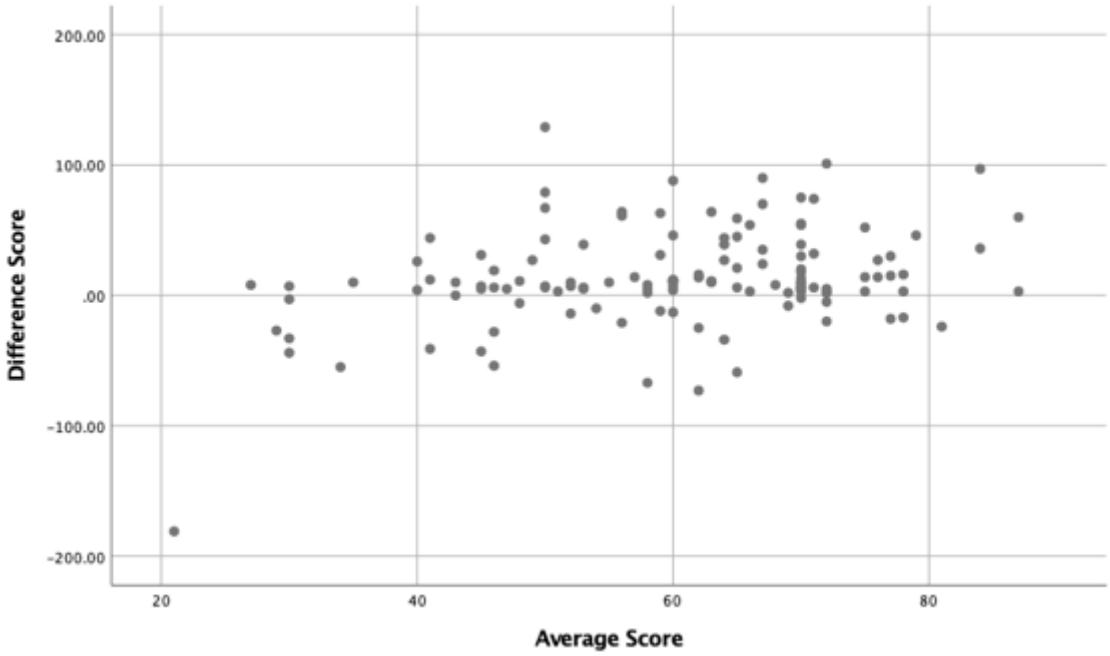

Figure 3. Scatter plot of the average score variable plotted against difference in reading scores.

Assumption 2 states that the errors between observed and predicted values should be normally distributed. Figure 4 illustrates the normality of residuals.

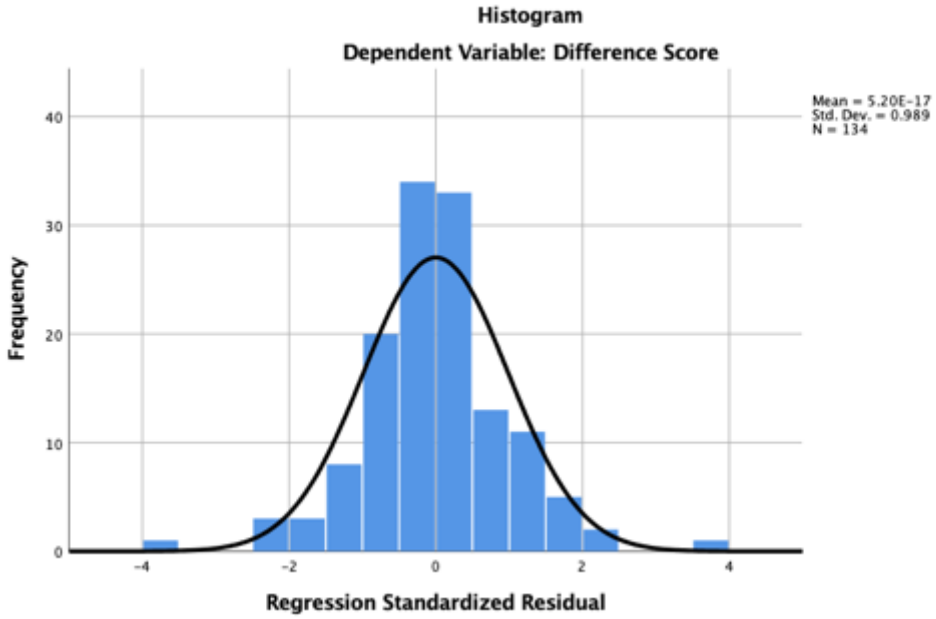

Figure 4. Histogram illustrates the normality of residuals.

Assumption 3 requires that the independent variables used in the multiple regression are not highly correlated with each other. Table 2 illustrates that time on task and number of assignments were highly correlated: (r = .8, α = 0.5). This shows that the variables are not independent of each other needing to control for their interdependence when implying their individual contribution to the dependent variable's variance. I controlled for this interdependence by removing time on task from the subsequent regression. Time on task was eliminated because the on-task minutes in the program could not be separated from the minutes spent logged on the program. Nauman (2019) defined time on task as the time that elapsed between the onset of the task, and the time the student gave a response. Applying Nauman's definition within the context of this study, the time a student spent reading the task instruction, reading potentially both

relevant and irrelevant parts of the text, and deciding on a response are identified in this study as time on task.

The CAI program used for this study did not account for Nauman's definition; thus, the program was eliminated because it did not differentiate active reading time from total log in time.

Table 2

Correlation Table

		Time on task	Number of activities	Average score
Pearson Correlation	Time on task	1	.86*	-.14
	Number of activities	-.120	1.00	-.049
	Average score	.322	-.049	1.000

* Significant at alpha = .05

Note that average score and number of activities, albeit not statistically significant, are negatively correlated. The correlations between the average score and time on task reveal that the more time a student spends does not correlate to a higher average score. Also, the correlations between average score and number of activities reveal the number of completed activities does not correlate to a higher average score if the student performs poorly on the assignments.

Assumption 4 is that the data show homoscedasticity or similarity of variance of error terms across the values of the independent variable. A plot of standardized residuals versus the predicted values can show whether points are equally distributed across all values of the independent variables (Osbourne & Waters, 2002). Figure 5 illustrates how the residuals are randomly scattered around the horizontal axis.

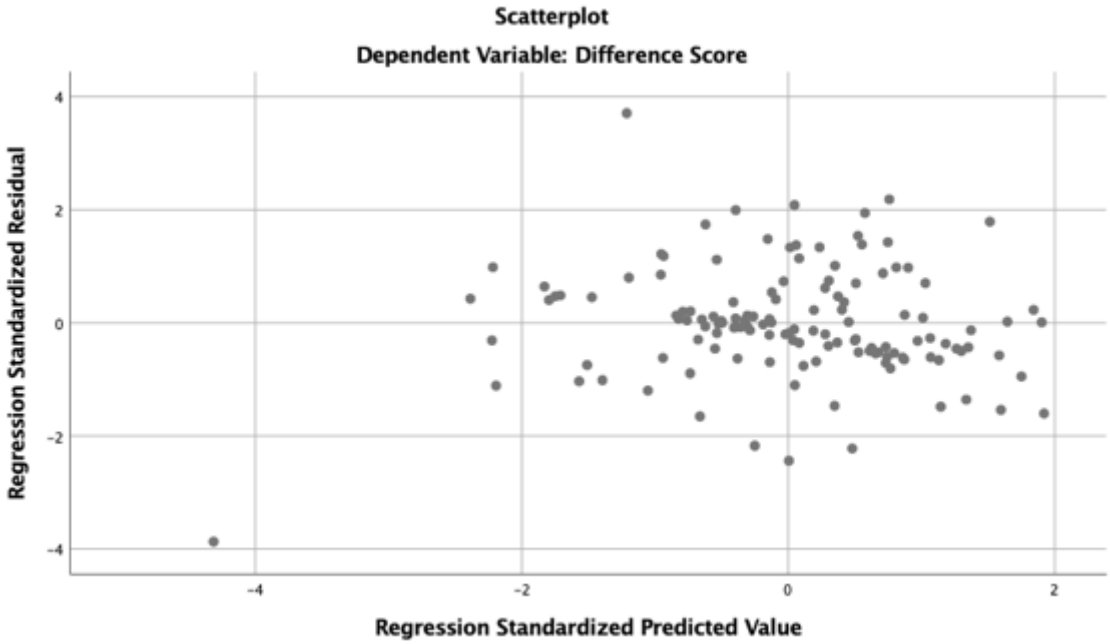

Figure 5. Illustrates homoscedasticity.

Regression Analysis

The assumptions for linear regression were met; thus, a multiple regression analysis was conducted to test whether the engagement variables, number of assignments, and average score can predict differences in reading achievement as measured by the difference in PARCC scores from 2017 to 2018. An *F* statistic tested the significance of the linear relationship between the predictor variable and the dependent variable. All hypotheses were tested at a .05.

A significant *F* statistic (F (2) = 8.47, $\alpha < .001$) indicated that the predictor variables number of assignments and average score do predict differences in reading achievement. The obtained *R*-square value was .12; this showed that 12% of the variance in difference in achievement can be accounted for by the predictor variables. Table 3

presents the coefficients of each variable in the regression model and the significance of each.

Table 3

Coefficients

	Unstandardized coefficients		Standardized coefficients		
	B	Std. error	Beta	*t*	Sig.
Constant	-33.3	14.9		-2.23	.027
Number of activities	-112	.089	-.104	-1.26	.209
Average score	.873	.227	.317	3.85	.000

A statistically significant relationship exists between the average scores of the CAI task and the improvement of reading achievement. The other predictor variable—number of assignments—did not show statistical significance. The final regression model tells us that increase in reading = .317 * average score, thus increasing a student's average score on their CAI average score would increase their PARCC score by .317 of a standard deviation.

Summary

The overarching research question in this study asked if relationships between changes in student reading achievement and engagement in CAI exist. The following hypotheses were tested because time on task—once of the predictor variables—was not included in the originally anticipated analysis.

$H_0$2: There is not a significant relationship between the number of CAI assignments completed and reading achievement.

$H_1$2: There is a significant relationship between the number of CAI assignments completed and reading achievement.

$H_0$3: There is not a significant relationship between the students' average cumulative score from CAI tasks and reading achievement.

$H_1$3: There is a significant relationship between the students' average cumulative score from CAI tasks and reading achievement.

Results indicate that the first null hypotheses, $H_0$2, cannot be rejected. There was no significant relationship between number of assignments and student achievement. A significant *t* value associated with Hypothesis 3 ($t = 3.85$, $\alpha < .001$), indicated that $H_0$3 can be rejected and the alternative hypothesis, which states that a significant relationship exists between student average score and difference in reading can be accepted. Nauman (2019) posited that students who struggle with reading will not use time or resources effectively compared to students who also enjoy reading. This supports the negative correlations found among average score and number of activities. The amount of time and number of activities does not correlate to an increase in reading achievement (Bauer-Kealey & Mather, 2017). Hudson, Reeves, Giles and Brannan (2020) found that possible implementation procedures such as scheduling and usage, along with inconsistencies of usage and lack of proficiencies could be why no statistical significance was found with CAI usage regarding time and number of assignments.

The results show that an increase in CAI engagement strategy instruction might lead to increases in students' reading achievements. A strong positive correlation was found between a student's average score and an increase in reading achievement based on the findings from this study and discussions from colleagues, which indicated that more professional learning is needed to provide teachers and administrators with additional training. Training on implementation and engagement strategies related to CAI as it pertains to integration and average score strategies is needed.

Project Deliverables

This study is based on the findings that were discovered in this literature review, in which a strong correlation was found among average score and reading achievement. These findings along with discussions from colleagues, revealed a need for a PD learning course specifically related to implementation and engagement strategies for CAI as it pertains to integration and average score strategies. Liu, Ritzhaupt, Dawson and Barron (2017) suggested that a correlation exists between comfort and confidence with technology and successful technology integration in the K–12 classrooms revealing teachers integrate CAI with success once trained. A PD learning course was developed using the study results. The course is a 3-day training session that allows participants to experience implementation and confidence building practices regarding integrating CAI strategies that will help students achieve average cumulative scores that support developing global leaders. Hudson and Woodward (2018) asserted that students of teachers receiving training on pedagogical knowledge using digital technologies in their classrooms performed better on digital literacy assessments. The PD course included a

PowerPoint presentation with resources to support teachers with implementation of CAI. Additionally, surveys are included to support student engagement strategies since there was a significant relationship found between the students' average cumulative score from CAI tasks and difference in reading achievement. A Likert-type scale survey is also used for the summative evaluation of the PD.

Section 3: The Project

Introduction

In this section, I present detailed information on the project and its relationship to prior literature. An overview of project is provided as well as the project goals and the reason why the project genre was chosen. I also share how I intend to implement and evaluate the project as well as the impact the project may have on the community.

Rationale

The project for this study is a PD learning course based on the study results and professional dialogue I had with educators who use CAI. The dialogue revealed the critical need for additional support with the implementation and use of CAI. The study data revealed that teachers need strategies that support student engagement as measured by average scores of student's completed CAI activities. This project provides teachers with guidance on CAI implementation to support reading achievement and student engagement. Teachers who productively engage in technology support the practice of enhanced learning designs (McKenney, Kali, Markauskaite, & Voogt, 2015).

Description and Goals

The project for this study was a PD learning course based on the study results. I selected this project genre to address implementing CAI to support reading achievement and student engagement. Professional learning is a key part of providing ongoing learning opportunities. The data analysis from Section 2 of this study formed the basis for the PD training. The study findings, recommendations, and implications may bring about positive social change. The PD training was open to the study site as well as all district

CAI users; all stakeholders who are involved with the study site can benefit from PD. The PD and the analysis in this study provided data that can be used to shape future technology and PD at the local site and district sites. The goal of this PD was to garner implementation strategies and confidence to help teachers implement CAI effectively. Participants may also learn management strategies to support student engagement and achievement. Participants will complete the PD training with tangible goals for implementation based on their new learning.

Review of the Literature

I examined literature to rationalize the PD training and curriculum materials, elaborate on the relationship between student engagement with CAI and their reading achievement, and explain the benefits of providing PD to help teachers increase student engagement while implementing CAI. The literature review contains two subsections: (a) the project genre description as it pertains to defining PD, the rationale for PD, and the use of training and curriculum and (b) implementation of CAI and student engagement. The databases used for the literature review included EBSCOHost, ERIC, and ProQuest, and the key terms *professional development, benefits of professional development, educational technology,* and *CAI training* were used to conduct literature searches.

Project Genre

PD is structured professional learning that changes teachers' knowledge, practice, instruction, and results in student learning (Darling-Hammond, Hyler, & Gardner, 2017). PD is an intellectual and personal commitment that requires engagement and paradigm shifts as new information is shared (Girvan, Conneely, & Tangney, 2016). PD can be

provided in both formal and informal manners and provides formative outcomes and content (Darling-Hammond et al., 2017). Technology-enhanced PD (TPD) is designed with the goal of improving teachers' integration of technology (Blanchard, LePrevost, Tolin, & Guitierrex, 2016).

I chose PD as the project genre to provide insightful data on supporting student engagement as students use CAI. Evaluation of the PD may yield insight into whether the PD increased teachers' ability to integrate CAI to support student engagement and reading achievement. Secondly, the PD directly supported student engagement practices within the context of student outcomes. The PD was inclusive of goals, engaging activities, resources, collaborative activities, modeling, feedback, and reflective opportunities at an appropriate pace.

PD supports teachers through providing them with data, strategies, and competency skills for the effective integration and usage of tools and instruction (Darling-Hammond et al., 2017). Successful PD has seven characteristics: (a) it is content focused, (b) it incorporates active learning, (c) it involves collaboration, (d) it uses models and demonstrated modeling effective practices, (e) it offers coaching and support, (f) it offers feedback and reflection, and (g) it has a sustained duration (Darling-Hammond et al., 2017). PD conducted in the NNJS district incorporated all of the characteristics described for successful PD models.

PD development requires planning beyond the introductory phase (Guskey, 2014). Instructional practice requires preparation and training to optimize the program's outcomes and overcome integration barriers (Baturay et al., 2017; Uluyol & Şahin, 2016).

Most PD focuses on the navigation of digital tools as opposed to how to use digital tools to meet specific instructional classroom goals and yield student achievement (Darling-Hammond et al. 2017; Hutchinson & Woodward, 2018). Effective PD requires actively engaging learners; this is more beneficial than passive attendance (Desimone & Pak, 2017; Girvan et al., 2016).

The first step to ensuring effective PD is selecting content that will impact teacher learning and yield student achievement (Darling-Hammond et al. 2017). The PD elected for the project had focused content on CAI usage, including basic class setup, system navigation, and student engagement strategies to support classroom usage. These strategies include time-on-task modeling, student tracking incentives, cumulative score monitoring, and troubleshooting strategies. These strategies were included in the PD training at the NNJS district because many educators had significant hesitation with integration, albeit routines or practices.

Additionally, the PD training incorporated active learning with modeling, a focus group discussion that will allow follow-up PD, and opportunities for learning with built in instructional support. PD is more successful when teachers have opportunities to practice the learned skills (Desimone & Pak, 2017). It is important when planning and executing PD that the training provide learning opportunities for adults to create a connection with multiple personal experiences (Girvan et al, 2016). The need for lifelong professional processes is referred to as systematic PD (Tondeur, Forkosh-Baruch, Prestridge, Albion, & Edirisinghe, 2016).

Professional Development

Equipping educators and employees with learning to support their classroom practices is an essential component of PD (Girvan et al, 2016). PD must be based on impacting both educators and student performance (Muñoz, Guskey & Aberli, 2009). In the NNJS district, educators participate in ongoing PD in both formal, district-wide, mandated trainings and in informal manners, such as grade-level professional learning communities that are developed to support teachers and student achievement. Preparation at each level of PD is necessary to ensure that learning occurs. PD is a New Jersey state requirement. New Jersey Administrative Code 6A:9C-3.2 (2013) states the following regarding PD:

- Professional development shall be comprised of professional learning opportunities aligned with student learning and educator development needs and school, school district, and/or state improvement goals.
- Professional development shall have as its primary focus the improvement of teachers' and school leaders' effectiveness in assisting all students to meet the Common Core Curriculum Standards.
- Professional development shall include the work of established collaborative teams of teachers, school leaders, and other administrative, instructional, and educational services staff members who commit to working together to accomplish common goals and who are engaged in a continuous cycle of professional improvement focusing on: 1. Evaluating student learning needs

through ongoing reviews of data on student performance. 2. Defining a clear set of educator learning goals based on the analysis of these data.

High quality PD is a critical factor for improving education (Guskey, 2002), schools, and student learning (Toom, 2016). Ongoing PD is a contributing factor to improving student outcomes because PD builds teachers' sense of self-efficacy (Main & Pendergrast, 2015). The technology pedagogical content knowledge (TPACK) is a framework that ensures that educational-based technologies are integrated into classrooms for optimal learning outcomes (Adams, 2019).

Effectiveness. The effects of PD can vary. The use of technology tools becomes effective in instruction after teachers engage in TPD for longer than 1 year, with the most significant gains after 3 years (Blanchard et al., 2016). Embedded PD in the NNJS district focuses on supporting instructional routines and practices to promote student achievement. Teachers in the NNJS district use PD learning to plan, restructure, and support integration of CAI to improve reading achievement.

Drossel, Eickelmann, and Schulz-Zander (2017) reported that teachers in Lithuania and Poland held higher views of self-efficacy as it related to integration ICT for teaching and learning, whereas teachers in Germany perceived ICT use in a negative way. Drossel et al. revealed that the Czech Republic held high participation rates in course preparation as opposed to Germany, where course participation was very low. Drossel et al.'s findings indicated that self-efficacy impacts school and classroom ICT-related collaboration.

Terek, Ivanociv, Terzic, Telek, and Scepanovic (2015) examined how to overcome the gap between initial teacher education and accredited PD and in-service training for beginning teachers. Terek et al. assessed teachers' need for a program that caters to teachers' specific challenges and found that continuous support is pertinent in a high-quality educational system. In their study, nearly 13% of teachers found integration of technology to be a challenge, and an additional 9% had trouble with usage of new technologies. Classroom teachers are in constant need of support with technology integration because their pedagogical training did not involve technology usage (Terek et al., 2015).

Blanchard et al. (2016) argued that students with teachers who participated in TPD showed significant gains on achievement scores compared to students who did not. Blanchard et al. investigated the effects of TPD on the beliefs and practices of European American or White and African American students in mathematics and science subjects in a rural, high-poverty district in the United States. In the study, teachers with 0–15 years of experiences were provided with an average of 103 TPD participation hours. Blanchard et al. found that long-term TPD can impact teacher beliefs and student excitement and interest in classroom technologies. Through simple linear regression analyses, students of TPD teachers predicted increases of .07 levels for math and .08 for science. A paired *t* test revealed higher belief scores with developed student-centered practices, while an ANOVA test revealed a significant interaction for the number of years students had TPD teachers (Blanchard et al., 2016).

Meissel, Parr, and Timperly (2016) investigated the effectiveness of PD using the hierarchical linear modeling with a focus on whether PD reduced the disparities for underserved learners in the New Zealand educational system. Meissel et al. provided ongoing visits once every 2 weeks throughout the 2-year literacy PD project. Large gains were made by learners in all groups; however, they found that further targeting would be required to provide equity across all groups of learners. Meissel et al. reported that professional learning can produce considerable gains in student achievement with the awareness that this did not show causality. Meissel et al. were not surprised by inconclusiveness concerning the effectiveness of PD because it is difficult to measure the effectiveness of PD trainings.

Moreover, Lu, Wang, Zhang, and Ji (2015) found that CAI can improve undergraduate students' learning. CAI management, training, and improvement of information literacy is critical in supporting classroom curriculum models with integration. Lu et al. analyzed problems and coping strategies in the process of using CAI technology to close gaps between training and integration. The findings of their study indicated CAI can improve learning independence, interests, course information.

Koh, Chai, and Lim (2017) examined how TPACK can support ICT integration and found that PD raised perceived confidence, increased student outcomes and general effectiveness for teacher confidence, and improved student learning. They discussed the importance of PD and allowing teachers to become conversant with the ICT design scaffolds. Through the use and knowledge gained from PD, teachers can use CAI in an effective manner to support reading achievement.

Liu, Ko, Willmann, and Fickert (2018) examined teachers' views of the usefulness of a year-long PD used to support the districts' iPad initiative. They found elementary teachers had a more positive views of the effectiveness of the training than high school teachers. Liu et al. reported that teachers with higher self-efficacy levels were more likely to benefit from the PD training. In addition, Liu et al. found that PD helped teachers integrate technology; technology was readily available to implement and integrate after the training, and the resources also offered teachers with classroom support.

Main and Pendergrast (2015) examined the relationship between continuing PD, teacher self-efficacy, and student learning outcomes. In the study, the PD facilitator's expertise and ability to provide transformational practice to meet the needs of students proved effective. Collective participation approaches were provided in the sessions; thus, the participants were able to support one another, which aided with their overall understanding. Additionally, the active learning aspect demonstrated strong alignment with modeling good practice, problem solving, and providing feedback.

Challenges. Tondeur et al. (2016) argued that TPD is necessary for educational shifts to enhance learning and combat integration challenges. Tondeur et al. examined teacher learning challenges for ICT. Tondeur et al. found the lack of suitable TPD may exacerbate the digital divide. Additionally, simply providing ICT does not directly correlate with improving learning. Professional learning communities within schools may facilitate learning experiences; however, it is a challenge to determine teacher effectiveness. Stakeholders will see changes in integration when providing and enabling

teachers with consistent reiterations of TPD. With rapid and vast changes in technology, continued support is suitable to enhance learning.

Coleman, Gibson, Cotten, Howell-Moroney, and Stringer (2015) investigated the relationship between PD and computer outcomes of fourth-grade and fifth-grade teachers in an urban low-income district. Coleman et al. examined teacher's computer attitudes, computer anxiety, and computer training. The findings revealed that a positive effect on computer integration may lead to improvements in elementary classrooms. Consistent training intensity had a more consistent impact on integration. In the NNJS district, PD serves to support teachers with integration. PD supports integration and aims to increase in reading achievement. Teachers implementing CAI programs can thrive when provided with opportunities to master integration.

Christ, Arya, and Liu (2019) analyzed challenges related to technology integration in literacy lessons. Using TPACK to highlight teachers' needs to integrate technology, Christ et al. provided 2 hours of seminar sessions across a 10-week semester. The sessions targeted effective digital features and lesson plan implementations. Christ et al. found that greater challenges stemmed from technology selection and planning at the appropriate level, with 36% of participants identifying with not planning effectively. Additionally, engaging students with interesting technology instruction provides students greater opportunities to stay on task. Off-task behaviors were reduced when students were engaged in digital literacy.

Joksimović, Robertson, Đokić, and Dražeta (2019) investigated the correlation between perceptions of strategies that affect PD and the challenges and successes of

implementation of TPD. Joksimović et al. found that technology integration correlates with self-efficacy and willingness. Veteran teachers tend to have lower self-efficacy, and teachers with low self-efficacy resist training. Supportive PD should include clear implementation and alignment and aid in the development of a positive outlook of change with the implementation culture.

Support. El Shaban and Egbert (2018) examined what effective computer-assisted language learning PD looks like. El Shaban and Egbert designed a model that consisted of two stages for adopting computer-assisted language learning technologies. El Shaban and Egbert examined two evidence-based components that support teacher's self-efficacy and ability to establish an enabling environment. El Shaban and Egbert found that individual teachers' needs can be supported through splitting the PD into both formal and informal meetings.

Murthy, Iyer, and Warriem (2015) described the design of effective integration of ICT with constructivist practices. The challenges encountered stemmed from planning integration at a large scale. Murthy et al. developed educational technology for engineering teachers; this technology implemented active learning strategies by providing training on student-centric teaching practices for effective integration. Murthy et al. found that active learning strategies for each technology must have hands-on activities to ensure teachers can transfer skills to students. Successful PD also emphasizes practice and reflection (Murthy et al., 2015).

Hammond, Bodzin, Popejoy, Anastasio, Holland, and Sahagian (2019) examined and designed PD and curriculum design for geospatial technology integration. Hammond

et al. supported teachers with the adaptation process of the program. The sessions established rapport and lasted 1–2 hours and helped teachers with established routines. Gradual release is an important PD tactic (Hammond et al., 2019). It is essential to provide teachers with time to adopt the material into their instructional setting. Hammond et al. offered teachers support through face-to face activities, online PD tasks, and hands-on learning activities. Collaborative design and development were an effective means to integrate the geospatial tools.

Girvan et al. (2016) investigated the experiences and outcomes for experiential learning as part of PD. Girvan et al. focused on reflection as a key element of PD. Teachers found it challenging to adapt to the changing roles in integration, and often learned from students if they were not confident with ICT usage. Girvan et al. concluded that gradual changes in practice supported by PD will help sustain engagement and progress with integration.

Liu, Tsai, and Huang (2015) examined collaborative PD with a focus on technology integration. Liu et al. found that collaboration was beneficial for PD, as teachers were able to gain and adopt new concepts and skills. Positive changes of implementation reflect an improvement in the PD of preservice teachers more than mentor teachers, due to mentor teachers noting that preservice teachers held superior technology skills.

Engagement. Supporting teachers with training will improve integration; however, it is equally important to support student engagement. Students who use technology run the risk of distractions, mismanagement, and lack of motivation (Haßler,

Major, & Hennessy, 2016). Facilities are being restructured to support technology integration, including the replacement of furniture, “no-front” classroom layouts, collaboration pods, and multipurpose space to transition from independent to collaborative technology usage (Erickson, 2019).

Sawang, O’Connor, and Ali (2017) examined ways to increase student engagement in a large class. Sawang et al. tested a model of classroom technology integration. Students’ stated that using the Keypads was an effective tool that enhanced student engagement (answering questions) as well as their level of understanding content. Similarly, Hou (2019) investigated integration strategies of interactive response systems. Hou found that students were more likely to answer questions when engaging at their own pace. Students who engaged at their own pace were less stressed and their attitudes toward integration, their participation, and academic performance with reading scores was enhanced. Both studies revealed that engagement strategies that required active participation positively impacted students.

Conversely, Fukuzawa and Boyd (2016) used hybrid problem-based learning to study several hundred undergraduate students who used an alternative passive learning option rooted in self-directed learning. Students felt that the online tool did not provide enough guidance and perceived the tool as too much work. Students are able to guide their completion rates using online tools. Active learning is the key ingredient to using instructional technology to enhance learning outcomes (Green, Tanforn, & Swift, 2018). Green et al. (2018) used clickers to increase class collaboration in a graduate hospitality classroom. One benefit discussed was participation without the pressure of having to

participate verbally. Green et al. indicated that students were satisfied with engagement of technology in the form of clickers, which informs the development of instructional design.

Herbert (2017) investigated whether the level of engagement impacted attrition and academic performance for first-year undergraduate students. Herbert found that the level of motivation did not correspond to average results; however, the increase in engagement did increase academic performance through active and collaborative learning experiences. The flipped-classroom approach demonstrated a positive impact on academic performance and attrition.

Fuad, Deb, Etim, and Gloster (2018) investigated the Mobile Response System's ability to enhance class engagement and problem-solving abilities and improve student performance. Fuad et al. found that multi process interactive exercises improved comprehension of students and positively impacted student achievement. Visual improvements and inclusion of more concepts, as well as consistency with usage, increase learners' impressions of the Mobile Response System.

Project Description

Potential resources and existing supports. This section describes the resources and supports needed to develop and present the PD plan. The most impactful and supportive components of PD training are the teachers and administrators. The resources necessary to implement the project included the PD PowerPoint presentation (see Appendix A), activity resources, speaker notes, and additional associated materials used throughout the execution of the PD plan. The PD plan was a multi-day, ongoing learning

session where teachers and administrators learned, practiced, and used application strategies to turnkey after follow-up sessions. PD trainings must include a variety of stakeholders to make perpetual changes that will impact the vision and mission of the district. Planning an effective PD for stakeholders that will support integration and student engagement is of a timely manner. Collaboration, modeling, monitoring, and reflection amongst stakeholders will lead to professional dialogue that will improve CAI integration, teacher learning, and student engagement.

Potential barriers and solution to barriers. Buy-in is a large hurdle to overcome with new instructional strategies or paradigm shifts. Penetrating institutional culture and routines is the most powerful barrier in existence. Many stakeholders are already bombarded with required management tasks and expectations; any shift that threatens stakeholders' established culture is met with negative criticism.

Educators who understand how to engage students with CAI can shift how impactful CAI can be on student achievement. Teachers' ability to successfully integrate student-centered CAI from beginning to end is important to teacher-centered instructional practices. To fulfill the project goal, it was essential that teachers gained expertise specific to engagement with CAI.

Proposal for implementation and timetable. Walden University approved the PD project to be facilitated and presented to NNJS stakeholders after the NNJS district's assistant superintendent granted permission. I established a time frame to present the study findings, the recommendations from the project, and the PD training. The PD plan is related to the student engagement variable. Student engagement leads to reading

achievement in conjunction with both effective and ineffective TPD strategies. This training was designed to take place over a 3-day PD training to provide stakeholders with learning, hands-on activities to practice and model learning, support, presentations, and reflection. Sessions included guidelines for integration and student engagement.

Timeline. The implementation process begins with outlining the vision, mission, purpose and goals of the project. An agenda will be used and PD norms can be posted to share expectations for the PD and ensure structure in the training aspect of this project. Deliverables will be posted in an online format for stakeholders to access anytime during the 3-day training. On Day 1, teachers will focus on learning stations that enhance participant awareness of integration needs, application of engagement variables, and variable monitoring. On Day 2, teachers will use goal-setting strategies to focus on building competency and increasing awareness with goal setting strategies. On Day 3, teachers will focus on strategically planning integration and troubleshooting. The main goal of the PD training is to provide stakeholders with a clear understanding of outcomes and responsibilities that would result in integrational changes.

Roles and responsibilities. My role with the PD plan included the design, creation, and development of the presentation materials, supplementary resources, the timeline, and facilitation of the PD sessions. I served as principal facilitator for the project. I was responsible for the creation, development, and distribution of promotional materials as well as securing the location for the PD.

Project Evaluation Plan

I will use formative evaluation and summative evaluations when conducting the project. The formative evaluation will determine if the project was successfully implemented. The formative evaluation addresses the delivery of expectations, guidelines for student engagement, and paradigm shifts. The summative evaluation will assess the overall effectiveness of the PD sessions.

Formative evaluation and summative evaluation. Formative assessments serve the purpose of providing evaluation while the activity is occurring. Stakeholders evaluate the PD during the PD sessions, which will help gauge the effectiveness of the PD overall. Evaluations will be given at the beginning of each session and asked three questions: (a) What do we want to accomplish?, (b) How will we know if we do?, and (c) What else might happen, good or bad? The formative evaluation for the PD is included in the final part of each session's agenda item. The evaluation questions will provide information on what was learned, how the learning will be implemented in the instructional environment, and whether teachers are confident with the learned strategies' ability to effectively impact student engagement. PD training participants will be asked four questions: (a) How confident are you utilizing strategies you learned today?, (b) What strategy will you implement upon returning to your instructional environment?, (c) What is your greatest struggle with integrating CAI? and, (d) How do you monitor student engagement? I would use this information to inform the additional PD sessions. All Google Form responses would remain confidential and responses would not be connected to any identifying information. The anonymity would encourage stakeholders to respond

honestly. The information gathered will be shared with administrators to support teachers in future PD sessions. The summative evaluations would provide information on the effectiveness of the PD training. A Likert-type scale with one open-ended question will be used to gather information on what additional resources or strategies would enhance the PD experience. See Appendix for the evaluation resources.

The evaluation plan provides information on how to address the needs of all stakeholders. The evaluation plan built my confidence as I planned to implement the PD training by providing information on how to address areas of improvement. The project includes school and district administration, teachers, and coaches. The inclusion of various stakeholders in PD training is key in ensuring the transfer of strategies are integrated at a variety of levels.

Project Implications

The local school district continues to plan for reading achievement. All teachers have the expectation to successfully integrate the CAI within daily instruction. This study determined that the average score of student's completed assignment had a predictable impact on reading achievement. Teachers need strategies for effective integration that support student engagement, as measured by students' average scores. Teachers should be empowered to model, instruct, and motivate students to actively engage in CAI. Students engaged in CAI earn average scores of > 74% on tasks shift language arts classrooms (Achieve3000, 2018). Additionally, achievement in CAI is linked with teacher competency as well as student engagement (Christ et al., 2019; Coleman et al., 2016; Hou & Zen, 2019). At the local level, the project has the potential to improve the

quality of CAI integration to improve student achievement. On a larger scale, this plan is an integral part of social growth and change and has the potential to improve integration practices and increase student achievement on a wider scale. This PD training would improve the landscape for areas that need improved technology integration by building bridges to connect student engagement with integration strategies.

Section 4: Reflections and Conclusions

Introduction

In this study, I examined the effectiveness of integrating aspects of student engagement while using CAI to increase student achievement. In this section, I describe the strengths and limitations of the project study. Additionally, my reflections on the development and implementations of the project, my recommendations for future evaluations, the importance of the completed study, and how the findings can motivate social change are discussed. This section also includes a summary of the project.

Project Strengths and Limitations

The purpose of this PD training was to inform the stakeholders in the NNJS district of the value and impact student engagement has on CAI. Teachers use CAI daily to support reading achievement; however, students show a gap in performance while using CAI. Therefore, PD was needed to support the integration of CAI to improve student engagement and improve reading achievement.

The NNJS district PD training aimed to support stakeholders with CAI integration to support student engagement. I developed this project to use formative and summative assessments to answer the evaluation questions that guided its creation. The formative evaluation provides data for the components of the PD that allows the training to shift to address the direct needs of the stakeholders.

Strengths. Through collaboration, stakeholders can receive support with integrating CAI effectively into instructional routines to support student engagement. I

have included various evidence-based engagement practices to support the integration of CAI. An additional strength of the PD training is that administrators can examine the effectiveness of the PD in regard to integration moving forward. However, limitations to the project do exist.

Limitations. Two limitations of the project study exist. The first limitation is that the research is reflective of one school for students in Grades 4 and 5. Additionally, the study only focused on the student engagement predictors that led to achievement as it pertains to the specific CAI; the study did not include general CAI strategies. These limitations minimize the study findings because including other grades could have provided further insight into CAI usage and alternative strategies could have revealed additional themes during the PD training.

Recommendations for Alternative Approaches

I have three suggestions for alternative approaches to this study. One alternative approach to addressing the problem in the NNJS district is to investigate CAI in lower and higher grades in new schools. Teachers indicated that CAI is used for Grades K–12. Critical information may be gained by focusing on various grade levels. Additionally, using a vast CAI strategy to support integration may yield more significant results in achievement because the district uses multiple CAI programs.

Another approach may be to use a qualitative case study in addition to the quantitative methodology. This alternative approach would allow for the data to reveal themes that hinder integration or teachers' perceptions of the causes of a lack of student achievement. In a case study, the researcher collects multiple forms of data (Creswell,

2012). Stakeholders may gain additional insight through using an alternative approach to the design.

Scholarship, Project Development and Evaluation, and Leadership and Change

As a doctoral student attending Walden University, I can see and experience high levels of academia and scholarship. During my journey, I learned to conduct and analyze research and complete scholarly writing. My challenges during this experience helped me to overcome obstacles and find ways to persevere. My journey through the doctoral program taught me discipline and self-motivation as well as how to be a better manager of time as a student, scholar, and educator. This process also increased my interest in data analysis and showed me how I can use my strengths to help others master difficult skills.

Project Development

I intended to determine whether PD training on student engagement variables and integration strategies was successful in integrating CAI into classrooms. After receiving feedback from the first day, I was able to see that integration was not relevant to competency or strategic time management. With this in mind, it was essential for me to support stakeholders with real-life solutions and provide student engagement strategies that would help with integration and lead to achievement.

I conducted a literature review of successful PD strategies and studied integration and student engagement. The evaluations from each training day shed light on the adjustments needed and revealed that the PD training increased the stakeholders' integration strategies along with engagement strategies. The development process taught

me the value of tailoring PD to meet the practical training needs of participants. The expertise gained through this development process will help me to design future PD trainings.

Leadership and Change

The development of the PD taught me valuable lessons related to leadership and change. When I began my doctoral journey, I was an advocate for students both in and out of the classroom. I supported students from the lens of a change agent and advocated for changes if I believed that alternative solutions existed. I gained confidence as a leader throughout my journey and enhanced my leadership skills throughout the project study.

Reflection on Importance of the Work

The evaluation conducted as part of the PD development was critical because it helped determine the effectiveness of the training for integration and student engagement strategies. The current study contributes to the growing body of literature on the topic of CAI engagement strategies. The findings from the PD training indicated that PD increases integration and engagement strategies, which stakeholders can utilize. The PD training allowed me to support teachers with a hands-on learning experience that positively influenced teachers' integration rates and implementation of student engagement strategies. PD participants expressed the need to witness integration in real-time instruction. To address this concern, I recommended that the study site allow teacher rotations to observe integration and student engagement strategies in real-time. This study has the potential to shift the paradigm of CAI integration as it pertains to student engagement at the local, state, and national levels.

Implications, Applications, and Directions for Future Research

This project study was grounded in Guskey's (2002) five levels of PD evaluation. The literature review and the study findings supported the integration of TPD to influence the implementation of engagement strategies. The project may support a new theory as it pertains to PD and student engagement practices with CAI. This project also implies that continued support for teachers with integration and student engagement strategies is essential. One specific recommendation for future research is expanding the study framework so that it is inclusive of multiple subjects and grade levels across the district.

Conclusion

In summation, the PD training that focused on integration and student engagement strategies with CAI had both strengths and limitations. The PD training supported stakeholders with direct challenges by integrating CAI into instructional routines to promote student engagement using an interactive structure. The interactive component of the PD training allowed participants to actively engage with fellow participants about ways to integrate implementation strategies in their classrooms or buildings at large. The PD process also enabled participants to process the strategies learned. Additionally, the PD process allows for administrators to examine how the PD is integrated to address needs directly. The limitations included the lack of scope in the study because the study was limited to Grades 4 and 5 at one school. The study was also only focused on the student engagement predictors pertinent to the specific CAI; the study did not include general CAI strategies. I was able to triangulate the data to increase the legitimacy of the study. My reflections on scholarship, development, and leadership summarized my

learning experiences during the doctoral journey. Lastly, the PD training provided a platform for social change to support stake holders with integration and student engagement strategies with CAI.

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Appendix: Project

Ice Breaker How comfortable are you using CAI?

Using the code, please select your answer.

- 1- Not at all
- 2- I can use only the BASICS
- 3- If I must
- 4- Comfortable
- 5- Very Comfortable

Once you've answered, find someone at your table to introduce yourself and discuss your response.

9:00- 9:05 Ice Breaker Purpose- Model using technology to poll comfort levels, to make everyone feel comfortable and establish learning levels.

Contents

- Training Norms
- Schedule
- Objectives
- Understanding the Data
- The Study
- CAI Definition
- Mission and Vision
- Virtual worlds
- Impact

9:05-9:06- Review what the training covers.

- Actively participate
- My Turn, Your Turn Listening
- Parking Lot Questions
- I Do, WE Do, Let's Plan
- Reflective Moments

Notes: 9:10-9:15- Discuss training Norms and help with Sign-in and Ice Breaker.

- 9:00-9:15- Signing in, Ice Breaker
- 9:16-10:00-Schedule, Objectives, Understanding the Data, and Current Study
- 10:01-10:45- Mission & Vision Statements, Understanding Integration, and Engagement Variables
- 10:45-10:55- Break
- 10:55-11:35- Learning Stations
- 11:35-11:45- Feedback from Learning Stations
- 11:45-12:00- Wrap-up morning session
  (Address Parking Lot Questions)
- 12:00-1:00- Lunch
- 1:01-1:05- Polling Question
- 1:05-1:45- Discussion about current integration needs.
- 1:45-2:05-Feedback from integration needs discussion
- 2:05- 2:15- Closeout Out/ Evaluation

9:16-Discuss Schedule

- **To understand the District's Mission and Vision Statement and how it relates to Integration**
- **To Understand Student Engagement and how to use the strategies to motivate students during CAI usage**
- To provide key integration strategies for CAI the promote reading achievement and monitoring student engagement
- Create plans for integration and Trouble Shooting

9:16- 9:20 I will examine the effectiveness of integrating aspects of student engagement leading to reading achievement while using CAI.

Understanding the Data

Reading Achievement scores

CAI Usage and Achievement Scores

Pre-Test Completion	Completed Activities	Avg. Activities per Student	Avg. Activity Score (Weighted)	Avg. Lexile Gain
97.3%	83,748	17	67%	39L

Reading Achievement Scores

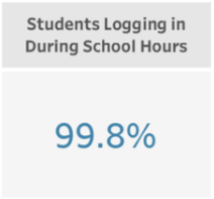
- Grade 4

Student Group	Valid Scores	Mean Scale Score	District Mean Scale Score	State Mean Scale Score
Schoolwide	69	739	746	756

Grade 5

Student Group	Valid Scores	Mean Scale Score	District Mean Scale Score	State Mean Scale Score
Schoolwide	67	748	747	755

CAI Usage and Achievement Scores



Meeting the Minimum Level of Proficiency

Content Area	Grade	2015	2016	2017	2018
Language Arts	3	730	725	719	734
Language Arts	4	736	745	732	739
Language Arts	5	735	755	756	747

- The purpose of this quantitative predictive study was to test whether student engagement variables (time on task, number of CAI completed assignments, and students' average score on CAI tasks) can be used to predict reading achievement.
- The purpose of this project is to provide training for teachers to support integration and students' engagement practices while using the CAI program.

Computer-Assisted Instruction

Computer assisted instruction (CAI) is an evidence- based instruction method that research shows improves reading outcomes for students (Khezrlou & Ellis, 2017). While students work independently with CAI programs, it becomes vital to monitor student engagement and usage to ensure adequate student progress (McTigue & Uppstad, 2019). Data indicates that appropriate implementation of CAI can raise student achievement in reading (Khezrlou, Ellis, & Sadghi, 2017; Lysenko & Abrami, 2014; Regan et al., 2014; Tingir et al., 2017).

What is it? How are you currently utilizing it within the classroom?

- Computer-assisted instruction is a teaching and learning tool with the information presented to a student by a computer (Şeker & Kartal, 2017).

Mission & Vision Statements

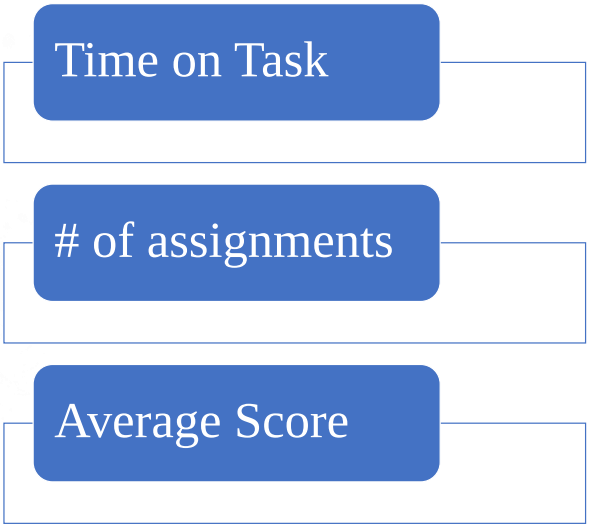
VISION STATEMENT

To prepare **all** of our students for college, careers, and life in high performing Northern New Jersey Schools.

MISSION STATEMENT

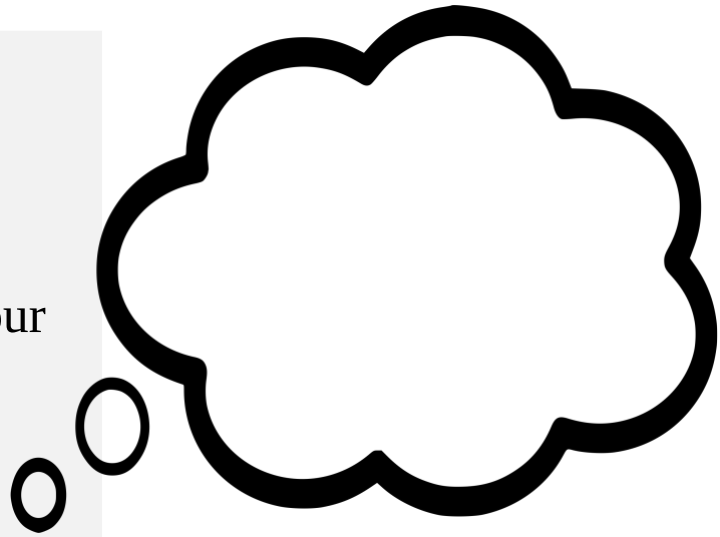
The Northern New Jersey Schools is committed to and will prepare **all** of our students for college, careers, and life. We will provide a safe, clean, positive, and supportive learning environment in which **all** students can successfully develop socially, emotionally and academically into lifelong learners and responsible, productive citizens. We will continually strengthen and align our curriculum with state, national, and international standards that are engaging, rigorous, relevant, and implemented consistently. We will ensure that all students, parents, staff, and community members are respected and informed in our family-friendly schools. We will strive to motivate and engage all of our students through various innovative instructional strategies, methods, and techniques. Utilizing students' skills, talents, and unique abilities, we will prepare them to meet the demands of an ever-changing competitive 21st century global society.

10:01-10:45 Mission & Vision States will be posted: All of the participants will be broken into small groups to dissect the statements to assess how we are meeting the statements with integration.



10:55-11:35 Learning Station 1: Participants will discuss and learn more about monitoring and adjusting to needs as it pertains to the Engagement Variables, specifically Average Scores.

How are these engagement variables monitored in your instructional environments?



10:55-11:35 Learning Station 2: Participants will discuss then learn strategies for guiding students to manage their engagement time while utilizing CAI.

Clarifying …

- What do you need to continued support with to ensure integration is effective?
- What didn't work for me in today's session was:

11:35-11:45 Participants will engage in discussion and feedback of Learning Stations.

Polling Question

- Do you feel knowledgeable about the current CAI program in use?

1:01-1:05 Participants will Partner Talk their responses and record.

Computer-Assisted Instruction

Integration and Average Scores Strategies

Session 2

Ice Breaker How comfortable are you integrating CAI?

Using the code, please select your answer.

- 1- Not at all
- 2- I look forward to learning more
- 3- If I must
- 4- Comfortable
- 5- Very Comfortable

Once you've answered, find someone at your table to greet a neighbor and discuss your response.

Ice Breaker 9:00- 9:05 Purpose- Model using technology to poll comfort levels, to make everyone feel comfortable and establish learning levels.

Schedule

Session 2

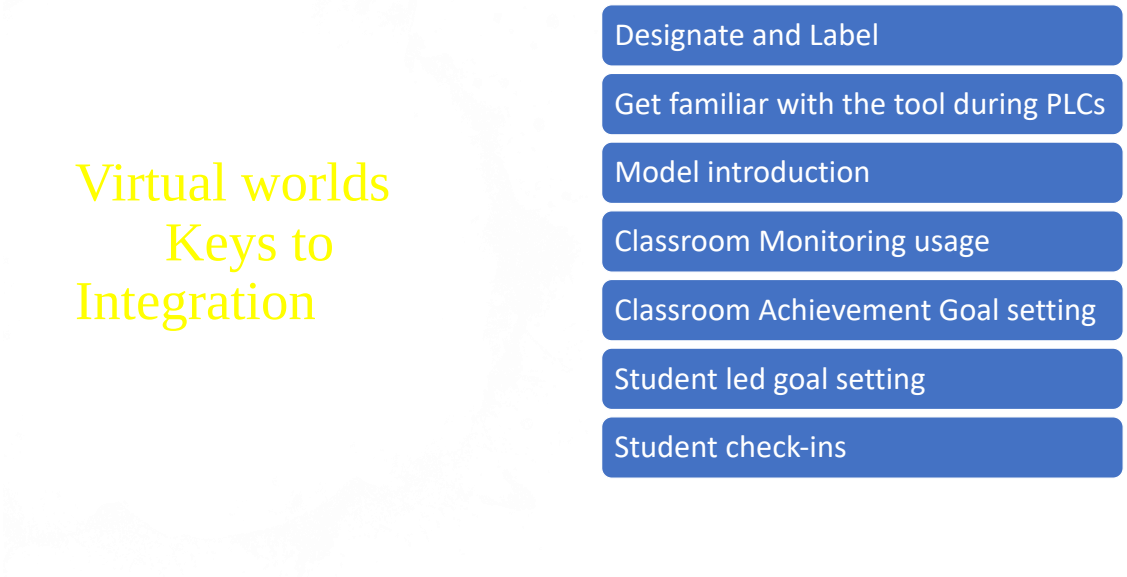
- 9:00-9:15- Signing in, Ice Breaker
- 9:16-10:00- Goal Setting
- 10:01-10:45- Learning Stations
- 10:45-10:55- Break
- 10:55-11:25- Integration Checklists
- 11:25-11:45- Feedback from Learning Stations
- 11:45-12:00- Wrap-up morning session (Address Parking Lot Questions)
- 12:00-1:00- Lunch
- 1:01-1:05- Polling Question
- 1:05-1:45- Average Score Strategies
- 1:45-2:05-Small group Discussions with Feedback from Learning Stations
- 2:05- 2:15- Close Out/ Evaluation

9:16-9:19 Discuss schedule: Address concerns or thoughts/ questions from previous session.

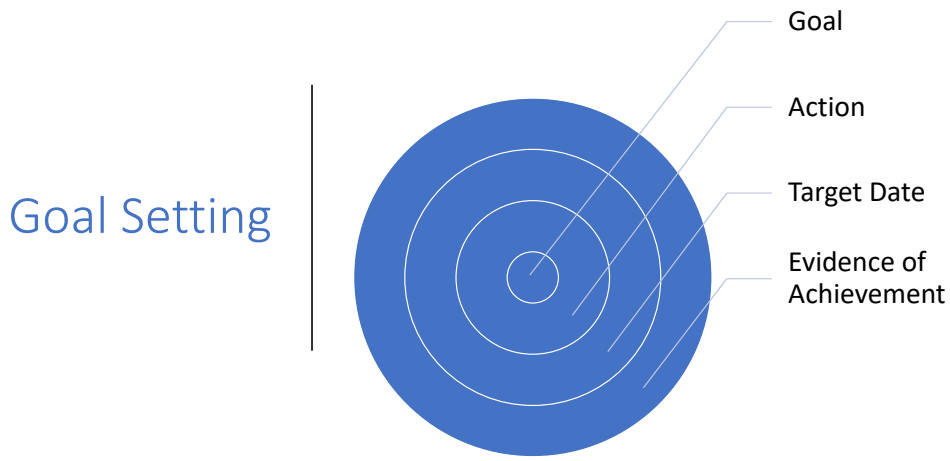
Objectives

- *To understand the District's Mission and Vision Statement and how it relates to Integration*
- *To Understand Student Engagement and how to use the strategies to motivate students during CAI usage*
- **To provide key integration strategies for CAI the promote reading achievement and monitoring student engagement**
- Create plans for integration and Trouble Shooting

9:19- 9:20: Discuss objectives for the session.



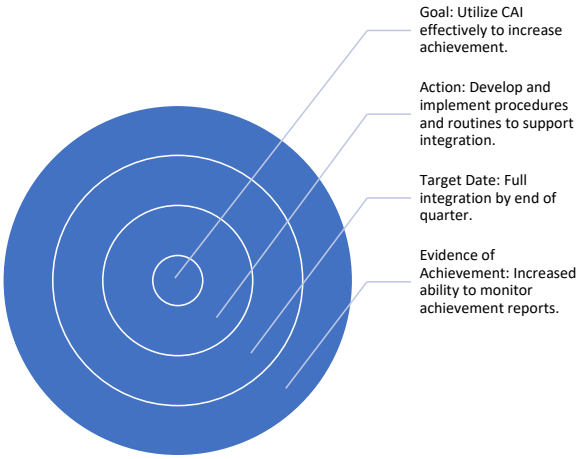
Learning Station 2: I will examine the effectiveness of integrating aspects of student engagement leading to reading achievement while using CAI through modelling. Participants will create a personal plan for implementing new integration strategies in your classroom. Participants will learn strategies designed to empower students to achieve more of their potential academically.



Learning Station 2: I will examine participants comfort levels with integration.
Participants will learn strategies for guiding students to make the most of their time, choosing purposeful and persistent actions necessary to stay on course to their goals.

Participants will learn strategies for guiding students to use critical and creative thinking along with planning that lead to academic knowledge and skills.

Goal Setting Example



Participants will engage in strategies for guiding teachers and students to make the most of their time, choosing purposeful and persistent actions necessary to stay on course to their goals. Strategies for guiding students to use critical and creative thinking that lead not only to academic knowledge and skills but also to the wisdom required to create a rich, full life. Goal: What do you want to achieve? Action: How will you accomplish the goal? Target Date: When do you anticipate your goal will be met? Evidence: How will you know your goal has been met? How will you know whether or not it has impacted instruction and student achievement?

Planning Sheet

CAI Goal Planning Sheet

_____'s Monthly CAI Goal.

	Goal:	Action:	Target:

Participants will engage in strategies that will help their students utilize CAI to improve achievement.

Integration Checklists for Teachers

Teacher Integration Checklist

	The technology usage is planned and purposeful.
	The CAI usage is a routine part of the environment.
	The CAI usage is monitored.
	The CAI usage is used to support achievement goals.
	There are CAI troubleshooting routines posted.
	CAI achievement is tracked and displayed.

Participants will engage in the checklist routine and implementation discussion.

Integration Checklists for Students

Student Integration Checklist

	I know my CAI goal.
	I responsibly log in to my CAI program.
	I refer to troubleshooting procedures.
	I track my achievement goal.

Participants will engage in the checklist routine and implementation discussion.

Average Score Engagement Strategies

Phase I	Phase II	Phase III
Whole Group	Small Group	Individual conferencing
Model	Model	Model
Discuss	Discuss	Discuss

Participants will learn, model, and practice each phase of the strategy using the discussion guide.

Average Score Engagement Monitoring

Teacher Tracking	Class Tracking	Student Tracking
CAI Data Tracker Monitoring Sheets	Rotate Student Leaders to transfer class Data onto Class Scoreboard	Individual Data sheets Update weekly/ monthly goals
Model – Tracking Model- CAI Tools to help with Average Scores	Model – Tracking Model- CAI Tools to help with Average Scores	Student Accountability of Average Score Strategies
Discuss	Celebrate Progress	Celebrate Progress

Participants will discuss and plan ways they will be able to implement the monitoring strategies. Participants will also be able to modify the strategy to tailor to their specific needs.

Average Score
Engagement
Monitoring

CAI Tools	Specific Reading CAI Connections Tools	Student Tracking
Student Progress Monitor Tracking Tool	Summarize	Understanding Reports
Highlighter Tool	Generating Questions	Individual Data Tracker Bar
Returning to the Text Tool	Setting the Purpose	Tracker Sheets

Participants will discuss and plan ways they will be able to implement the monitoring strategies. Participants will also be able to modify the strategy to tailor to their specific needs.

Computer-Assisted Instruction

Integration and Trouble Shooting Strategies

Session 3

Objectives

- To understand the District's Mission and Vision Statement and how it relates to Integration
- To Understand Student Engagement and how to use the strategies to motivate students during CAI usage
- To provide key integration strategies for CAI the promote reading achievement and monitoring student engagement
- **Create plans for integration and Trouble Shooting**

9:16- 9:19 I will review objectives, discuss concerns or questions from previous day.

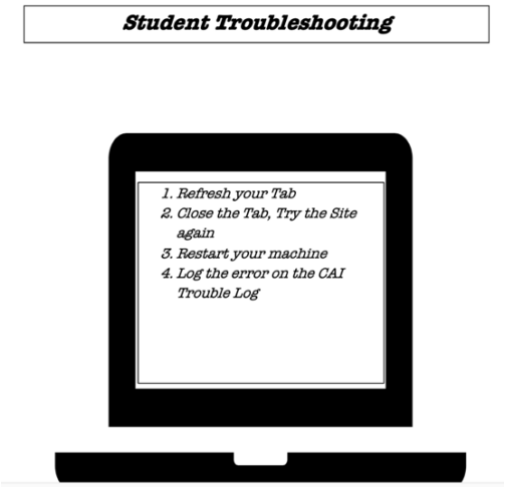
Schedule

Session 3

- 9:00-9:15- Signing in, Ice Breaker
- 9:16-10:00- Learning Stations
- 10:01-10:45- Learning Stations
- 10:45-10:55- Break
- 10:55-11:25- Integration Solutions Discussion
- 11:25-11:45- Feedback from Learning Stations
- 11:45-12:00- Wrap-up morning session
  (Address Parking Lot Questions)
- 12:00-1:00- Lunch
- 1:01-1:05- Polling Question
- 1:05-1:45- Implementation Planning in groups
- 1:45-2:05-Small group Discussions with Feedback from Learning Stations
- 2:05- 2:15- Close Out/ Evaluation

9:19-9:20 I will provide the overview of the schedule.

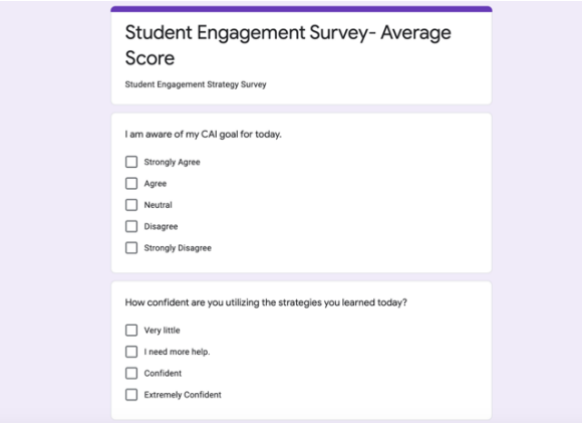
Trouble Shooting Guide



Participants will discuss Troubleshooting strategies already in place and learn why student led trouble shooting is critical.

Student Survey

Average Score- Engagement Survey



https://forms.gle/5hM6p2v1mm84SaH49

Participants will have access to online classroom survey samples. Participants will be able to tailor their surveys to fit their needs.

Increased Awareness

What are the benefits of monitoring and reflection while engaging in CAI?

Partner talk for teachers to model conversations with students to be motivated for

academic achievement while using CAI, thus promoting greater perseverance when they encounter inevitable challenges during usage.

Integration Solutions

Guiding Questions:

- ❑ What do I need to integrate successfully?
- ❑ What do my students need?
- ❑ CAI checklists for accountability.
- ❑ Student Access

Based on Participant Needs, Participants will be able to garner skills to implement daily CAI usage with Trouble shooting Tickets, Tech Support information, and navigate their current CAI program Help Page.

Integration Solutions

CAI checklists for STUDENT accountability

- ❑ I know how to log in and out of my CAI Program Successfully.
- ❑ I handled my device with care.
- ❑ I know my CAI goal for the week.
- ❑ I used one CAI strategy tool this session.
- ❑ I have added my CAI Data for this session.

Integration and Engagement Survey
https://forms.gle/wKf6Z4n598hjTVU99

Based on Participant Needs, Participants will be able to garner skills to implement daily CAI usage with Trouble shooting Tickets, Tech Support information, and navigate their current CAI program Help Page.

Implementation Planning Quick Guide

1. Designated Technology resources
2. Digital environment/ programs
3. CAI program training
4. Modeling for students
5. Directions and usage outline
6. Tracking systems
7. Weekly Data Reports
8. Student Conferences on Progress

Partner talk for teachers to construct a quick checklist guide to ensure accountability upon returning to classroom to promote success.

References:

Lysenko, L. V., & Abrami, P. C. (2014). Promoting reading comprehension with the use of technology. *Computers & Education*, *75*, 162-172.

McTigue, E. M., & Uppstad, P. H. (2019). Getting serious about serious games: best practices for computer games in reading classrooms. *The Reading Teacher*, *72*(4), 453-461.

Regan, K., Berkeley, S., Hughes, M., & Kirby, S. (2014). Effects of computer-assisted instruction for struggling elementary readers with disabilities. *The Journal of Special Education*, *48*(2), 106–119. https://doi.org/10.1177/0022466913497261

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Tingir, S., Cavlazoglu, B., Caliskan, O., Koklu, O., & Intepe-Tingir, S. (2017). Effects of mobile devices on K–12 students' achievement: a meta-analysis. *Journal of Computer Assisted Learning*, *33*(4), 355-369.

Evaluation Surveys:

Ice Breaker Survey 1

https://forms.gle/CsYhDbsFoXSPdU449

Ice Breaker Survey 2

https://forms.gle/nPFtmxSoFiudND998

Daily Session Surveys

Computer-Assisted Instruction Learning Survey 1

https://forms.gle/LtiY2RCK8w7pVfUZ6

Computer-Assisted Instruction Learning Survey 2

https://forms.gle/wbVKpcjH4m7FF7vB6

Computer-Assisted Instruction Learning Survey 3

https://forms.gle/8BhMGPtuDcLq681s9

PD Session Conclusion Surveys

Computer-Assisted Instruction Session Survey 1

https://forms.gle/KvmAs8eTysrE1FXd9

Computer-Assisted Instruction Learning Survey 2

https://forms.gle/BDczaYfSu5XayNRH9

Computer-Assisted Instruction Session Survey 3

https://forms.gle/GVSox3vTWigfsqFm6

Summative Evaluation Survey

Computer-Assisted Instruction Summative Evaluation Survey

https://forms.gle/jroDsMspMa2WCw6t6

Computer-Assisted Instruction Summative Evaluation Survey

Summative Evaluation 1 Month Following PD

1. What changes were made to my CAI instructional setting?

Tick all that apply.

- [ ] I have not made changes.
- [ ] I have implemented management changes.
- [ ] I have implemented CAI routines.
- [ ] I have implemented whole CAI progress monitoring.
- [ ] I have implemented individual CAI progress monitoring.
- [ ] I have implemented goal setting.

2. How comfortable are you using CAI engagement strategies?

Tick all that apply.

- [ ] 1- Not at all
- [ ] 2- I can use only the BASICS
- [ ] 3- If I must
- [ ] 4- Comfortable
- [ ] 5- Very Comfortable

3. Have you received additional support with implementation challenges?

Mark only one oval.

- ◯ I have received support.
- ◯ I have not received support.
- ◯ I am in need of additional support.

4. How have you implemented CAI engagement strategies into your learning environment?

5. What additional assistance would help with CAI implementation ?

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