THE EFFECT OF DATA-DRIVEN PROFESSIONAL LEARNING COMMUNITIES ON LITERACY

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Abstract

The purpose of this quantitative study was to examine the effect of data-driven professional learning communities on literacy in a rural, Title I public school in Northeast Tennessee. The theoretical framework of this study was based on Jerome Bruner's Constructivist Theory. The study included 253 students enrolled in grades 1-5. The Star Reading Assessment was used to measure student progress. The results were analyzed using confidence interval testing from Normal Curve Equivalency and Grade Level Equivalency scores. The major findings resulting from the study were that data-driven professional learning communities had a positive effect on literacy achievement for children in grades 1-5. This study further identified 2nd and 5th grades as two areas to target for more student and teacher support because their parameter provided less evidence of student growth in literacy.

Keywords: professional learning communities, data-driven professional learning communities, literacy, Title I, rural, elementary, public school

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Dedication

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CHAPTER 1: PURPOSE & ORGANIZATION

Introduction

In 1983, the National Committee for Excellence in Education penned a "Nation at Risk" for President Ronald Regan to explain the dilemma facing public education in the United States. The first excerpt from the article stated:

> Our Nation is at risk. Our once unchallenged preeminence in commerce, industry, science, and competitors throughout the world are overtaking technological innovation. This report is concerned with only one of the many causes and dimensions of the problem, but it is the one that undergirds American prosperity, security, and civility. We report to the American people that while we can take justifiable pride in what our schools and colleges have historically accomplished and contributed to the United States and the well-being of its people, the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people. What was unimaginable a generation ago has begun to occur--others are matching and surpassing our educational attainments (para. 1).

The United States is once again at a crossroads in education, as the current system has failed to provide students with the adequate skills to be proficient readers. According to the Tennessee Department of Education (2016), only 43% of students in the state are reading on grade level at the conclusion of 3rd grade. Because less than half of Tennessee students are reading on grade-level, a current and future problem is posed. History offers a possible solution to the problem. Educators must unite and work collaboratively as educational professionals. This is known in the educational world as professional learning

communities.

Professional learning communities (PLC) have been implemented in educational settings across the country with the intentions of increasing student academic achievement (Dufour & Eaker, 1998). In countries such as Finland and Japan, where students routinely outperform those in the United States in academic performance, collaboration among teachers is an essential aspect of instructional improvement (Mirel & Goldin, 2012). The effect of data-driven PLCs on education should be analyzed to statistically gauge their benefits on increasing student achievement in literacy. Increasingly, higher expectations in literacy continue to develop for educators, districts, and states. Educators are expected to ensure that all students leave their classroom reading on grade level. Therefore, it is necessary to examine the correlation of students' literacy scores and the implementation of data-driven professional learning communities. Throughout the evolution of education, educators have progressed from an independent, closed-door approach to a collaborative, open-door approach. Thus, the establishment of data-driven professional learning communities could have a significant effect on improving student performance in the educational setting.

Background of the Study

State assessments, literacy rates, and the ability for students to be able to read and comprehend on grade- level are the major challenges that every administrator in Tennessee will face over the next four years. The adoption of the "Tennessee Core Standards" and the "Read to be Ready" initiative in Tennessee has prompted a shift in education and placed the literacy rate at the highest level of importance because every tested subject requires students to be able to read and comprehend the material for every

subject assessed by the state (Johnston, 2015). The Tennessee Department of Education has established the Tennessee Core Standards as the blueprint for continuous improvement in education across the State of Tennessee (Tennessee Department of Education, 2011). These are simply the Common Core standards that have been adopted by 42 states (National Governors Association, 2013). State educational leaders and the National Governors Association created these standards to impose a system of national standards on K-12 education. Approximately 75% of educators in Tennessee support the new curriculum, according to two separate polls conducted by the Tennessee Education Association and National Education Association (O'Brien, 2014). With this shift, the increase of student literacy rates is vital to success for schools and districts. Thus, improving literacy scores in the educational setting is essential for educators nationwide. This study examined the significance of the implementation of data-driven professional learning communities and literacy scores in a K-8 public school setting according to the Star Reading Test.

Statement of the Problem

The purpose of this study was to determine the correlation between the implementation of data-driven professional learning communities and their effect, if any, on student literacy scores according to the Star Reading Assessment. Resources and literature are abundantly available for professional development and school improvement during this time of standardized testing and accountability. A working knowledge of data-driven professional learning communities is assumed for all participating educators. There is a wealth of information available on professional learning communities; however, the correlation between data-driven professional learning communities and

increased student performance in literacy is unknown. Therefore, the results produced could have widespread effect on literacy improvement plans and academic enhancement in the United States. Increasing the literacy rate is an issue that nearly every public school needs to address. The ability to read at a high-level should be the expectation for all students.

This study sought to determine the effect size on mean Normal Curve Equivalent and Grade Level Equivalency Star Reading test scores of students in a rural, East Tennessee school system, whose teachers participated in data-driven professional learning communities. The mean NCE Star Reading test scores of participating teachers were analyzed to determine if any associations exist between pre-implementation test scores (2015-2016) and post-implementation year scores (2016-2017). Two years of Star Reading scores were used from students whose teachers have participated in data-driven PLCs. The Star Reading NCE scores of students whose teachers participated in data-driven professional learning communities were analyzed by comparing the pre-implementation year scores (2015-2016) to post-implementation data results for years (2016-2017). The pre-implementation student scores consisted of data and test scores from the year before implementation of data-driven professional learning communities. The post-implementation year scores (2016- 2017) consisted of data and test scores from the year following the implementation of data-driven professional learning communities. In the study, there were two sets of student scores to analyze: pre- and post-implementation NCE scores for years one (2015-2016) and (2016-2017). Comparisons were examined using NCE and GLE scores to determine if there were any differences in NCE and GLE scores within the pre- and post-implementation subgroups.

Significance of the Study

This study focused on the Star Reading NCE and GLE scores of students whose teachers participated in data-driven professional learning communities and those students whose teachers did not participate in data-driven professional learning communities. Based on the findings, school systems could use data-driven professional learning communities in a more effective manner to ensure that student literacy rates improve over time. As a result, educators and educational administration could improve their instructional practices, content knowledge, and classroom design.

Theoretical Foundation

The theoretical framework for the study was based on Jerome Bruner's Constructivist Theory. Burner's constructivist theory is a broad conceptual framework that exceeds educational boundaries due to its basis in cognitive development. The constructivist theory supports the premise of professional learning communities because the principles of the constructivist theory suggest that learning involves seeking meaning for one's self and then comparing the meaning to the concept of other people (Paul, 2005). The underlying principles of the constructivist perspectives suggest that teachers must understand their own learning and acquisition of knowledge before being able to effectively instruct in the classroom. Therefore, it is vital for teachers to have the opportunity to reflect and develop plans that establish a foundational knowledge that teachers may present to students. Professional Learning Communities provide an avenue by which knowledge can occur through a continuous cycle of learning rooted in self-reflection, collaboration, professional dialogue and instructional focus (Hord, 2004). There is significant research about the structure, characteristics, implementation and

school-level benefits of professional learning communities (Dufour, 2007). However, additional research-based results are needed regarding the effect of professional learning communities on student literacy development.

The correlation of data-driven professional learning communities and literacy scores is based on a constructivist theory of learning. The learning of educators and students is a continuous process that is affected by social interaction and the ability to adapt to different circumstances and situations. With the constructivist theory, the individual or group, through interactions within their environment, actively constructs perspective knowledge in an attempt to make sense of the world (Murphy 1997). Constructivism combined with professional learning communities has helped many school districts improve test scores across the country. Gulati (2004) stated that educational environments based on constructivism suggest that learning is accomplished best by providing real-life contexts in a setting of flexibility, allowing for freedom to choose learning resources and openness in discussing issues. Thus, it is imperative for successful data-driven professional learning communities to be based on openness and trust among its members.

Research Questions

1. Is there a difference in students' mean Star Reading NCE scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

   Ho1: There is no difference in students' NCE scores (pre-implementation years 2015-2016 post-implementation years 2016-2017) between teachers who

participated in data-driven professional learning communities and teachers that did not participate in data-driven professional learning communities.

2. Is there a difference in students' mean Star Reading Grade Level Equivalency scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

   Ho2: There is no difference in students' Grade Level Equivalency scores (pre-implementation year 2015-2016 post-implementation years 2016-2017) between teachers who participated in data-driven professional learning communities and teachers that did not participate in data-driven professional learning communities.

Delimitations

Delimitations are established boundaries of a study that factor into the research. Delimitations identified are sample size, subjects, and variables of the study. The sample was taken from the examination of 253 students and five grade levels. The pre-implementation NCE scores were accumulated over the school year 2015-2016, while the post-implementation NCE scores were accumulated over the school year 2016- 2017. Subjects only included teachers from one school that were well-versed in the data-driven professional learning community process. Teachers were required to be trained and fully participate in the data-driven professional learning community meetings and fully incorporated assigned agendas pertaining to literacy achievement data. Additionally, the variables of the study (data-driven, professional learning communities, and literacy) were selected to advance and provide data for the education community.

Limitations

Research limitations are influences upon research that the researcher cannot control. Research limitations should be addressed because they restrict the methodology and conclusion of the study. The influential limitations identified were history effect, maturation, assessment, and selection bias. History effect was a factor in this research. The students were currently enrolled in school, which impacted this research. The extraneous effect of education could play a role by affecting the internal validity of the PLC study (Ary, Jacobs, Sorensen, & Walker, 2014). Maturation references biological and psychological changes over the passing of time. Maturation could affect the study because children were involved. Children naturally experience biological and psychological changes as a result of growing. These effects could mistakenly be attributed to the experimental treatment. The study involved assessment using the same assessment in a pre- and post-test manner. Although the assessment questions were different, the assessment would likely be more familiar and cause less apprehension, which could affect the internal validity of the study. Thus, the selection process could propose a threat to internal validity due to the inability to use random sampling.

Assumptions

It was assumed that teachers were well-versed and experienced in implementation of data-driven PLCs. Training was implemented to ensure that all educators had thorough working knowledge and skills to successfully implement data-driven professional learning communities. Educators participated in grade-level teams with the goal of ensuring that all students leave their specific grade reading on grade- level.

Definition of Terms

Constructivism: A learning process in which the learner is building an internal illustration of knowledge, a personal interpretation of experience (Constructivist Theories, 2008).

Estimated Oral Reading Fluency: Estimated Oral Reading Fluency is an estimate of a student's ability to read words quickly and accurately in order to comprehend text efficiently. Students with oral reading fluency demonstrate accurate decoding, automatic word recognition, and appropriate use of the rhythmic aspects of language (e.g., intonation, phrasing, pitch, and emphasis). Est. ORF is reported in correct words per minute, and is based on a known relationship between STAR Reading performance and oral reading fluency. Estimated ORF is only reported for students in grades 1–4 (Renaissance Learning, 2016).

Gender: The socially constructed roles, behaviors, activities and attributes that a particular society considers appropriate for men and women (World Health Organization, 2008).

Grade Equivalent: Grade equivalent is a norm-referenced score that represents how a student's test performance compares with other students nationally. For example, a 5th grade student with a GE score of 7.6 performed as well as a typical 7th grader after the 6th month of the school year. This score does not necessarily mean that the student is capable of reading 7th grade material—it only indicates that the student's reading skills are well above average for the 5th grade (Renaissance Learning, 2016).

Grade Placement: Grade Placement is a numeric representation of a student's grade level, based on the specific month in which a student takes a STAR Reading test. STAR

Reading considers the standard school year to run from September through June and assigns increment values of 0.0 through 0.9 to these months. The software automatically assigns grade placements using a student's grade level and the month in which a STAR Reading test was taken. GP is important because PR and NCE values are based not only on the Scaled Score, but also on the grade placement of the student at the time of the test (Renaissance Learning, 2016).

Instructional Reading Level: Instructional reading level is calculated after a student completes a STAR Reading test; it is a criterion-referenced score that is the highest reading level at which a student is 80% proficient (or higher) at comprehending material with assistance. Research has found that this level of comprehension corresponds to being at least 90–98% proficient at recognizing words; STAR Reading does not directly assess word recognition. IRL scores are Pre-Primer (PP), Primer (P), grades 1.0 through 12.9, and Post-High School (PHS) (Renaissance Learning, 2016).

Lexile® Measure: represents a student's reading ability. The Lexile® Measure is shown as a preceding number followed by an "L": 750L is 750 Lexile®. Higher Lexile® measures indicate higher levels of reading ability. A Lexile® measure can range from below 200L for emergent readers to above 1600L for advanced readers. Readers who score below 0L receive a BR for Beginning Reader (Renaissance Learning, 2016).

Lexile®: ZPD is a ZPD score converted to the Lexile® scale (Renaissance Learning, 2016).

Percentile Rank: Percentile rank is a norm-referenced score that provides a measure of a student's reading ability compared to other students in the same grade nationally. The percentile rank score, which ranges from 1 to 99, indicates the percentage of other

students nationally who obtained scores equal to or lower than the score of a particular student. For example, a student with a percentile rank score of 85 performed as well as or better than 85% of other students in the same grade (Renaissance Learning, 2016).

Percentile Rank Range (PRR): PRR indicates the statistical variability in a student's percentile rank score. For example, a student with a percentile rank range of 32–59 is likely to score within that range if the STAR Reading test is taken again within a short time (i.e., four to six weeks) (Renaissance Learning, 2016).

Scale Score: Scale score is useful for comparing student performance over time and across grades. A scaled score is calculated based on the difficulty of questions and the number of correct responses. Because the same range is used for all students, scaled scores can be used to compare student performance across grade levels. STAR Reading scaled scores range from 0 to 1400. All norm-referenced scores are derived from the scaled score (Renaissance Learning, 2016).

Professional Learning Communities: An organization with a shared mission, collective inquiry, collaborative teams, action orientation, continuous improvement, and results orientation (Dufour & Eaker, 1998).

STAR Reading Assessment: Diagnostic assessment tool, used in Tennessee for correlation purposes on state standardized assessments. The STAR assessment outputs skill-based test results in the form of scaled scores and percentile ranks, while also categorizing each student into levels (Renaissance Learning, 2016).

Star Reading Reports: Information designed to provide teachers with information that drives instructional practices. It provides educators with assessment reports designed to assist in targeting which students need intervention and what areas are identified as

deficiencies. These identified areas of deficiency provide valuable time-saving information for educators. This information allows for strategic improvement plans to be developed on an individual basis for each student. There is little lost instructional time if Star Reading Reports are organized.

Types of Star Reading Reports:

- **Diagnostic:** This report provides the most information about an individual student. It offers information such as the student's grade equivalent, percentile rank, estimated oral reading fluency, scaled score, instructional reading level, and zone of proximal development. It also provides tips to maximize individual reading growth.
- **Growth:** This report shows the growth of a group of students over a specific period of time. This period of time is customizable from a few weeks to months, or growth over the course of several years.
- **Screening:** This report provides teachers with a graph that details whether they are above or below their benchmark as they are assessed throughout the year. This report is useful because if students are falling below the mark, then the teacher needs to modify his/her approach with that student.
    - **Summary:** This report provides teachers with whole group test results for a specific test date or range. This is a very useful for comparing multiple students at one time.

Zone of Proximal Development: Zone of Proximal Development is a range of readability levels from which a student should select books to read. It is a range that is neither too difficult nor too easy, within which students can experience optimal growth.

Students' individual ZPDs are reported on the STAR Reading Diagnostic, Parent, Reading Range, and Summary reports. ZPDs are approximate and professional judgment should be used to adjust the range to fit the ability level of each student (Renaissance Learning, 2016). Table 1 displays the suggested ZPD of grade-level students.

Table 1. Grade Equivalency Reading Level and Zone of Proximal Development Chart.

Grade-Equivalent Reading Score	Suggested ZPD
1.0	**1.0-2.0**
1.5	**1.5-2.5**
2.0	**2.0-3.0**
2.5	**2.3-3.3**
3.0	**2.6-3.6**
3.5	**2.8-4.0**
4.0	**3.0-4.5**
4.5	**3.2-5.0**
5.0	**3.4-5.4**
5.5	**3.7-5.7**
6.0	**4.0-6.1**
6.5	**4.2-6.5**
7.0	**4.3-7.0**
7.5	**4.4-7.5**
8.0	**4.5-8.0**
9.0	**4.6-9.0**
10.0	**4.7-10.0**
11.0	**4.8-11.0**
12.0	**4.9-12.0**

Organization of the Document

This document, detailing the current state of literacy instruction and subsequent literature achievement by United States students, is organized into five chapters. Chapter 1 contains an introduction to the study, background of the study, statement of the problem, significance of the study, theoretical framework, research questions, limitations, delimitations, assumptions, and definitions of terms. Chapter 2 provides a literature review focusing on the history of PLCs and the essential components of literacy development in students. Chapter 3 notes the methods and procedures used in the study, along with an overview of the data analysis strategy. Chapter four presents the results of the data analysis. Chapter five offers implications of the research, recommendations for future research and conclusions.

Chapter 2: REVIEW OF LITERATURE

Review of Related Literature

This literature review examined the role of data-driven professional learning communities in the complex process of teaching literacy. The review of literature begins with a generalized overview of current research on literacy development; followed by an in-depth discussion of the facets that comprise literacy. The theoretical framework is evaluated, and professional learning communities are discussed. Specific literature about the relationship between the implementation of data-driven professional learning communities and the development of grade-level readers in a public educational setting are examined. The second chapter details gaps in literature and the necessity for this study.

Introduction

In the mid-1980's perception of the public school system in the United States suffered from a lack of public confidence (Schmuck & Schmuck, 2001). Critical reports began to question the effectiveness of the education system. The most prominent of these reports, "A Nation at Risk," compared the scores of American students with international students abroad (1983). This report established a precedent by comparing American educational standing in the world to other nations across the globe, resulting in a wave of reforms across the nation. Literacy was the foremost indicator of focus in the report.

According to the 2009 National Center for Education Statistics less than 40% of U.S 4th graders could read at a proficient level per standardized assessment data (as cited in D'Ardenne et al., 2013). Students, who are not at least moderately fluent in reading by 3rd grade, are at greater risk to not graduate from high school (Slavin, Karweit, Wasik,

Madden, & Dolan, 1994). This demonstrates the importance of literacy skills and how important improving literacy rates are to students' educational and social outcomes.

Literacy is likely the most significant current educational problem. Literacy is the focus of nearly every educational organization in the world because the ramifications are detrimental to society. The cost of illiteracy to the global economy is estimated at USD $1.19 trillion (Gaynor, 2013). The effects of illiteracy include limited job opportunities, increased risk for poor health, increased risk being involved in criminal activity, and dependence on social welfare. For a problem that can be solved with books and teachers, illiteracy remains remarkably expensive for many countries. Finn (1991), stated that despite the talk of reform, the influx of billions of dollars into increasing literacy skills among children, and free public education, the United States is still considered a failure in the area of literacy attainment. The failure to reach sufficient literacy achievement has drawn attention among organizations nationwide.

The National Council of Teachers of English, in conjunction with 3,000 of the nation's top English teachers, investigated how working together to implement literacy standards affected classroom instruction (National Reading Panel, 2000). The most powerful information reported from the study was that professional learning communities were considered by English teachers to be the most effective tool that educators and schools could implement. The group identified nine key findings that positively impact literacy instruction:

- Nationwide, teachers feel ill-prepared to help their students achieve the new literacy standards.
- Working with peers is the most valued support for standards implementation.

- Time for working together in schools is decreasing.
- Most teachers have not had a voice in determining how standards are implemented in their schools.
- Positive changes are occurring most where teachers are actively involved in the renovation.
- Teachers feeling most comfortable tend to be those who work more frequently with others to analyze student work, design curriculum, and create assessments.
- Teachers in all disciplines are actively engaged in shifting literacy practices.
- Teachers engaged in cross-discipline conversation about literacy are making greater shifts in their instruction.
- When given the opportunity, teachers own the change by innovating and designing appropriate lessons and materials.

Neurological and Environmental Constructs of Literacy

From day one, a child's brain begins forming connections very quickly connections which build the foundation for all learning he/she will do later in life. Ninety percent of a child's critical brain development occurs by age 5 (Fisher, 2013). There are many factors that create learning gaps for children, some of which begin at birth. Babies that are considered to be low birth-weight are at a high risk for neurodevelopmental problems, such as cerebral palsy, blindness, learning disabilities and mental retardation, behavioral problems, as well as Attention Deficit Hyperactivity Disorder (ADHD); all of which drastically affect a student's chances of school success (Case & Paxson). As children grow, their environment plays an important part in their linguistic development.

Children from low-income homes do not receive the verbal interactions, access to literature and are rarely read to at home, compared to those children of middle-income families (Brooks-Gunn & Markman, 2005). This lack of exposure to literacy skills broadens the gap between students before a child even enters the educational system. Once a student enters the educational setting, instructional time plays a crucial role in ensuring that students are reading on grade level.

Factors that Inhibit Grade-Level Reading Proficiency

Research indicated that when children are immersed with high-quality early learning experiences, they are 40% less likely to fall behind in school and 70% more likely to graduate from high school (Steinberg, Bornstein, Vandell, & Rook, 2010). In fact, 50% of the school achievement gap between economically disadvantaged young children and their more affluent peers starts before kindergarten. The National Research Council (1998) reported that children, who are struggling readers in 1st grade, are 88% more likely to be struggling readers in 4th grade. When children struggle to read in 4th grade, they are four times more likely to drop out of high school. This is why 3rd grade reading scores are emphasized nationwide. As research has illustrated, children who are not on track by the end of third grade are unlikely to graduate from high school (National Research Council, 1998). In the past years, many of Tennessee's students have passed through elementary school without acquiring this strong foundation, decoding skills coupled with deep comprehension, and have been met with escalating challenges as they move from grade to grade (Tennessee Department of Education, 2016). This knowledge and research magnifies the importance that educators know and understand the different components of literacy and are able to identify deficiencies in a timely manner.

The Components of Literacy

Phonics, phonemic awareness, vocabulary, comprehension, and fluency are often referred to as the building blocks of literacy (Grainger, 2010). Collaboratively, these skills drive the reading process. According to the National Early Literacy Panel (2008), a child equipped with the foundational skills of reading is more likely to be a successful reader. The importance of educator awareness and understanding of these early literacy skills is vital in the growth of readers.

Phoneme.

A phoneme is the smallest unit of sound in a word. Syllables and words are combined from phonemes (Neese, 2017). For example, the word "cat" is comprised of three phonemes (or three sounds): /c/ /a/ and /t/. The word "fish" is also comprised of three phonemes (or three sounds), even though "fish" has four letters: /f/ /i/ /sh/. Phoneme awareness and understanding lead to a deep understanding of phonemic awareness.

Phonemic awareness.

According to the National Early Literacy Panel (2008), phonemic awareness is the strongest primary predictor of early reading outcomes. Phonemic awareness is the knowledge that words are made up of a combination of individual sounds. For example, the word "cat" is comprised of three sounds (phonemes) /c/ /a/ and /t/. When these three sounds are combined fluidly, they comprise the word "cat". Phonemic awareness is more than recognizing sounds. Phonemic awareness includes the ability to hold the sounds, blend them successfully into words, and take them apart again.

Phonics.

Phonics is the relationship between a specific letter and its sound, only as it relates to the written word (National Early Literacy Panel, 2008). Phonics is used when a reader encounters an unknown word. With knowledge of phonics, a child can decode the word by focusing on the specific sound of each letter or combination of letters. Phonics knowledge is not only used in reading, but also in writing tasks. Phonics is used for encoding text. If a child is trying to spell a word, the child will use his/her phonics knowledge to begin spelling the initial sound and move throughout the writing task. An early phonics learner often achieves a close approximation of correct spelling rather than complete accuracy.

Comprehension.

Text comprehension is the interaction that happens between reader and text. Comprehension is influenced by a reader's vocabulary, cultural knowledge, and memory (National Reading Panel, 2000). More than merely decoding words on a page, comprehension is the intentional thinking process that occurs as a child reads. Just as comprehension is a component of the reading process, it relies greatly on a child's reading fluency.

Fluency.

Fluency is the automaticity that takes place during reading (National Reading Panel, 2000). Fluency is reading a text accurately and smoothly. Fluency develops from reading practice. When fluent readers read aloud, their expression, intonation, and pacing are natural. This does not mean that fluent readers never make mistakes. The same reader may read a familiar text fluently and a new, more challenging text less fluently.

Phonics and Phonemic Awareness.

In an analysis of children's 1st grade reading achievement, the results showed the importance of phonics and phonemic awareness in predicting academic success with beginning reading skills (Juel, 1988). These phonological skills ideally develop in home and preschool contexts. They include frequent interaction with print, attention to letter names and sounds, opportunities to engage in extended talk, such as narrative, and exposure to domains of knowledge and the networks of words associated with these domains (Craig, 2003). Therefore, it is imperative that educators have a strong knowledge of phonics in the primary setting to properly serve students, who along the way have failed to develop the needed phonological and phonemic skills to be successful readers. As children begin literacy instruction, their entry into phonological instruction is supported by knowledge of letters and letter–sound correspondences, by experience with a range of literature exposure, and by the abilities involved in understanding text (Morris, Bloodgood, & Perney, 2003). The ultimate goal of teaching phonics is creating competent word learners for future readers (Fountas & Pinnell, 2006).

Vocabulary.

The importance of vocabulary to literacy is unparalleled. In 2000, the National Reading Panel identified vocabulary instruction as one of the five essential components of reading instruction, and a large body of research indicates the critical role vocabulary knowledge plays in reading comprehension (August, Carlo, Dressler & Snow, 2005). Vocabulary skills are important in predicting reading development over time because they are implicated in multiple aspects of reading. Children who begin school with larger vocabularies show greater sensitivity to sound patterns within words (McDowell,

Lonigan, & Goldstein, 2007), and thus have an advantage in learning early letter–sound correspondences. As children move beyond the beginning stages of learning to read, breadth of vocabulary supports accurate reading fluency. Vocabulary size is associated with other aspects of word knowledge, such as morphological awareness, a critical component of skilled reading in 3rd grade and beyond (Carlisle & Fleming, 2003). Furthermore, vocabulary knowledge is emphasized throughout the highly influential Common Core State Standards (Kosanovich & Verhagen, 2012). Specifically, the standards make the requirement to "…acquire and use accurately a range of general academic and domain-specific words and phrases" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, pp. 25). Vocabulary is an essential skill to support developing readers.

Children increase their vocabulary through both direct and indirect instruction (Youngsun, 2017). Children continually learn new words indirectly through listening and speaking to the people around them, being read to by others, and reading on their own. Sometimes children need to be taught new words explicitly, especially when words are crucial to their understanding of a story or concept. Access to high-quality books is important for children to expand their vocabularies and develop basic reading skills. These basic literacy skills provide the foundation for improved vocabulary, which increases the likelihood that students will read and comprehend on a level that is equivalent to that of their grade-level peers.

Comprehension and Fluency.

Comprehension and fluency work together to allow children increased knowledge elaboration (Segers, Perfetti, & Verhoeven, 2014). Researchers agree that fluent readers

have the ability to decode words quickly and accurately, thus increasing their ability to retain more resources for increased comprehension and future knowledge (Therrien, 2004). Duke & Pearson's research revealed that educators often need specific training in teaching comprehension and fluency and most commonly they do not teach either intentionally (2002). Children who read with expression have better comprehension and have increased fluency; in turn, fluency guides increased comprehension (Therrien, 2004).

Best Practices for Effective Literacy Teachers

Exemplary literacy teachers are crucial for student literacy success in the classroom. Each educator must incorporate research-based strategies and an appropriate instructional design that aids in the development of grade-level literacy skills when lesson planning. The instructional components for necessary literacy development are phonics, phonemic awareness, vocabulary, comprehension, and fluency. A national survey conducted by Indiana State University, reaching more than 81,000 adolescents, found that students want more interactive classes and prefer activities that involve interaction with teachers and peers (Yazzie-Mintz 2010). This study also reported boredom, loss of interest, irrelevant courses, and bad relationships with teachers as the top reasons for truancy or dropping out of school. Therefore, the most effective teachers build relationships with students and foster healthy student interactions in the classroom. Effective literacy teachers must incorporate the skills necessary for literacy development in a manner that builds relationships in an interactive and trusting learning environment. Implementing research-based instructional strategies in the classroom has been shown to

improve students' motivation to learn and strengthen the teacher-student connection (Wachob, 2015).

Best Practices for Effective Schools

Initiatives such as Read to be Ready and other state and federal mandates have forced schools and school districts across the country to place a greater emphasis on literacy and strategies that will ensure students leave classrooms reading on grade level. Tableman (2004) compared and listed some of the elements of instructional methods that were commonly found in effective schools. According to Tableman, commonalities in effective schools where: the communication and collaboration among teachers allowed for the grade-level teams to be able to work together within their grade levels, but also branch out across grade levels to align instruction to state standards and assessment. This established program consistency; collaboration on instruction among teacher teams and educational interventionist was evident; peer-coaching practices had been put into place to aid in the mentoring of new teachers; teachers and staff worked together to encourage student academic growth and promote success. Basic skills and higher-order comprehension skills were emphasized and became a point of focus for each individual student. A systematic curriculum was monitored by frequent assessment to measure the academic development of students. Literacy instruction was integrated with the entirety of the curriculum and incorporated reading into the daily routines of science instruction. Group assignments were made based on academic ability grouping that included modifications as student assessment scores dictated. Individualized coaching and scaffolding encouraged students that demonstrated difficulties with comprehension and application of the material by using structured comments and applying different levels of

student questioning.

Just as literacy is intertwined in all areas of academics, it is important to explore and implement best practices to aid in the development of literacy skills among students. Professional learning communities are known for building an individual and collaborative capacity to influence student academic achievement (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006).

Professional Learning Communities

The implementation of data-driven professional learning communities has contributed to teacher and school improvement by working together and demonstrating individual collective expertise in analyzing student data and work, identifying appropriate instructional strategies to meet students' learning needs, and critically exploring best practices (Thessin & Starr, 2011). The premise of the professional learning communities is to share knowledge collectively and create an equal level of expertise for communal dependence and reliance (Kelly & Cherkowski, 2015). In guidelines published from the National Association of Secondary School Principals (2005), it is noted that the first thing a principal must do to improve literacy in a school is to compose and organize a group of literacy professionals. Ashton & Webb (1986) noted that teachers will be more committed to implementation of shared goals when they are involved from the beginning in making important decisions about how to achieve school improvement goals. Therefore, the establishment of professional learning communities could have a significant effect on literacy rates in the educational setting.

Successful professional learning communities have clear expectations and support from school leaders, and expect that they will be part of a satisfying, high-functioning team that accomplishes goals (Darnell, 2015). Bolster and Henley (2005) defined

professional learning communities as a small group of educational professionals working together on a regular basis for learning, joint planning, and problem solving. Grade levels, multiple grade levels, departments, or interdisciplinary groups can organize professional learning communities. The members of each group interact with one other and depend one another for the accomplishment of specific goals. The group stays together long enough to form habits and conventions. A professional learning community occurs when a 'team' of individuals who share a goal work together to achieve the goal, assess their progress, make corrections, and hold themselves accountable for achieving their common goal (AITSL, 2014). Professional learning communities are about learning in practice, paying attention to what is done and why, and determining how to improve student learning by improving teachers, which is initiated by making them learners and active participants of a changing teaching and learning process (Svanbjörnsdóttir, Macdonald, & Frímannsson 2016). Benefits to educators and students include a reduction in the isolation of teachers, better equipped and prepared teachers, and academic growth for students (Ransom & Esmail, 2016).

An exemplary professional learning community shifts the attention from subject matter to improving teaching quality to enhance student learning and achievement. An effective learning community cultivates an attitude of inquiry and focuses attention on student thinking and understanding. In a dynamic learning community, everyone learns. In addition to everyone learning, faculty development through a professional learning community can establish collegial, professional networks, as well as provide a way for faculty to best influence and promote academic success (Kane, Shaw, Pany, Salley, & Snider, 2016). In the professional learning community, the collaborative nature of the

organization dictates the collective output is more beneficial and robust than individual efforts toward the same goal (Urquhart, et. al, 2013).

Review and Analysis of Studies

According to Sompong, Erawan and Dhar-tadsa-na-non (2015), the need for developing professional learning communities in schools through the development of a model, and the findings of the model-based professional learning community as related to literacy skills, is essential. The quantitative study of 7,458 participants found the highest statistical ratings among educators to be in the ability to compile the model. The model was collaboratively formed by the educators and consisted of: preparation for learning, development of shared value and visions, learning from shared work practice, and expected outcomes. Educational teachings state that educator satisfaction most often occurs when educators are able to add input, as this establishes the educational culture. This helps to establish proper and systematic professional learning community integration. The model emphasizes strong leadership, not just by the top administrators, but also shared leadership through implementation of professional learning communities. The planning process is collaborative and designed to build an atmosphere of collaboration and teamwork to improve literacy by incorporating best practices for effective schools.

Discrepancy in Research

Research indicates that professional learning communities positively affect student achievement, teacher morale, teacher effectiveness, job satisfaction and the overall school environment (Ackerman, 2011). As a result of external influences, schools search for methods to respond to the demands of new educational initiatives and

policymakers, thus they have had to incorporate new strategies, including a change of school structures (Kalkan, 2016). This restructuring has often resulted in the implementation of professional learning communities and most recently, the development of data-driven professional learning communities. Minimal research is available on data-driven professional learning communities and student academic growth in literacy. Given the enormous pressure that the education profession is under to increase student literacy achievement, it is important to examine the correlation of implementing data-driven professional learning communities and their effect on student achievement in literacy.

Theoretical Framework

The correlation of data-driven professional learning communities and literacy scores is based on a constructivist theory of learning. The learning of educators and students is a continuous process that is affected by social interaction and the ability to adapt to different circumstances and situations. The constructivist theory stipulates that the individual or group, through interactions within their environment, actively constructs perspective knowledge in an attempt to make sense of the world (Murphy, 1997). Constructivism combined with professional learning communities has helped many school districts in the United States improve test score. Gulati (2004) stated that educational environments based on constructivism suggest that learning is accomplished best by providing real-life contexts in a setting of flexibility, allowing for freedom to choose learning resources and openness in discussing issues. This is imperative for successful data-driven professional learning communities to be based on openness and trust among its members.

Further Research in Literacy and Professional Learning Communities

The research presented in this literature review implied a need for additional exploration in the areas of literacy and professional learning communities. This study used data-focused professional learning communities to increase literacy skills among students in a low socioeconomic, public school setting. The research investigated the impact of professional learning communities on literacy improvement. The results affirmed the use of best practices for schools by integration of professional learning communities focused on data for literacy improvement.

Chapter Summary

Literacy is a complex process that entails much knowledge, training, and data to successfully implement. Professional learning communities have been beneficial in academic growth amid extensive research. The forming of teacher-composed data-driven professional learning communities could prove to significantly impact student literacy growth. Amid the research, the following questions were examined.

1. Is there a difference in students' mean Star Reading NCE scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

   Ho1: There is no difference in students' NCE scores (pre-implementation year 2015-2016 and post-implementation year 2016-2017) between teachers who participated in data-driven professional learning communities and teachers that did not participate in data-driven professional learning communities.

2. Is there a difference in students' mean Star Reading Grade Level equivalency scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

   Ho2: There is no difference in students' Grade Level Equivalency scores (pre-implementation year 2015-2016 and post-implementation years 2016-2017) between teachers who participated in data-driven professional learning communities and teachers that did not participate in data-driven professional learning communities.

CHAPTER 3: METHODS AND PROCEDURES

Chapter Overview

It is vital to explore best practices to increase student achievement. Literacy is likely the most important educational area of study. Therefore, expanding the practice efforts and effects of educators using professional learning communities to increase literacy skills among students is relevant and beneficial. Chapter 3 describes the methodology and procedures that were used. The chapter begins with a chapter overview and a review of the research design, followed by a review of the population, instrumentation, data analysis, research questions, and hypotheses.

Research Design

A quantitative research design was chosen. This is a comparative analysis study that examines the differences, if any, in the Normal Curve Equivalent (NCE) and Grade Level Equivalency (GLE) scores of students whose teachers participated in data-driven professional learning communities and students' NCE and GLE scores of teachers who did not participate in data-driven professional learning communities. Normal Curve Equivalent and Grade Level Equivalency scores obtained from the Star Reading Assessment were used to measure variables that are identified as mean NCE and GLE scores.

Teacher participation and teacher nonparticipation in data-driven professional leaning communities were also used as a predictor or independent variable in the study. One elementary school and 253 students who took the Star Reading test during school years 2015-2016 and 2016-2017 were included. The treatment group included 11

teachers who each participated in data-driven professional learning communities in the 2016-2017 school year.

Instrumentation

The Star Reading Assessment was used as the instrumentation, and was chosen for reliability and its consistent use across the United States. The Star Reading Assessment is nationally-normed and a research-based universal literacy screener.

The use of Normal Curve Equivalent (NCE) and Grade Level Equivalency (GLE) scores from two different school years as pre-implementation and post-implementation NCE and GLE scores might foster "threats to validity" concerns. Using pre and post-implementation test results from three individual school years might initiate questioning regarding the validity of these results. This threat to validity prompted the researcher to use a large student sample. The Star Reading Assessment, a nationally-normed universal screener, provided the student data from the pre-implementation and post-implementation. Measuring the same population of students over two entire school years provided consistency for the study. Eliminating short-term spikes or down trends provides a clear picture of the student's academic performance.

The Star Reading Assessment report allowed access to grade level NCE reports. Each grade-level report is designed to allow for cross grade-level comparisons to ascertain if academic achievement growth has occurred from one year to the next. The data from each of the two years were divided into two groups: pre-implementation and post-implementation NCE scores. Table 2 and 3 exemplify the manner in which data were organized.

Table 2. Normal Curve Equivalent Mean Scores Organization Table.

Grade	# of students	2015-2016 cohort Mean NCE (pre implementation)	2016-2017 cohort Mean NCE (post implementation)	Difference
1				
2				
3				
4				
5				

Table 3. Grade Level Equivalency Mean Scores Organization Table.

GRADE	# of students	2015-2016 cohort Mean GLE (pre implementation)	2016-2017 cohort Mean GLE (post implementation)	Difference
1				
2				
3				
4				
5				

Data analysis was conducted by separating the two groups (pre and post-implementation), calculating the difference and performing confidence interval testing for statistical analysis of research questions and each of the null hypothesis . To eliminate the

risk of skewing the results when comparing pre-implementation and post-implementation students, only original cohort members were included in the study. This adjustment was implemented to account for incoming transient students, who may have been subjected to educators that previously participated in data-driven professional learning communities. By thoroughly screening only cohort group members, the Star Reading scores presented strong research on the academic movement of each cohort group.

Sample

Prior to conducting this study, approval was obtained from the Institutional Review Board (IRB) at Carson-Newman University. Data collection was conducted using the reports from Star Reading NCE scores for teachers and students for school years: 2015-2016 and 2016-2017. The director of schools of the research district granted permission for the collection and analysis of data used for the study.

Grades 1-5 Star Reading Normal Curve Equivalent (NCE) and Grade Level Equivalency (GLE) scores were compared for differences between the NCE and GLE test scores of students whose teachers participated in data-driven professional learning communities and those scores of students whose teachers did not participate in data-driven professional learning communities.

The percentage of students receiving free- or reduced-price meals and student gender information were obtained from the Director of Federal Programs in the research district. The cohorts who participated were selected non-randomly; all students in each grade cohort were participants. Including all students in the grade level as the original cohort strengthened the validity of the study

The population was multi-age that included student stratification characteristics such as gender, socioeconomics, and student grade level. Teacher stratification characteristics were derived from the teacher's grade level assignment and those who participated in the data-driven professional learning community.

Research Questions and Null Hypotheses

1. Is there a difference in students' mean Star Reading NCE scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

   Ho1: There is no difference in students' NCE scores (pre-implementation years 2015-2016 post-implementation years 2016- 2017) between teachers who participated in data-driven professional learning communities and teachers that did not participate in data-driven professional learning communities.

2. Is there a difference in students' mean Star Reading Grade Level equivalency scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

   Ho2: There is no difference in students' Grade Level Equivalency scores (pre-implementation years 2015-2016 post-implementation years 2016 -2017) between teachers who participated in data-driven professional learning communities and teachers that did not participate in data-driven professional learning communities.

Data Analysis

The mean scores of all students with teachers who participated in data-driven professional learning communities during the 2016-2017 school year and the mean scores of students of non-participating teachers during the 2015-2016 school year were analyzed

using confidence interval testing. A confidence interval for mean difference test was conducted to evaluate whether teacher participation in data-driven professional learning communities was related to movement of student Normal Curve Equivalency (NCE) and Grade Level Equivalency (GLE) scores.

Hypothesis test such as a T-test conclude with a yes or no decision regarding the findings of the study. The decision to accept or reject a null hypothesis is based on a statistical test that results in significant or no significant findings. Confidence interval testing can be used to predict hypothesis testing, such as a t-test (Blair & Taylor, 2008). Confidence interval testing provides more information about the study or the measurable significance of the research. Confidence interval testing was chosen to establish the actual parameter of power that data-driven professional learning communities have on literacy scores. Confidence interval testing provides a lower and upper value that establishes an estimate about the actual significance of the research. The accuracy of confidence interval testing on large and small sample size research provides more precise information about the research than could be obtained by hypothesis testing.

Therefore, the use of confidence interval testing served as a parameter for the sample to examine statistical significance. The confidence interval test was conducted at confidence levels of 90%, 95%, and 99% to develop a more informative conclusion to the test. The confidence interval test informs of differences, if any, between scores. This study was conducted and data was accumulated over two consecutive school years: pre-implementation 2015-2016 and post-implementation 2016-2017. The pre-implementation (2015-2016) and post-implementation (2016 -2017) data were representative of two groups of students who were clustered together for data analysis purposes. Differences between academic years were analyzed. The statistics used were consistent with the design of the study.

Summary

Data-driven professional learning implementation occurred in July 2016. Star Reading NCE and GLE test score data were collected. The Star Reading data from the school years served as the pre-implementation (2015-2016) and post-implementation (2016-2017). Star reading Normal Curve Equivalency (NCE) and Grade Level Equivalency (GLE) scores of pre-implementation students were used to establish baselines for each cohort group.

The post-participation scores were recorded for the end of the (2016 -2017) school year. The NCE and GLE scores were recorded and comparisons measured using confidence interval testing on student performance before and after implementation of data-driven professional learning communities.

Chapter 3 presents the research design, population, and statistical procedures that were used for data analysis. The study used quantitative procedures to compare Star Reading Normal Curve Equivalent (NCE) and Grade Level Equivalency (GLE) scores of students in grades 1-5 in an East Tennessee elementary school. The study's population includes 253 students and 11 teachers who participated in data-driven professional learning communities. Data from Star Reading Assessment was used. The study consisted of two research questions:

1. Is there a difference in students' mean Star Reading NCE scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

2. Is there a difference in students' mean Star Reading Grade Level equivalency scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

CHAPTER 4: RESULTS

Introduction

This study sought to analyze statistical significance on mean Normal Curve Equivalent and Grade Level Equivalency Star Reading test scores of students in a rural, East Tennessee school system, whose teachers participated in data-driven professional learning communities. The quantitative study utilized confidence interval testing to determine the significance of the implementation of data-driven professional learning communities on Normal Curve Equivalent and Grade Level Equivalency scores. The purpose was to examine the impact of data-driven professional learning communities on student literacy scores according to the Star Reading Assessment. The Star Reading Test was used as an instrument, and was chosen based on its reliability and widespread use in Tennessee as a universal literacy screener.

Participants

This study focused on the performance of students taught by educators who participated in data-driven professional learning communities. Eleven teachers participated in data-driven professional learning communities training during summer 2016. Following the training, these teachers instructed 253 students during the 2016-2017 academic year. Table 4.1 outlines the training timeline with the summer training year.

Table 4. Summer Training Timeline.

School Year	Nonparticipation Year	Training Year	Participation Year
2016-2017 School Year (Year 1)	2015-2016	2016	2016-2017

The students' Normal Curve Equivalent (NCE) and Grade Level Equivalency (GLE) scores from the Star Reading Assessment were the variables examined to

determine if students' performance improved. After training: students' scores were gathered from the 2015-2016 school year, in which the teachers had not participated nor implemented data-driven professional learning community strategies. In summer 2016, after training, teachers implemented data-driven professional learning community strategies in grades 1-5. Data from students in grades 1-5 from years 2015-2016 and 2016-2017 (combined) were analyzed to answer the research questions. Table 5 illustrates the teacher and student population for each year.

Table 5. Teacher and Student Population.

Year	Teachers (N)	Students (N)
2015-2016	11	253
2016-2017	11	253

1st Grade NCE Scores

1st grade Star Reading scores were compiled from the 2015-2016 and 2016-2017 school years. The students' Normal Curve Equivalent (NCE) scores were charted for the 40 1st grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 40 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. Table 6 displays the 1st grade Star Reading NCE scores that were analyzed for the 2015-2016 school year and compared to the 2016-2017 school year. The resulting difference was examined to create a grade-level mean difference of 13.9 with a standard deviation of 16.5 for students in the stated grade level.

Table 6. Analysis of 1st Grade NCE Mean Scores.

Grade	*2015-2016*	*2016-2017*	*Difference*
1st	*49.8*	*63.7*	*13.9*

1st Grade NCE Analysis

1st grade Star Reading NCE score differences was analyzed for the 2015-2016 school year and compared to the 2016-2017 school year. The resulting difference of 13.9 with a standard deviation of 16.5 was examined to create a grade-level mean difference for students in 1st grade using confidence interval testing. The confidence interval test was performed at 90%, 95% and 99% intervals. Confidence interval testing revealed the upper and lower value that resulted in the parameters of confidence. A confidence interval of 90% resulted in a range of 9.5 to 18.3. The confidence interval at 95% confidence produced parameters of 8.6 to 19.2. At 99% confidence, the results produced values of 6.8 to 20.9. This means that at each individual confidence level, it is reasonable to estimate the true mean difference lies between the upper and lower limits if the test were performed many times with multiple samples. Thus, if repeated with a greater sample size, the parameter given would contain the true mean difference. Therefore, at 99% confidence the true mean would fall between 6.8 and 20.9. Figure 4.1 provides an illustration of the difference in NCE scores for the 2015-2016 and 2016-2017 school years.

Figure 4.1 *1st Grade NCE Scores*

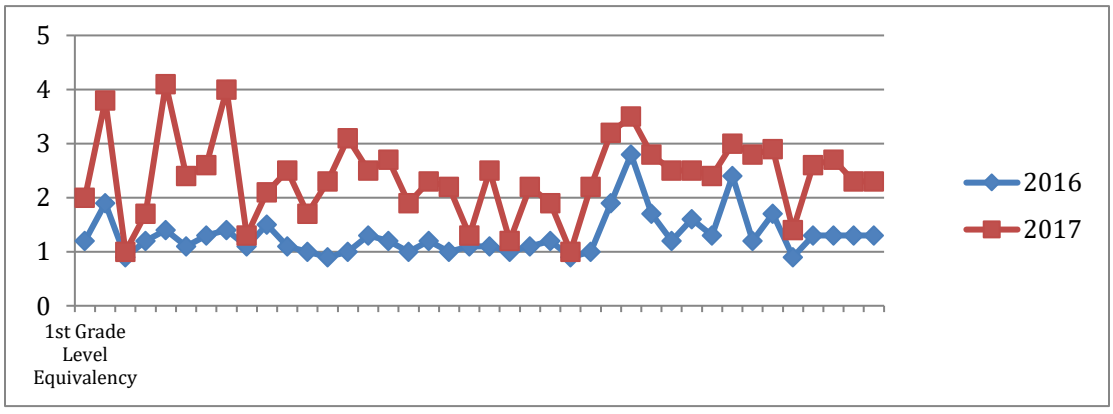

Figure 4.1. 1st grade Star Reading NCE scores were charted for the 2015-2016 school year and the 2016-2017 school year. The figure highlights the difference between the pre- and post- data-driven professional learning community implementation.

2nd Grade NCE Scores

2nd grade Star Reading scores were compiled from the 2015-2016 and 2016-2017 school years. The students' Normal Curve Equivalent (NCE) scores were charted for 50 2nd grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 50 students were tested and these scores served as the post-implementation of data-driven professional learning communities scores. Star Reading NCE scores were analyzed for the 2015-2016 school year and compared to the 2016-2017 school year. The resulting difference was examined to create a grade-level mean difference for students in the stated grade level. The mean difference NCE score was 3.2. Table 7 displays the mean difference NCE scores between the two school years.

Table 7. Analysis of 2nd Grade NCE Mean Scores.

Grade	*2016*	*2017*	*Difference*
2nd	*44.4*	*47.6*	*3.2*

2nd Grade NCE Analysis

2nd grade Star Reading scores were analyzed from the 2015-2016 and 2016-2017 school years. The resulting difference of 3.2 with a standard deviation of 8.9 was examined to create a grad- level mean difference for students in 2nd grade using confidence interval testing. This created a lower and upper value to establish a confidence interval. 2nd grade confidence interval testing was performed at 90%, 95% and 99% confidence. A confidence interval of 90% resulted in lower and upper values of 1.1 to 5.3. The confidence interval of 95% produced parameters of .7 to 5.7. At 99% confidence, the interval was -.1 to 6.5. This confidence interval test establishes minimal difference at 99% confidence. The parameter contains a zero, which means the actual

mean difference falls between -.7 and 5.7. Figure 4.2 represents the 2nd grade score for the 2015-2016 and 2016-2017 school years.

Figure 4.2 *2nd Grade NCE Chart*

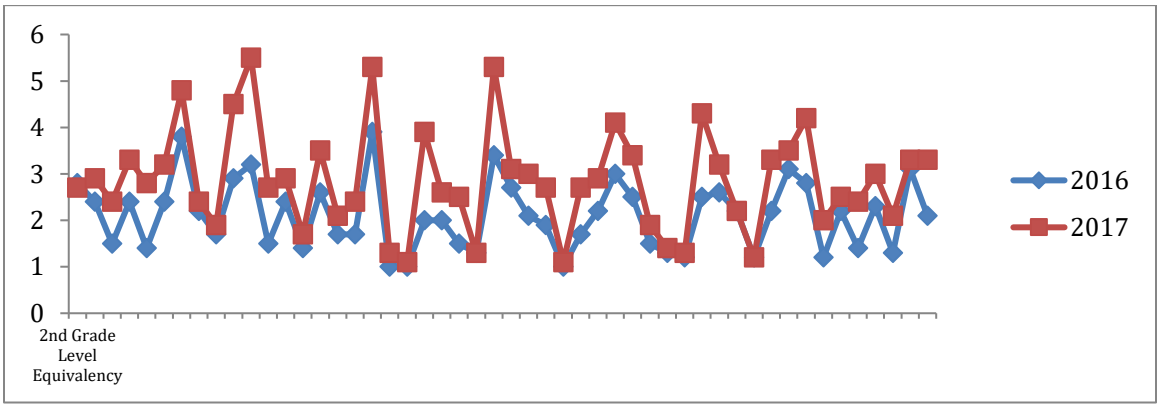

Figure 4.2. Star Reading NCE scores were charted for the stated grade level the 2015-2016 school year and the 2016-2017 school year. The difference in each individual score is visible on the above figure.

3rd Grade NCE Scores

3rd grade Star Reading scores were compiled from the 2015-2016 and 2016-2017 school years. The students' Normal Curve Equivalent (NCE) scores were tracked for 51 3rd grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, these 51 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. Table 8 displays the mean difference NCE score was 4.9 with a standard deviation of 10.4

Table 8. Analysis of 3rd Grade NCE Mean Scores.

Grade	*2016*	*2017*	*Difference*
3rd	*45.8*	*50.7*	*4.9*

3rd Grade NCE Analysis

3rd grade Star Reading scores were analyzed from the 2015-2016 and 2016-2017 school years. Confidence interval testing was conducted using the difference of 4.9 with a standard deviation of 10.4 to assess the statistical parameters of the scores. Confidence interval testing was performed at 90%, 95%, and 99%. Confidence interval testing at 90% resulted in a lower and upper value of 2.4 to 7.3. The confidence interval at 95% resulted in parameters of 1.9 to 7.8. The 99% confidence interval produced results of 1 to 8.8. Data indicate the actual mean difference would fall some where between 1 and 8.8 if the study was replicated using a larger sample size. Figure 4.3 provides a visual representation of the difference in NCE scores for the 2015-2016 and 2016-2017 school years.

Figure 4.3 *3rd Grade NCE Chart*

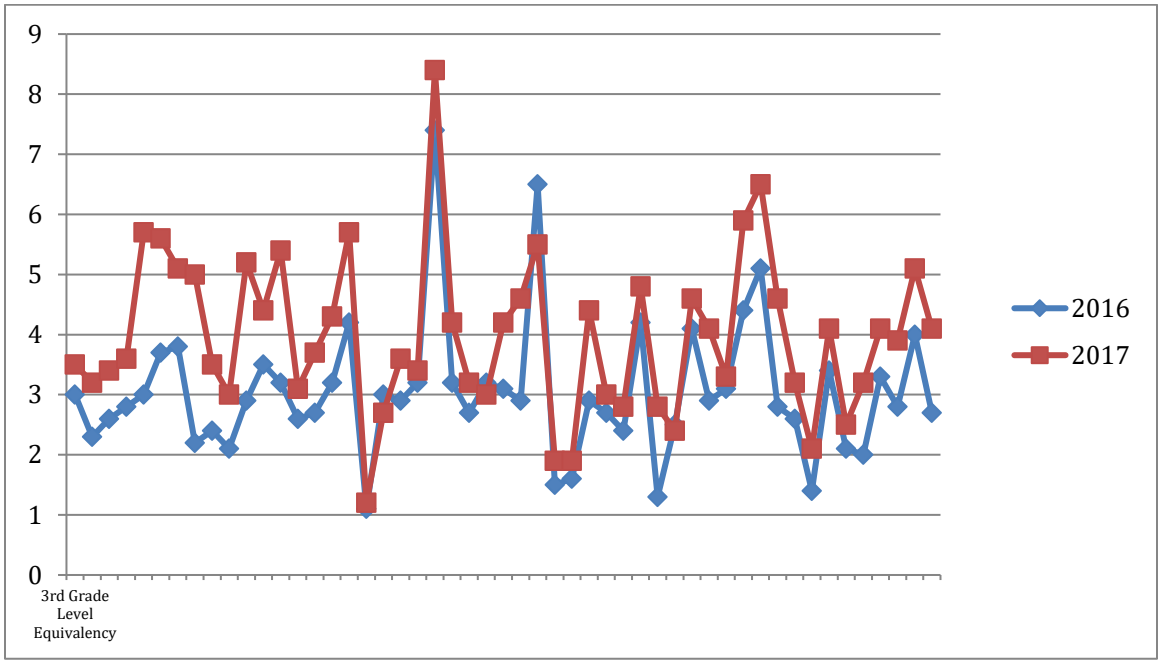

Figure 4.3. Star Reading NCE scores were charted for the 3rd grade students from the 2015-2016 and the 2016-2017 school years. The difference in each individual score is visible on the above figure.

4th Grade NCE Scores

4th grade Star Reading scores were compiled from the 2015-2016 and 2016-2017 school years. The students' Normal Curve Equivalent (NCE) scores were charted for the 46 4th grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 46 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. The mean difference NCE score was 5.9. Table 9 displays the mean difference NCE scores between the two school years.

Table 9. Analysis of 4th Grade NCE Mean Scores.

Grade	*2016*	*2017*	*Difference*
4th	*51.8*	*57.8*	*6*

4th Grade NCE Analysis

The mean difference NCE score of 5.9 was used to determine an upper and lower value using confidence interval testing. Confidence interval testing was applied to the 4th grade difference value of 6 with a standard deviation of 8.4. The confidence interval levels were 90%, 95%, and 99%. A confidence interval test 90% revealed parameters of 3.9 to 8. The confidence interval of 95% resulted in a low value of 3.5 and a high value of 8.4. The 99% confidence interval test revealed confidence scores of 2.6 to 9.3. Thus at each confidence level; it is reasonable to estimate the true mean difference is positioned in the established parameter limits if the test were performed many times with multiple samples. Therefore, if repeated with a greater sample size, the parameter given would contain the true mean difference. Thus, at 99% confidence level the NCE score would increase between 2.6 and 9.3 points. Figure 4.4 provides a graphic representation of the difference in NCE scores for the 2015-2016 and 2016-2017 school years

Figure 4.4 *4th Grade NCE Chart*

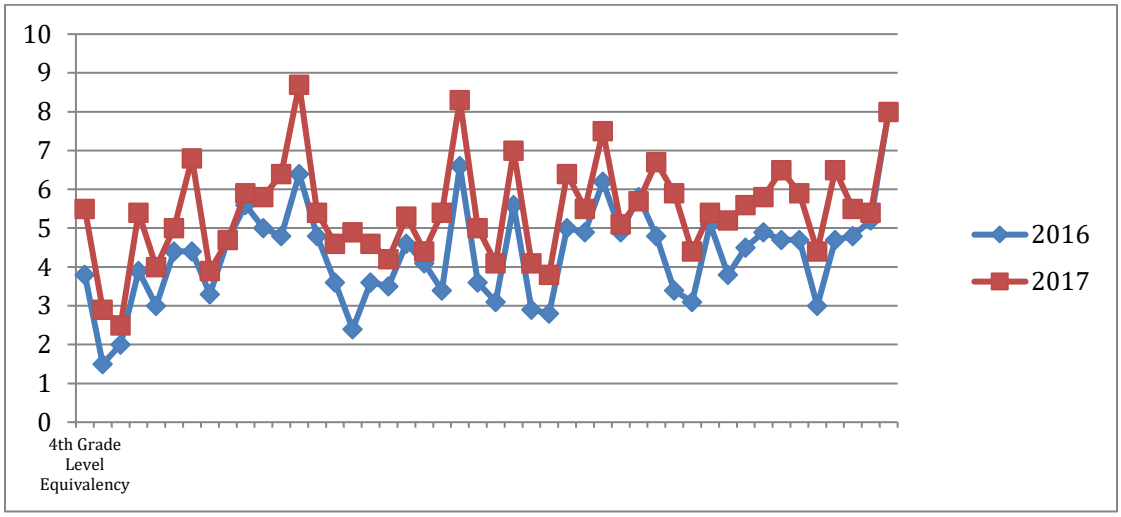

Figure 4.4. 4th grade Star Reading NCE scores were charted for the 2015-2016 school year and the 2016-2017 school year. The difference in each individual score is graphically represented.

5th Grade NCE Scores

5th grade Star Reading scores were compiled from the 2015-2016 and 2016-2017 academic years. The students' Normal Curve Equivalent (NCE) scores were charted. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 66 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. The mean difference NCE score was .7 with a standard deviation of 10.3 as represented by Table 10.

Table 10. Analysis of 5th Grade NCE Mean Scores.

Grade	*2016*	*2017*	*Difference*
5th	*48.3*	*49*	*.7*

5th Grade NCE Analysis

Using the difference of .7 and a standard deviation of 10.3; a confidence interval test was performed. The confidence levels at 90%, 95% and 99%. A confidence interval assessment at 90% confidence resulted in a lower and upper value of -1.4 to 2.8. The confidence interval of 95% produced parameters of -1.8 to 3.2. The 99% confidence interval resulted in values of -2.6 to 4.1. These results were used to determine if any significant growth occurred from the 2015-2016 and the 2016-2017 school year. The occurrence of zero in the parameter scores suggests that minimal difference occurred with this specific group of the sample according to confidence interval testing. Figure 4.5 provides an illustration of the difference in NCE scores for the 2015-2016 and 2016-2017 school years. Each data point displays the results of the annual cohort group that is being represented on Figure 4.5.

Figure 4.5 *5th Grade NCE Chart*

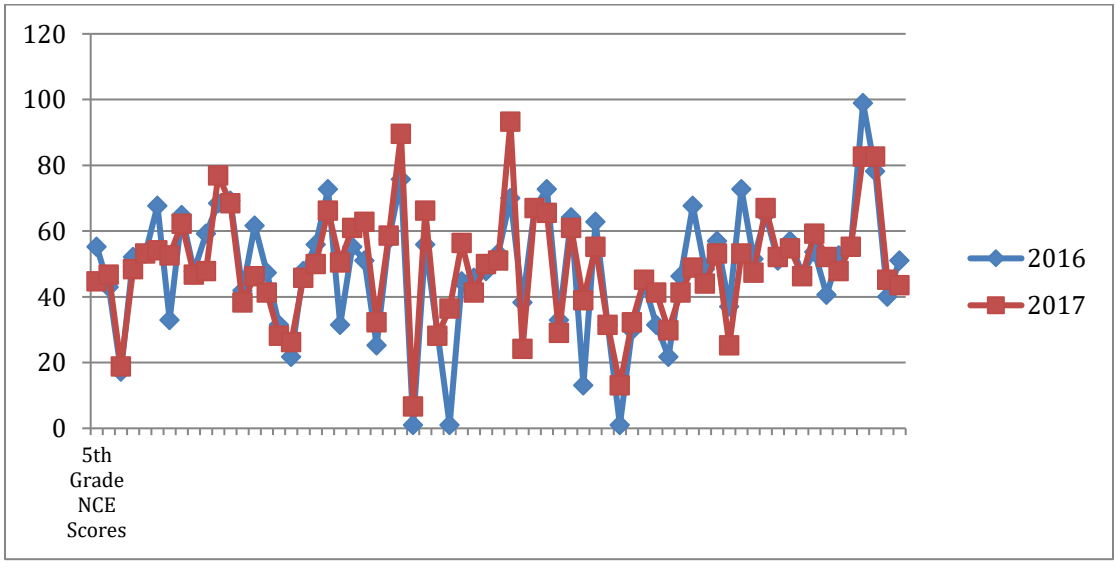

Figure 4.5. Star Reading NCE scores were charted for 5th grade students for the 2015-2016 school year and the 2016-2017 school year. The difference in each individual score is visible on the above figure.

Analysis NCE Scores: Grades 1-5

Data from the 2015-2016 and 2016-2017 academic years were collected from the research school: represented by 11 teachers. The participating teachers taught a total of 251 students in grades 1- 5. The pre-test average 2015-2016 NCE score was 47.8 with a standard deviation of 2.9, whereas the average post-test 2016-2017 NCE score was 53.7 with a standard deviation of 6.8. The mean scores of all students who had teachers who participated in data-driven professional learning communities during the 2016-2017 school year was 53.7 with a standard deviation of 6.8, while the mean scores of students of non-participating teachers during the 2015-2016 school year was 47.8 with a standard deviation of 2.9. A confidence interval for mean difference test was conducted to evaluate whether teacher participation in data-driven professional learning communities reflected a difference Normal Curve Equivalency (NCE) scores. The use of confidence interval testing served as a parameter for the sample to examine statistical significance. The confidence interval test was conducted at confidence levels of 90%, 95% and 99% to develop a more informative data set for the study. The confidence interval test displayed a significant difference based on the parameters.

The upper and lower value or parameter is a range that is based on the level of confidence statistically computed by the scores. A result of zero indicates a null value of the parameter (Blair & Taylor, 2008). A null value would infer that there is no statistical significance between the two groups and acceptance of the null hypothesis. A 90% confidence interval for mean difference test resulted in a lower and upper value of 5.2 to 6.2. A 95% confidence interval for mean difference resulted in a lower and upper value of 5.1 to 6.3. At 99% confidence: the parameter was 4.9 to 6.5. At 99% confidence testing: the mean score rose between 4.9 and 6.5 points over the 2016-2017 school year. If a t-test were conducted on the cumulative sample grades 1-5, a t-test would interpret

the data as statistically significant. Therefore, the null hypothesis was rejected. Figure 4.6 illustrates the Normal Curve Equivalent pre-implementation and post implementation

Figure 4.6 *Illustrates the 2016-2017 (Pre- Implementation and Post-Implementation)*

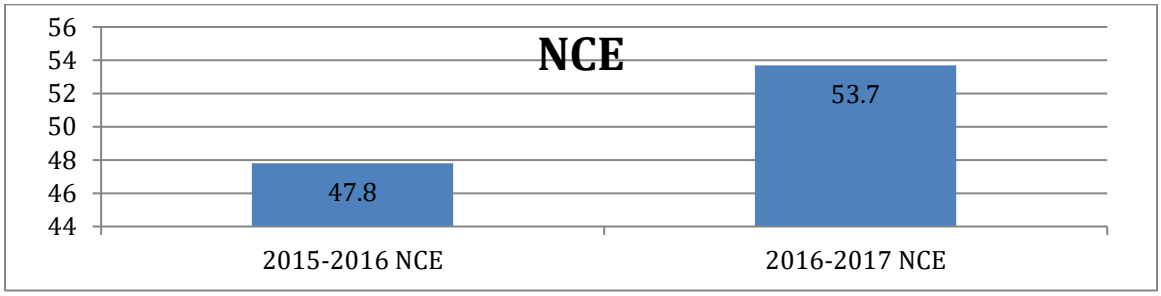

Figure 4.6. Outlines the study populations' mean average Normal Curve Equivalent scores for the 2015-2016 and 2016-2017 school years.

Grade Level Equivalency

The importance of grade-level reading skills for students has never been greater. The constant standardized testing required of students mandates a literacy skill set that is at or above grade-level. This study analyzed the grade-level reading data of students in grades 1-5 by answering the following question.

Research Question 2

- Is there a difference in students' mean Star Reading Grade Level Equivalency scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?
- There is no difference in students' Grade Level Equivalency scores (pre-implementation school year 2015-2016 and post-implementation year 2016-2017) between teachers who participated in data-driven professional learning communities and teachers that did not participate in data-driven professional learning communities.

1st Grade GLE Scores

1st grade Star Reading scores were compiled from the 2015-2016 and 2016-2017 school years. The students' Grade Level Equivalency (GLE) scores were charted for 40 1st grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 40 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. The mean difference NCE score was 1.1. Table 11 details the results for 2015-2016 and 2016-2017: as well as the difference that occurred.

Table 11. Analysis of 1st Grade GLE Mean Scores.

Grade	*2016*	*2017*	*Difference*
1st	*1.3*	*2.4*	*1.1*

1st Grade GLE Analysis

1st grade Star Reading GLE scores difference was analyzed for the 2015-2016 school year and compared to the 2016-2017 school year. The resulting difference of 1.1 with a standard deviation of .59 was examined to create a parameter for students in 1st grade using confidence interval testing. A confidence interval test was performed at 90%, 95% and 99% intervals. A confidence interval of 90% resulted in a lower and upper value of .94 to 1.2. The confidence interval of 95% resulted in a lower and upper value of .9 to 1.3. At 99% confidence: the parameter was .8 to 1.4. These parameters estimated that the actual mean difference in grade-level at 99% confidence interval was between 8 months and 16 months grade-level growth. Figure 4.7 provides an illustration of the difference in GLE scores for the 2015-2016 and 2016-2017 school years.

Figure 4.7 *Grade Level Equivalency Scores for 1st Grade*

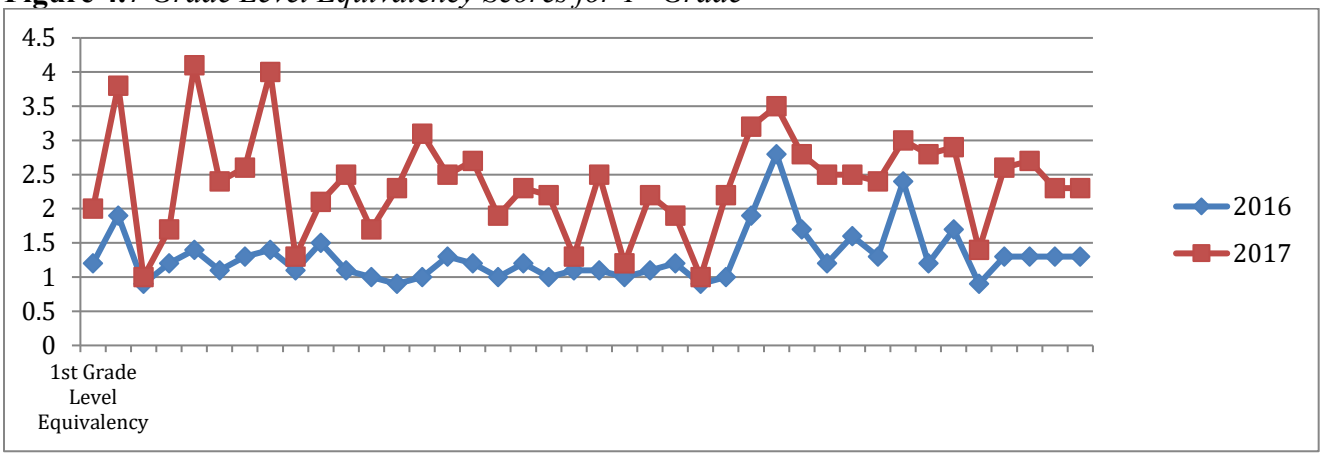

Figure 4.7. Details Star Reading Grade Level Equivalency scores for the 2015-2016 school year and the 2016-2017 school year. The difference in grade level equivalency for each individual score is illustrated in the above figure.

2nd Grade GLE Scores

2nd grade Star Reading scores were gathered from the 2015-2016 and 2016-2017 school years. The students' Grade Level Equivalency (GLE) scores were charted for the 50 2nd grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 50 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. The mean difference NCE score was .8 with a standard deviation of .56. Table 12 details the results for 2015-2016 and 2016-2017: as well as the difference that occurred.

Table12. Analysis of 2nd Grade GLE Mean Scores.

Grade	*2016*	*2017*	*Difference*
2nd Grade	*2.1*	*2.9*	*.8*

2nd Grade GLE Analysis

The difference was analyzed by performing a series of confidence interval testing. The confidence test was performed at 90%, 95% and 99% intervals. A confidence

interval of 90% resulted in a lower and upper value of .6 to .9. The confidence interval of 95% resulted in a lower and upper value of .6 to 1. A 99% confidence interval resulted in lower and upper values of .5 to 1. These parameters estimated that the actual mean difference in grade level at 99% confidence interval was between 5 months and 1-year grade-level growth. Figure 4.8 provides an illustration of the difference in GLE scores for the 2015-2016 and 2016-2017 school years. Each line displays the results of the annual cohort group that is being represented.

Figure 4.8 *Grade Level Equivalency Scores for 2nd Grade*

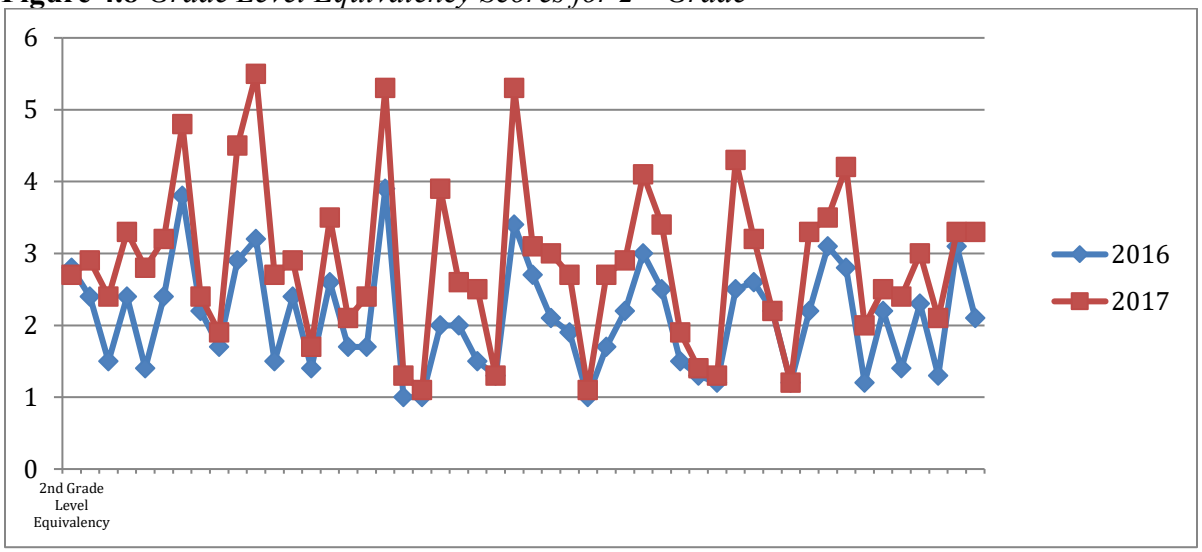

Figure 4.8. Star Reading Grade Level Equivalency scores were charted for 2nd grade students. The above figure illustrates the 2015-2016 and 2016-2017 differences.

3rd Grade GLE Scores

3rd grade Star Reading scores were compiled from the 2015-2016 and 2016-2017 school years. The students' Grade Level Equivalency (GLE) scores were charted for the 52 3rd grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 52 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. The mean difference NCE score was .9 with a standard deviation of .73. Table 13 describes how students performed in 2015-2016 compared to 2016-2017 on the Star Reading assessment based on GLE scores.

Table 13. Analysis of 3rd Grade GLE Mean Scores.

Grade	*2016*	*2017*	*Difference*
3rd	*3*	*3.9*	*.9*

3rd Grade GLE Analysis

There was an increase or difference of .9 on GLE scores from the 2015-2016 school year to the 2016-2017 school year. This information was used to conduct a series of confidence interval tests to determine the actual significance of such numbers. The testing varied in confidence levels to more adequately establish upper and lower values to determine any statistical significance. A confidence interval test was performed at 90%, 95% and 99% intervals. A confidence interval of 90% resulted in a lower and upper value of .73 to 1.1. The confidence interval of 95% resulted in a lower and upper value of .69 to 1.1. A 99% confidence interval resulted in parameters of .62 to 1.2. These parameters estimate that the actual mean difference grade level at 99% confidence interval was between 6 months and 14 months grade-level growth during the 2016-2017 school year. Figure 4.9 provides an illustration of the difference in GLE scores for the 2015-16 and 2016-2017 school years.

Figure 4.9 *Grade Level Equivalency Scores for 3rd Grade*

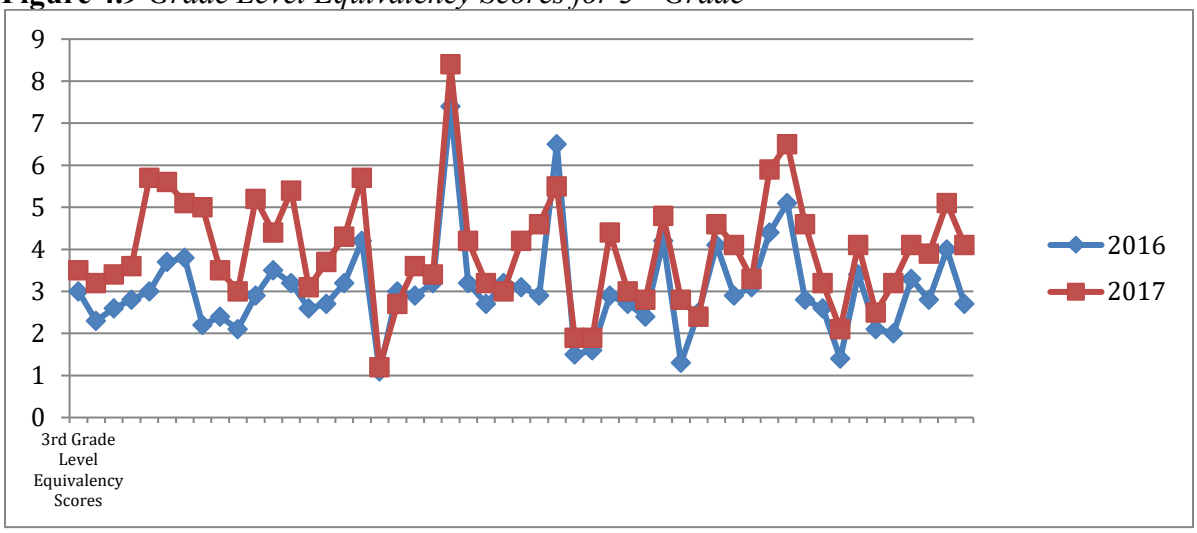

Figure 4.9. Star Reading Grade Level Equivalency scores were charted for 3rd gradestudents. The GLE scores displayed are representative of pre- and post-implementation of data-driven professional learning committees.

4th Grade GLE Scores

4th grade Star Reading scores were compiled from the 2015-2016 and 2016- 2017 school years. The students Grade Level Equivalency (GLE) scores were charted for the 46 4th grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 46 students were tested and these scores served as the post-implementation of data-driven professional learning communities' scores. The mean difference NCE score was 1.1 with a standard deviation of .67. Table 14 details the results for 2015-2016 and 2016-2017: as well as the difference that occurred.

Table 14. Analysis of 4th Grade GLE Mean Scores.

Grade	*2016*	*2017*	*Difference*
4th	*4.3*	*5.4*	*1.1*

4th Grade GLE Analysis

The 1.1 GLE difference was used to determine any significant difference using confidence interval testing. A confidence interval test was performed at 90%, 95% and 99% intervals. A confidence interval of 90% resulted in a lower and upper value of .9 to 1.3. The confidence interval of 95% resulted in a lower and upper value of .89 to 1.3. A 99% confidence interval resulted in lower and upper values of .83 to .1.4. These parameters established that the actual mean difference in grade level at 99% confidence interval was between 8 months and 16 months in grade-level growth for the 2016-2017 school year. Figure 4.10 provides the various GLE scores for the 2015-2016 and 2016-2017 school years.

Figure 4.10 *Grade Level Equivalency Scores for 4th Grade*

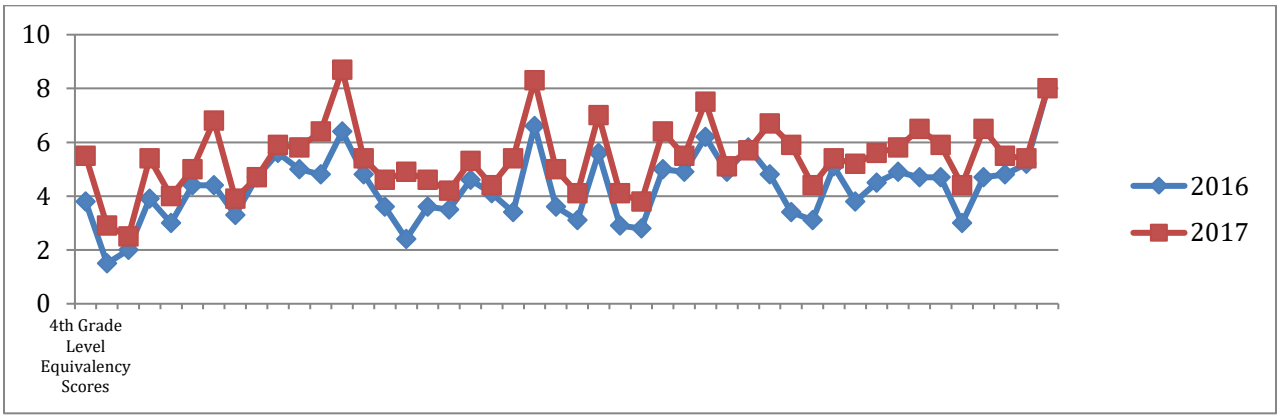

Figure 4.10. Star Reading Grade Level Equivalency scores were charted for the 4th grade level the 2015-2016 and 2016-2017 school years. The difference in each individual score is visible on the above figure.

5th Grade GLE Scores

5th grade Star Reading scores were compiled from 2015-2016 and 2016-2017. The students Grade Level Equivalency (GLE) scores were charted for the 67 5th grade students. The scores from May 2016 were used as the scores for pre-implementation of data-driven professional learning communities. In May 2017, the same 67 students were tested and these scores served as the post-implementation of data-driven professional

learning communities' scores. The mean difference NCE score was .7 with a standard deviation of 1.3. Table 15 describes the difference established by comparing different groups over the specified time period.

Table 15. Analysis of 5th Grade GLE Mean Scores.

Grade	*2016*	*2017*	*Difference*
5th	*5.1*	*5.8*	*.7*

5th Grade GLE Analysis

Using the difference of .7 and a standard deviation of 1.3, a confidence interval testing was conducted. Confidence interval testing was performed for 5th grade students to determine the confidence levels at 90%, 95% and 99%. A confidence interval of 90% resulted in a lower and upper value of .4 to .9. The confidence interval of 95% resulted in a lower and upper value of .4 to 1. A 99% confidence parameter produced lower and upper values of .3 to 1.1. These parameters placed the actual mean difference in grade level at 99% confidence interval was between 4 months and 9 months of grade-level growth for the 2016-2017 school years. Figure 4.11 provides the various GLE scores for the 2015-2016 and 2016-2017 school years.

Figure 4.11 *Grade Level Equivalency Scores for 5th Grade*

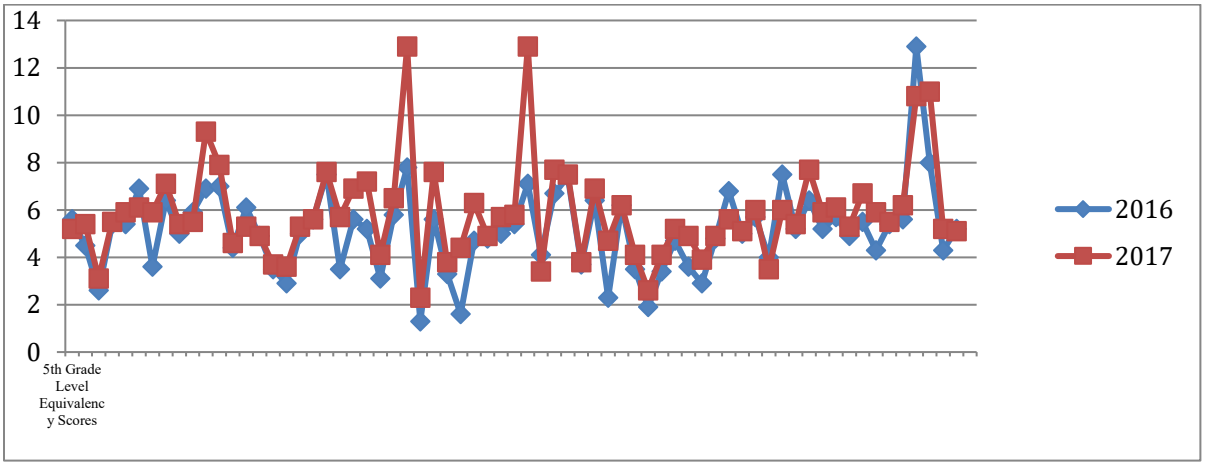

Figure 4.11. Star Reading Grade Level Equivalency scores were charted for each grade level cohort during the 2015-2016 school year and the 2016-2017 school year. The difference in each individual score is visible on the above figure.

Analysis of GLE Scores Grades 1-5

Data from the 2015-2016 and 2016-2017 academic years were collected from the research school represented by 11 teachers. The participating teachers taught a total of 253 students in grades 1-5. The pre-implementation average 2015-2016 GLE was 3.1, whereas the average post-implementation 2016-2017 NCE was 4.1. This data suggested that the grade-level equivalency for students improved over a year's growth on average. The data indicated that 38% of students were at or above grade-level on the Star Reading Assessment in 2015-2016 and 52% were at or above grade level in 2016-2017. This resulted in an increase of 14% in at or above grade-level readers.

The mean Grade Level Equivalency scores of all students with teachers who participated in data-driven professional learning communities during the 2016-2017 school year was 4.1 with a standard deviation of 1.3, while the mean scores of students of non-participating teachers during the 2015-2016 school year was 3.1 with a standard deviation of 1.4. This resulted in a difference of the mean values. A confidence interval for mean difference test was conducted to evaluate whether teacher participation in data-driven professional learning communities was related to student Grade Level

Equivalency (GLE) scores. The implementation of confidence interval testing served as a parameter for the sample to analyze statistical significance. The confidence interval test was performed at confidence levels of 90%, 95%, and 99% to develop a more conclusive result to the test. The confidence interval test revealed any differences and established parameters for the impact of the professional learning communities.

The upper and lower value establishes a range that is based on the level of confidence statistically computed derived from the data. A null value would imply that there is no significance between the two groups and the study would thus accept the null hypothesis. Confidence interval testing was performed at confidence levels of 90%, 95%, and 99% for population of the sample. A 90% confidence interval for mean difference test resulted in a lower and upper value of .45 and 1.18. A 95% confidence interval for mean difference resulted in a lower and upper value of .38 to 1.31. At 99% confidence the parameter was .23 to 1.72. The results of confidence interval testing for mean difference of the entire sample of 253 students at 99% intervals revealed that a mean difference of 2 months to 1 year 2 months was achieved for the entire sample. If a t-test were to be conducted on the entire sample of students' GLE scores grades 1-5 sample, a t-test would interpret the data as statistically significant based on the question posed. Therefore, the null hypothesis was rejected.

Figure 4.12 *Pre-participation and Post-participation Mean Star Reading Grade Level Equivalency for 2015-2016 and 2016-2017*

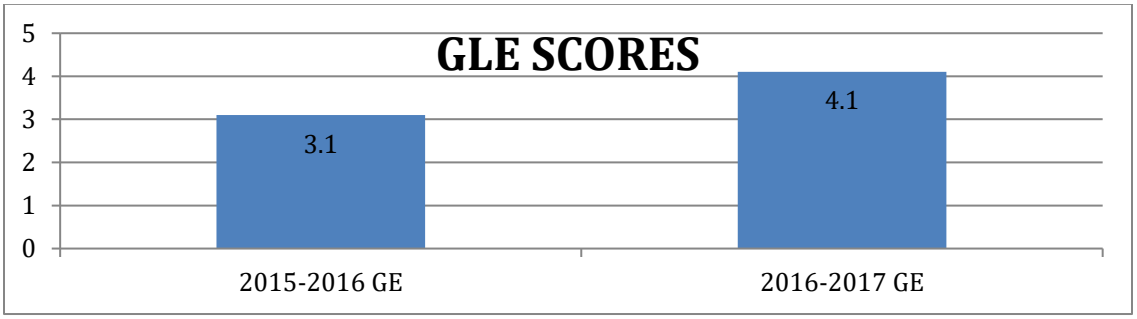

Figure 4.12. This figure outlines the study population's mean average Grade Level Equivalency scores for the 2015-2016 and 2016-2017 school years.

Summary

This chapter included a collection of data results and analyses to provide answers to two research questions. The following questions were used as a guide to determine the effect of data-driven professional learning communities.

1. Is there a difference in students' mean Star Reading NCE scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?
2. Is there a difference in students' mean Star Reading Grade Level equivalency scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

Confidence interval testing was employed to analyze the results of teacher participation in data-driven professional learning communities. The cumulative results revealed significant effects on students' Star Reading National Curve Equivalency (NCE) scores and Grade Level Equivalency (GLE) scores. According to the findings, a t-test would determine the data as statistically significant. Thus, given the results of confidence interval testing, this study produced statistically significant findings based on the implementation of data-driven professional learning communities.

CHAPTER 5: CONCLUSION

Introduction

The ability for students to read, write, and comprehend on grade level is a task that every educator has faced and will continue to face as the role of state assessments and standardized testing continues to expand in education. The adoption of Common Core standards has fostered a shift in education. The restructuring of standards in Tennessee has emphasized literacy improvement as a top priority. Students on grade level in literacy are better prepared to achieve high academic marks as opposed to below proficient readers. A student proficient in literacy not only can perform well academically, but is also enabled to achieve more in life and increase overall well-being (McDonnell, Lonigan, & Goldstein, 2007). It is vital that educators examine high quality practices that result in the improvement of literacy instruction. This chapter summarizes the findings and implications based on the results of the implementation of data-driven professional learning communities on literacy scores. Chapter 5 also offers suggestions for further research on data-driven professional learning communities.

Discussion of Confidence Interval Results

The purpose was to determine the effects of implementation of data-driven professional learning communities on literacy scores. Data were obtained from the Star Reading assessment. Normal Curve Equivalent and Grade Level Equivalency scores were analyzed based on pre- and post-use of data-driven professional learning communities. Data were collected from the research school located in Northeast Tennessee. A total of 11 teachers and 253 students were involved in the study. The data used were collected from a 2-year period of Star Reading assessment. Confidence interval testing was conducted on each individual grade-level; once this was completed; confidence interval testing was conducted on the entire sample for 2015-2016 pre-implementation and 2016-2017 post-implementation to answer the following research questions:

Research Question 1

Is there a difference in students' mean Star Reading NCE scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

Research Question 2

Is there a difference in students' mean Star Reading Grade Level equivalency scores (pre-implementation and post-implementation) between teachers who participated in data-driven professional learning communities?

Normal Curve Equivalent

Confidence interval testing was used to evaluate if there were any differences in students' Star Reading Normal Curve Equivalent scores as a result of data-driven professional learning community integration. The data analysis revealed that there was a significant difference between pre-participation and post-participation in students' Star Reading NCE scores. The average mean Star Reading NCE score of the sample pre-participation was (M = 47.8, SD= 2.9) as compared to the average post-participation Star Reading Assessment score of (M = 53.7, SD=6.8), which yielded a difference of (M=5.8, SD=4.9). Confidence interval testing conducted on the entire sample resulted in parameter scores greater than zero for 90%, 95%, and 99% confidence levels; consequently, the null hypothesis was rejected. A minimal difference for grades 2 and 5 was noted. Once the NCE score analysis was conducted, Grade Level Equivalency scores were examined.

Grade Level Equivalency

To further examine the effects of data-driven professional learning communities on literacy, Grade Level Equivalency scores were analyzed. Confidence interval testing was used to again determine upper and lower values at 90%, 95%, and 99% confidence

levels for the Grade Level Equivalency scores of the sample. The 2015-2016 pre-implementation scores (M=3.1, SD= 1.4) compared to the post-implementation scores (M=4.1, SD=1.4) resulted in a difference of (M=.9, SD.2). This data produced a parameter of .8 to .9 at 90% confidence level. At 95% confidence the lower and upper was .8 to .92. The 99% confidence interval test resulted in parameters of .86 to .93. The confidence level indicated no negative parameters; therefore, the null hypothesis was rejected again.

Implications

Based on the study's results, there appeared to be numerous significant findings; as a consequence, this may help to inform educators, future researchers, and broaden literacy practices. Initially, local school districts should consider using student data as an integral component of professional learning communities. This could result in improvement of literacy rates in the school district. Next, data-driven professional learning communities should continue to evolve to maximize student results. To achieve the best results educators should document and learn from the implementation of data-driven professional learning communities. Further, school districts that have not implemented data-driven professional learning communities should consider the benefits. Data indicate that professional learning communities foster increased student test scores, which should prompt consideration of implementation. Additionally, educators seeking to improve student literacy scores should examine the benefits of data-driven professional learning communities. When analyzing the research and benefits; employment of data-driven professional learning communities should not be overlooked, because it may result in a considerable increase in student literacy achievement.

Recommendations for Further Research and Limitations

When reviewing the results of this research, there were noteworthy areas for future research. Several limitations were also evident. For future research, this study

should be replicated using a control group in which different students from the same grade level at different schools could be used for comparison. Similarly, research should be performed using other subject areas to further ascertain the effects of integration of data-driven professional learning communities. In the future, research should be conducted over an extended time to analyze the longevity of the use of data-driven professional learning communities. Teacher tenure should also be scrutinized because it may also be a factor in student achievement. Future research should also be more restrictive regarding participants and setting. Extending focus to examine subgroups (disability, ethnicity, gifted, etc.) would increase the validity of data-driven professional learning communities. Further, extending focus to urban systems for comparison could also prove beneficial. With the recommendation of future research, it is necessary to discuss the limitations of the current study.

Limitations are a component of research that should be considered when discussing results because they help clarify the boundaries of the study. This study included several limitations. First, no control group was used. The pre-participation and post-participation NCE and GLE scores were from the same group of students. Given the inability to obtain a control group and the use of convenience sampling, students were not coded for subgroups. Further, the current study focused on only one school, located in a rural, Title I school district. The final limitation consisted of teacher experience and age groups. This study included a mixed group of experienced and inexperienced teachers and only focused on elementary students, as opposed to emphasizing a particular subset of educators and a variation of student grade levels.

Conclusion

Overall, the results yielded some considerable findings regarding literacy scores and data-driven professional learning communities. The confidence interval analyses produced statistical significance when investigating the implementation of data-driven professional learning communities. This research adds to the body of current research on

professional learning communities and the role of data-driven professional learning communities in increasing student literacy achievement. The results sought to support the future direction of research, while providing thought for more research on this topic of study.

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Appendix A

Normal Curve Equivalent Scores

1st Grade Students	B or G	2016 NCE	2017 NCE	Difference
Student 1	Male	53.2	59.3	6.1
Student 2	Female	73.7	89.6	15.9
Student 3	Male	10.4	6.7	-3.7
Student 4	Male	55.3	50.5	-4.8
Student 5	Female	64.9	93.3	28.4
Student 6	Male	44.7	69.3	24.6
Student 7	Male	58.1	73.7	15.6
Student 8	Female	64.2	89.6	25.4
Student 9	Female	42.5	29.1	-13.4
Student 10	Female	66.3	61	-5.3
Student 11	Male	35.8	70.1	34.3
Student 12	Male	28.2	48.9	20.7
Student 13	Male	6.7	65.6	58.9
Student 14	Female	28.2	81.1	52.9
Student 15	Male	57	71.8	14.8
Student 16	Female	53.2	74.7	21.5
Student 17	Female	31.5	55.3	23.8
Student 18	Female	53.2	67	13.8
Student 19	Male	33.7	63.5	29.8
Student 20	Female	42.5	32.3	-10.2
Student 21	Male	44.7	70.9	26.2
Student 22	Male	33.7	24.2	-9.5
Student 23	Male	40.1	63.5	23.4
Student 24	Male	55.3	57	1.7
Student 25	Male	15.4	1	-14.4
Student 26	Female	31.5	64.2	32.7
Student 27	Male	74.7	82.7	8
Student 28	Female	86.9	84.6	-2.3
Student 29	Male	69.3	77	7.7
Student 30	Female	55.3	71.8	16.5
Student 31	Male	67.7	70.1	2.4
Student 32	Male	57	69.3	12.3
Student 33	Female	84.6	79.6	-5
Student 34	Female	48.4	77	28.6
Student 35	Male	69.3	78.2	8.9
Student 36	Male	17.3	41.9	24.6
Student 37	Female	59.3	73.7	14.4
Student 38	Female	60.4	74.7	14.3
Student 39	Female	57	67	10
Student 40	Male	58.1	67	8.9

2nd Grade Students	B or G	2016 NCE	2017 NCE	Difference
Student 1	Male	63.5	50	-13.5
Student 2	Male	56.4	53.2	-3.2
Student 3	Female	33.7	41.3	7.6

Student 4	Male	56.4	59.9	3.5
Student 5	Male	30.7	52.1	21.4
Student 6	Female	56.4	58.7	2.3
Student 7	Male	79.6	78.2	-1.4
Student 8	Male	49.5	41.9	-7.6
Student 9	Female	37.7	28.2	-9.5
Student 10	Female	67	75.8	8.8
Student 11	Male	72.8	86.9	14.1
Student 12	Female	33.7	50	16.3
Student 13	Male	56.4	53.2	-3.2
Student 14	Female	30.7	23	-7.7
Student 15	Female	59.9	63.5	3.6
Student 16	Male	37.1	35.1	2
Student 17	Male	38.3	42.5	4.2
Student 18	Female	79.6	84.6	5
Student 19	Male	1	6.7	5.7
Student 20	Female	1	1	0
Student 21	Male	46.8	67.7	20.9
Student 22	Female	45.8	47.4	1.6
Student 23	Female	33	45.2	12.2
Student 24	Female	23	10.4	-12.6
Student 25	Female	74.7	84.6	9.9
Student 26	Female	62.3	56.4	-5.9
Student 27	Female	47.4	55.3	7.9
Student 28	Female	43	49.5	6.5
Student 29	Female	1	1	0
Student 30	Male	37.7	49.5	11.8
Student 31	Female	51.6	53.7	2.1
Student 32	Female	67.7	69.3	1.6
Student 33	Female	59.3	61	1.7
Student 34	Male	32.3	28.2	-4.1
Student 35	Male	24.2	13.1	-11.1
Student 36	Male	6.7	6.7	0
Student 37	Female	57.5	73.7	16.2
Student 38	Female	50.5	58.7	8.2
Student 39	Male	50.5	37.1	-13.4
Student 40	Male	6.7	1	-5.7
Student 41	Male	51.1	61	9.9
Student 42	Male	58.1	62.9	4.8
Student 43	Male	64.2	71.8	7.6
Student 44	Female	10.4	29.9	19.5
Student 45	Male	50.5	45.2	-5.3
Student 46	Male	31.5	42.5	11
Student 47	Female	52.1	55.9	3.8
Student 48	Female	23	33	10
Student 49	Male	69.3	60.4	-8.9

Student 50	Female	48.9	61	12.1

3rd Grade Students	B or G	2016 NCE	2017 NCE	Difference
Student 1	Female	48.4	46.8	-1.6
Student 2	Female	35.1	42.5	7.4
Student 3	Male	41.9	46.3	4.4
Student 4	Male	45.2	48.4	3.2
Student 5	Male	48.4	73.7	25.3
Student 6	Female	58.7	72.8	14.1
Student 7	Female	60.4	65.6	5.2
Student 8	Female	29.9	65.6	35.7
Student 9	Male	36.5	46.8	10.3
Student 10	Female	29.1	39	9.9
Student 11	Female	46.3	67	20.7
Student 12	Female	57	58.1	1.1
Student 13	Female	52.6	70.9	18.3
Student 14	Male	40.7	40.1	-0.6
Student 15	Male	43.5	49.5	5.9
Student 16	Male	53.2	57.5	4.3
Student 17	Male	65.6	73.7	8.1
Student 18	Male	1	1	0
Student 19	Male	48.4	34.4	-14
Student 20	Male	46.8	48.9	2.1
Student 21	Female	52.6	46.8	-5.8
Student 22	Male	93.3	93.3	0
Student 23	Female	53.2	56.4	3.2
Student 24	Female	34.4	43	8.6
Student 25	Female	53.7	38.3	-15.4
Student 26	Female	50.5	55.9	5.4
Student 27	Female	47.4	60.4	13
Student 28	Male	93.3	71.8	-21.5
Student 29	Male	13.1	13.1	0
Student 30	Female	15.4	13.1	-2.3
Student 31	Male	47.4	58.7	11.3
Student 32	Male	44.1	39	-5.1
Student 33	Male	36.5	35.8	-0.7
Student 34	Female	65.6	62.9	-2.7
Student 35	Female	6.7	35.1	28.4
Student 36	Male	38.3	25.3	-13
Student 37	Female	64.2	60.4	-3.8
Student 38	Female	47.4	55.3	7.9
Student 39	Male	41.9	44.7	2.8
Student 40	Female	67	75.8	8.8
Student 41	Female	77	82.7	5.7
Student 42	Female	45.2	60.4	15.2
Student 43	Male	40.7	41.9	1.2

Student 44	Female	10.4	17.3	6.9
Student 45	Female	55.3	54.2	-1.1
Student 46	Male	27.2	29.1	1.9
Student 47	Female	24.2	44.1	19.9
Student 48	Female	54.2	55.3	1.1
Student 49	Female	45.2	52.1	6.9
Student 50	Male	62.3	66.3	4
Student 51	Male	42.5	53.2	10.7

4th Grade Students	B or G	2016 NCE	2017 NCE	Difference
Student 1	Male	46.8	59.9	13.1
Student 2	Male	1	25.3	24.3
Student 3	Male	13.1	18.9	5.8
Student 4	Female	47.9	58.7	10.8
Student 5	Male	35.1	42.5	7.4
Student 6	Male	53.7	53.7	0
Student 7	Male	53.7	71.8	18.1
Student 8	Female	40.7	40.1	-0.6
Student 9	Male	51.6	50	-1.6
Student 10	Male	69.3	64.9	-4.4
Student 11	Male	61.7	62.9	1.2
Student 12	Male	59.9	69.3	9.4
Student 13	Male	78.2	89.6	11.4
Student 14	Female	59.3	58.7	-0.6
Student 15	Female	44.7	48.9	4.2
Student 16	Male	21.8	53.2	31.4
Student 17	Male	44.1	48.9	4.8
Student 18	Female	43	44.1	1.1
Student 19	Male	56.4	57.5	1.1
Student 20	Female	51.1	47.4	-3.7
Student 21	Male	41.9	58.7	16.8
Student 22	Female	79.6	84.6	5
Student 23	Male	44.1	53.2	9.1
Student 24	Female	37.7	43.6	5.9
Student 25	Male	69.3	73.7	4.4
Student 26	Male	33	43	10
Student 27	Female	32.3	37.7	5.4
Student 28	Female	61.7	69.3	7.6
Student 29	Female	59.9	59.9	0
Student 30	Female	77	77	0
Student 31	Male	60.4	54.8	-5.6
Student 32	Male	70.9	62.3	-8.6
Student 33	Female	58.1	71.8	13.7
Student 34	Male	41.9	64.2	22.3
Student 35	Female	37.1	46.8	9.7
Student 36	Female	62.9	58.7	-4.2

Student 37	Female	46.8	56.4	9.6
Student 38	Male	54.8	60.4	5.6
Student 39	Male	59.9	62.9	3
Student 40	Female	57.5	70.1	12.6
Student 41	Male	58.1	64.2	6.1
Student 42	Male	35.1	46.8	11.7
Student 43	Female	58.1	70.1	12
Student 44	Male	57.7	59.3	0.6
Student 45	Male	63.5	58.1	-5.4
Student 46	Male	89.6	82.7	-6.9

5th Grade students		2016 NCE	2017 NCE	Difference
Student 1		55.3	44.7	-10.6
Student 2		43	46.8	3.8
Student 3		17.3	18.9	1.6
Student 4		52.1	48.4	-3.7
Student 5		53.2	53.2	0
Student 6		67.7	54.2	-13.5
Student 7		33	52.6	19.6
Student 8		64.9	62.3	-2.6
Student 9		47.9	46.8	-1.1
Student 10		59.3	47.9	-11.4
Student 11		68.5	77	8.5
Student 12		69.3	68.5	-0.8
Student 13		41.9	38.3	-3.6
Student 14		61.7	46.3	-15.4
Student 15		47.4	41.3	-6.1
Student 16		31.5	28.2	-3.3
Student 17		21.8	26.3	4.5
Student 18		47.9	45.8	-2.1
Student 19		55.9	50	-5.9
Student 20		72.8	66.3	-6.5
Student 21		31.5	50.5	19
Student 22		55.3	61	5.7
Student 23		51.1	62.9	11.8
Student 24		25.3	32.3	7
Student 25		57.5	58.7	1.2
Student 26		75.8	89.6	13.8
Student 27		1	6.7	5.7
Student 28		55.9	66.3	10.4
Student 29		29.1	28.2	0.9
Student 30		1	36.5	35.5
Student 31		44.7	56.4	11.7
Student 32		45.8	41.3	-4.5

Student 33		47.9	50	2.1
Student 34		53.2	51.1	-2.1
Student 35		70.1	93.3	23.2
Student 36		38.3	24.2	-14.1
Student 37		67	67	0
Student 38		72.8	65.6	-7.2
Student 39		33	29.1	-3.9
Student 40		64.2	61	-3.2
Student 41		13.1	39	25.9
Student 42		62.9	55.3	-7.6
Student 43		31.5	31.5	0
Student 44		1	13.1	12.1
Student 45		29.9	32.3	2.4
Student 46		44.1	45.2	1.1
Student 47		31.5	41.3	9.8
Student 48		21.8	29.9	8.1
Student 49		46.3	41.3	-5
Student 50		48.4	44.1	-4.3
Student 51		57	53.2	-3.8
Student 52		37.1	25.3	-11.8
Student 53		72.8	53.2	-19.6
Student 54		51.6	47.4	-4.2
Student 55		64.9	67	2.1
Student 56		51.1	52.1	1
Student 57		57	54.8	-2.2
Student 58		46.8	46.3	-0.5
Student 59		53.7	59.3	5.6
Student 60		40.7	52.1	11.4
Student 61		52.6	47.9	-4.7
Student 62		55.3	55.3	0
Student 63		99	82.7	-16.3
Student 64		78.2	82.7	4.5
Student 65		40.1	45.2	5.1
Student 66		51.1	43.6	-7.5

Appendix B

Grade Level Equivalency Scores

1st Grade Students	B or G	2016 GE	2017 GE	Difference
Student 1	Male	1.2	2	0.8
Student 2	Female	1.9	3.8	1.9
Student 3	Male	0.9	1	0.1
Student 4	Male	1.2	1.7	0.5
Student 5	Female	1.4	4.1	2.7
Student 6	Male	1.1	2.4	1.3
Student 7	Male	1.3	2.6	1.3
Student 8	Female	1.4	4	2.6
Student 9	Female	1.1	1.3	0.2
Student 10	Female	1.5	2.1	0.6
Student 11	Male	1.1	2.5	1.4
Student 12	Male	1	1.7	0.7
Student 13	Male	0.9	2.3	1.4
Student 14	Female	1	3.1	2.1
Student 15	Male	1.3	2.5	1.2
Student 16	Female	1.2	2.7	1.5
Student 17	Female	1	1.9	0.9
Student 18	Female	1.2	2.3	1.1
Student 19	Male	1	2.2	1.2
Student 20	Female	1.1	1.3	0.2
Student 21	Male	1.1	2.5	1.4
Student 22	Male	1	1.2	0.2
Student 23	Male	1.1	2.2	1.1
Student 24	Male	1.2	1.9	0.7
Student 25	Male	0.9	1	0.1
Student 26	Female	1	2.2	1.2
Student 27	Male	1.9	3.2	1.3
Student 28	Female	2.8	3.5	0.7
Student 29	Male	1.7	2.8	1.1
Student 30	Female	1.2	2.5	1.3
Student 31	Male	1.6	2.5	0.9
Student 32	Male	1.3	2.4	1.1
Student 33	Female	2.4	3	0.6
Student 34	Female	1.2	2.8	1.6
Student 35	Male	1.7	2.9	1.2
Student 36	Male	0.9	1.4	0.5
Student 37	Female	1.3	2.6	1.3
Student 38	Female	1.3	2.7	1.4
Student 39	Female	1.3	2.3	1
Student 40	Male	1.3	2.3	1

2nd Grade Students	B or G	2016 GE	2017 GE	Difference
Student 1	Male	2.8	2.7	-0.1
Student 2	Male	2.4	2.9	0.5

Student 3	Female	1.5	2.4	0.9
Student 4	Male	2.4	3.3	0.9
Student 5	Male	1.4	2.8	1.4
Student 6	Female	2.4	3.2	0.8
Student 7	Male	3.8	4.8	1
Student 8	Male	2.2	2.4	0.2
Student 9	Female	1.7	1.9	0.2
Student 10	Female	2.9	4.5	1.6
Student 11	Male	3.2	5.5	2.3
Student 12	Female	1.5	2.7	1.2
Student 13	Male	2.4	2.9	0.5
Student 14	Female	1.4	1.7	0.3
Student 15	Female	2.6	3.5	0.9
Student 16	Male	1.7	2.1	0.4
Student 17	Male	1.7	2.4	0.7
Student 18	Female	3.9	5.3	1.4
Student 19	Male	1	1.3	0.3
Student 20	Female	1	1.1	0.1
Student 21	Male	2	3.9	1.9
Student 22	Female	2	2.6	0.6
Student 23	Female	1.5	2.5	1
Student 24	Female	1.3	1.3	0
Student 25	Female	3.4	5.3	1.9
Student 26	Female	2.7	3.1	0.4
Student 27	Female	2.1	3	0.9
Student 28	Female	1.9	2.7	0.8
Student 29	Female	1	1.1	0.1
Student 30	Male	1.7	2.7	1
Student 31	Female	2.2	2.9	0.7
Student 32	Female	3	4.1	1.1
Student 33	Female	2.5	3.4	0.9
Student 34	Male	1.5	1.9	0.4
Student 35	Male	1.3	1.4	0.1
Student 36	Male	1.2	1.3	0.1
Student 37	Female	2.5	4.3	1.8
Student 38	Female	2.6	3.2	0.6
Student 39	Male	2.2	2.2	0
Student 40	Male	1.2	1.2	0
Student 41	Male	2.2	3.3	1.1
Student 42	Male	3.1	3.5	0.4
Student 43	Male	2.8	4.2	1.4
Student 44	Female	1.2	2	0.8
Student 45	Male	2.2	2.5	0.3
Student 46	Male	1.4	2.4	1
Student 47	Female	2.3	3	0.7
Student 48	Female	1.3	2.1	0.8

Student 49	Male	3.1	3.3	0.2
Student 50	Female	2.1	3.3	1.2

3rd Grade Students	B or G	2016 GE	2017 GE	Difference
Student 1	Female	3	3.5	0.5
Student 2	Female	2.3	3.2	0.9
Student 3	Male	2.6	3.4	0.8
Student 4	Male	2.8	3.6	0.8
Student 5	Male	3	5.7	2.7
Student 6	Female	3.7	5.6	1.9
Student 7	Female	3.8	5.1	1.3
Student 8	Female	2.2	5	2.8
Student 9	Male	2.4	3.5	1.1
Student 10	Female	2.1	3	0.9
Student 11	Female	2.9	5.2	2.3
Student 12	Female	3.5	4.4	0.9
Student 13	Female	3.2	5.4	2.2
Student 14	Male	2.6	3.1	0.5
Student 15	Male	2.7	3.7	1
Student 16	Male	3.2	4.3	1.1
Student 17	Male	4.2	5.7	1.5
Student 18	Male	1.1	1.2	0.1
Student 19	Male	3	2.7	-0.3
Student 20	Male	2.9	3.6	0.7
Student 21	Female	3.2	3.4	0.2
Student 22	Male	7.4	8.4	1
Student 23	Female	3.2	4.2	1
Student 24	Female	2.7	3.2	0.5
Student 25	Female	3.2	3	-0.2
Student 26	Female	3.1	4.2	1.1
Student 27	Female	2.9	4.6	1.7
Student 28	Male	6.5	5.5	-1
Student 29	Male	1.5	1.9	0.4
Student 30	Female	1.6	1.9	0.3
Student 31	Male	2.9	4.4	1.5
Student 32	Male	2.7	3	0.3
Student 33	Male	2.4	2.8	0.4
Student 34	Female	4.2	4.8	0.6
Student 35	Female	1.3	2.8	1.5
Student 36	Male	2.5	2.4	-0.1
Student 37	Female	4.1	4.6	0.5
Student 38	Female	2.9	4.1	1.2
Student 39	Male	3.1	3.3	0.2
Student 40	Female	4.4	5.9	1.5
Student 41	Female	5.1	6.5	1.4
Student 42	Female	2.8	4.6	1.8

Student 43	Male	2.6	3.2	0.6
Student 44	Female	1.4	2.1	0.7
Student 45	Female	3.4	4.1	0.7
Student 46	Male	2.1	2.5	0.4
Student 47	Female	2	3.2	1.2
Student 48	Female	3.3	4.1	0.8
Student 49	Female	2.8	3.9	1.1
Student 50	Male	4	5.1	1.1
Student 51	Male	2.7	4.1	1.4

4th Grade Students	B or G	2016 GE	2017 GE	Difference
Student 1	Male	3.8	5.5	1.7
Student 2	Male	1.5	2.9	1.4
Student 3	Male	2	2.5	0.5
Student 4	Female	3.9	5.4	1.5
Student 5	Male	3	4	1
Student 6	Male	4.4	5	0.6
Student 7	Male	4.4	6.8	2.4
Student 8	Female	3.3	3.9	0.6
Student 9	Male	4.7	4.7	0
Student 10	Male	5.6	5.9	0.3
Student 11	Male	5	5.8	0.8
Student 12	Male	4.8	6.4	1.6
Student 13	Male	6.4	8.7	2.3
Student 14	Female	4.8	5.4	0.6
Student 15	Female	3.6	4.6	1
Student 16	Male	2.4	4.9	2.5
Student 17	Male	3.6	4.6	1
Student 18	Female	3.5	4.2	0.7
Student 19	Male	4.6	5.3	0.7
Student 20	Female	4.1	4.4	0.3
Student 21	Male	3.4	5.4	2
Student 22	Female	6.6	8.3	1.7
Student 23	Male	3.6	5	1.4
Student 24	Female	3.1	4.1	1
Student 25	Male	5.6	7	1.4
Student 26	Male	2.9	4.1	1.2
Student 27	Female	2.8	3.8	0.8
Student 28	Female	5	6.4	1.4
Student 29	Female	4.9	5.5	0.6
Student 30	Female	6.2	7.5	1.3
Student 31	Male	4.9	5.1	0.2
Student 32	Male	5.8	5.7	-0.1
Student 33	Female	4.8	6.7	1.9
Student 34	Male	3.4	5.9	2.5
Student 35	Female	3.1	4.4	1.3

Student 36	Female	5.1	5.4	0.3
Student 37	Female	3.8	5.2	1.4
Student 38	Male	4.5	5.6	1.1
Student 39	Male	4.9	5.8	0.9
Student 40	Female	4.7	6.5	1.8
Student 41	Male	4.7	5.9	1.2
Student 42	Male	3	4.4	1.4
Student 43	Female	4.7	6.5	1.8
Student 44	Male	4.8	5.5	0.7
Student 45	Male	5.2	5.4	0.2
Student 46	Male	8	8	0

5th Grade Students	B or G	2016 GE	2017 GE	Difference
Student 1	Male	5.6	5.2	-0.4
Student 2	Female	4.5	5.4	0.9
Student 3	Male	2.6	3.1	0.5
Student 4	Male	5.4	5.5	0.1
Student 5	Female	5.4	5.9	0.5
Student 6	Male	6.9	6.1	-0.8
Student 7	Male	3.6	5.9	2.3
Student 8	Male	6.4	7.1	0.7
Student 9	Female	5	5.4	0.4
Student 10	Male	5.9	5.5	-0.4
Student 11	Male	6.9	9.3	2.4
Student 12	Male	7	7.9	0.9
Student 13	Male	4.4	4.6	0.2
Student 14	Male	6.1	5.3	-0.8
Student 15	Male	4.9	4.9	0
Student 16	Female	3.5	3.7	0.2
Student 17	Female	2.9	3.6	0.7
Student 18	Male	5	5.3	0.3
Student 19	Male	5.6	5.6	0
Student 20	Male	7.5	7.6	0.1
Student 21	Male	3.5	5.7	2.2
Student 22	Female	5.6	6.9	1.3
Student 23	Female	5.2	7.2	2
Student 24	Female	3.1	4.1	1
Student 25	Male	5.8	6.5	0.7
Student 26	Female	7.8	12.9	5.1
Student 27	Male	1.3	2.3	1
Student 28	Female	5.6	7.6	2
Student 29	Male	3.3	3.8	0.5
Student 30	Female	1.6	4.4	2.8
Student 31	Female	4.7	6.3	1.6
Student 32	Male	4.8	4.9	0.1
Student 33	Female	5	5.7	0.7

Student 34	Male	5.4	5.8	0.4
Student 35	Female	7.1	12.9	5.9
Student 36	Female	4.1	3.4	-0.7
Student 37	Male	6.7	7.7	1
Student 38	Female	7.4	7.5	0.1
Student 39	Female	3.7	3.8	0.1
Student 40	Male	6.4	6.9	0.5
Student 41	Male	2.3	4.7	2.4
Student 42	Female	6.2	6.2	0
Student 43	Male	3.5	4.1	0.6
Student 44	Male	1.9	2.6	0.7
Student 45	Female	3.4	4.1	0.7
Student 46	Male	4.7	5.2	0.5
Student 47	Male	3.6	4.9	1.3
Student 48	Male	2.9	3.9	1
Student 49	Male	4.8	4.9	0.1
Student 50	Female	5	5.1	0.1
Student 51	Male	5.7	6	0.3
Student 52	Female	4	3.5	-0.5
Student 53	Female	7.5	6	-1.5
Student 54	Female	5.2	5.4	0.2
Student 55	Female	6.4	7.7	1.3
Student 56	Female	5.2	5.9	0.7
Student 57	Female	5.7	6.1	0.4
Student 58	Male	4.9	5.3	0.4
Student 59	Male	5.5	6.7	1.2
Student 60	Female	4.3	5.9	1.6
Student 61	Male	5.4	5.5	0.1
Student 62	Male	5.6	6.2	0.6
Student 63	Female	12.9	10.8	-2.2
Student 64	Male	8	11	3
Student 65	Female	4.3	5.2	0.9
Student 66	Male	5.2	5.1	-0.1