IMPACT OF ELEMENTARY LITERACY ON HIGH SCHOOL LEARNING OUTCOMES

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Dedication

"I touch the future. I teach."

Christa McAuliffe

This capstone research project is dedicated to my family, the loves of my life:

- My parents, James and Lois Smith, who were my first and best teachers;
- My husband, Bruce, the rock of the family and my true north for over 30 years;
- My son, James, who always makes me so proud to be his mom.

Acknowledgments

"*A teacher affects eternity; he can never tell where his influence stops."*

Henry Adams

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Abstract

Third grade is regarded as a milestone year. From kindergarten to second grade, students learn to read, but from grades three and beyond students read to learn. This longitudinal mixed methods research study examines the impact of third-grade reading proficiency (as measured by the Pennsylvania System of School Assessment) on later high school learning outcomes. Specifically, the study tracks three cohorts of third-grade students from 2009, 2010, and 2011, examines the eighth-grade instructional reading level (IRL) of these students five years later, then analyzes the types of courses these students enrolled in three years later as students at Parkland High School in 2017, 2018, and 2019, respectively. The focus is on the number of students enrolled in Advanced Placement and Project Lead the Way courses, both college-level courses considered to be among the most rigorous offered by the Parkland School District in Allentown, Pennsylvania. The quantitative analysis determined there was a strong positive correlation between third-grade reading proficiency level and the enrollment of students in these programs. In addition, Parkland elementary teachers participated in the Progress in International Reading and Literacy Study (PIRLS) to provide qualitative data on Parkland's early literacy program by examining the specific teaching techniques, strategies, and resources Parkland's elementary teachers use on a daily or weekly basis. The combined datasets provide a more complete picture of Parkland's early literacy program and its impact on students throughout their academic career at Parkland School District.

CHAPTER I

Introduction

In 2013, when a team of Parkland teachers and administrators was in the process of researching full-day kindergarten, they paid a visit to a Pennsylvania school district in suburban Philadelphia whose Superintendent touted himself as being a literacy leader. As evidence, the group was able to tour the District's new K-1 literacy center which had won national awards for its design and academic programming. In his comments to Parkland staff, the Superintendent spoke at length about his District's changing demographics and rapidly growing student population. In his view, building a solid foundation where all students could continue to be successful required a focus on ensuring students reach proficiency in reading by third grade. He cited examples of how establishing literacy as a districtwide goal had impacted the District's graduation rate and overall student achievement.

His words made an impression. In 2014, when the Parkland School District embarked on a plan to add full-day kindergarten, Parkland administrators stressed the importance of students reading by third grade as one of the reasons in support of full-day kindergarten. When asked by the Board to provide evidence, the team pulled a snapshot of data from the third-grade class of 2005, looking at how those students who were not proficient in reading - as measured by the Pennsylvania System of School Assessment (PSSA) - fared eight years later, in 2013, when it came to taking more rigorous coursework such as the District's Advanced Placement (AP) high school courses. While not formal research, the numbers from this data snapshot revealed fewer than one percent of students who were not proficient in reading by third grade later enrolled in more advanced courses, far less than the number of students that was the norm.

Now the Parkland School District is facing demographic changes similar to that suburban Philadelphia school district visited more than ten years ago. Parkland's enrollment in 2022-2023 was 9,852 students, up more than 400 students from five years prior. Over 32 percent of the District's students are eligible for free or reduced lunch, a number that has seen steady increases over the last several years, rising from nine percent in 2007. This number is closely monitored since there is a body of research that shows poverty can negatively impact a child's early language acquisition skills (Kainz & Vernon, 2007) although Parkland has established support to help mitigate its impact.

While the demographics may have changed, the District's mission remains the same: to ensure a quality education rich in academics, arts, and athletic opportunities to address the needs of the whole child, and to make sure these opportunities for learning are available to all students. This action research project is designed to formally study the impact of elementary literacy on student access to the array of academic opportunities at Parkland High School.

Research Questions

1. How does third-grade reading proficiency impact later student enrollment in high school Advanced Placement (AP) courses?
2. How does third-grade reading proficiency impact later student enrollment in high school Project Lead the Way courses?
3. What instructional practices and beliefs are common among Parkland's elementary staff in schools which have consistently high levels of students reaching reading proficiency by third grade as measured by the PSSA?

These questions will provide both quantitative and qualitative data to help the District better understand the relationship between elementary student achievement and

its later impact on students' access to academic opportunities as students at Parkland High School. They will also help identify factors that may lead to higher levels of students reading by third grade in the first place.

Data Collection

This mixed-methods action research project uses an explanatory sequential design approach. Both quantitative and qualitative data were collected and analyzed separately with findings from the qualitative research used to augment the quantitative research.

To answer research questions one and two, quantitative data from the third grade PSSA exam results from three cohorts of students during testing years 2009, 2010, and 2011 were correlated against Pennsylvania Information Management System (PIMS) data collections for those same students eight years later (2017, 2018, and 2019) using Microsoft Power Business Intelligence (more commonly referred to as Power BI), Excel, and other data analysis tools.

District instructional reading level data from the STAR progress monitoring tool, as well as high school data on course enrollment, were used to measure student performance at both the elementary and secondary levels.

Lastly, to answer research question three, a qualitative case study was conducted that surveyed teachers in five of the nine Parkland elementary schools. The comprehensive questionnaire used for the study helped to determine if the educational background, understanding of literacy instruction, instructional time spent on literacy, access to resources, and teaching methodologies of teachers made an impact on the building's ability to achieve a high percentage of students who demonstrated reading proficiency by third grade. All data collected was electronic and housed on secure servers using a two-factor authentication process.

The questions for the qualitative case study survey came from the 2016 Progress in International Reading Literacy Survey (PIRLS) questionnaire. As noted by the National Center for Educational Statistics (n.d.), "it is designed to measure school and teacher practices related to instruction" and has been used by schools worldwide since 2001, with a high degree of reliability. The questionnaire was completed by Parkland's K-4 teachers and required between 15 and 30 minutes to complete electronically. The full survey instrument can be found in Appendix A. Teachers had the option to complete the survey; it was not required. The Volunteer Consent Form (Appendix B) outlines the consent process in more detail. The results from both the quantitative and qualitative studies were analyzed and merged at the end to identify patterns and address the original action research questions.

Last spring and summer the researcher completed both Google and IBM professional data analyst certifications (Appendix G) to prepare for the extensive data analysis that was involved with this project. In addition to creating specific tables of data related to the research questions outlined above, the longitudinal data from three cohorts of students were presented using Microsoft Power BI data visualization tools to create an interactive data dashboard with natural language query capabilities. This enabled the Parkland administrators to visualize and analyze the information to derive insights from each of the three cohorts studied to determine if there are any consistent trends. This also allowed the principals to focus on their buildings' specific data and analyze the strengths or weaknesses of their existing literacy programs more easily. Thanks to the leadership of the elementary principals, the elementary schools are surprisingly in lockstep with each other, and this level of data analysis helped reveal specific literacy teaching beliefs and practices common among the schools.

Financial Implications

The financial implications for this research project are minimal given the District has had a focus on elementary literacy for several years, with a significant investment in teacher training on the Language Essentials for Teachers of Reading and Spelling (LETRS) program, a scientifically based literacy approach. The District is in the process of upgrading its current elementary English/Language Arts curriculum as part of the normal five-year curriculum review cycle. The District has also recently adopted the Enhanced Core Reading Instruction (ECRI) program to deepen its understanding of best practices to promote literacy instruction in grades K, 1, and 2, an initiative that will have some financial impact. There may be costs involved with securing substitute teachers for building teams who will be involved in analyzing the data as a result of this study. Also, the District's emphasis on literacy may lead to a shifting of Title I funds for school support, especially in the area of Title I assistants.

The District is fortunate to have a partnership with Lehigh Valley Reads, a local non-profit organization comprised of community leaders from school, business, and local government. Lehigh Valley Reads provides parents with literacy resources to help them prepare their children for not only school but a lifetime of learning, and there is currently no cost to the District to tap into the resources this organization provides.

Parkland School District has a solid literacy program. This can be seen in the nine Parkland elementary schools that serve over 4300 students from a wide range of socio-economic backgrounds, yet all schools consistently have students who score above average as measured by the state PSSA English/Language Arts exams. This longitudinal research study will show what impact this strong literacy foundation had on students years later in their academic careers once enrolled at Parkland High School.

CHAPTER II

Literature Review

Reading, ‘Riting, and ‘Rithmetic. Based on a colloquial phrase coined at the beginning of the 19th century (Burrus, 2014), the “3 R’s” were the foundational subjects of the American public education system. More than 200 years later, these subjects (now referred to as Reading, Writing, and Mathematics), remain the focus of elementary education. However, much has changed over the last 200 years, including the understanding of reading and the role literacy plays in a person’s ability to successfully engage in school, the job market, and society. This chapter serves to explore the research regarding the history of early childhood literacy in the United States, the factors that impact a child’s ability to read, and the effects of literacy and illiteracy on children and society at large.

History of Early Childhood Literacy

Reading is one of the highest achievements of human intelligence. Many other species communicate, but none have anything like reading and writing (Seidenberg, 2013). Written language is an invention unique to humanity, dating back to 5000 B. C. when the Mesopotamians developed cuneiform, a logo or picture-based form of writing using clay tablets. A few hundred years later the Egyptians followed suit with a more elaborate but still picture-based form of written language called hieroglyphics. These languages were created as a way to record speech in a longer-lasting form (Seidenberg, 2013).

There is a relationship between speaking, writing, and thinking. Our ability to record spoken ideas led to more advanced thinking and expanded human vocabulary past

the ability to be properly expressed by pictures alone (Seidenberg, 2013). Hence the development of an alphabet, with characters – not pictures - representing sounds that could be used to express words. This seemingly small shift has had profound implications for how reading is taught since "while reading is a foundational skill, it is not a natural one" (Luscombe, 2022, para. 7).

The English alphabet consists of 26 letters that can be combined to form 44 sounds. These 44 sounds can be combined to create more than 15,000 syllables and an endless world of words (Chall, 1967; Luscombe, 2022). According to Luscombe (2022):

> Ideally, children figure out what the letter string says at about the same moment a word they already know crystallizes into view. And after a couple of those "aha" moments, usually starting in first and second grade, when nicky reveals itself as 'nice' or ka-heef transforms into 'chief,' the word seems to move into permanent memory. (para. 7)

Thus, learning to read is the product of exposure to a robust vocabulary coupled with sophisticated decoding skills.

Yet there are multiple schools of thought on how best to teach reading, with two sides currently divided into those who support more explicit phonemic instruction (Moats, 2019) and those who favor "balanced" teaching of literacy where learning to read occurs through a more organic process requiring less direct instruction (Calkins, 2016).

Some of the confusion comes from a lack of a single definition for balanced literacy. According to Hanford (2018), although it does usually include some phonics, balanced literacy has been criticized "for paying insufficient attention to explicit, systematic instruction which some students require" (p. 5). Most of the 600 teachers questioned in a 2019 *Education Week* survey indicated they used a balanced literacy

approach, but they also specified they spent at least some instructional time on phonics "for a median of 31 minutes a day" although teachers indicated the phonics instruction they delivered did not always follow a systemic process (Education Week Research Center, 2020, p. 10).

The debate about how reading should be taught is not new. Indeed, it goes back almost as far as reading instruction itself. According to Flesch (1955), "until the 1930s the traditional method of teaching reading to American children was phonics" (p. 27). Parents, guardians, or teachers would help a child learn to master the sounds associated with the 26 letters of the alphabet and the corresponding 44 phonemes. Advocates of this approach argued that the "key to learning to read was in deciphering the alphabetic code" (Flesch, 1955, p. 105). Flesch's 1955 book, *Why Johnny Can't Read*, highlights the impact of this shift in reading instruction and sparked the debate that has ping-ponged between the two sides ever since.

To settle the issue, in 1997 Congress convened a 14-member National Reading Panel involving school administrators, working teachers, and scientists to evaluate existing research and evidence to identify the best ways of teaching children to read. Their review of the research and examination of best practices was exhaustive, spanning the course of over two years. On April 13, 2000, the National Reading Panel (NRP) concluded its work and submitted its final report, the 449-page *Teaching Children to Read: An Evidenced Based Assessment of the Scientific Research Literature on Reading and Its Implications for Reading Instruction.*

The report recommended five components of a quality literacy program (phonemic awareness, phonics, fluency, vocabulary, and comprehension), with phonemic awareness (PA) yielding the most impact in their meta-analysis of instructional practices

that had a significant effect on reading achievement. The 2000 NRP report concluded that phonics instruction is the key to learning to read, phonemic awareness is the lock, and the two work best when combined in a scaffolded approach:

> Phonemes are the smallest units composing spoken language. For example, the words "go" and "she" each consist of two sounds or phonemes. Phonemes are different from letters that represent phonemes in the spelling of words. Instruction in phonemic awareness (PA) involves teaching children to focus on and manipulate phonemes in spoken syllables and words. PA instruction is frequently confused with phonics instruction, which entails teaching students how to use letter-sound relations to read or spell words. PA instruction qualifies as phonics instruction when it involves teaching children to blend or segment the sounds in words using letters. (p. 19)

The NRP report, though comprehensive and widely lauded, did not settle the debate about reading instruction. There was concern that students and teachers would not be enthusiastic about an approach to reading instruction that was too phonetically based. Many educators still insisted learning to read was a natural process and that a holistic "balanced literacy" approach would be better at inspiring a lifelong love of reading. The result, according to Shanahan (2020), was that "balanced literacy came to mean whatever anybody wanted it to. Schools did not have to buy expensive new curriculums. Districts did not have to retrain their teachers. Teachers could add some lessons on phonics, but they didn't have to hit reset on the way they taught" (p. 239).

This explains why some educators embraced Lucy Calkins' book, *The Art of*

Teaching Reading, published in 2001 as a counterweight to the National Reading Panel findings. Calkins, a Columbia University professor, created the Units of Study reading curriculum that in 2018 was used in about a third of American classrooms (Hanford, 2018). Until 2022, Units of Study emphasized the "three-cueing" approach to reading, where students learn to decipher unfamiliar words through pictures and context clues (Calkins, 2001). The balanced literacy approach is also appealing because it promotes student autonomy, allowing students to choose their own books to spark a love of reading. Calkins' balanced literacy curriculum and teaching methodology helped establish Columbia University as a preeminent teacher's college, and her approach was the predominant pre-service teacher training model used by New York City schools.

However, the 2010 Anne E. Casey Foundation research report, "*Early Warning! Why Reading by Third Grade Matters*," sounded the alarm that elementary reading instruction was still not hitting the mark, and with dire consequences. Citing the results of the 2009 National Assessment of Educational Progress (NAEP), the report (Feister, 2010) revealed only 17 percent of low-income students and 33 percent of all students tested were proficient in reading by third grade. The research report was one of the first widely published studies to focus on the importance of reading by third grade. Students in grades K-3 *learn to read*, but students from grades 4 through high school *read to learn*, solidifying reading's impact on mathematics, science, social studies, and all other courses students engage in via reading (Feister, 2010).

What are the consequences for missing the Reading by Grade 3 (RBG3) benchmark? *Early Warning* cites data that students who are unable to read by the end of third grade are four times more likely not to graduate, with the odds worsening for those

students from low-income households, who are six times more likely not to graduate. The cost to society for each of these high school dropouts was calculated to be $260,000 per child based on 2009 dollars (Sum et al., 2009). The cost of lost opportunities for millions of American students? Immeasurable.

In 2013, the Anne E. Casey Foundation issued a follow-up to its earlier work titled *Early Warning Confirmed*. The report reiterated and updated the original 2010 *Early Warning* report's findings, providing a renewed sense of urgency for the country to sharpen its focus on early childhood literacy. *Early Warning Confirmed* identified five specific research-based factors that impact a child's ability to read: 1) a child's readiness for school; 2) chronic absence from school; 3) summer learning loss; 4) family stressors that interfere with learning; and 5) quality reading instruction based on current research-based strategies outlined by the National Reading Panel (Feister, 2013, p. 21). The report emphasized the gap in 2011 NAEP reading scores – 29 points – between students from low-income families and those from more affluent households, stressing the unfortunate irony that unless these students were eventually able to learn to read so they could graduate from high school, they were likely to repeat the cycle of poverty with their own children (Feister, 2013).

Early Warning Confirmed framed literacy as an equity issue, challenging but not unsolvable (Feister, 2013). It highlighted the literacy-focused initiatives that developed between 2010 and 2013, such as the Campaign for Grade-Level Reading, a national movement that galvanized 350 school districts (representing 8 million students in 34 states) to commit to having students reach reading proficiency by third grade. The campaign continues its work to this day, and its website, gradelevelreading.net, is a

clearinghouse of resources for teachers, administrators, parents, and non-profit organizations who want to help raise the bar for literacy achievement in their local communities (Feister, 2013).

One outcome of the work of the National Reading Panel and the Anne E. Casey Foundation was an expanded awareness of the importance of elementary literacy, not only among educators but scientists as well, who were increasingly interested in what had been dubbed the "science of reading." A case in point is neuroscientist and psycholinguist, Mark Seidenberg, who launched his 2017 book, *Language at the Speed of Sight*. Seidenberg's book traced the research on the origins of language development and the impact of learning to read on the human brain. His findings shed new light on the relationship between speech and reading. As Seidenberg (2017) stated, "We read with our eyes but the starting point for reading is speech" (p. 20).

Seidenberg proved his point through a survey of world languages that showed oral speech always precedes written language; the reverse is never true. His research confirmed that there is a strong reciprocal relationship between speech and print. It is the beginning reader's primary task to make the connection between the speech he or she uses and hears, and the written words on the page. Writing encodes spoken language. The process of reading decodes the words on the page so the reader can "hear" the words again, either spoken aloud or most often quietly as they read to themselves. In this model of how children learn to read, speech and language acquisition play a critical role in the reading process.

Table 1 lists other findings that reveal how speech and reading are interconnected, yet distinct (Seidenberg, 2017, p. 25):

Table 1

A Comparison of Speech Versus Reading

Speech	**Reading**
Speech evolved in the species.	Reading is a cultural artifact; not all cultures read.
Speech is universal; in the absence of a speech impediment, everyone learns to speak.	Reading proficiency varies widely from state to state, even county to county.
Children learn how to speak through interactions with other language users.	Reading is taught through informal interactions with parents or guardians like bedtime stories or more formal instruction at school.
Speech is fast fading and can be messy with wide variations of inflection and tone. Listeners are at the mercy of the speaker.	Writing was developed to transcend the impermanence of speech, enabling a passage to be read repeatedly. It has structure, grammar, and punctuation. Readers control the speed at which they absorb written words.

Seidenberg's research, with its emphasis on the relationship between spoken language and reading, supported the National Reading Panel's case for phonemic awareness. As Seidenberg (2017) stated, "Learning to treat spoken language as if it were composed of phonemes is an important step to learning how to read an alphabetic writing

system" (p. 38). Enlisting cognitive science, Seidenberg looked at which specific areas of the brain are involved during the reading process. He analyzed thousands of CT images, which showed a surprising amount of the brain "lights up" during the reading process as synapses from both the left and right sides of the brain engage.

Seidenberg also detailed the cognitive science behind dyslexia, an often misunderstood developmental reading disorder affecting as many as one in five readers (Moats, 2019). Seidenberg's research clarified that dyslexia is not a vision problem that causes readers to see letters in reverse, but a language processing issue where readers struggle to make the necessary connections between speech and written words (Seidenberg, 2017). Students with dyslexia are usually of average or above-average intelligence. As Shaywitz (2021) stated, "…dyslexia is an island of weakness in a sea of strengths" (p. 82).

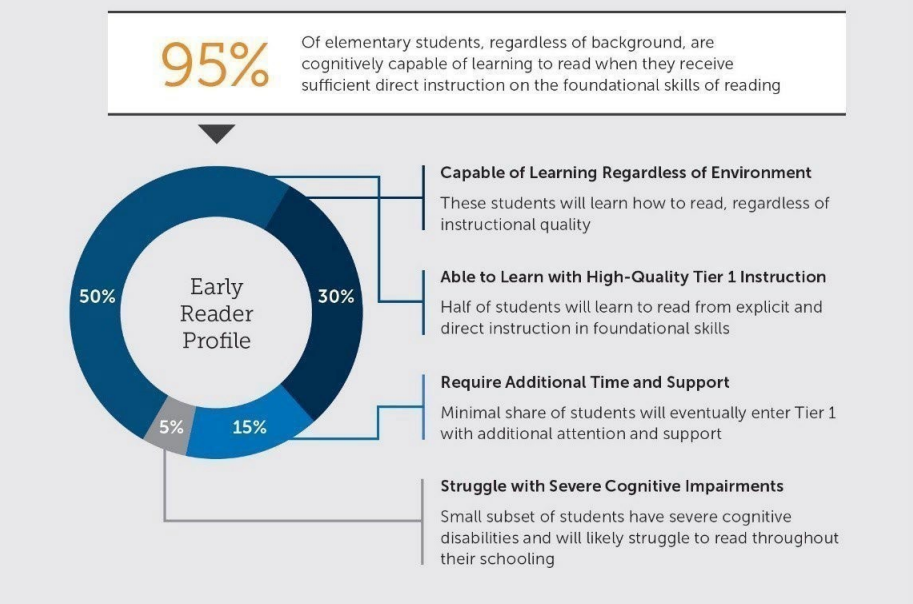
While Seidenberg's work shed light on the basic mechanisms that support skilled reading and the causes of reading impairment - making visible what happens in the brain during the process - the science of reading had to be linked to the science of *teaching* in order to make an impact in the classroom. As noted by Shanahan (2020):

> The cognitive and neuropsychological studies that Seidenberg examined on how readers read words are an important part of the science of reading instruction but not just or even mainly because they are high-quality studies. These studies are valuable because they have contributed to our understanding of reading instruction through their consistency with the findings of extensive instructional experiments that have demonstrated consistently and overwhelmingly that explicit and systematic teaching of decoding is beneficial. (p.7)

Shanahan appreciated the cognitive science validating the pedagogy reforms he helped promote 17 years earlier in the 2010 National Reading Panel's report. But it was Harvard researcher and educator Louisa Moats who eventually built the bridge between the science and pedagogy of reading. In her 2019 journal article, *Structured Literacy: Effective Instruction for Students with Dyslexia and Related Reading Difficulties*, Moats confirmed the critical need to use phonemic awareness in early literacy instruction with students, particularly those experiencing dyslexia. Her belief was that the immersion method of reading instruction does not work with these students, yet she was optimistic that student reading deficits could be overcome through effective teaching. Moats was encouraged by research (Figure 1) estimating that "95 percent of elementary students, regardless of background, are cognitively capable of learning to read when they receive sufficient direct instruction on the foundational skills of reading."

Figure 1

Early Reader Profile



Note. From the report *Narrowing the Third-Grade Reading Gap* (EAB, 2019, p.7)

Structured literacy is the term Moats coined for systemic, explicit instruction that focuses on language processing skills by building phonemic awareness. Moats believed structured literacy benefited all students but was especially critical in order for struggling readers to be successful (Moats, 2019). She developed a teacher training program, *Language Essentials for Teachers of Reading and Spelling* (LETRS), based on these concepts. Teachers who completed the full training regimen and implemented the LETRS strategies - with a focus on explicit instruction on decoding strategies - showed positive results, especially with students that had in the past experienced significant reading difficulties (Hanford, 2018). Moats' work provided teachers with detailed instructional strategies that could help students with reading difficulties decipher the relationship between spoken and written language, thus making the cognitive research of Seidenberg something that could be tangibly implemented in an elementary classroom.

A meta-analysis of 235 research studies showed the effectiveness of structured literacy, indicating that phonemic awareness played a "pivotal" role in reading development (Melby-Lervåg et al., 2012, p. 10). Yet the balanced literacy approach, with its three-cueing system and only some phonemic awareness skill-building, was reported by 72 percent of teachers in the 2019 *Education Week* survey as the predominant instructional methodology used in most American classrooms (Education Week Research Center, 2020). In her 2020 journal article, *Teaching Reading IS Rocket Science: What Expert Teachers Of Reading Should Know And Be Able To Do*, Moats (2020) responded to what she thought was at the root of the disconnect. Acknowledging that the body of evidence to guide the practice of teaching was "stronger than it has ever been," Moats (2020) also added:

> Unfortunately, much of this research is not yet included in teacher preparation

> programs, widely used curricula, or professional development, so it should come as no surprise that typical classroom practices often deviate substantially from what is recommended by our most credible sources. As a result, reading achievement is not as strong as it should be for most students, and the consequences are particularly dire for students from the least advantaged families and communities. (p.1)

So where do things stand now? The pendulum does seem to have swung back to a more structured literacy approach to reading, one where phonemic awareness and decoding skills are foundational for all students, although balanced literacy may be used to supplement reading opportunities for those students who demonstrate consistent progress with the development of foundational reading skills (Burkins & Yates, 2022).

Mississippi school districts mandated intensive LETRS training for its K-3 teachers, despite fears that a presumably "dry" phonics-based curriculum may not only extinguish a love of learning but a love of teaching (Hanford, 2020). Fortunately, that did not happen. Teachers became excited when they could see the proverbial lightbulbs going on for students who had previously struggled. In 2020, in what has been called the "Mississippi Miracle," the state had the highest NAEP gains in the country (Luscombe, 2022); once the lowest, their fourth-grade students are now posting scores on par with the national average.

Change, especially in education, happens slowly – then all at once. In a nod to the 2010 *Early Warning* report, most states, including Pennsylvania (via its Future Ready Index), now monitor third-grade reading proficiency as a measure of student success. Recognizing that quality instruction lies at the root of affecting significant change,

from 2013 through 2022 26 states have enacted laws requiring the use of "evidence-based" reading instruction, an umbrella term that includes programs based on the science of reading, structured literacy, or the simple view of reading (Luscombe, 2022). And in January 2022, the Pennsylvania House of Representatives passed legislation (HB 2045), through a unanimous vote, requiring all pre-service teachers to complete professional development in the science of reading.

Impacts on Early Childhood Literacy

As of 2020 in Pennsylvania, compulsory schooling does not begin until a child reaches six years old, but a child's education, in reality, begins as soon as they are born (Sahakian et al., 2022). Early childhood is a critical period for brain development, with birth to age two being the fastest growth period according to recent cognitive research (Sahakian et al., 2022). Richter et al. (2021) confirmed "children's brain volumes double during their first year and reach 80–90% of their adult sizes by age 3" (p. 2).

Although growth continues through adolescence and the brain remains open to new knowledge throughout the course of one's lifetime, the early stage is critical for neurodevelopment, cognition, learning, and behavior. "To optimize typical development, it is important to seize the critical period for early educational activities and to make this experience of good quality, thus ensuring the best outcomes in the future" (Sahakian et al., 2022, p.5).

These findings were confirmed by Dicataldo and Roch (2022) in their research on the impact of toddlers' engagement in language activities and the impact on language acquisition. Dicataldo and Roch (2022) noted the most intensive period of language development is during the first years of life, during which the brain is developing

rapidly. “Research has shown that children from disadvantaged households who received high-quality stimulation at a young age grew into adults who earned an average of 25% more than those who did not receive these interventions” (Dicataldo & Roch, 2022, p.1). Their research surfaced the impact of the home environment on a child’s early language acquisition, with positive correlations between higher levels of maternal education and future higher performance on standardized tests (Dicataldo & Roch, 2022, p. 5).

Both of these studies referenced the landmark Hart and Risley report, *Early Catastrophe: The Thirty Million Word Gap by Age 3*. Researchers Hart and Risley entered the homes of 42 families from various socioeconomic backgrounds over a period of four years to assess the ways in which daily exchanges between a parent and child shape language and vocabulary development (Hart & Risley, 2003). Their findings broke new ground, documenting as much as a 30 million word gap - or 300 percent difference - between children from affluent families and children from low-income families (Hart & Risley, 2003)**.** The study found that between 86 and 98 percent of a child’s vocabulary was derived from their parents or guardians (Hart & Risley, 2003). Going further, the study found children from low-income families were exposed to 616 words per hour, while children from middle to high-come families were exposed to 2152 words per hour (Hart & Risley, 2003). Follow-up studies have shown that these differences in interactive language experiences can have lasting effects on a child’s performance later in life (Dicataldo & Roch, 2022).

What the research has made clear is that parents and guardians – not school districts – are a child’s first teachers, and they should be made aware of the importance of cultivating their child’s language acquisition. While it is not necessary for parents to

"teach" reading per se, or for a child to know how to read prior to coming to school, it is helpful for a child to have an adult read to them prior to entering school, or at a minimum be exposed to language frequently, whether it's through talking, reading, or even singing (Brown et al., 2019). According to Hart and Risley (2003):

> Within a child's early life, the caregiver is responsible for most, if not all, social simulation, and consequently language and communication development. How parents and/or guardians interact with their children is of great consequence given it lays an important foundation, impacting the way the children process future information many years down the road. (p. 3)

Engaged parenting makes a difference in a child's school readiness (Pasini, 2018). It's somewhat like a relay race, in that the more parents and/or guardians can help their child progress with the cognitively challenging task of language acquisition from birth to age five, the greater the likelihood that educators will be able to take the baton and help the child reach the next leg of the language acquisition journey: learning to read. That is why Pasini (2018) advocated for a collective impact approach to address the problem of illiteracy. Collective impact is where organizations rally around a single issue to address a social challenge that no one agency or group could successfully address alone (Pasini, 2018). In her case study, Pasini highlighted the San Mateo Big Lift project in which parents, libraries, and over 30 other community groups successfully united in their efforts to tackle the challenge of having children read by third grade (Pasini, 2018).

The Big Lift project serves seven of the neediest school districts in San Mateo County, impacts more than 4000 children, and focuses on what project leaders have defined as their "four pillars" (Pasini, 2018, p. 609):

- High-quality preschool for 2000 children;

- Summer learning programs for 1200 kindergarten through grade 2 children;
- Targeted attendance messages to the families of the 4000 participating children;
- Parent engagement programs such as Raise a Reader and other programs.

The Big Lift program has produced tangible results, with students who participated in the summer learning programs gaining up to 1.5 months of learning as opposed to the traditional 2 months loss (a net gain of 3.5 months), and 97 percent of parents reporting they would recommend the Big Lift Inspiring Summers program to other parents (Pasini, 2018, p. 614). Less tangible but still important benefits have come from the partnerships, connections, and shared focus of the community as a result of this initiative.

Part of the success of Big Lift was its ability to engage both children *and* parents. Parent engagement programs like Big Lift that provide mentoring can have a significant effect on a child's language development and overall cognitive development (Brown et al., 2019). Family literacy or home literacy programs involve family members participating in literacy activities within the home environment and can have many positive effects beyond language acquisition, including expanded background knowledge, improved socialization, and a greater sense of belonging within the family and community (Brown et al., 2019, p. 64). "Involving parents in their child's literacy development has been identified as one of the most important supports for a child's academic success" (Brown et al., 2019, p. 66).

There are a variety of strategies to support parents as their child's first teacher. In some communities, pediatricians - often the first point of contact for new parents - are

starting to provide newborn parents with books and reading tips through programs like Reach Out and Read (Thakur et al., 2016). In some communities like Charlotte, North Carolina, and the Lehigh Valley in Pennsylvania (via lehighvalleyreads.org), parents can sign up for a free texting service called Parent Powered to have research-based child development strategies sent to their phones several times a week. Some communities offer free access to digital book libraries such as World Reader, or book delivery services, such as the Imagination Library, where parents can register at no cost to have an age-appropriate book sent to their home monthly, from the time their child is born until they reach five years old, resulting in the development of a home library of up to 60 high-quality books before the child enters school.

The Imagination Library, funded by the Dolly Parton Foundation, has distributed over 200 million books in the United States since the program's inception in 1995. In their research study of the Imagination Library, Ridzi et al. (2016) showed that the program has a positive effect. The study examined 2,741 incoming kindergarteners in the Syracuse Area School District and assessed their readiness using the AimsWeb Letter Naming Fluency (LNF) test in the fall of 2013 and 2014. The results? A significantly higher number of students (29 percent) who consistently used the program over a period of three years were proficient on the LNF test, even when accounting for demographic differences (Ridzi et al., 2016, p. 16). The Imagination Library is currently available in 47 Pennsylvania communities, including Pittsburgh, Philadelphia, Lancaster, Kutztown, Wyoming Valley, and Carbon County (Imagination Library, n.d.). Nationally, Governor Gavin Newsom recently signed a law enabling all preschool California children to participate in the program, joining seven other states that also offer the program.

Ridzi's findings were confirmed by Silinskas et al. (2020) in their journal article, *Home Literacy Activities and Children's Reading Skills*. The longitudinal study found "the frequency of shared reading and teaching of reading at home" directly correlated with an increase in independent reading one year later (Silinskas et al., 2020). Children who engaged in reading activities at home with their parents became more confident and overall better readers who went on to read more on their own. As for the format of the books being read – print or digital – Kulikova (2019) found in her meta-analysis of the benefits and drawbacks of each format that the overall difference in impact on a child's reading proficiency was not statistically significant, with a tilt to print books since parents were more likely to engage in reading a print book with their child versus on a device, thus promoting the parent-child bond. A longitudinal study by Capotosto (2022) tracked the types of books in low-income homes, noting that it was not only the presence of books but the availability of age-appropriate books that made a difference in students' later testing in third grade. Students from the study who scored proficient or above had access to books that were at or below their reading level, while students who were below proficiency either lacked access to books or had books that were too difficult for them to successfully read at home (Capotosto, 2022).

In 2002, the National Early Literacy Panel (NELP) was convened to study synthesized research regarding early childhood development from birth to age 5, including the impact of a child's home environment. Timothy Shanahan, a leading member of the 1997 National Reading Panel and co-author of its subsequent report, *Teaching Children to Read* (2000), was also involved in this similarly expansive effort. The primary goal of the report was to "identify interventions, parenting activities, and

instructional practices that promote the development of children's early literacy skills" (National Early Literacy Panel, 2008, p. 14).

After extensive analysis, the panel issued its 2008 report, *Developing Early Literacy*, which identified six variables or precursors with a medium to high correlation to a child's later conventional literacy skill development such as word recognition and decoding (National Early Literacy Panel, 2008, p. 59). These six skills are:

- alphabet knowledge (AK): knowledge of the names and sounds associated with printed letters;
- phonological awareness (PA): the ability to detect, manipulate, or analyze the auditory aspects of spoken language (including the ability to distinguish or segment words, syllables, or phonemes), independent of meaning;
- rapid automatic naming (RAN) of letters or digits: the ability to rapidly name a sequence of random letters or digits;
- RAN of objects or colors: the ability to rapidly name a sequence of repeating random sets of pictures of objects (e.g., "car," "tree," "house," "man") or colors;
- writing or writing name: the ability to write letters in isolation on request or to write one's own name;
- phonological memory: the ability to remember spoken information for a short period of time (National Early Literacy Panel, 2008, p. 60).

While parents can help their children acquire these skills, especially if they are provided information or coaching, these skills are often explicitly taught in early childhood education programs (Peisner-Feinberg, 2020). Several studies have examined the impact of early childhood education, sometimes referred to as "PreK" and its impact on school readiness and future learning outcomes.

"More than 10 million children who live below the poverty threshold attend public PreK-12 schools, and over 1 million of these children attend public pre-kindergarten and kindergarten" (National Center for Children in Poverty, 2017). According to Allee-Herndon and Roberts (2018), "especially in early childhood, poverty poses the single greatest threat to children's well-being and educational equity" (p. 5). They advocate for quality PreK programs that include purposeful play opportunities such as storytelling accompanied by opportunities for students to talk and draw about what they hear; games and puzzles that build executive function; and dancing and music that build gross motor functions. These purposeful play activities, Allee-Herndon and Roberts (2018) point out, are also beneficial to children in the early primary grades of elementary school (p. 7).

In Pennsylvania, there is a state-funded Pre-K program for 3- and 4-year-olds called Pennsylvania Pre-K Counts (PA PKC). The goal of PA PKC is to help reduce educational disparities by providing high-quality pre-kindergarten for children who lack opportunities or reside in environments that place them at risk of school failure. In studying 52 school districts that participate in PA PKC, Peisner-Feinberg (2020) documented evidence to support that the program makes a difference in preparing children for school. Overall, the study found positive learning outcomes for math and language arts, regardless of demographics. Further, for children who participated in PA PKC, "these effects were equivalent to an increase of approximately 5 months of learning for vocabulary, 4 months for math problem-solving skills, and 5 months for knowledge of math concepts" (Peisner-Feinberg et al., 2022, p. 26).

The Parent-Child Home Program (www.parentchildplus.org) is another program

available to select low-income families in Pennsylvania. This program involves having early childhood educators enter directly into homes to work with parents and children twice a week. The results are promising, with longitudinal data showing 84 percent of participating children later reach grade-level reading targets and graduate from high school (Hanna & Graham, 2022). The findings suggest that both PA PKC and Parent- Child Home programs offer children from at-risk homes in Pennsylvania an important buffer and head start to ensure their readiness for kindergarten.

Although kindergarten is not required in Pennsylvania, according to Pennsylvania School Code 51.62 (Admission of Students), students as young as 4 years 7 months old may attend a full or half-day kindergarten program if it is available at their local public school district, charter school, or cyber charter school. Fortunately, according to the Pennsylvania Department of Education (n.d.), there are 428 school districts in Pennsylvania (out of 500) that offer full-day kindergarten programs, although it is important to note this includes school districts that offer half-day kindergarten with a full-day option for select students.

According to Giaquinto (2015), "Pennsylvania kindergarten policies at both the state and local levels differ significantly, including areas such as availability, length of the day, entry assessments, quality of instruction, class size, funding, teacher preparation and licensure, and curriculum" (p.1). The end result is not all five-year-olds attend kindergarten and those who do attend may be in kindergarten for varying times and learn different things. In his study of two rural school districts in Lehigh County, Giaquinto (2015) found the students in full-day kindergarten outperformed the students in half-day kindergarten in reading fluency as measured by DIBELS, in all areas except for one,

although there were tangible positive results found in both full and half-time kindergarten programs.

These findings were confirmed by a longitudinal research study from Stanley et al. (2017), that used DIBELS to establish baseline reading fluency skills for kindergarten students and the Simple View of Reading (SVR) as a framework for deciphering the results. In the SVR framework, language comprehension and decoding skills provide the foundation for reading comprehension (Moats, 2019).

In this study, researchers investigated the correlation between several DIBELS reading fluency indicators with kindergarten students (n=3180) against the students' later reading comprehension scores in third and tenth grade. The findings lent plausibility to the SVR framework, indicating that kindergarten students' decoding skills correlate to the students' third-grade and even tenth-grade reading comprehension abilities. The researchers suggested greater attention should be paid to students' decoding skills even as early as kindergarten or PreK, pointing to countries such as Finland where parents of young children are provided research-based phonemic awareness games. These games not only develop language skills but identify at-risk students and students who may have dyslexia (Stanley et al., 2017, p. 150). An example is GraphoGame (https://www.educationfinland.fi/member/graphogame) available in 250 languages, including English and Spanish.

The relationship between a child's ability to read and the quality of instruction they receive is also well documented. In their study, Brokamp et al. (2018) showed that teachers who were able to stay focused on core concepts, used data successfully to target interventions, and motivated students to read more (especially texts that grew their

knowledge base) had students who were successfully able to reach grade-level proficiency in reading (p. 1). An ancillary benefit was that as students' reading ability improved so did their behavior (Brokamp et al., 2018).

These findings were confirmed in a qualitative study reviewing the process of two schools that were transitioning from a balanced literacy instructional approach to a science of reading approach. Warren (2019) stated that teachers who were more inclined to adopt the science of reading approach were provided access to an instructional coach, someone who could provide feedback on their instruction. Teachers were also motivated to use this new methodology after they saw their students' reading skills improve. These early adopters were then able to influence other teachers within their school to follow suit, even teachers who had been firmly committed to the balanced literacy approach (Warren, 2019). This echoed the advice of Moats (2020), who emphasized that learning how to teach reading is a complex task, one that requires a systemic process, encouragement, coaching, patience, and time. School districts that have been successful with transitioning to the science of reading approach often have at least one staff member - a lead teacher, reading specialist, or principal – who is skilled in the methodology and can provide teachers with support.

In a 2018 mixed methods study that tested the reading knowledge of 42 Texas principals and interviewed the staff and principals on their leadership abilities, Baker (2003), outlined the behaviors of principals that consistently led to higher levels of reading achievement (p. 103):

1. The ability to empower strong reading teachers and support their efforts as they do their job. As one administrator commented during an interview ("…leadership

is not found in the principal alone") (p. 103).

2. The principal needs at least a rudimentary understanding of reading instruction, although they do not need to be experts (p 103).
3. Autonomy or shared decision-making was consistently modeled by successful principals (p. 104).
4. Successful principals earmarked resources for professional development, and they participated in professional development activities with their staff. They could and did model effective teaching practices for the staff as appropriate (p. 104).
5. Visibility and accessibility were also identified as key features of strong effective leaders (p. 105).
6. The principal is the main catalyst for change. Although he or she does not need to be viewed as the source of all instructional knowledge, the principal is the lead champion for maintaining a building culture and climate that consistently reaffirms a belief that all children can learn. (p. 105).

Looking at teachers' perceptions of what is behind the literacy success of a high-performing school was the concept behind the 2019 qualitative study by Georgiou et al. Their research solicited the opinions of all language arts teachers from a Canadian school that had consistently high reading scores as measured by standardized tests. The teachers' comments were then reviewed by the principal and reading specialist for their respective feedback (Georgiou et al., 2019).

To what did the teachers attribute their school's success with reading? Comments like "a school-wide focus on improving reading"; "weekly collaborative teams focused on job-embedded professional development"; "common formative

> assessments given by grade level teams"; and "common team planning time" received the highest scores (Georgiou et al., 2019, p. 5). The principal, in his review of the teacher's responses, commented that the teachers in his building were a very collegial group with a strong *esprit de corp*. As he noted "one teacher's struggle becomes everyone's problem," and teachers in his building would routinely venture into each other's classrooms (Georgiou et al., 2019, p. 11).

Skilled teachers, working with an encouraging principal in a collaborative, student-centered environment, with classrooms rich in knowledge-building literacy resources, were cited as the most important elements of the school's high literacy scores (Georgiou et al., 2019). These factors superseded even the amount of instructional time spent on teaching English/Language Arts in third grade based on the results of a 2017 study that cross-referenced student achievement scores on the New Jersey Assessment of Knowledge and Skills (NJAKS) against the instructional time New Jersey school districts in New Jersey reported on the annual state report card. "Through statistical analysis using simultaneous multiple regressions, as well as hierarchical regressions, it was found that the amount of instructional time for a school did not have a statistically significant impact on student achievement" (Telischak, 2016, p. 134), demonstrating it is not the *quantity* but the *quality* of instruction that makes a difference.

Research studies found that other factors such as technology, classroom libraries, and school libraries also had an impact on student reading achievement. A 2016 quantitative experimental design study found first through third-grade students who used the Lexia Reading Core5 software program made significant gains on the NWEA MAP assessment (17 points) as compared to students in the control group who did not use the

software and saw only a five-point gain (Taylor et al., 2018). Larger comparative increases were noted in students who had special needs or were from low-income households. The general requirement was 60 minutes per week in order for the program to be successful.

Another technology that showed promise for reading instruction was voice amplification systems. Voice amplification systems provide mild to moderate volume increase and more even distribution of a teacher's voice in the classroom. This technology is especially important in the primary classroom where much of the instruction is spoken, and gaining phonemic awareness requires the ability of students to hear the teacher clearly. An experimental design study showed a slight (2.8 percent) improvement in first-grade reading scores in classrooms that used voice amplification systems versus those that did not use the technology (Millett & Purcell, 2010). A comprehensive meta-analysis of 21 studies reviewing voice amplification systems found positive effects on student learning with the caveat that factors such as a child's background, location in the classroom, overall classroom layout, and tonal quality of the teacher's voice need to be taken into consideration (Mealings, 2022).

Finally, multiple studies have confirmed the impact of a school library on student reading outcomes. Students from a random sampling of 39 Ohio schools participated in a qualitative survey about their school's library, with 99.4 percent reporting they felt the library played a role in helping them become better learners (Todd & Kuhlthau, 2001, p. 50). In addition, students who were able to check out at least one book a week, or participated in a library's summer learning program, experienced the most benefit from their school library (Roman & Fiore, 2010). As stated by Bogel (2006) "school libraries play an active and important role in student learning and achievement" (p. 51).

Effects of Early Childhood Literacy

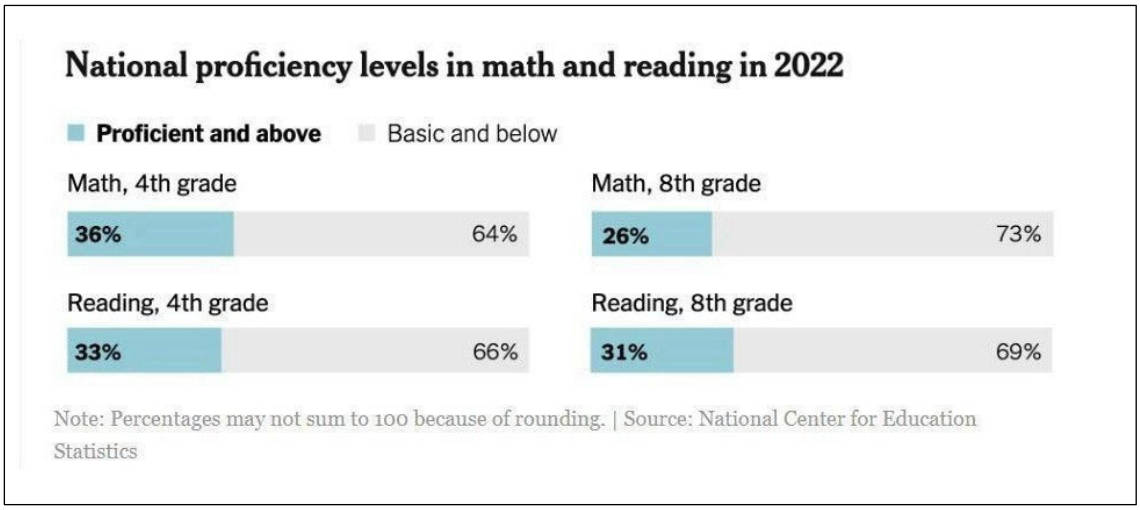
For elementary students, third grade is a gateway year. It is where the pivot begins from learning to read to reading to learn. For students who have reached reading proficiency, the door to further learning opportunities opens wider; for those who are still struggling to learn to read, the doorway begins to narrow (EAB, 2019).

There are several reasons for this. An influential textbook by Emmett Betts published 70 years ago, *Foundations of Reading Instruction*, established three levels of reading for students: independent, instructional, and frustration (Shanahan, 2020). Texts that may be too easy for developing readers (independent level) or too difficult (frustration level) do not lead to higher levels of academic growth. Ideally, the texts that students read are at an instructional level, where they are not too difficult for a student to read, especially with the assistance of a skilled teacher. Instructional texts force the student to stretch and grow, but not become discouraged.

The problem, as illustrated in the 2019 National Assessment of Educational Progress (NAEP) results - sometimes referred to as the "nation's report card" - is that only 34 percent of the 294,000 fourth-grade students tested were proficient in reading (NAEP, 2022). While this is an increase from the 29 percent seen in 1992, as illustrated in Figure 2 the pandemic has reduced even the small gains made over the last three decades in reading as reported by NAEP (2022). The gap between the number of students Moats (2020) stated should be able to read (95 percent) and the number of American students who actually are reading on grade level by fourth grade is significant and persistent.

Figure 2

2022 National Assessment of Educational Progress (NAEP) Results



Although ideally students are provided challenging texts that force them to stretch and expand their reading skills (Shanahan, 2020), too many students who are below grade level for reading can find their textbooks incomprehensible (National Conference of State Legislatures, 2019). This problem is compounded since many of the supports found in the early primary grades for struggling readers are no longer in place for students once they leave elementary school. Yet the current system of secondary instruction in most subjects is heavily text-based, designed on the assumption that by fourth grade the majority of students are skilled readers.

This is consistent with studies linking third-grade reading proficiency with achievement in other subjects. In a 2020 longitudinal study of over 350K students, researchers found a statistically significant relationship established between students' reading proficiency in primary grades and later achievement in mathematics, although it is interesting to note that the study did not show the reverse; strong math skills in early grades did not necessarily correlate to the development of strong reading skills (Hübner

et al., 2022). Specifically, "the largest change in mathematics achievement predicted by reading was found for average or above-average reading achievement levels in combination with low mathematics achievement levels" (Hübner et al., 2022, p. 24).

Poor reading comprehension manifests itself in not only reduced learning but also overall student engagement. As students become less able to learn via their textbooks, some students may even start to display negative classroom behaviors. But the opposite is also true. As noted by Brokamp et al. (2018), in a study of 66 third-grade classrooms and 593 third-grade students, "the higher the students' reading fluency level is at the beginning of Grade 3, the better their task-focused behavior, emotional stability, and compliant behavior are at the end of Grade 3" (p. 7). This relationship was confirmed by research from the ABCD Project, a well-known longitudinal study, which showed that reading for pleasure is one of the most cognitively rewarding activities that children can engage in, resulting in not only smarter but happier children, with fewer behavioral issues and mental health benefits that extend into adolescence (Sahakian et al., 2022, p. 16).

Beyond other grade-level subjects, current studies have linked reading performance at the elementary level to reading comprehension in middle school and high school: "79% of the variance in high school reading ability can be accounted for by intensity of foundational skills instruction in 1st grade" (EAB, 2019, p. 20). This concept is aligned with the Simple View of Reading (SVR), which looks at reading comprehension as the result of a student's ability to decode words (and automatically recognize words on sight) coupled with the ability to apply correct meaning to the words. For example, it is not enough for a student to be able to recognize the word "light" - they must also be able to understand what the word means given the context in which it is

written. Extracting meaning from words on a page is the purpose of reading. Decoding alone is not enough to create meaning, but it is a powerful start. The research shows a student's ability to decode words as an emergent reader influences the student's future reading comprehension skills (EAB, 2019).

This was confirmed by a longitudinal study that reviewed the link between 3100 Florida students' third-grade Oral Reading Fluency (ORF) scores against the students' later tenth-grade reading comprehension achievement results as measured by the state Florida Assessment for Instruction in Reading (FAIR). The analysis found that third-grade ORF scores were a strong predictor of tenth-grade FAIR assessment outcomes, and elementary students with strong reading fluency skills were more apt to become high school students with better reading comprehension skills (Stanley et al., 2017).

The findings from this study aligned with the 2020 National Center for Analysis of Longitudinal Data in Educational Research (CALDER) report, *Assessing the Accuracy of Elementary School Test Scores as Predictors of Students' High School Outcomes*. Using panel data spanning grades 3-12 from three states (North Carolina, Massachusetts, and Washington), the CALDER study investigated the link between third-grade state test results and three specific high school learning outcomes: 1) tenth-grade state test scores; 2) the probability of taking advanced math courses; and 3) high school graduation (Goldhaber et al., 2020). Their findings showed that the state test results from third grade had almost as much predictive value in determining high school outcomes as the state test results from eighth grade in determining later high school outcomes.

This held true across state lines but not across socio-economic levels (Goldhaber et al., 2020, p. 2). The CALDER study provided quantitative evidence of the role poverty

plays in reducing the gains made possible by elementary reading mastery.

> An economically disadvantaged student (EDS) in third grade lowers the student's predicted position in the high school math distribution by 5.8 percentile points; the predicted probability of taking an advanced course in high school by 9.7 percentile points; and the predicted probability of graduation by 10.2 percentage points" (Goldhaber et al., 2020, p. 3).

This data does not negate the importance of early childhood literacy. On the contrary, it shows how critical a strong academic foundation is for students to have a chance at overcoming the burdens of poverty (Goldhaber et al., 2020, p. 24).

These findings are in alignment with previous research studies cited by the Anne E. Casey Foundation, *Early Warning* (2010) and *Early Warning Confirmed* (2013), and a third report from 2011, *How Third Grade Reading Skills and Poverty Influence Graduation*. In this report, the findings from a longitudinal study tracked 4,000 students in New York, demonstrating those who did not read proficiently by third grade were four times more likely to leave school without a diploma than proficient readers:

> For the worst readers, those who couldn't master even the basic skills by third grade, the rate is nearly six times greater. While these struggling readers account for about a third of the students, they represent more than three-fifths of those who eventually drop out or fail to graduate on time. What's more, the study shows that poverty has a powerful influence on graduation rates. The combined effect of reading poorly and living in poverty puts these children in double jeopardy. (Hernandez et al., 2011, p. 3)

A 2019 study, *A Quantitative Research Study on the Future Impacts of Third*

Grade Reading, sought to replicate the findings from the Anne E. Casey reports for students in Utah. In this longitudinal study tracking students from 2010 to 2019, Dalton looked at the relationship between third-grade reading test scores and the alignment with eighth-grade state assessment results, eleventh-grade ACT scores, and graduation rates. The findings:

- Nearly nine of 10 students in the *exceed expectations* category on the third-grade reading assessment graduated high school as compared to only six in 10 who did not meet the expectations.
- Economically disadvantaged students in all three reading categories had graduation rates nearly 10 points lower when compared to students from less financially distressed families.
- Seventy-five percent of students who scored in the *exceeds expectations* category took the SAT or ACT compared to only 25 percent of students in the *does not meet expectations* category. (Dalton, 2019, p. 18)

These data suggest correlations exist between third-grade reading proficiency and future academic success as measured by common performance benchmarks. But what impact does third-grade reading have on a student's access to future coursework? Although there appears to be a clear throughline between early childhood literacy and graduation rates, is there a similar connection between early childhood literacy and the type of courses in which students enroll in high school? The impact of early childhood literacy and its impact on high school learning opportunities, the focus of this study, is not as heavily researched, perhaps due to a lack of longitudinal data and the disparities that exist in high school programming.

A 2010 longitudinal study of 26,000 students attending Chicago Public Schools examined the connection between third-grade reading and later high school outcomes. The report, *Third Grade Reading: How Is It Related to High School Performance and College Enrollment*, had several findings:

- Fewer than 20 percent of students who were below grade level in third grade attended college, compared to about a third of students who were at grade level, and nearly 60 percent of students who were reading above grade level (Lesnick et al., 2010, p. 2).
- There was a strong correlation (r=0.67) between students' reading proficiency in third grade and eighth grade (Lesnick et al., 2010, p. 20). This is particularly important for Chicago Public Schools since students who meet certain academic and attendance requirements in eighth grade have their choice of which high school to attend. The study showed that higher-performing eighth-grade students chose higher-performing high schools.
- There were marked differences in high school attendance among the students who were either below grade level, at grade level, or above grade level in reading in third grade. Students who were below grade level averaged 15 days absent per semester; students at grade level averaged nine days absent per semester; students who were above grade level averaged five days absent per semester (Lesnick et al., 2010, p. 41).

Another 2010 study, *High Achievement on Advanced Placement Exams: The Relationship of School-level Contextual Factors to Performance,* looked at the factors which influence student performance on Advanced Placement (AP) course exams. AP

courses are often a metric in determining the rigor of a high school's academic program. The study indicated poverty did play a role in the number of students enrolled in AP courses, with high-poverty school districts offering fewer AP opportunities than more affluent school districts (Burney, 2010). The study cited Adelman's 1999 longitudinal research which indicated that having even one high school AP course on their transcript nearly doubled the chances of a student graduating from college (Burney, 2010, p. 116).

These findings aligned with a later 2008 study, *Who's Taking the Advanced Placement Courses and How Are They Doing: A Statewide Two-Year Study,* that examined AP testing results in all Texas high school campuses from 2004-05 and 2005-06. Despite the AP Board's statement on equitable practices, the study posited that Texas students of color and economically disadvantaged students were not enrolled in AP courses in percentages equal to the local school's general population (Moore & Slate, 2008). The authors of the study stated "We contend that all students should have equal access to AP classes and AP exams. Unequal access here simply adds to the inequities already present in today's schools and society. We believe that schools can do better" (Moore & Slate, 2008, p. 64).

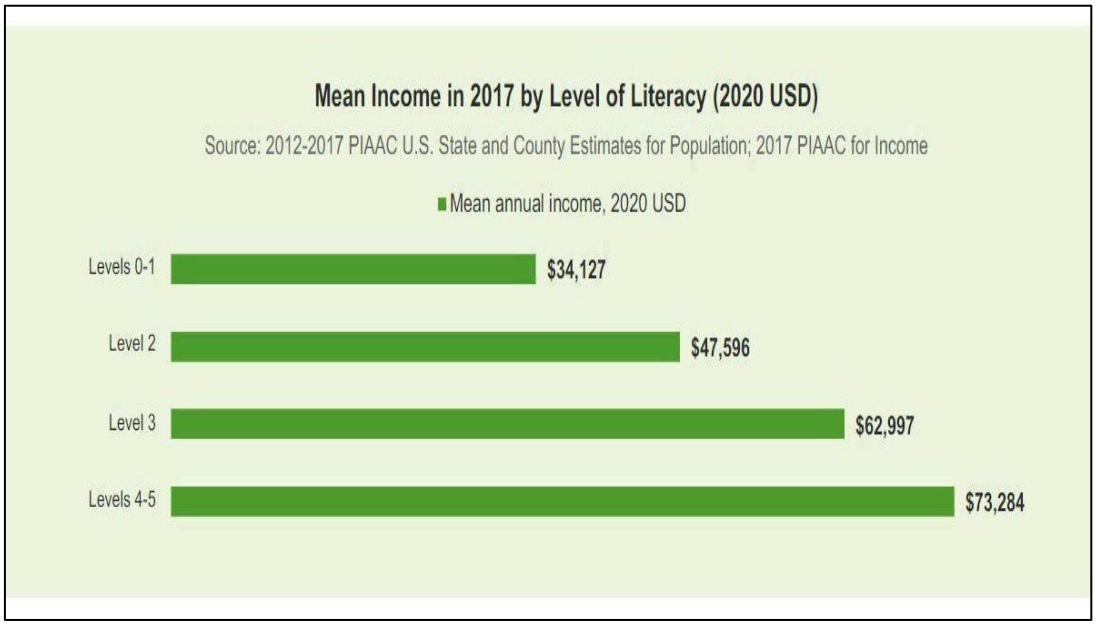
Much is expected of schools because what happens in school has a broader societal impact. *Early Warning* (2010) was one of the first studies to show the effect of early childhood literacy on graduation rates. Students who do not graduate high school are eight times more likely to be incarcerated (Renbarger et al., 2019), which helps explain why 85 percent of teens in juvenile detention programs and 70 percent of adults who are incarcerated are functionally illiterate as measured by the Program for the International Assessment of Adult Competencies (PIAAC) and reported by the National

Center for Educational Statistics (2019). According to Rothwell (2020), both the NCES data and a 2020 Gallup research study showed 20 percent of American adults are functionally illiterate, equivalent to the PIAAC level 0 or 1.

Based on NCES data, 54 percent of U.S. adults 16 to 74 years old - about 130 million people – are functionally literate but lack proficiency, reading at or below the equivalent of a sixth-grade level (Rothwell, 2020, p. 3). They are at PIAAC level 2 or below, with most having only the ability to complete simple forms and read basic texts. As stated by Rothwell (2020), "this has dollars and cents implications because literacy is correlated with several important outcomes such as personal income, employment levels, health, and overall economic growth" (p. 4). Figure 3 illustrates the difference in mean annual income based on PIAAC literacy levels (0-5) in US 2020 dollars.

Figure 3

Mean Income in 2017 by Level of Literacy (USD 2020)



Note. From the report *Assessing the Economic Gains of Eradicating Illiteracy* (Rothwell, 2020, p. 3)

Not reading by third grade has a clear ripple effect in middle school, high school, and beyond. British A. Robinson, President and CEO of the Barbara Bush Foundation, an organization dedicated to combating illiteracy, stated: "America's low literacy crisis is largely ignored, historically underfunded and woefully under-researched, despite being one of the great solvable problems of our time" (Nietzel, 2020, p. 3).

Summary

A review of the literature on the relationship between early childhood literacy and later high school learning outcomes is both disappointing and hopeful. It is disappointing that a number of scientific studies have confirmed most students *can read* if given the proper instruction and support (EAB, 2019). Yet, as indicated by the 2022 NAEP results, the majority of the nation's students – more than 2/3 of fourth and eighth graders tested – are still not proficient in reading (NAEP, 2022). The hope lies in that although no one panacea will ensure a child eventually becomes literate, research shows there are several factors that can have a measurable impact on a child's ability to read, regardless of demographics or zip code (Seidenberg, 2017).

What would the environment look like for a child who has a high probability of reading by third grade and achieving later high school success? Research shows:

- They would have parents or guardians that understand that their newborn child's mind is like a sponge, with the most rapid rates of brain development occurring from birth to age two (Sahakian et al., 2022).
- Parents or guardians would use this valuable time period to read or simply talk to their child, exposing them to copious amounts of language

and knowledge as their child's first teacher, recognizing children learn to read with their ears first (Hart & Risley, 2003); (Seidenberg, 2017).

- Parents and guardians of newborns and toddlers would have access to reading/literacy resources to help them such as their pediatrician (Thakur et al., 2016), public libraries (Roman & Fiore, 2010), and age-appropriate books for their own home libraries (Ridzi et al., 2016).
- Young children would have access to quality PreK (Peisner-Feinberg et al., 2022) and kindergarten programs (Giaquinto, 2015), with all kindergarten students screened for dyslexia (Moats, 2019); (Shaywitz, 2021).
- Once in school, the child would learn the five essential reading skills as defined by the National Reading Panel: phonemic awareness, phonics, fluency, vocabulary, and comprehension (National Institute of Child Health and Human Development, 2000).
- If a child is struggling to read, a teacher knowledgeable in the science of reading would provide appropriate interventions to help the child eventually "crack the code" (Moats, 2020). This would include having the child read books designed to stretch and grow both his or her emergent reading skills (Shanahan, 2020) and background knowledge (Wexler, 2020).
- By the end of third grade, the child should be proficient in reading so they can continue to "read to learn" during the next several years of their academic journey, hopefully becoming lifelong learners in the process (Feister, 2010).

- The reading proficiency of the child in third grade will most likely determine his or her reading comprehension skills in eighth grade, which in turn is linked to the child's likelihood of success in high school and beyond (Lesnick et al., 2010).

CHAPTER III

Methodology

A review of the literature made clear the importance of early childhood literacy and the pivotal milestone of third-grade reading (Feister, 2010). It also confirmed the need for a systemic, collective impact approach to early childhood literacy. The research established that children begin the process of language acquisition from the time they are born (Sahakian et al., 2022), and there are numerous opportunities for learning prior to a child entering school, whether at home (Hart & Risley, 2003), at public libraries (Roman & Fiore, 2010), or through a PreK learning center (Peisner-Feinberg et al., 2022). Once in school, research studies confirmed the need for high-quality literacy instruction (Moats, 2019) using a systemic approach that includes phonemic awareness, phonics, vocabulary, fluency, comprehension, and writing (National Institute of Child Health and Human Development, 2000), with access to knowledge-building books written at an appropriate instructional level (Wexler, 2020).

The effects of not reaching the third-grade reading milestone were also clear, with research demonstrating the impact on a child's social and emotional health (Brokamp et al., 2018), the likelihood of graduating from high school (Feister, 2010), attending college (Lesnick et al., 2010), and future earnings potential (Nietzel, 2020).

What the research did not make as clear was the effect of early childhood literacy on the coursework students had access to later in their academic careers as high school students. Although there were longitudinal studies that demonstrated, for example, the correlation between first-grade Oral Reading Fluency (ORF) scores and later high school reading comprehension ability (Stanley et al., 2017), or the relationship between third-

grade test scores, enrollment in advanced high school math courses, and tenth-grade standardized test scores (Goldhaber et al., 2020), these studies provided data tangential to the main focus of this study: the relationship between third-grade reading proficiency and later access to high school AP and PLTW courses. The need to have access to longitudinal data spanning a period of at least eight years, coupled with the wide range of course offerings in American high schools, may have limited the amount of research in this area. It is challenging to make an apples-to-apples comparison from one school district to the next. Yet it is important to understand the factors that may enhance or preclude equitable student access to high school learning opportunities.

Purpose

The purpose of this action-research project is to examine what relationship exists between early childhood literacy (as measured by the third-grade PSSA) and later access to high school learning opportunities using the following research questions:

1. How does third-grade reading proficiency impact later student enrollment in high school Advanced Placement (AP) courses?
2. How does third-grade reading proficiency impact later student enrollment in high school Project Lead the Way courses?
3. What instructional practices and beliefs are common among Parkland's elementary staff in schools which have consistently high levels of students reaching reading proficiency by third grade as measured by the PSSA?

Parkland School District offers diverse and rigorous educational programs that enable students to engage in more than 160 electives and earn college credit while still in high school. Parkland High School has three Project Lead the Way (PLTW) career

pathways (Biomedical Science, Computer Science, and Engineering) and 30 Advanced Placement (AP) courses. Based on the 2022 AP test results, 82 percent of students who took 769 AP tests achieved a score of three or higher, the qualifying score for most colleges to accept AP courses for college credit (Parkland School District, 2022b). Dual enrollment opportunities are available through Seton Hall University, and juniors and seniors also have the option to enroll in Lehigh Carbon Community College (LCCC) and graduate from Parkland High School with both a high school diploma and an associate degree from LCCC. In 2022, the District reported more than 400 students participated in a dual enrollment opportunity, and 96 percent of seniors graduated from Parkland High School (Parkland School District, 2023). This research project is in keeping with the District's philosophy of excellence through equity, one that holds high expectations for the success of all students reinforced through strong student support programs.

Settings and Participants

The Parkland School District is located in the region known as the Lehigh Valley, the third-largest metropolitan area in Pennsylvania. The Lehigh Valley region of eastern Pennsylvania is made up of Lehigh and Northampton counties and is home to the three cities of Allentown, Bethlehem, and Easton, as well as numerous townships and boroughs. According to the Parkland School District (2023), the region's largest employers are ADP, Air Products, Amazon, B. Braun Medical, Crayola, Lehigh University, Mack Trucks, Olympus, and two hospital systems, Lehigh Valley Health Network, St. Luke's University Health Network, and Parkland School District itself, with the District employing almost 1500 employees during the 2021-2022 school year.

The 72 square miles of the Parkland School District encompass three townships with a total population of approximately 60,000. The District's wide socio-economic range results from bordering the city of Allentown on the southeast and extending to farmland at the western and northern extremities. The District currently has one high school (grades 9-12); two middle schools (grades 6-8); and nine elementary schools (grades K-5). Parkland is experiencing rapid population growth, with two new elementary schools built since 2010.

Diversity is a key strength of the District. According to the Parkland School District (2023), the district had 9,694 students at the end of the 2021-2022 school year, comprised of students from families that speak 39 different languages. Table 2 provides a demographic overview of the 2022-2023 student population:

Table 2

Parkland's 2022-2023 Student Population Overview

Eligible for Free/Reduced Lunch	32%
Receiving Special Education Services	15%
Receiving Gifted Education Services	5%
Number of English Language Learners	322
Diversity of Study Body:	
White	60%
Hispanic	18%
Asian/Pacific Islander	13%
Black	5%
Multi-racial	4%

Archived PSSA exam data from testing years 2009, 2010, and 2011 for all Parkland elementary schools, third-grade students only, was used to enable a comparison of these third-grade students' progress eight years later as students at Parkland High School in academic years 2017, 2018, and 2019. Table 3 provides a demographic overview of these three cohorts of third-grade students from PSSA testing years 2009, 2010, and 2011:

Table 3

Population Overview of Third-Grade Students from Testing Years 2009, 2010, and 2011

	Total Number of Students	**Eligible for Free/Reduced Lunch**	**IEP (not gifted)**	**Diversity of Student Population**
2009	673	12.9%	19.6%	Asian/Pacific Islander–7.7% Black – 2.8% Hispanic – 6.9% Native American–0.7% White – 81.7%
2010	708	16.6%	20.5%	Asian/Pacific Islander–10.5% Black – 4% Hispanic – 5.9% Native American–0.2% White – 79.3%
2011	700	16.5%	19.4%	Asian/Pacific Islander–9.4% Black – 2.8% Hispanic – 6.5% Multiracial – 1.1% Native American–0.3% White – 79.7%

The student population numbers in this table do not reflect the entire third-grade student numbers since those special education students with the most significant cognitive needs (less than 2 percent) qualified for the Pennsylvania Alternate System of Assessment (PASA), a modified version of the PSSA that is a required accommodation in accordance with the federal Individuals with Disabilities Education Act (IDEA) of 2004.

Impact of COVID-19 Pandemic

It should be noted that the COVID-19 pandemic, which shut down all Pennsylvania schools in March 2020, caused the cancellation of PSSA and Keystone exam testing in the Spring of 2020. Most Pennsylvania school districts, including Parkland, transitioned from fully face-to-face instruction to fully online instruction, then to various hybrid models of instruction, then back to fully face-to-face instruction, all within the course of a single calendar year. PSSA and Keystone exam testing in 2021 yielded lower than typical test results for Parkland and most Pennsylvania school districts, as per a statement by the Pennsylvania Department of Education (Hanna & Graham, 2022), so 2019 is the last academic year to yield a valid longitudinal comparison for this research study. Although the student population data reveal changes in Parkland's demographic composition over the course of the duration of the study (2009 through 2019) - with increases in the number of students eligible for the free or reduced lunch program and decreases in the special education student population - these changes are not a result of the COVID-19 pandemic.

Cohort Population Changes Over Time

It should also be noted that the third-grade students from 2009, 2010, and 2011 who stayed in the district long enough to enroll at Parkland High School were fewer than the number of students in the original cohorts (673, 708, and 700, respectively). Some Parkland students moved out of the area during this time while others chose to enroll in the charter, cyber charter, and non-public schools within the Lehigh Valley. Table 4 represents the composition of students who were in the District consistently from third through eleventh grade.

Table 4

Change in Cohort Population Demographics from 2009/2010/2011 to 2017/2018/2019

Cohort	Number of Students	Eligible for Free or Reduced Lunch	IEP (not gifted)	Diversity of Student Population
2009/2017	673/535	12.9%/10.6%	19.6%/19.3%	Asian/Pacific Islander–7.7%/7.8% Black – 2.8%/2.2% Hispanic – 6.9%/5.6% Native American– 0.7%/0.7% White – 81.7%/83.5%
2010/2018	708/553	16.6%/12.5%	20.5%/17.7%	Asian/Pacific Islander–10.5%/10% Black – 4%/3.4% Hispanic – 5.9%/5% Native American–0.2%/0.1% White – 79.3%/81.1%
2011/2019	700/558	16.5%/13.6%	19.4%/18.3%	Asian/Pacific Islander–9.4%/9% Black – 2.8%/3.0% Hispanic – 6.5%/6.0% Multiracial – 1.1%/0.7% Native American– 0.3%/0.2% White – 79.7%/81.0%

In looking at this data, there were 673 third-grade students in 2009 but only 535 students remained in the cohort by 11th grade; there were 708 third-grade students in 2010 but only 553 students remained in the cohort by 11th grade; and there were 700 third-grade students in 2011 but only 558 remained in the cohort by 11th grade. It is these smaller populations of students – those that remained at Parkland throughout their elementary, middle, and high school years – that were analyzed to determine what courses these students enrolled in at Parkland High School.

Parkland High School Academic Programs

Parkland High School has a capacity of 3200 students and current enrollment shows the school has a population of 3200 students (Parkland School District, 2023), making it the fifth-largest high school in the state. Parkland High School's focus on

personalized learning, whether it is through participation in Academics, Arts, or Athletics (referred to as the district's "three pillars") is a purposeful effort to help students discover their niche despite the large size of the school. Table 5 describes the types of courses offered at Parkland High School (Parkland School District, 2022a).

Table 5

Parkland High School Course Types

Course Level	**Description**
AP= Advanced Placement	Parkland offers 30 AP courses in the areas of English, science, social studies, math, art, and music. Courses offer rigorous, college-level study following the College Board's curricula.
HRS = Honors	Honors courses are designed to offer a greater depth of study at an accelerated pace.
GHP = Gifted/High Potential	These courses in English, math, science and social studies use advanced research skills and higher-level course materials.
CP= College Preparatory	These courses are moderately paced and are designed for students considering continuing education.
CEW=Career/Education/Work Readiness	These courses provide required courses for students enrolled part-time at LCTI.
APPL= Applied (note: Applied courses were discontinued in 2017)	Applied courses provided direct support and remediation for students who may have struggled with traditional coursework.

PLTW= Project Lead the Way	Project Lead the Way offers rigorous, hands-on experience. Parkland offers three PLTW pathways in Engineering, Computer Science, and Biomedical Science. Each pathway consists of four courses. Certain PLTW courses qualify for college credit.
AP/PLTW= course categorized as counting towards both AP and Project Lead the Way credit	There is one course, AP Computer Science Principles, that qualifies for both AP credit and PLTW course credit.
LCTI (Lehigh County Technical Institute)	Courses for students enrolled full-time at LCTI.
Cyber (Parkland Cyber Academy)	Online course options are available for students as needed.

While the research questions for this study focus on the overall profile of students enrolled in AP and PLTW courses, considered some of Parkland's most rigorous course offerings, the research study also examines the top courses based on student enrollment at Parkland High School as correlated to students past third-grade reading proficiency levels. This broader survey includes the range of course types offered at the high school level in order to answer questions that may arise as a result of the data. Did a third-grade student's reading proficiency impact the courses he or she took as a student at Parkland High School? Were there other factors that may have also been at play? The structure of this research study will enable an analysis of these questions as well.

The types of courses students enroll in may vary, but Parkland High School has consistent graduation requirements that all students must meet. According to the Parkland School District (2022a), students are required to take a minimum of 24.25 credits over the course of four years of study (Table 6):

Table 6

2022-2023 Parkland High School Course Requirements

English	4.0 Credits
Science	4.0 Credits (Note: Biology is required of all students)
Social Studies	3.0 Credits
Mathematics	3.0 Credits
Health/Physical Education/ Driver's Education	1.25 Credits
Career Explorations	.5 Credits
Electives	8.5 Credits (with some requirements)

PIRLS Study Participants

The quantitative portion of the study provides a longitudinal overview of students' academic progress, while the qualitative survey of current grade K-5 teachers helps connect student progress to instructional practice, thus providing a more complete picture of Parkland's early literacy program from 2009 to the present.

The questions for the qualitative case study survey came from the 2016 Progress in International Reading Literacy Survey (PIRLS) questionnaire. As noted on the

National Center for Educational Statistics website (n.d.), the survey "is designed to measure school and teacher practices related to instruction" and has been used by schools worldwide since 2001, with a high degree of reliability. The questionnaire was completed by Parkland's K-5 teachers and required between 15 and 30 minutes to complete electronically. The full survey instrument can be found in Appendix A. Teachers had the option to complete the survey; it was not required. The Volunteer Consent Form (Appendix B) outlines the consent process in more detail.

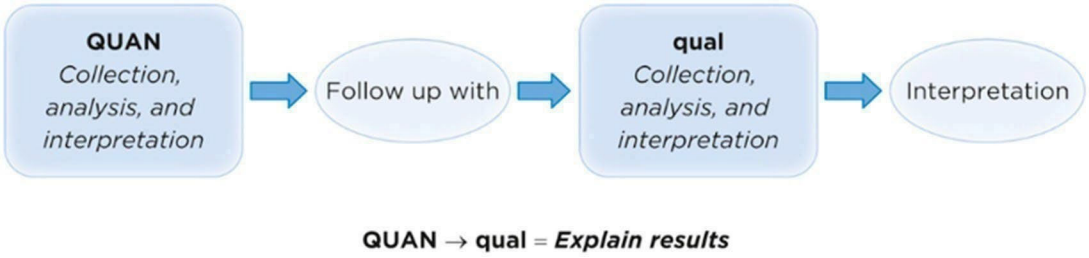
In addition, the research project received approval from the PennWest University Institutional Review Board (IRB) on September 11, 2022 (Appendix C), allowing the project to be completed within the timeframe of September 12, 2022, through September 11, 2023. In addition, Dr. Mark Madson, current Parkland Superintendent of Schools, granted permission for the research study, including the use of archived student data and the survey of current Parkland staff, within the parameters set forth in his letter dated August 3, 2022 (Appendix D). The next section outlines the research plan to use both quantitative from the longitudinal research study and qualitative data from the PIRLS questionnaire to identify patterns and address the original action research questions.

Research Plan

As stated by Mertler (2021), "standardized test data is routinely used but should be offset by other types of data" (p. 248). This research project relies primarily on quantitative data - including but not limited to standardized test data - enhanced by qualitative data, therefore the research methodology is best described as an explanatory sequential design approach. In this approach, the design begins with the collection and analysis of quantitative data followed by the collection of qualitative data to answer any questions the quantitative data alone may not be able to address (Figure 4).

Figure 4

Explanatory Design With Quantitative and Qualitative Data (Mertler, 2021, p. 145)

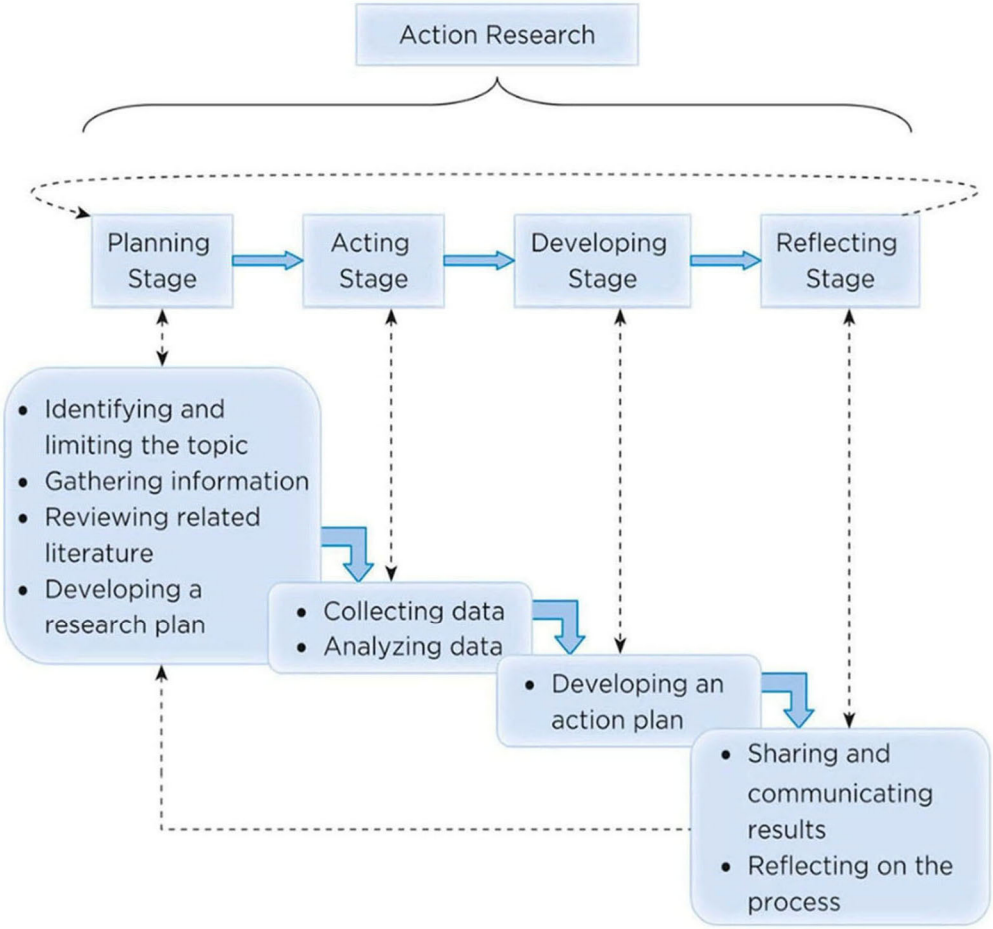


In this research project, quantitative data provided the initial information on the types of courses third-grade students enrolled in eight years later as students at Parkland High School, enabling deeper analysis of any patterns or trends that may be related to a student's reading proficiency level (Advanced, Proficient, Basic, or Below Basic). In addition, qualitative data from the PIRLS survey answered questions related to the early childhood literacy beliefs and practices of Parkland's K-5 elementary literacy teachers. Parkland's early literacy programs are excellent, based on PSSA test results and the District's own local assessments. This qualitative data helped address questions related to how early childhood literacy instruction takes place in Parkland classrooms and why teachers favor certain instructional literacy practices over others. In addition, patterns and trends were able to emerge from the survey regarding how instructional practices or resources compare and contrast among Parkland's elementary schools.

This research plan also follows the guidelines outlined in *Introduction to Education Research* (Mertler, 2021) in which Mertler emphasizes the cyclical nature of action research, one in which reflection is built into the process. The research questions are designed to prompt additional questions and a deeper inquiry into the topic of the impact of early childhood literacy. Figure 5 visualizes the process:

Figure 5

Cyclical Nature of Action Research (Mertler, 2021, p. 166)

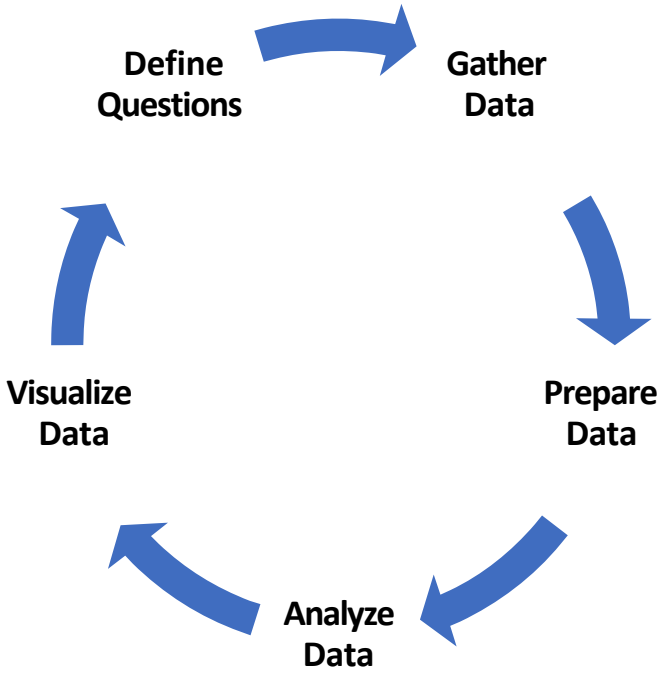


Data Normalization and Analysis Process

The cyclical nature of action research parallels the data normalization process the researcher encountered in the IBM and Google data scientist certification programs (Appendix G). Data normalization ensures that data is not only accurate but clear and consistent, with a focus on the user's ability to effectively analyze the data for further inquiry. The steps involved in data normalization (Figure 6) include: 1) defining the questions; 2) gathering the data; 3) preparing the data; 4) analyzing the data; and 5) visualizing the data, with reflection built into the process at every stage.

Figure 6

Data Normalization and Analysis Process



Defining the questions. The data normalization process starts with the end in mind by examining the questions the researcher is trying to answer. The research questions for this study are:

1. How does third-grade reading proficiency impact later student enrollment in high school Advanced Placement (AP) courses? (quantitative)
2. How does third-grade reading proficiency impact later student enrollment in high school Project Lead the Way courses? (quantitative)
3. What instructional practices and beliefs are common among Parkland's elementary staff in schools which have consistently high levels of students reaching reading proficiency by third grade as measured by the PSSA? (qualitative)

Gathering the data. The next step in the process is to determine the best sources of data to answer the research questions. For the first two research questions, Parkland provided four tables of data from the District's data warehouse, Performance Matters: 1) PSSA state testing data from testing years 2009, 2010, and 2011; 2) local reading assessment (STAR) data that provides the instructional reading level (IRL) for eighth-grade students during testing years 2014, 2015, and 2016; 3) high school Keystone state assessment data for Biology, Literature, and Algebra for testing years 2017, 2018, and 2019; and 4) high school course enrollment and course grade data for student enrollment years 2017, 2018, and 2019. The district provided more data than was technically needed to answer the research questions, but the additional STAR and Keystone data helped create a throughline of academic achievement for students enrolled in the district from third grade through eleventh grade, as well as allow comparison of results from both state and local assessments, adding another layer of validity to the process.

For the third research question, the PIRLS questionnaire was distributed to Parkland K-5 teachers within the timeframe of March 10, 2023 (an in-service day) through April 11, 2023 (the day following Parkland's spring break). The responses from this 34-question survey were automatically tabulated into a comma-separated value (CSV) file which was then imported into Excel for further analysis, making the process of data gathering more streamlined as compared to the longitudinal portion of this study.

Analyzing the data. Before any insights could be derived from the data, a thorough process of cleaning (also referred to as data normalization) was completed in order to ensure the validity and accuracy of the results. In this case, the PSSA data files had more than 100 columns of data and needed to be reduced to only the data necessary

to conduct the research. In addition, it was important that each table of information have a primary key, a field of unique data that would serve as the common denominator among all four tables of data. Parkland assigns a unique student identification number (student ID), to each student upon enrollment, and this student ID field served as the primary key to link all the tables together (Figure 7). In this stage of the process, fields of data are also examined to determine distinct and unique values. For example, there are four distinct PSSA proficiency levels (Advanced, Proficient, Basic, and Below Basic) but if there was only one student who achieved the proficiency level of Advanced then that value would also be considered unique. Microsoft Power BI has several tools to simplify the process of identifying distinct and unique values within a dataset, as well as identify any errors that may be within the data:

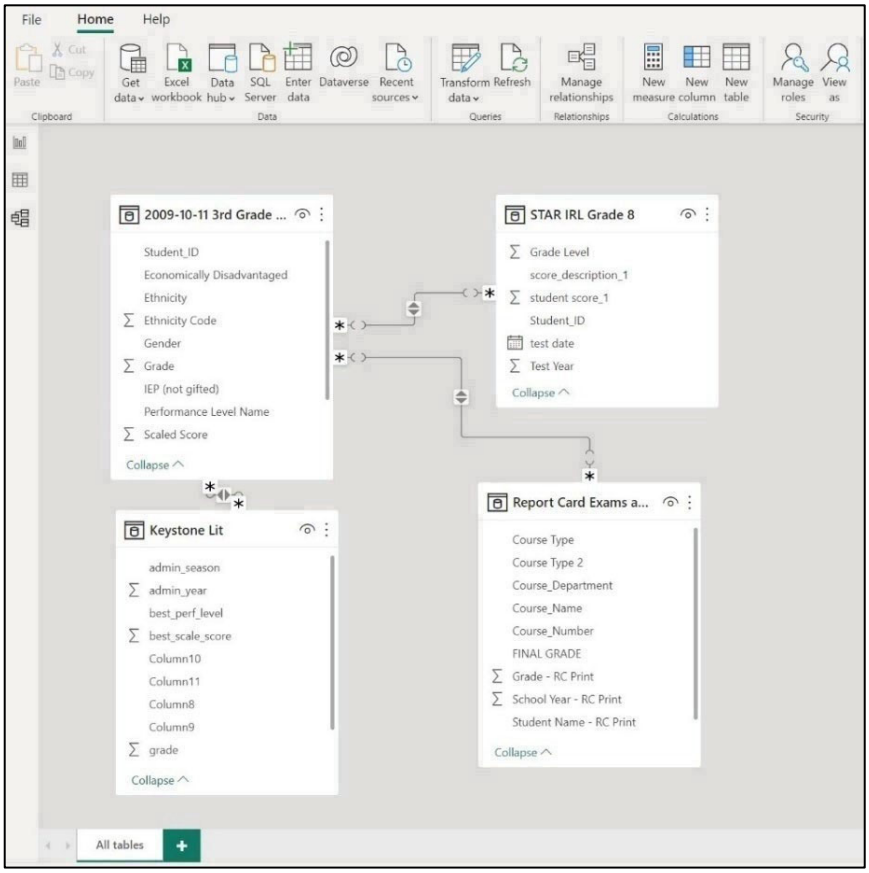
Figure 7

Data Normalization Using Microsoft Power BI

Preparing the data. Once the data normalization process is complete, the data is prepared for further analysis which makes the results clear to not only the researcher but anyone who may eventually use the data. Preparing the data for this study involved linking the four tables of information Parkland provided and triangulating that data with the information provided by the PIRLS questionnaire. Microsoft Power BI has the ability to link disparate data files together (Figure 8), again simplifying the process rather than having to use additional tools such as SQL or Microsoft Access. This process enabled a longitudinal look at a Parkland student's academic journey from elementary school, to middle school, to high school.

Figure 8

Microsoft Power BI Table Joins



It is also common practice, especially when preparing data for quantitative analysis by a wider audience, to construct a data dictionary (Table 7) so the end-user is clear on what the data values for each field (or column) of data represent.

Table 7

Data Dictionary for Quantitative Data Analysis

Table Name	**Fields**
2009-2011 Student PSSA Data – Third-Grade Reading	**1. Student_ID (primary key)** 2. Subject (Reading) 3. Grade Level (3) 4. Year Tested (2009, 2010, 2011) 5. School Tested 6. Scaled Score (range 1000 to 1928) 7. Proficiency Level: Adv=Advanced; Pro=Proficiency; Bas=Basic; Bel=Below Basic; 8. Ethnicity (1= Native American; 2=Asian/Pacific Islander; 3=Black; 4=Hispanic; 5=White; 6=Multiracial) 9. IEP (not gifted) – Y=Yes, N=No 10. Economically Disadvantaged – Y=Yes, N=No 11. Gender – F=Female, M=Male

2014 – 2016 Student Grade 8 IRL (Instructional Reading Level) Data	**1. Student_ID (primary key)** 2. Test Year – 2014, 2015, 2016 3. Student_Score (range 1.1 to 13) 4. Grade_Level (roundedStudent_Score, range 1 to 13)
2013–2019 Keystone Literature Exam Data	**1. Student_ID (primary key)** 2. Grade (11) 3. Scaled Score (range 1385 to 1712) 4. Best Performance Level –Adv= Advanced; Pro=Proficient; Bas=Basic; Bel=Below Basic
2017–2019 Report Card Exams and Final Grades Data	**1. Student_ID (primary key)** 2. School Year (2017, 2018, 2019) 3. Grade Level (9, 10, 11, 12, 13) 4. Course Number (range 0 to 1000) 5. Course Name 6. Course Department 7. Course Type (AP=Advanced Placement; HRS=Honors; GHP=Gifted/High Potential; CP=College Preparatory; CEW=Career/Education/Work Ready 8. Final Grade (A, B, C, D, F, I, W)

Visualizing the data. Reporting the results of the data analysis is the last step in the process, but it should be noted this will most likely not close the book on the subject, but rather lead to additional questions in keeping with the iterative and ongoing nature of action research (Mertler, 2021). To enhance the inquiry process, a data dashboard for the quantitative analysis portion of this research project was constructed using Microsoft Power BI. Microsoft Power BI provides a number of options for visualizing data and has the advantage of being interactive, so the end-user can derive insights based on his or her background and understanding of the information. It is also a straightforward process to modify the layout, create multi-page reports, and update the original data using this tool. Figures 9, 10, and 11 depict examples that demonstrate how a single data dashboard can yield several insights from the same set of data.

Figure 9

Longitudinal Data Dashboard (no filters)

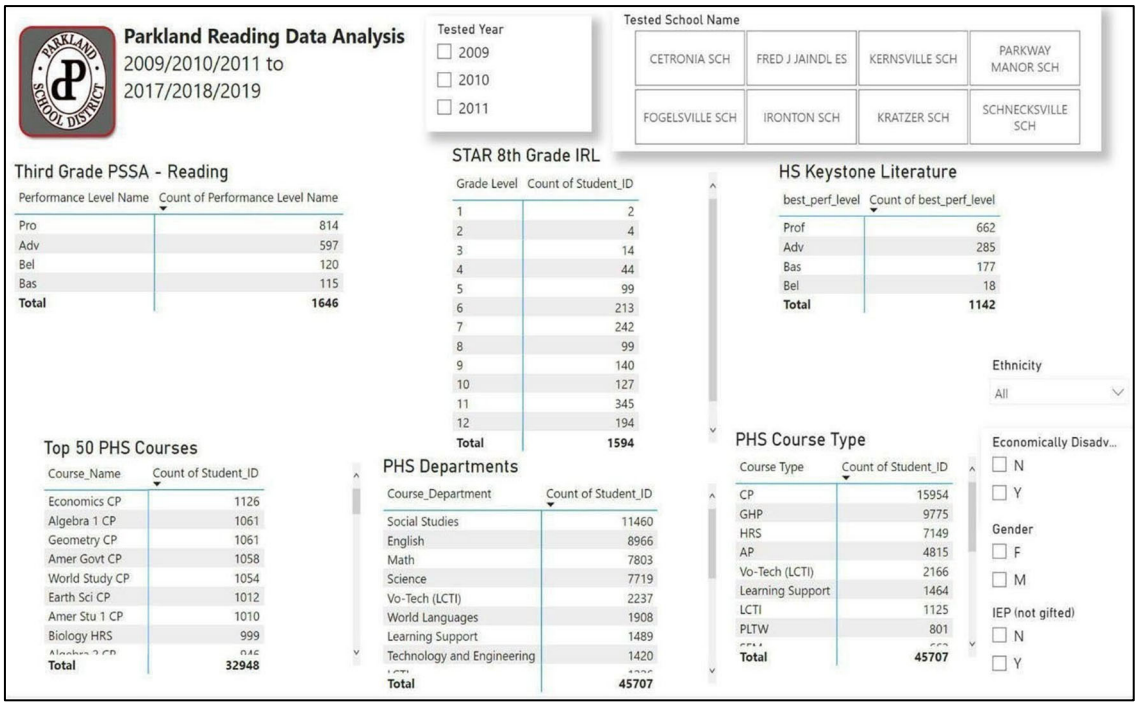


Figure 10

Longitudinal Data Dashboard (filtered by testing year (2010) and PSSA proficiency level (Below Basic))

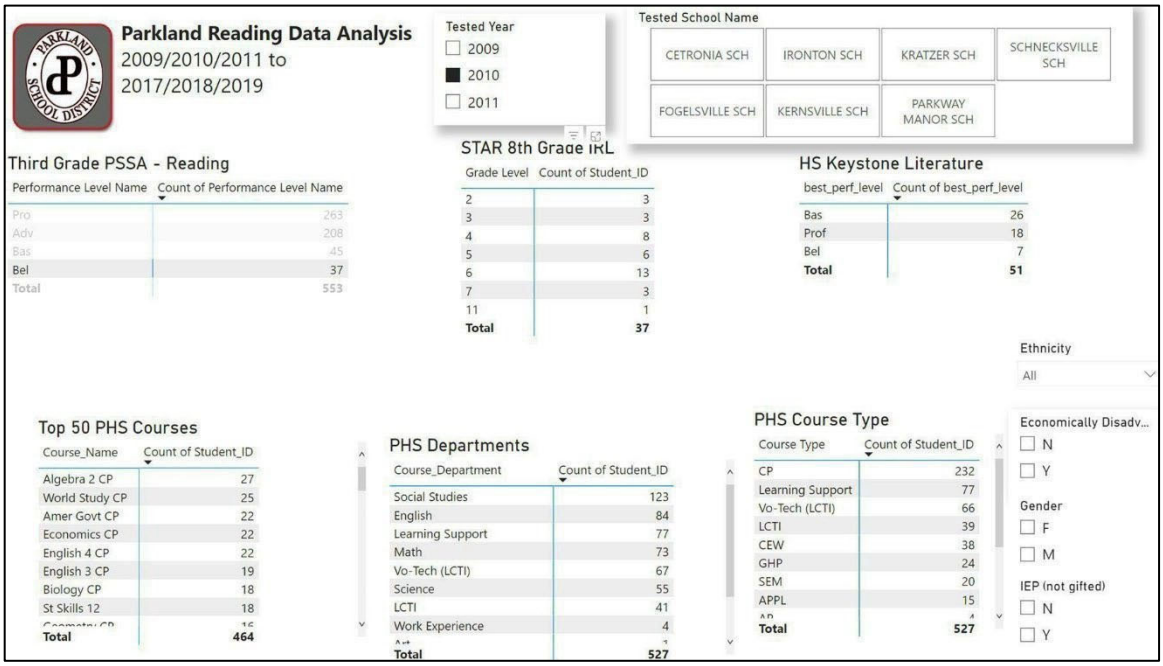
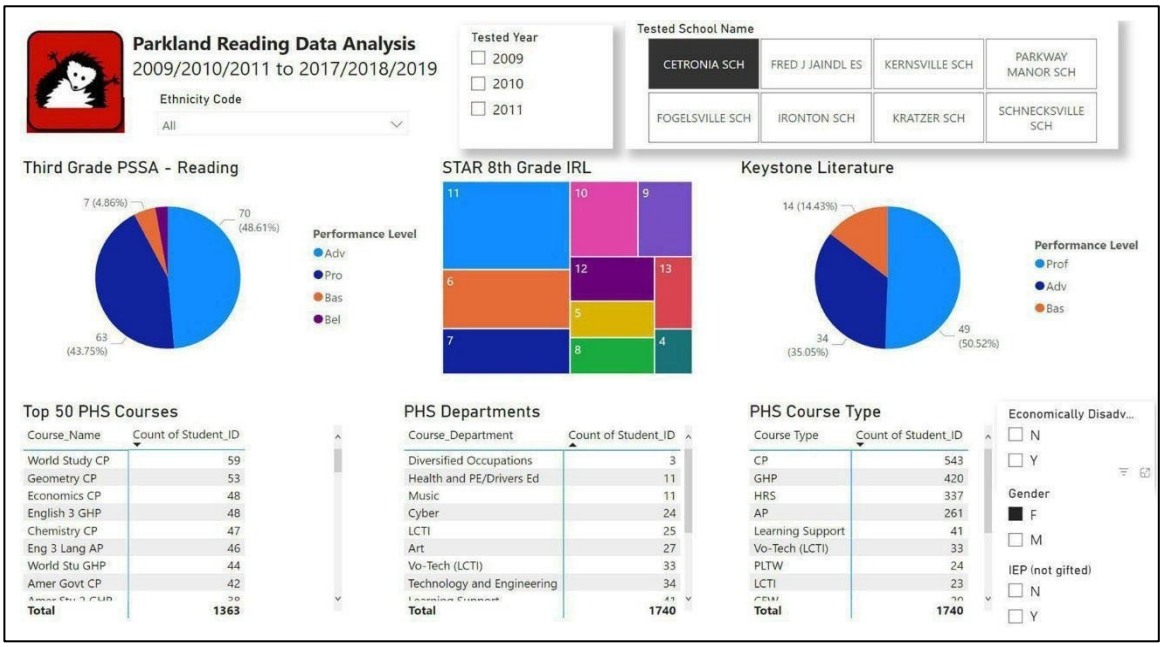


Figure 11

Longitudinal Data Dashboard (filtered by school (Cetronia) and student gender (female))



The student data can be further disaggregated through filters based on school building and student demographic information such as ethnicity and gender. The more filters an end-user applies, the smaller the subset of results that are produced. Clicking anywhere outside one of the charts removes the filters and brings back the original data, making it easy to perform multiple queries. This data dashboard approach also enables a comparison of other factors that may have an impact on students' high school learning outcomes. For example, it was possible to look at not only the relationship between reading proficiency and enrollment in AP courses but also if a student's socioeconomic status or having an Individualized Education Plan (IEP) played a role in AP course enrollment.

In keeping with the explanatory sequential research design, qualitative data from the PIRLS study was later added to this quantitative data dashboard. To triangulate the two sets of data, a question was added to the PIRLS study to identify those teachers who were working in the District during 2009, 2010, and 2011 school years.

Validity and Data Integrity

According to Mertler (2021), "Quality research must meet standards of sound practice" (p. 167). Every effort has been made to ensure this research study meets those standards, with a focus on the practices put forth by Hendricks (2016) in her book, *Improving Schools Through Action Research: A Reflective Practice Approach:*

- Credibility – results are accurate and truthful;
- Transferability – results can be shared with others;
- Dependability – the study can be replicated;
- Confirmability – the results of the research are free of bias.

In addition to the data normalization process used for the longitudinal data study portion of this research project, the PIRLS questionnaire was distributed via a secure process to ensure data validation. Using Adobe Acrobat Pro, each question response was labeled so the results could be further analyzed in Microsoft Power BI or Excel. Teachers received the Volunteer Consent Form (Appendix B) for the PIRLS questionnaire via email, entered their name and email address if they chose to participate, and after form submission received a link to the PIRLS questionnaire. Upon completion of the PIRLS questionnaire, teachers received a confirmation email with a copy of the completed survey. These extra steps helped validate the identity of the teacher completing the survey without invalidating the anonymity of the teacher's responses.

In the process of collating the data, the researcher discovered a few anomalies that will also be noted in the data findings portion of this research project. Parkland has added two new elementary schools recently, Fred J. Jaindl Elementary, which opened in 2010, and Veterans Memorial Elementary, which opened in 2021. Since the data dashboard only summarizes data from 2009 through 2019, Veterans Memorial Elementary does not appear and data for Fred J. Jaindl Elementary does not appear until 2011. Pennsylvania did not add the Keystone Literature exam until 2010, so it does not appear in the 2009 data. Parkland has had the Project Lead the Way Engineering pathway for almost 20 years, but only recently added the Project Lead the Way Computer Science and Biomedical Science pathways in 2018 and 2019, respectively, which may have had an effect on the number of PLTW courses taken in these pathways. Finally, the district decided to phase out Applied courses at Parkland High School in an effort to consolidate the number of academic tracks, so Applied courses do not appear as options after 2017.

Summary

In 2014, when Parkland School District was in the process of completing a cost/benefit analysis of adding Full-Day Kindergarten (FDK), a group of administrators, the researcher included, surmised that FDK was an important cornerstone for helping students reach reading proficiency by third grade, with potential for even longer-term impact. Part of the analysis included looking at third-grade PSSA reading data from 2005 to see what, if any, relationship existed between reading proficiency in third grade and student access to AP courses eight years later in 2013. That single data snapshot analyzed in 2014 showed that less than one percent of students who were not proficient on the PSSA reading exam later went on to take AP courses at Parkland High School, far less than the norm, based on the District's Parkland High School Profile and the researcher's own data analysis.

Fast forward to today, this mixed methods research project is similarly focused on the impact of third-grade reading proficiency on later access to coursework at Parkland High School, but this time examines not one but three different cohorts of student data to determine whether the 2014 results were an anomaly or part of a consistent pattern. In addition, this research project has looked at both quantitative and qualitative data in order to consider other factors such as student demographics or instructional practices which also play a role in overall student literacy success. The end result is a much fuller picture of Parkland's early literacy program, from 2009 to the present, and the impact early literacy has had on Parkland students' high school learning outcomes.

The next chapter reviews how both quantitative and qualitative data were used to answer the original research questions, as well as other findings that emerged as a result of this explanatory sequential research project.

CHAPTER IV

Data Analysis and Results

To gain a more complete picture of the impact of Parkland's early literacy program on later student enrollment in high school courses, a mixed methods approach was used that relied primarily on longitudinal data from three cohorts of third-grade students tested in 2009, 2010, and 2011 (n=1646), and the courses these students took eight years later while enrolled at Parkland High School in 2017, 2018, and 2019, respectively. The data tables used for the quantitative portion of the study were the third-grade PSSA reading assessment results, the eighth-grade STAR instructional reading level (IRL) results, a district-provided file that tracked all high school course enrollments from 2017 to 2019, and the high school Keystone Literature assessment results. These files, once linked together using Microsoft Power BI, provided a more complete trajectory of a student's academic journey based on the proficiency level achieved on the third-grade PSSA reading exam.

To understand the context for the third-grade reading PSSA results, the Progress in International Reading and Literacy Study (PIRLS) was used to gather qualitative feedback from current Parkland elementary teachers about their instructional practices and beliefs related to early childhood literacy. In keeping with the explanatory sequential approach to data analysis, the PIRLS data provided insights about Parkland's early literacy program that the quantitative data alone could not fully address.

Data Analysis

In Pennsylvania, students who achieve a proficiency level of Proficient or Advanced are considered to be proficient in that subject area. Conversely, students who

achieve a proficiency level of Basic or Below Basic are considered not proficient in the subject area tested: "A student performing at the Basic level demonstrates limited comprehension of literary and informational texts" (Pennsylvania Department of Education, n.d.). Based on these criteria, statewide reading proficiency levels on the PSSA, as reported by the Pennsylvania Department of Education, were as follows:

- in 2009, 67% of Pennsylvania third-grade students were Proficient in reading;
- in 2010, 70% of Pennsylvania third-grade students were Proficient in reading;
- in 2011, 72% of Pennsylvania third-grade students were Proficient in reading.

By comparison, in 2009, 87.7% of Parkland students were Proficient in Reading while 12.3% of students were Not Proficient. In 2010, 85.2% of Parkland students were Proficient in Reading while 14.8% of students were Not Proficient. In 2011, 84.4% of Parkland students were Proficient in Reading while 15.6% of students were Not Proficient (Table 8). The average of the cohorts combined was 85.7% of students Proficient in Reading while 14.3% of students were Not Proficient in Reading.

Table 8

Breakdown of Number of Students by Third-Grade Reading Proficiency Level

Third Grade Reading Proficiency Level	**2009 Cohort Number of Students/ Percent of Total**	**2010 Cohort Number of Students/ Percent of Total**	**2011 Cohort Number of Students/ Percent of Total**	**All Cohorts Number of Students/ Percent of Total**
Advanced	194/**36.2%**	208/**37.6%**	195/**34.9%**	597/**36.26%**
Proficient	275/**51.5%**	263/**47.6%**	276/**49.5%**	814/**49.45%**
Basic	27/**5.04%**	45/**8.1%**	43/**7.7%**	115/**6.98%**
Below Basic	39/**7.28%**	37/**6.7%**	44/**7.8%**	120/**7.20%**
All (Combined)	535	553	558	1646

This baseline is important to establish since Parkland had proportionally fewer students to begin with who were Basic or Below Basic and this is a factor to consider when looking at the number of students who eventually took AP and PLTW courses.

Another factor to consider is the eighth-grade instructional reading level (as measured by the local STAR IRL assessment) which shows the reading level of Parkland students a few months before they began enrolling in their first classes as future ninth graders at Parkland High School. As stated in the CALDER study, *Assessing the Accuracy of Elementary School Test Scores as Predictors of Students' High School Outcomes*, "in particular both third and eighth-grade tests are statistically significant in the same model for both advanced course-taking and high school graduation" (Goldhaber, 2020, p. 16). This longitudinal study, spanning nine years, three states, and over 200K students, concluded that state test results from third grade had almost as much predictive value in determining advanced course-taking (r=.94) as the state test results from eighth grade (Goldhaber et al., 2020, p. 23).

Results

Using Microsoft Power BI, the descriptive analysis in Table 9 confirms the relationship between median and average third and eighth-grade instructional reading levels (IRL), with consistency among the three cohorts.

Table 9

Impact of 3rd-Grade PSSA Reading Proficiency Levels on 8th-Grade Instructional Reading Levels

Third-Grade Reading Proficiency Level	**2009 Cohort Median/ Average IRL**	**2010 Cohort Median/ Average IRL**	**2011 Cohort Median/ Average IRL**	**All Cohorts Median/ Average IRL**
Advanced	11/10.69	11/10.80	11/10.77	11/10.77
Proficient	8/8.82	7/8.818	8/8.28	8/8.3
Basic	6/6.23	6/6.27	6/6.21	6/6.24
Below Basic	4/4.40	5/5.0	5/4.8	5/5.05

Parkland third-grade students who were Advanced in reading as measured by the third-grade PSSA were, on average, at a tenth-grade reading level five years later in eighth grade.

Students who were Proficient in third grade were at grade level in eighth grade. Students who were at a Basic reading proficiency level in third grade were at a sixth-grade reading level on average as eighth graders, or two years below grade level. Finally, students who were at a Below Basic proficiency level were, on average, at a fourth or fifth-grade reading level as eight grade students, or at least three grade levels below grade level.

To verify the accuracy of the analysis generated by the Microsoft Power BI data dashboard, the data was also calculated using a web-based statistical analysis tool called StatCrunch, which yielded comparable results. Although this required converting all the descriptive data to a numerical format, StatCrunch was an additional tool for triangulating the data analysis results from Microsoft PowerBI and for calculating the Pearson correlation coefficient. In this case, StatCrunch confirmed a strong positive relationship between third-grade PSSA reading exam results and eighth-grade instructional reading levels (r=.86), which is considered statistically significant (Mertler, 2021, p. 119).

Figure 12

StatCrunch Data Analysis –Third Grade PSSA Proficiency Level and Eighth Grade IRL

Summary statistics for Scaled Score:
Group by: Performance Level Name

Performance Level Name	Mean	Variance	Std. dev.	Median
Adv	1539.7406	6797.6558	82.447897	1529
Bas	1202.9958	450.02568	21.213809	1207
Bel	1107.9392	1885.2112	43.419018	1124
Pro	1345.8529	3172.8125	56.327724	1346

Summary statistics for 8th Grade IRL:
Group by: Performance Level Name

Performance Level Name	Mean	Variance	Std. dev.	Median
Adv	10.763387	2.9431708	1.7155672	11
Bas	6.2465491	2.1390368	1.4625446	6
Bel	5.0999254	2.5860574	1.6081223	5
Pro	8.2609701	4.7484625	2.1790967	8

The following charts examine the relationship between the STAR eighth-grade IRL and third-grade reading proficiency. They also compare these criteria against other factors such as being economically disadvantaged or receiving special education services through an IEP (generalized, not gifted). Figure 13 shows that the data from all cohorts (no filter applied for subgroups) indicates that the median eighth-grade IRL of all eighth-grade students (*n*=1646) was a ninth-grade median IRL, with an average IRL of 8.82, or overall Parkland's eighth-grade students were above grade level in reading.

Figure 13

All Cohorts – All Students – STAR 8th Grade IRL (Median and Average)

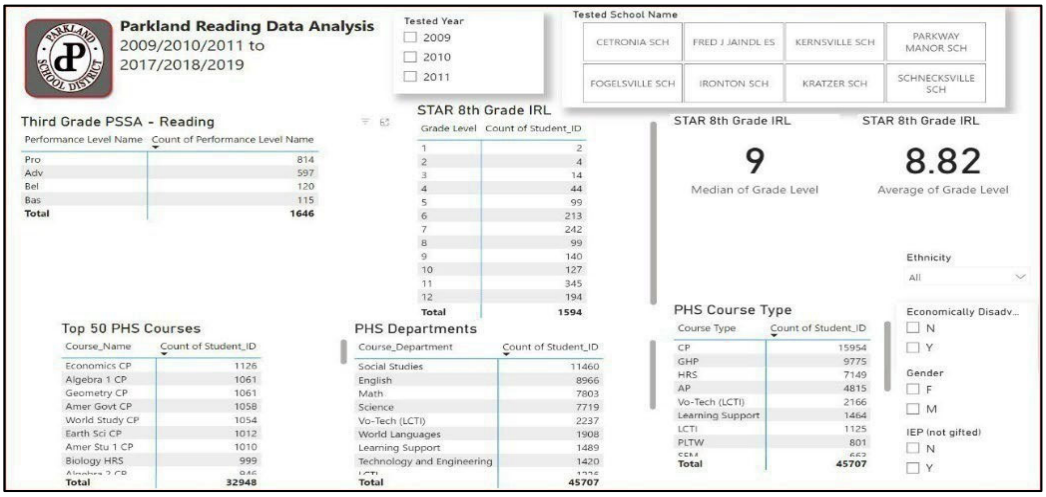
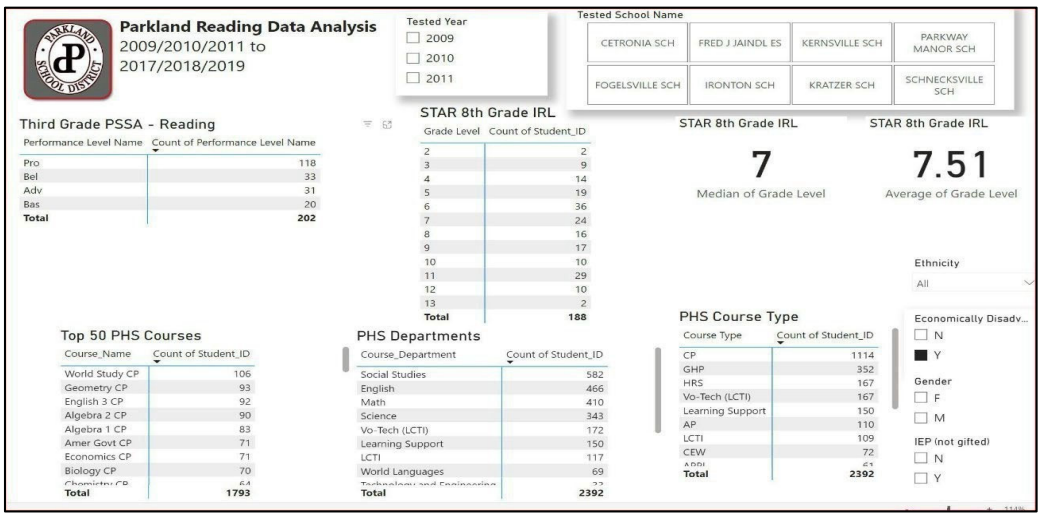


Figure 14

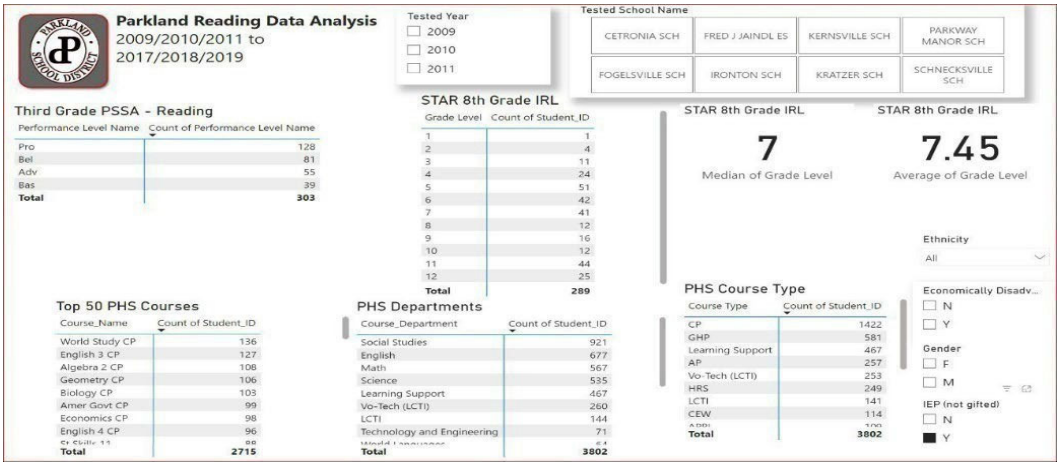
All Cohorts – 8th Grade IRL of Economically Disadvantaged Students



When disaggregated by the subgroup of students who are considered economically disadvantaged (*n*=202), Figure 14 shows the average instructional reading level dropped a full grade level with a similar decline noted in the subgroup of students with individualized education plans (*n*=303), as shown in Figure 15.

Figure 15

All Cohorts –Eighth-grade IRL of Students with IEPs



However, students who were Basic or Below Basic in third-grade reading proficiency (Figure 16) had an even steeper decline in reading level. The data reveals not being proficient in reading by third grade was more impactful to students' eighth-grade instructional reading level than being economically disadvantaged or requiring an IEP.

Figure 16

All Cohorts – Third Grade Reading Proficiency (Basic and Below Basic) and Eighth Grade IRL

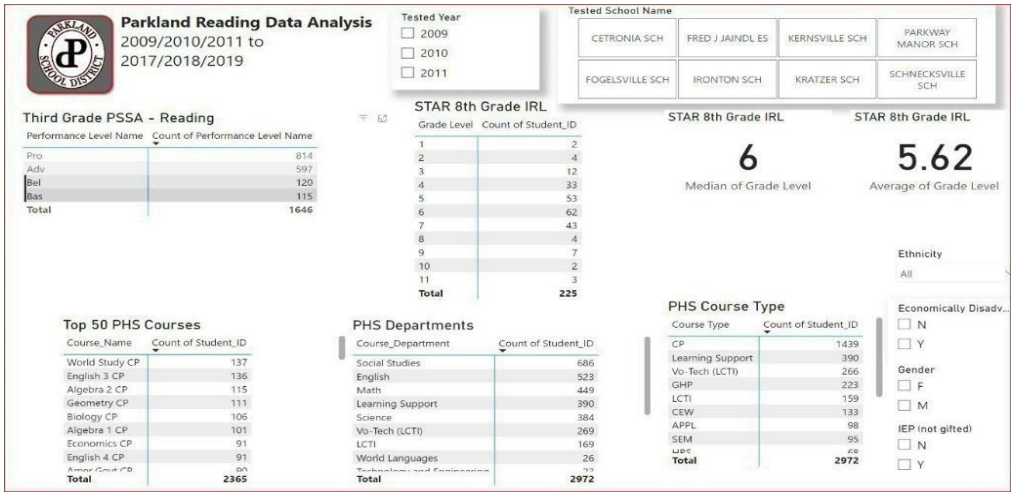
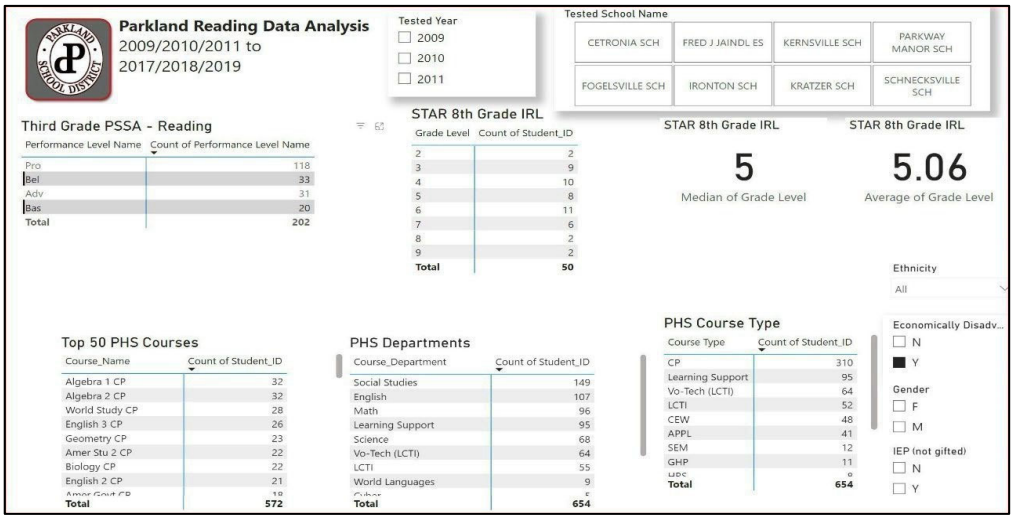


Figure 17 shows that Parkland students who were in both subgroups (*n*=202) had, on average, a fifth-grade median IRL in eighth grade. These students were therefore at least three years below the average IRL of the Parkland student population as a whole shortly before they scheduled their first high school courses. These results echo the findings of the *Double Jeopardy* report (Hernandez, 2011) that outlined the academic impact on students who were both economically disadvantaged and not proficient in reading by third grade. Students in the *Double Jeopardy* report (*n*=3975) were six times more likely to not graduate high school without targeted support (Hernandez, 2011).

Figure 17

All Cohorts - 8th Grade IRL for Students Not Proficient in Third Grade Reading and Economically Disadvantaged



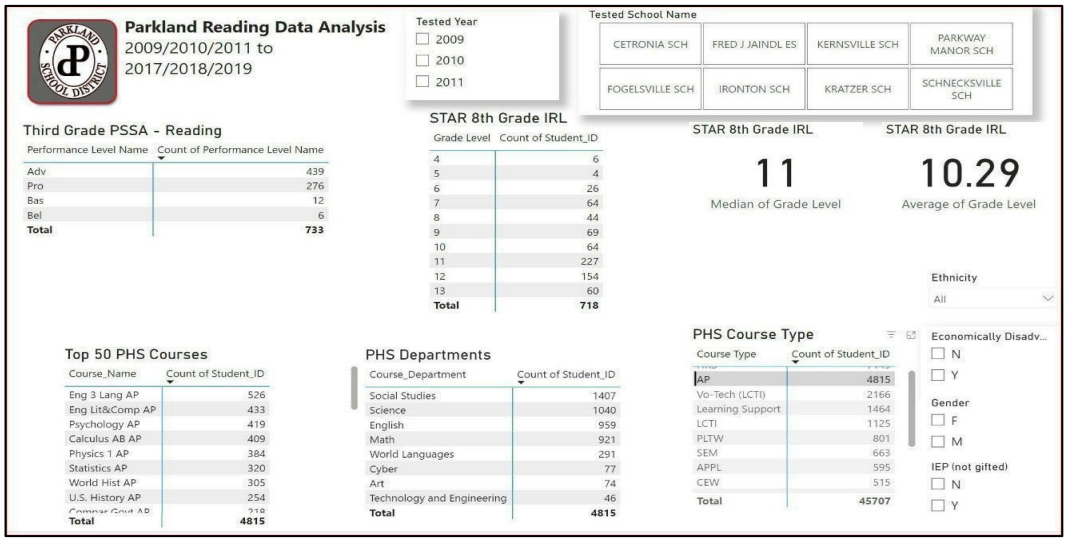
In sum, both the descriptive and statistical data established a strong relationship exists between third-grade reading proficiency levels and the corresponding eighth-grade instructional reading level. Parkland students who were at an Advanced or Proficient level in third grade were more likely to be at or above grade level in reading by eighth grade, a critical point in a student's academic career as it is the time when students prepare for their first high school course selections. This data provides an important baseline prior to reviewing the additional findings that address research questions one and two.

Research Question One

This section focuses on the first research question: How does third-grade reading proficiency impact later student enrollment in high school Advanced Placement (AP) courses? AP courses are considered college-level, and many students eventually take AP final exams in order to receive college credit for their work by receiving a score of three or higher (out of five). Based on the Parkland High School Profile (2023), in 2022, 82% of students who took 769 AP tests achieved a score of three or higher, and 29% achieved a maximum score of five. When looking at all cohorts, 733 of the 1646 students (44%) took at least one AP course with many students taking several of Parkland's 30 AP courses. These students (Figure 18), who were enrolled at Parkland from grades three through twelve, were overall strong readers, with an average eighth-grade instructional reading level of 10.29.

Figure 18

All Cohorts – Students Enrolled in AP Courses (2017, 2018, and 2019)



Of the 733 students who took AP courses, 715 were either Advanced or Proficient in reading by third grade. Conversely, only 18 of the 1646 students (or 1.09%) who were Basic or Below Basic in reading by third grade eventually took AP courses.

Table 10

Impact of 3rd-Grade PSSA Reading Proficiency Levels on Number of Students Enrolled in Advanced Placement (AP) Courses

Third-Grade Reading Proficiency Level	**2009 Cohort Students Taking AP Courses (2017)**	**2010 Cohort Students Taking AP Courses (2018)**	**2011 Cohort Students Taking AP Courses (2019)**	**All Cohorts Students Taking AP Courses**
Advanced	155	152	132	439
Proficient	103	94	80	276
Basic	3	7	3	12
Below Basic	2	3	0	6
All (Combined)	262/535	256/553	215/558	733/1646

Analyzing the data further, when looking at the 2009 cohort, five of the 535 students who were not proficient in reading (0.93%) went on to take AP courses; the 2010 cohort had 10 of 553 students (1.8%) take AP courses; and the 2011 cohort had three out of 588 students (0.53%) take AP courses. These numbers are lower than the original percentage of students from these cohorts who were not proficient in reading – 12.3%, 14.8%, and 15.6%, respectively.

The StatCrunch correlation coefficient shows a statistically significant relationship between the number of students taking AP courses and third-grade reading proficiency (r=.81). This number is lower than the CALDER study analysis of the relationship between advanced course-taking and third-grade proficiency (r=.94) (Goldhaber, 2020, p. 23), but that is perhaps because the CALDER study looked at only advanced courses and this study focused more narrowly on AP and PLTW courses, which are both advanced and college-level courses.

It is important to note that correlation does not equal causation (Mertler, 2021, p. 119). The correlation between third-grade reading proficiency and the number of AP

courses taken does not mean that one causes the other. However, the correlation between third-grade reading proficiency and the number of AP courses taken does suggest there is a relationship between the two variables. This relationship could be due to a number of factors, such as the fact that students who are more proficient in reading are more likely to be exposed to challenging academic material, which could lead them to take AP courses. Table 11 provides a descriptive analysis of the relationship between students who took AP courses and other student subgroups.

Table 11

Impact of Third-Grade PSSA Reading Proficiency Levels on Additional Subgroups (AP)

Overall Student Demographics	**2009 Cohort # of Students Taking AP Courses (2017)**	**2010 Cohort # of Students Taking AP Courses (2018)**	**2011 Cohort # of Students Taking AP Courses (2019)**	**All Cohorts # of Students Taking AP Courses (2017–2019)**
Economically Disadvantaged	10	18	12	40
IEP	32	28	20	80
Female	142	121	124	387
Mal	120	135	91	346
Asian/Pacific Islander	34	43	39	116
Black	2	5	3	10
Hispanic	8	12	11	31
Native American	3	1	0	4
White	215	195	160	570

Earlier analysis showed students who were economically disadvantaged or had IEPs had, on average, higher eighth-grade IRLs than students who were not proficient in reading as third-graders (seventh-grade IRL versus sixth-grade IRL). Here we see a proportionately higher number of students from these subgroups went on to take AP courses:

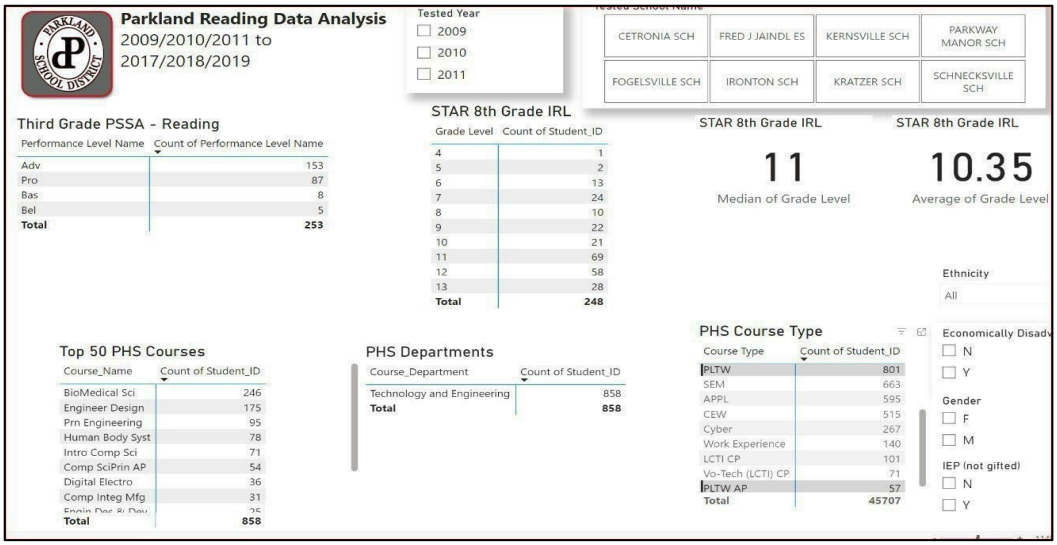
- 40/1646 economically disadvantaged students (2.43%);
- 80/1646 students with IEPS (4.8%);
- 18/1646 students who were not proficient in third-grade reading (1.09%).

Research Question Two

This section focuses on the second research question: How does third-grade reading proficiency impact later student enrollment in high school Project Lead the Way (PLTW) courses? PLTW courses are considered college-level, and many students eventually take PLTW final exams in order to receive college credit for their work, granted by the Rochester Institute of Technology and other colleges and universities. Parkland currently offers three PLTW tracks: 1) Engineering; 2) Biomedical Science; and 3) Computer Science. Parkland High School has offered PLTW Engineering for more than 20 years, while PLTW Biomedical Science and PLTW Computer Science programs were added in the last five years. Each program consists of at least four courses culminating in a Capstone course. Parkland students who took these courses were overall strong readers, with an average eighth-grade instructional reading level of 10.35.

Figure 19

All Cohorts – Students Enrolled in PLTW Courses (2017, 2018, and 2019)



Of the 253 students who took PLTW courses, 240 were either Advanced or Proficient in reading by third grade. Conversely, only 13 of the 1646 students (or 0.78%) who were Basic or Below Basic in reading by third grade eventually went out to take PLTW courses.

Table 12

Impact of 3rd-Grade PSSA Reading Proficiency Levels on Number of Students Taking Project Lead the Way (PLTW) Courses

Third-Grade Reading Proficiency Level	**2009 Cohort Number of Students Taking PLTW Courses**	**2010 Cohort Number of Students Taking PLTW Courses**	**2011 Cohort Number of Students Taking PLTW Courses**	**All Cohorts Number of Students Taking PLTW Courses**
Advanced	22	66	68	153
Proficiency	16	33	44	87
Basic	2	4	4	8
Below Basic	0	1	2	5
All (Combined)	40/535	99/553	114/558	253/1646

Analyzing the data from Table 12 further, when looking at the 2009 cohort, two of the 535 students who were not proficient in reading (0.37%) went on to take PLTW courses; the 2010 cohort had five of 553 students (0.9%) take PLTW courses; and the 2011 cohort had six out of 588 students (1.07%) take PLTW courses. These numbers are much lower proportionately than the original percentage of students from these cohorts who were not proficient in reading – 12.3%, 14.8%, and 15.6%, respectively.

The StatCrunch correlation coefficient shows a statistically significant relationship between the number of students taking PLTW courses and third-grade reading proficiency (r=.73). This number is lower than the CALDER study analysis of the relationship between advanced course-taking and third-grade proficiency (r=.94) (Goldhaber, 2020, p.23), but that is perhaps because the CALDER study looked at advanced courses and this study focused more narrowly on AP and PLTW courses, which are both advanced and college-level courses. However, both findings are statistically significant.

Again, it is important to note that correlation does not equal causation (Mertler, 2021, p. 119). The correlation between third-grade reading proficiency and the number of PLTW courses taken does not mean that one causes the other. One important factor is that

there are fewer PLTW courses than AP courses, primarily because the additional PLTW tracks (Computer Science and Biomedical) were not added to Parkland's course catalog options until 2018 and 2019, respectively. However, the correlation between third-grade reading proficiency and the number of PLTW courses taken is statistically significant and does suggest that there is a positive relationship between the two variables. Table 13 provides a descriptive analysis of the relationship between students who took PLTW courses and other student subgroups.

Table 13

Impact of Third-Grade PSSA Reading Proficiency Levels on Additional Subgroups (PLTW)

Overall Student Demographics	**2009 Cohort Students Taking PLTW Courses**	**2010 Cohort Students Taking PLTW Courses**	**2011 Cohort Students Taking PLTW Courses**	**All Cohorts Students Taking PLTW Courses**
Economically Disadvantaged	1	5	9	15
IEP	8	11	11	30
Female	8	33	53	94
Male	32	66	61	159
Asian/Pacific Islander	4	19	29	52
Black	1	2	1	4
Hispanic	2	5	3	10
Native American	0	0	1	1
White	33	73	80	186

Earlier analysis showed students who were economically disadvantaged or had IEPs had, on average, higher eighth-grade IRLs than students who were not proficient in reading as third graders (seventh grade versus sixth grade). Here we see a proportionately higher number of students from these subgroups went on to take PLTW courses:

- 15/1646 economically disadvantaged students (0.90%);
- 30/1646 students with IEPS (1.8%);
- 13/1646 students who were not proficient in third-grade reading (0.78%).

Research Question Three

The quantitative data analysis indicated a strong positive relationship between reading proficiency and the number of students taking Advanced Placement or Project Lead the Way courses. And in all three years where the PSSA reading data was examined (2009, 2010, and 2011), Parkland scores were above the State average. This section addresses the question: What instructional practices and beliefs are common among Parkland's elementary staff in schools which have consistently high levels of students reaching reading proficiency by third grade as measured by the PSSA?

The 2016 Progress in International Reading Literacy Survey (PIRLS) questionnaire was used for the qualitative portion of this research study. As noted on the National Center for Educational Statistics website (n.d.), "it is designed to measure school and teacher practices related to reading instruction" and has been used by schools worldwide since 2001, with a high degree of reliability."

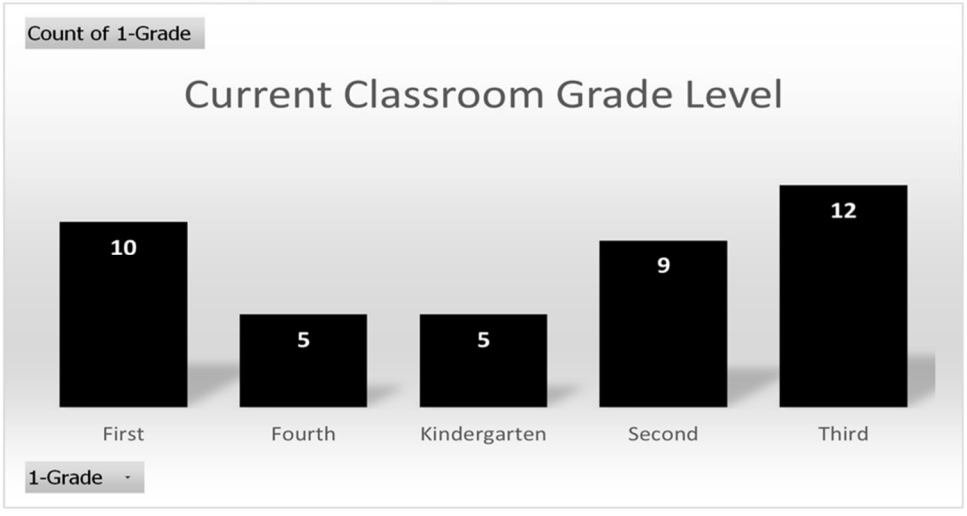
The PIRLS study (Appendix A) is comprised of 34 questions, but many of the questions consist of multiple parts, so in total the questionnaire measured 125 data points with several open-ended questions included. The questions are organized into 8 sections labeled as follows: 1) About You; 2) School Environment; 3) About Being a Teacher; 4) About Teaching Reading; 5) Computer and Library Resources: 6) Homework; 7) Assessing Reading; and 8) Final Thoughts (open-ended questions). The largest section, and the one most relevant to addressing the research question regarding instructional practices, was section 4, About Teaching Reading. This section asked teachers several specific questions regarding the instructional practices, strategies, and resources they use on a consistent basis.

The PIRLS study is a research-based tool, originally created in 2001 by the National Center for Educational Statistics with oversight by the United States Department of Education. It is usually updated and administered every five years to school districts that choose to participate. The PIRLS study took approximately 30 minutes to complete, and 41 teachers representing five of the nine Parkland elementary schools (or 20.19% of Parkland's total elementary teaching staff) volunteered to participate. As illustrated in Figure 20 there was representation across grade levels K-4:

- Five of the 41 teachers (12%) teach Kindergarten;
- Ten of the 41 teachers (24%) teach First Grade;
- Nine of the 41 teachers (22%) teach Second Grade;
- Twelve of the 41 teachers (29%) teach Third Grade;
- Five of the 41 teachers (12%) teach Fourth Grade.

Figure 20

Grade Level Taught of PIRLS Participants



According to Dr. Pamela Kelly, the Director of Human Resources at Parkland, 100% of Parkland elementary teachers are highly qualified based on the standards set forth by the Pennsylvania Department of Education. In addition, all but one of the teachers who

completed the survey indicated they had a master's degree. Based on the response to the first part of Question 3 (Figure 21), the teachers who participated in the study were an experienced group, well-versed in Parkland's early literacy program. In response to the second part of Question 3, "Were you a teacher at Parkland during the years 2009, 2010, and 2011?," the majority of the teacher (36/41 responses or 88%) indicated they were teaching at Parkland during the time corresponding to the third-grade testing data that was analyzed in the quantitative portion of the study (Figure 22).

Figure 21

Years of Teaching Experience of PIRLS Participants

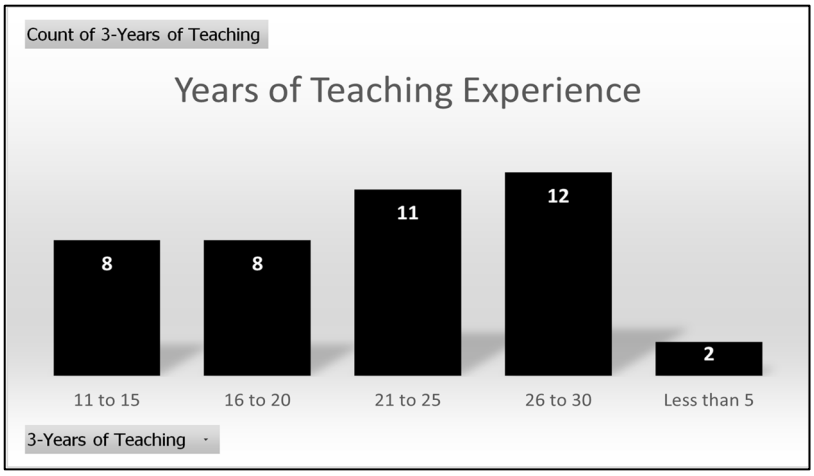
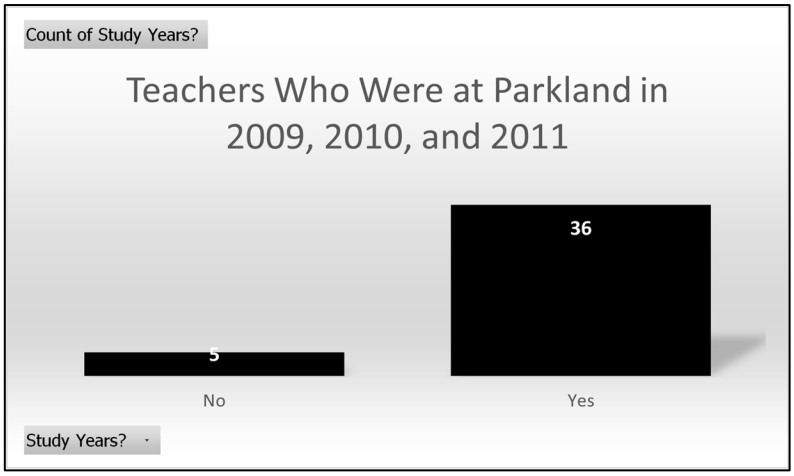


Figure 22

Teachers Who Were at Parkland in 2009, 2010, and 2011



In qualitative research, researchers aim to gather in-depth insights, perspectives, and experiences from a smaller number of participants. This approach allows for a deeper understanding of the research topic but may not involve large sample sizes typically associated with quantitative research. Generally, qualitative studies involve smaller sample sizes, ranging from as few as 5 to as many as 30 participants, although there can be exceptions (Mertler, 2021). As stated by Mertler (2021), "It is important to note that the focus in qualitative research is on the richness and depth of the data rather than the number of responses. Researchers prioritize the *quality* of the information gathered rather than the *quantity* of participants" (p. 210).

The depth of the questions, coupled with the responses from this experienced group of elementary teachers, provided a comprehensive answer to the third research question: What instructional practices and beliefs are common among Parkland's elementary staff in schools which have consistently high levels of students reaching reading proficiency by third grade as measured by the PSSA?

PIRLS Question 20: When you have reading instruction and/or do reading activities with the students, how often do you do the following?

- Read aloud to students:
    - Every day or almost every day – 37/41 responses or 90.2%;
    - Once or Twice a Week - 4/41 responses or 9.8%;
- Ask students to read aloud:
    - Every day or almost every day - 31/41 responses or 75.61%;
    - Once or twice a week - 8/41responses or 19.51%;
    - Once or twice a month - 2/41 responses or 4.87%;
- Ask students to read silently on their own:
    - Every day or almost every day - 39/41 responses or 95.13%;
    - Once or twice a week - 2/41 responses or 4.87%;

- Teach students strategies for decoding sounds and words:
    - Every day or almost every day – 27/41 responses or 65.85%;
    - Once or twice a week – 12/41 responses or 29.26%;
    - Once or twice a month – 2/41 responses or 4.87%;
- Teach new students new vocabulary systematically:
    - Every day or almost every day – 14/41 responses or 34.14%;
    - Once or twice a week – 27/41 responses or 65.85%;
- Teach students how to summarize the main ideas:
    - Every day or almost every day – 9/41 responses or 21.95%;
    - Once or twice a week – 16/41 responses or 39.02%;
    - Once or twice a month – 2/41 responses or 4.87%;
- Teach or model skimming or scanning strategies
    - Once or twice a week – 17/41 responses or 41.46%;
    - Once or twice a month – 12/41 responses or 29.26%;
    - Never or almost never – 2/41 responses or 4.87%;
- Provide reading materials that match the students' interests:
    - Every or almost every lesson – 7/41 responses or 17.07%;
    - About half the lessons – 16/41 responses or 39.02%;
    - Some lessons – 18/41 responses or 43.90%;
- Provide materials that are appropriate for the reading level of the students:
    - Every or almost every lesson – 27/41 responses or 65.85%;
    - About half the lessons – 14/41 responses or 34.14%;
- Link new content to students' prior knowledge:
    - Every lesson or almost every lesson – 27/41 responses or 65.85%;
    - About half the lessons – 14/41 responses or 34.14%;
- Encourage students to develop their understanding of the text:
    - Every or almost every lesson – 37/41 responses or 90.24%;
    - About half the lessons – 4/41 responses or 9.76%;

- Encourage student discussion of texts:
    - Every or almost every lesson – 37/41 responses or 90.24%;
    - About half the lessons – 4/41 responses or 9.76%;
- Give students time to read books of their own choosing:
    - Every or almost every lesson – 23/41 responses or 56.09%;
    - About half the lessons – 6/41 responses or 14.6%;
    - Some of the lessons – 11/41 responses or 26.82%;
- Give individualized feedback to each student:
    - Every day or almost every day – 23/41 responses or 56.09%;
    - About half the lessons – 10/41 responses or 24.39%;
    - Some of the lessons – 8/41 responses or 19.51%;
- Have students locate information within the text:
    - Every day or almost every day – 41/41 or 100%;
- Have students identify the main ideas of what they have read:
    - Every day or almost every day – 25/41 responses or 60.97%;
    - Once or twice a week – 16/41 responses or 39.02%;
- Have students explain or support their understanding of what they have read:
    - Every day or almost every day – 35/41 responses or 85.36%;
    - Once or twice a week – 6/41 responses or 14.63%;
- Have students compare what they have read with experiences they have had:
    - Every day or almost every day – 23/41 responses or 56.09%;
    - Once or twice a week – 14/41 responses or 34.14%;
    - Once or twice a month – 4/41 responses or 9.76%%;
- Have students compare what they have read with other things they have read:
    - Every day or almost every day – 15/41 responses or 36.58%;
    - Once or twice a week – 18/41 responses or 43.90%
    - Once or twice a month – 8/41 responses or 19.51%;

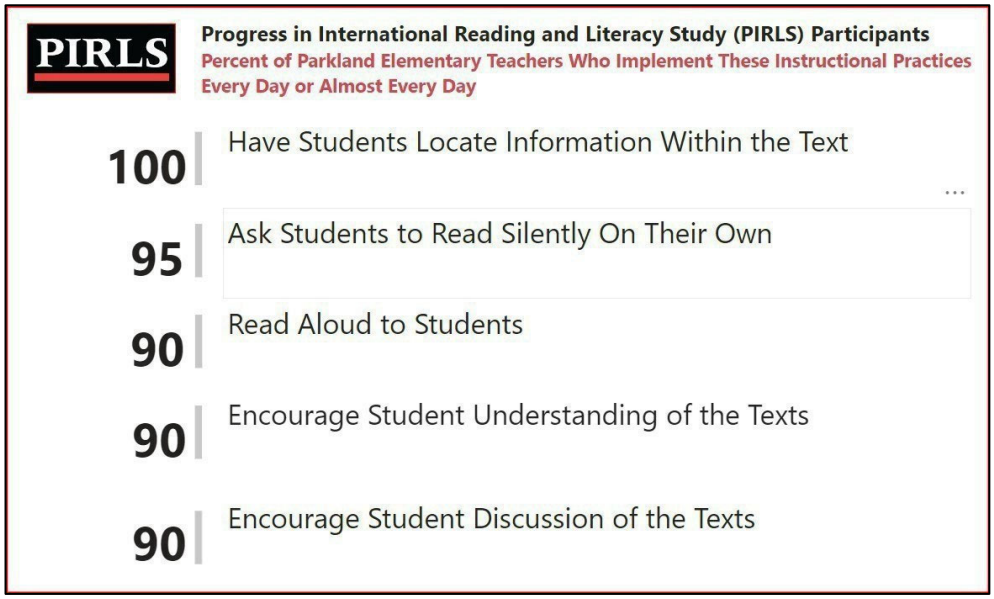
- Have students make predictions about what will happen next in the text:
    - Every day or almost every day – 29/41 responses or 70.73%;
    - Once or twice a week – 10/41 responses or 24.39%;
    - Once or twice a month – 2/41 responses or 4.87%;
- Have students make generalizations and draw inferences based on what they have read:
    - Every day or almost every day – 21/41 responses or 51.21%;
    - Once or twice a week – 18/41 responses or 43.90%;
    - Once or twice a month – 2/41 responses or 4.87%;
- Have students write something about or in response to something they have read:
    - Every day or almost every day – 13/41 responses or 31.70%;
    - Once or twice a week – 20/41 responses or 48.78%;
    - Once or twice a month – 8/41 responses or 19.51%;
- Have students talk with each other about what they have read:
    - Every day or almost every day – 21/41 responses or 51.21%;
    - Once or twice a week – 16/41 responses or 39.02%;
    - Once or twice a month – 4/41 responses or 9.75%;
- Have students work independently on an assigned plan or goal:
    - Always or almost always – 7/41 responses or 17.07%;
    - Often – 21/41 responses or 51.21%;
    - Sometimes – 11/41 responses or 26.83%;
    - Never – 2/41 responses or 4.87%;
- Have students take a written test or quiz about what they have read:
    - Every day or almost every day – 4/41 responses or 9.75%;
    - Once or twice a week – 18/41 responses or 43.90%;
    - Once or twice a month – 19/41 responses or 46.34%;

There was surprising consistency to some responses regarding the specific instructional strategies Parkland teachers use to teach reading, regardless of building or even grade level. It speaks to the experience, training, and skill level of the teachers. The number of different strategies and resources the teachers use on a regular basis confirmed the complexity of teaching reading, or as Moats (2020) stated: "Teaching reading IS rocket science. But it is also established science, with clear specific, practical instructional strategies that all teachers should be taught and supported in using" (p.1).

Figure 23 illustrates the top instructional strategies that Parkland elementary teachers indicated they used either every day or almost every day:

Figure 23

Most Popular Instructional Practices for Teaching Reading

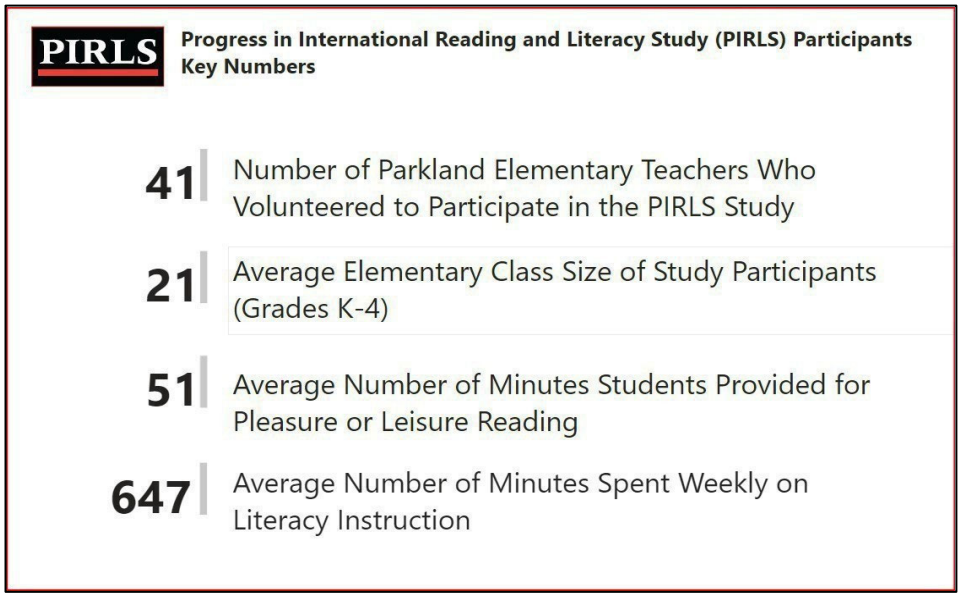


Additional strategies that were widely used by teachers either every day or almost every day included having students explain what they have read (85%) and asking students to read aloud (75%). Teachers were also asked to provide open-ended responses relative to their class size, the number of instructional minutes they spend weekly on reading

instruction, and the amount of time they provide students for pleasure reading weekly. Figure 24 provides an overview of these key numbers:

Figure 24

PIRLS Study – Key Numbers



Finally, teachers were asked at the end of the survey to provide a response to the open-ended question: What have you found most beneficial in learning about and providing effective early literacy instruction while at Parkland School District? Below are a few of their responses (the full list can be found in Appendix F):

- "I feel like as an effective kindergarten teacher I am always working on researching and learning the new and best ways to help my students learn and grow. When I explicitly teach in a structured way with both whole and small groups, I find I get the best results with my students." [Respondent 2]
- "It's important to start early and to read TO the children, as well as listen to them read. Too many children are not read to and I see a decline in their interest in reading/books." [Respondent 13]

- "I have found that LETRS and Heggerty have improved my students' phonemic awareness which helps them become better readers." [Respondent 6]
- "A focus on phonemic awareness has helped my students grow. This district gets reading instruction. It is a priority in my building." [Respondent 16]

Discussion

The qualitative findings from the PIRLS study outlined a number of instructional strategies that a majority of Parkland teachers use consistently. The average amount of time teachers indicated they spend on English/Language Arts instruction - 647 minutes weekly - was also significant. Library time is important at Parkland, with 100% of teachers indicating they maintain a classroom library for their students and also have their class go to the school library every week. Additional data surfaced that speaks to the culture and climate of the schools:

- The average elementary class size was 21;
- 100 percent of teachers responded they felt safe at their school;
- Most teachers (88 percent) have been at Parkland for at least 12 years;
- Students are provided, on average, 51 minutes for pleasure reading weekly.

As one teacher (Respondent 20) stated, "Reading is important in this school." And the beliefs of teachers matter. While there are many factors that contribute to a student's success, research suggests that, among school-related factors, teachers are most impactful (Chetty et al., 2014).

The PIRLS data overall showed that Parkland has a high-quality teaching staff that feels supported and is provided with regular professional development opportunities and access to quality teaching materials. These qualitative factors have played and continue to play a role in Parkland's above-average reading proficiency levels. This is important since the

quantitative data affirmed that third-grade reading proficiency levels had a cascading effect, later impacting eighth-grade students' instructional reading levels and eventually the number of students enrolled in advanced high school courses.

The amount of quantitative and qualitative data used in this mixed-methods study was considerable. Every effort was made to extrapolate the data most relevant to the original research questions, to grab the signal from the proverbial noise. Therefore, not all data collated for this project is included in the final research report. However, there is data that is still important to understanding the impact of Parkland's early literacy program. This data can be found in Appendix E (Top 5 Courses and Course Types Students Enrolled in 2017, 2018, and 2019, Organized by Third-Grade Proficiency Level) and Appendix F (PIRLS Open-Ended Responses).

Summary

Although it stands to reason that a student's reading ability would affect the types of courses the student enrolls in, the persistent and statistically significant nature of the relationship between third-grade reading levels and later access to advanced courses was surprising. In 2014, when the District first reviewed data to look at the correlation, it wasn't definitive if the results – only one percent of students who were not proficient in third-grade reading later enrolled in AP courses – were an anomaly or a trend. Now, having examined three additional cohorts of students, all of which produced similar results with not only AP but PLTW courses as well, the answer is clear.

In the process of conducting this research study, two additional trends emerged: 1) the relationship between third-grade reading proficiency levels and eighth-grade IRL; and 2) lack of reading proficiency can be even more impactful to students long-term than other historically determinant factors such as being economically disadvantaged.

However, while the study was able to answer some key questions, in keeping with the nature of action research, it also raised others. These opportunities for reflection and future study will be explored in the next and final chapter.

CHAPTER V

Conclusions and Recommendations

This chapter concludes the study by summarizing the key research findings in relation to the research aims and questions, as well as the value and contribution thereof. It also reviews the limitations of the study, provides recommendations as a result of the study, and proposes areas for future research.

The original research questions sought to look at the relationship between third-grade reading proficiency levels as measured by the Pennsylvania System of School Assessment (PSSA) and their relationship to student enrollment in advanced high school courses as represented by Advanced Placement (AP) and Project Lead the Way (PLTW) courses, both college-level rigor. In addition, teacher feedback on the Progress in International Reading and Literacy Study (PIRLS) was used to answer questions about instructional practices Parkland teachers use to develop elementary-grade readers. Through this study, the quantitative data illustrating the impact of third-grade reading proficiency was complemented by qualitative data showing the instructional practices, resources, and environment that contribute to Parkland's elementary literacy program. The combined datasets provided a more complete picture of Parkland's elementary literacy program and its impact on high school learning outcomes.

Key Findings

The focus on third grade as a key year in academic development was validated by the CALDER study, *Assessing the Accuracy of Elementary School Test Scores as Predictors of Students' High School Outcomes* (Goldhaber et al., 2020):

> We conclude that early student struggles on state tests are a credible warning signal for schools and systems that make the case for additional

> academic support in the near term, as opposed to assuming that additional years of instruction are likely to change a student's trajectory. Educators and families should take third-grade test results seriously and respond accordingly; while they may not be determinative, they provide a strong indication of the path a student is on. (p. 22)

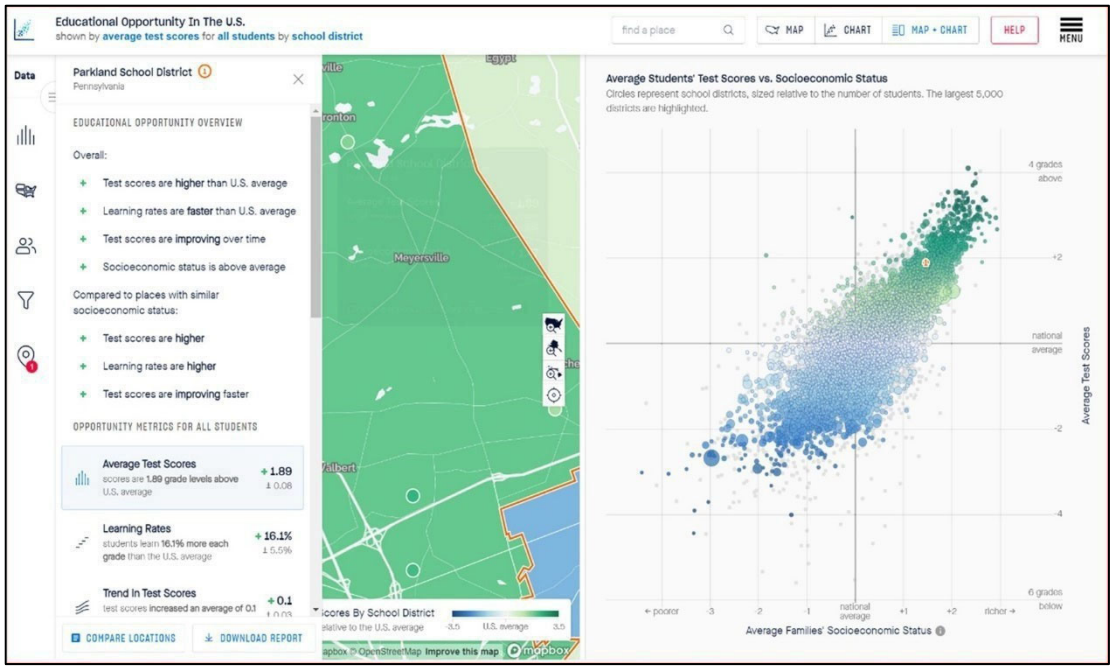
The CALDER study – analyzing nine years of panel data from three different states (North Carolina, Massachusetts, and Washington) - later concluded that third-grade standardized test results had almost as much predictive power as eighth-grade test results in ascertaining which third-grade students would eventually take advanced courses in high school (r=.94) (Goldhaber et al., 2020, p.23). In a similar fashion, the research study at Parkland affirmed a strong relationship between third-grade PSSA reading proficiency levels and eighth-grade STAR instructional reading levels (r=.86), as well as statistically significant relationships between third-grade reading proficiency and enrollment in high school AP courses (r=.81) and PLTW courses (r=.73).

In addition, students enrolled in either AP or PLTW courses were – on average – at a tenth-grade instructional reading level when tested in eighth grade, or at least two grade levels higher than the average of their peers. Conversely, students who were not proficient in reading by third grade were – on average – at a sixth-grade reading level in eighth grade, or at least two years below the average IRL when tested in eighth grade. These students subsequently enrolled in both AP and PLTW courses at much lower rates than their peers, averaging approximately one percent enrollment rates for both AP and PLTW courses. However, overall Parkland had higher than average third-grade reading proficiency scores (87.7% in 2009, 85.2% in 2010, and 84.4% in 2011) which likely

contributed to the high levels of students that participated in advanced courses at Parkland High School from 2017 to 2019. Figure 25 shows the results of a Stanford study released in April 2023 (edopportunity.org) that confirmed these high achievement levels were not due solely to Parkland's above-average socioeconomic level:

Figure 25

Stanford Study – Impact of Socioeconomic Levels on Academic Performance 2009 to 2018 – Parkland School District



The study analyzed national and state testing data from 2009 to 2018, comparing the performance of school districts across the country relative to the school district's socio-economic level. The analysis found that during this timeframe Parkland School District compared favorably to school districts with similar socioeconomic status, achieving higher test scores, with test scores improving at a faster-than-average rate. Learning rates were also higher, with students learning 16.1 percent more each grade than the United States average (Educational Opportunity Project at Stanford University, 2023).

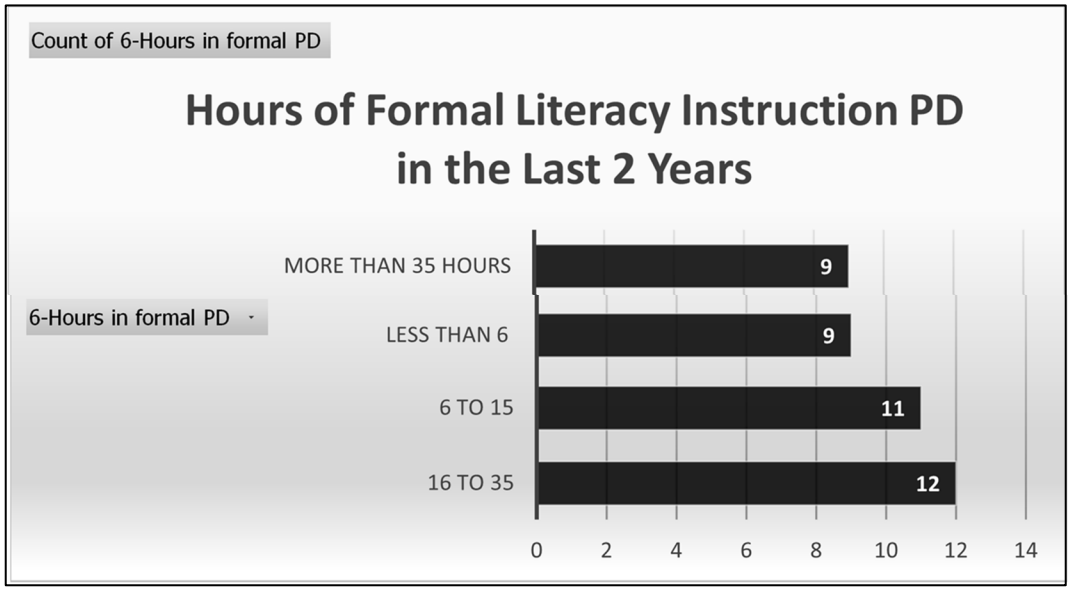
The third research question addressed the instructional strategies, practices, policies, and beliefs that contributed to these above-average test scores. The quantitative section of this study, encompassing research questions one and two, addressed the "what" aspect, while the qualitative data analysis from research question three shed light on the "how." Parkland starts by ensuring all teachers are highly qualified as measured by the Pennsylvania Department of Education state standards. The results of the PIRLS study demonstrated there is an emphasis placed on literacy at the elementary level, as evidenced by the average amount of literacy-focused instructional time allotted per week (more than 600 minutes) with students provided an average of 51 minutes per week for personal leisure reading. In addition, there is a classroom library in every classroom, and scheduled library time for classes every week.

With regards to staffing, every Parkland elementary school has a building principal, library/media specialist, and a reading specialist. And despite a rapidly growing student population, the District tries to follow a policy of no more than 22 students in kindergarten to second-grade classrooms, and no more than 25 students in third through fifth-grade classrooms. Adherence to this policy could be seen in the average class size of 21 students for the teachers who participated in the study.

Instructionally, there were a number of practices that Parkland teachers do every day or almost every day, with 100 percent of PIRLS participants indicating they regularly have students locate information within the text and 90 percent responding they regularly encourage student understanding of the text and discussion of the text. As shown in Figure 26, all teachers have recently received professional development specific to the topic of literacy instruction, in addition to regular grade-level meetings, which may explain, in part, the consistency found in teachers' instructional practices.

Figure 26

Hours of Formal Literacy Professional Development in the Last Two Years



Though the PIRLS data provided a large quantity of useful information, it is difficult to define precisely what contributed most to Parkland's overall success with elementary literacy. It is likely a combination of many factors, with the PIRLS study simply scratching the surface. However, thanks to the longitudinal data accessible in Pennsylvania, the outcomes of Parkland's focus on early literacy are easier to pinpoint.

The CALDER report noted that "today more than half of the states still do not have easy access to detailed longitudinal data spanning third grade to graduation" (Goldhaber et al., 2020, p. 3). Fortunately, since 2010 Pennsylvania has maintained a longitudinal database of student academic and related data called the Pennsylvania Information Management System, or PIMS. Some of this data is accessible to the public through two sites, the Future Reading Index (futurereadypa.org) and the Pennsylvania Value-Added Assessment System (PVAAS), available at pvaas.sas.com. The PVAAS data portal provides information on students' academic growth, with the expectation that

students should achieve at least a year's worth of academic growth in a given school year in the subjects that are measured (English/Language Arts, Mathematics, and Science). As shown in Table 14, in 2022 Parkland had strong PVAAS growth indicators "well above" a year's worth of growth in English/Language Arts grades four through eight.

Table 14

2022 PVAAS Academic Growth Measures for Parkland School District

Grade	Subject	Year	Growth Color Indicator	Growth Index	Effect Size	Growth Measure
6	PSSA Math - 4-8	2022	Well Above	4.34	0.16	2.0
	PSSA English Language Arts - 4-8	2022	Well Above	9.05	0.33	4.2
7	PSSA Math - 4-8	2022	Well Above	4.85	0.19	2.4
	PSSA English Language Arts - 4-8	2022	Well Above	4.47	0.18	2.3
8	PSSA Math - 4-8	2022	Well Above	5.09	0.20	2.6
	PSSA English Language Arts - 4-8	2022	Well Above	6.32	0.25	3.2
	PSSA Science - 4,8	2022	Below	-1.63	-0.06	-7.3
Across Grades	PSSA Math - 4-8	2022	Well Above	11.78	0.20	2.5
	PSSA English Language Arts - 4-8	2022	Well Above	14.35	0.25	3.1

Limitations

As noted in this study, the ability to read alters not only a child's access to print information but their behavior and disposition (Brokamp); ability to fully participate in future learning opportunities (Goldhaber et al., 2020; Lesnick et al., 2010); potential financial earnings (Nietzel, 2020); and overall quality of life. Given the impact of third-grade reading, it is worth uncovering any factors that have either a positive or adverse effect on students' reading abilities. The PIRLS questionnaire did provide some information, but it also pointed to areas for additional review. Although teachers from

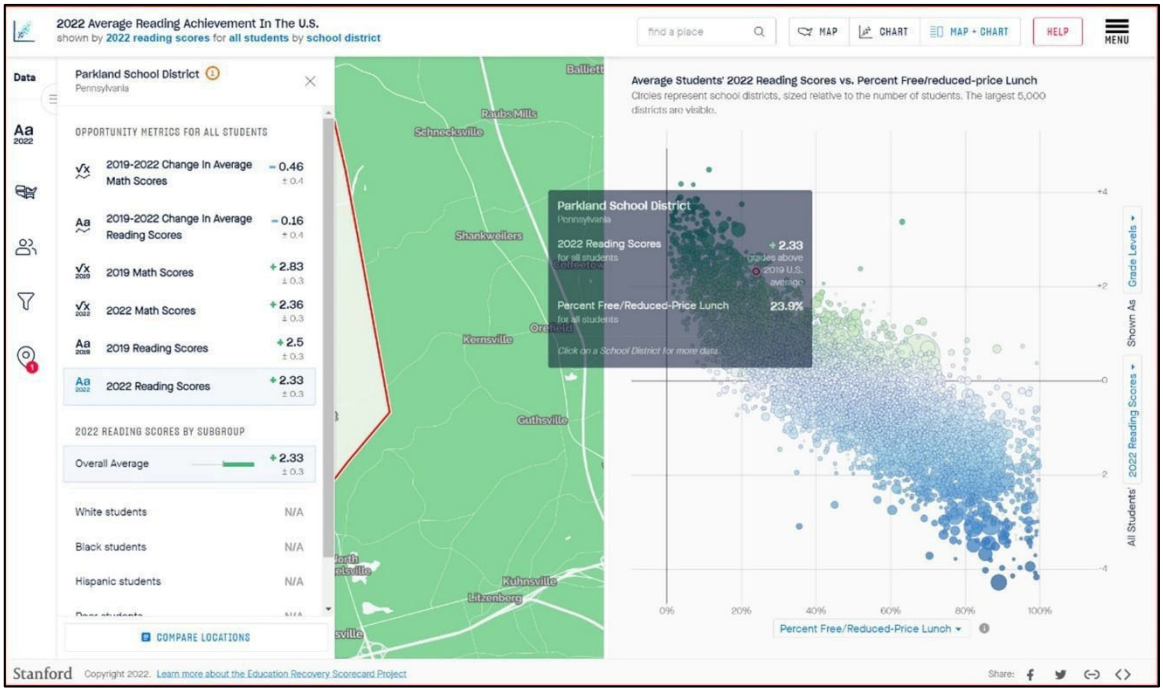
five of the nine Parkland elementary schools participated in the PIRLS study, it would be worthwhile to have a broader discussion with all elementary schools about what does and does not work when it comes to helping students read. Constructively, the District has recently adopted the Enhanced Core Reading Instruction (ECRI) program to deepen its understanding of best practices to promote early literacy instruction in grades K, 1, and 2.

The PIRLS qualitative data is a snapshot of where teachers are currently with their instructional practice, which of course is not determinant of where they were in 2009, 2010, and 2011. This is another limitation of the study. However, 36 out of the 41 teachers who participated in the PIRLS survey (or 88 percent) had been teachers at Parkland during 2009, 2010, and 2011, providing some measure of triangulation between the quantitative and qualitative datasets. In addition, as noted the data from the 2023 Stanford University study confirmed Parkland had positive learning outcomes during the timeframe 2009 through 2018, just prior to the pandemic.

These positive learning outcomes continued post-pandemic, as evidenced by a second study released by Stanford University in April 2023 which examined the impact of the pandemic on student learning by analyzing national and state testing data from 2019 through 2022 (Educational Opportunity Project at Stanford University, 2023). The Stanford data shows that although Parkland's reading scores declined by 0.16 of a grade level from 2019 to 2022, the overall reading scores in 2022 were still 2.33 grade levels higher than the United States average (Figure 27). Although not correlative, Parkland's strong reading achievement pre-pandemic likely helped the District maintain a high level of student performance post-pandemic. It is another discovery from this study that warrants further investigation.

Figure 27

Stanford Study – Impact of the Pandemic on Reading Achievement – 2019 to 2022



The Stanford data confirms the pandemic did have at least some impact on Parkland's reading and math scores, which is why the longitudinal timeframe for the quantitative study is 2009 through 2019. Ideally, the timeframe would have run through the 2022-2023 school year to align the data as closely as possible with the recent PIRLS data, but the pandemic put school districts and teachers in less-than-ideal conditions.

Another limitation can be found in the nature of longitudinal studies. It proved useful to analyze three cohorts of students for this study: third graders from 2009, 2010, and 2011 whose total population among the three cohorts was 2081 students. However, by focusing on the group of students who were at Parkland from third through eleventh grades (n=1646), results from students who were at Parkland in third grade but later left the District (n=435) were not considered. This may have been a factor in the high

number of students enrolled in AP courses (733/1646 students from all three cohorts, or 44.35 percent). By comparison, in a typical year at Parkland High School between 25 and 36 percent of students enroll in at least one AP course. It warrants further study to see if transiency also plays a role in student access to advanced high school courses.

Implications for Practice

By several measures, Parkland has a strong early literacy program. It is working to improve further through the addition of programs like ECRI and by strengthening relationships with parents and community partners. Parkland recognizes the power of collective impact. Having students reach reading proficiency by third grade is somewhat like a relay race, and the further ahead students are when they enroll with the District the easier it is to have students reach that critical milestone. Raising awareness of the importance of early childhood literacy for parents, guardians, and child-care providers in the birth to age five space is, therefore, an important part of the learning-to-read process.

Accordingly, Parkland has recently had meetings with local PreK providers to analyze the Kindergarten Entry Inventory (KEI) data that the District captures electronically during its kindergarten screening process. By partnering with local PreK providers and providing them with the KEI data, these PreK educators can see the impact of their own instructional programs and can adjust, if needed, so that their curricula and instructional goals are more closely aligned with that of the District. This strategy has the backing of research, which suggests an early focus on literacy has long-term benefits: "79% of the variance in high school reading ability can be accounted for by intensity of foundational skills instruction in 1st grade" (EAB, 2019, p. 20).

Although children do not need to know how to read prior to starting kindergarten, having exposure to language early and often is helpful. Early childhood is a critical period for brain development, with birth to age two being the fastest growth period according to recent cognitive research (Sahakian et al., 2022).

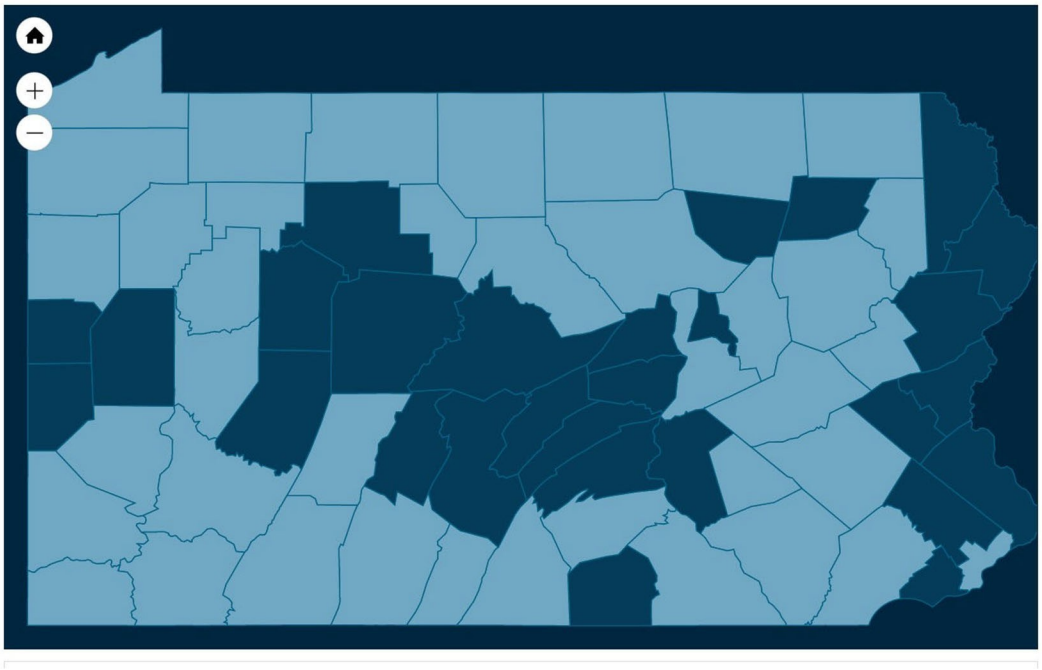
Currently, the District provides parent workshops through a program called Parent University, and also targeted elementary parent workshops with funding from the Title I federal grant program. Through its partnership with Lehigh Valley Reads, parents of PreK children can sign up for weekly tips from a texting service called Parent Powered that promotes literacy in the home. World Reader, a digital library of hundreds of books, is another free service provided by Lehigh Valley Reads.

While access to digital books is helpful, according to Kulikova (2019), access to print books for young children is preferable. Unfortunately, according to Buehler and Guignard (2019) "sixty-one percent of low-income families do not have access to print books in the home" (p. 16). However, the District could tap into services such as the Imagination Library that would provide parents in the Parkland community with the ability to have books delivered directly to the home monthly from birth to age five, with the potential to build a home library of 60 books by the time the child reaches kindergarten.

According to its website, the Imagination Library is currently accessible to ten percent of American children, and there are several research studies that have concluded the service has a strong positive literacy effect on children, especially when it is used for a period of at least two years (Ridzi et al., 2016). Presently, there are 47 locations that offer the service in the state of Pennsylvania, including several that border the Parkland School District in Lehigh County as shown by the areas shaded in light blue (Figure 28).

Figure 28

Imagination Library Locations within Pennsylvania (as of June, 2023)



There is a cost of $2.20 per book for the service (which includes mailing), with funding usually provided by a local foundation or other non-profit agency. For example, in Pennsylvania, 13 of the 47 sites that provide the Imagination Library service are managed by the local United Way. Students in Carbon County, which borders the District to the north, are able to enroll in the service through a partnership between St. Luke's University Hospital and the Carbon County Community Foundation. In this way, as soon as a child is born the parents are provided information and resources about early literacy at the nexus of care. Some school districts, such as Kutztown, offer the service through their own local foundation. According to the Imagination Library website's cost estimator, based on the District zip codes Parkland currently has 4754 students under the age of five who could take advantage of this service (Table 15).

Table 15

Imagination Library Costs – Parkland School District – Years 1 through 5

TOTAL ELIGIBLE POPULATION UNDER 5	BUDGETED POPULATION (65 % OF ELIGIBLE)	COST OF BOOKS AND MAILING PER CHILD
4754	3090	$2.20

THE EXPENSES BELOW REFLECT THE CORRESPONDING PERCENTAGE OF THE BUDGETED POPULATION

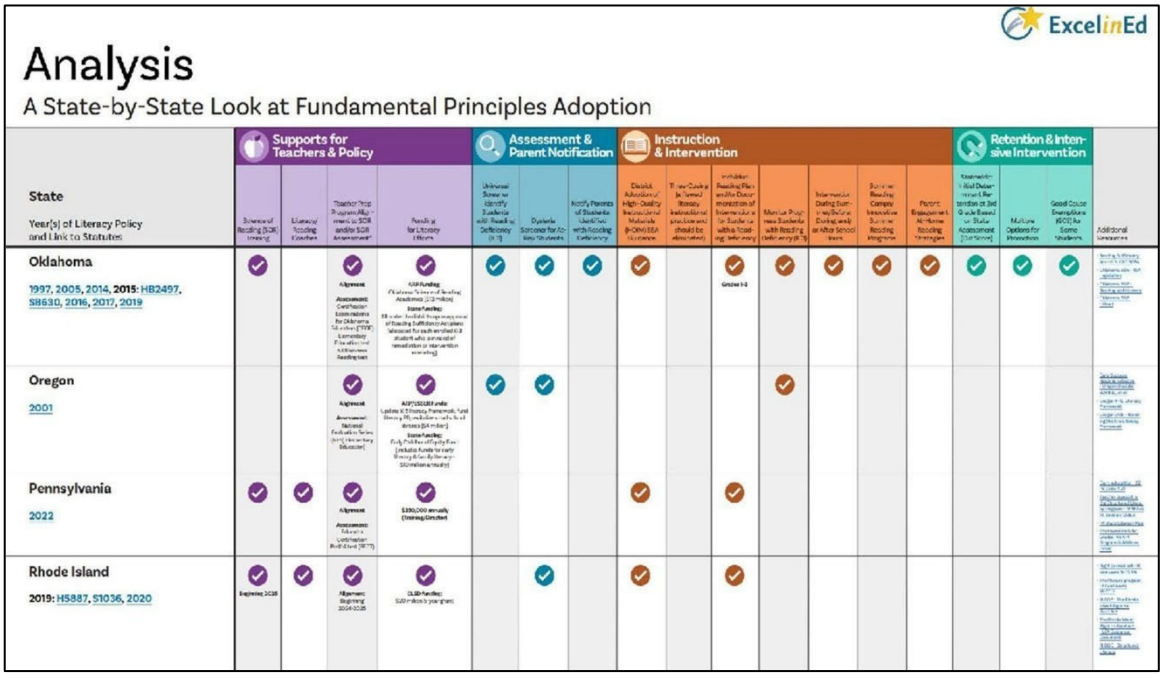
	Registered Population	YEAR 1	Registered Population	YEAR 2	Registered Population	YEAR 3	Registered Population	YEAR 4	Registered Population	YEAR 5
Mth 1	5%	$340	20%	$1,360	40%	$2,719	60%	$4,079	80%	$5,438
Mth 2	6%	$432	22%	$1,483	42%	$2,843	62%	$4,203	82%	$5,562
Mth 3	8%	$525	24%	$1,607	44%	$2,967	64%	$4,326	84%	$5,686
Mth 4	9%	$617	25%	$1,731	45%	$3,090	65%	$4,450	85%	$5,810
Mth 5	10%	$710	27%	$1,854	47%	$3,214	67%	$4,574	87%	$5,933
Mth 6	12%	$802	29%	$1,978	49%	$3,338	69%	$4,697	89%	$6,057
Mth 7	13%	$895	31%	$2,102	51%	$3,462	71%	$4,821	91%	$6,181
Mth 8	15%	$987	33%	$2,226	53%	$3,585	73%	$4,945	93%	$6,304
Mth 9	16%	$1,080	35%	$2,349	55%	$3,709	75%	$5,069	95%	$6,428
Mth 10	17%	$1,172	36%	$2,473	56%	$3,833	76%	$5,192	96%	$6,552
Mth 11	19%	$1,264	38%	$2,597	58%	$3,956	78%	$5,316	98%	$6,676
Mth 12	20%	$1,357	40%	$2,721	60%	$4,080	80%	$5,440	100%	$6,799
		$10,181		$24,481		$40,796		$57,112		$73,426

Using a sliding scale, if eligible children in the Parkland community currently under the age of five were to enroll in the service, the annual cost would be $73,426 dollars. However, since Parkland currently has partnerships with St. Luke's University Hospital and the United Way of the Greater Lehigh Valley, there is potential to have costs defrayed or absorbed by these non-profit organizations. Parkland's own non-profit foundation could help contribute as part of a cost-sharing initiative with these organizations.

At the State level, Pennsylvania has made recent strides in the area of Teacher Preparation and Policy (Figure 29). Last year Pennsylvania passed HB 2045 that requires all pre-service teachers to learn about the science of reading starting in the 2024-2025 school year. However, Pennsylvania is one of only nine states that does not require universal or dyslexia screening in kindergarten (ExcelinEd, 2023) .

Figure 29

ExcelinEd (2023) Analysis of Progress in State Early Literacy Efforts



Finally, although several states have adopted policies promoting structured literacy, there is still confusion regarding which curricula and instructional strategies best promote the development of strong readers. In 1997, the National Reading Panel was convened to unify the country around best practices in reading instruction. Three years later, the NRP issued its landmark report, *Teaching Children to Read: An Evidence-based Assessment of the Scientific Research Literature on Reading and its Implications for Reading Instruction*. Twenty-three years later, it may be time to convene a similar group, one that brings together PreK-12 educators, researchers, cognitive scientists, parents, and community partners, to make recommendations and provide a clear blueprint on how to address the learning gaps in reading that effect too many American children and prevent them from reaching their potential.

Considerations for Future Research

The District provided a great deal of data for this project, but to stay within the scope of the project, unfortunately not all of it was used. However, the data invites further exploration. For example, it may be worthwhile to examine the grades of students enrolled in advanced high school courses and analyze these student performance indicators in light of the students' original third-grade reading proficiency level.

Given the longitudinal data the District maintains, it would be interesting to see if the findings from the original *Early Warning* report (Feister, 2010) – namely that students who were not reading by third grade were four times as likely not to graduate – is also a pattern at Parkland, or if the District finds any link between early literacy and graduation rates.

Student factors such as being economically disadvantaged or having an IEP have been reviewed in this study, but the data dashboard constructed for this research project enables the District to analyze the impact of other factors related to access to advanced high school courses, such as ethnicity or gender. In addition, each elementary school has the ability to analyze its own longitudinal student data (with the exception as noted of Veterans Memorial Elementary, Parkland's newest school, which opened in 2020 and thus was outside the window of this study).

Other student-related factors not captured in the data dashboard, such as the social-emotional health of a child, are also worthy of consideration in relation to literacy. The District has invested considerable time and energy into ensuring children who have experienced trauma have additional support. Given this focus, it may be worthwhile for the District to study what impact trauma may have on a student's ability to learn to read, or, conversely, if illiteracy contributes to a student's trauma.

In a similar vein, some of the research studies reviewed cited the impact of learning to read on student behavior, with evidence that student behavior improves in tandem with improvements in students' literacy skills (Brokamp, 2018; Sahakian, 2022). In light of this research, it may be worthwhile for the District to analyze if teachers, guidance counselors, school psychologists, or principals note a similar correlation.

In the PIRLS study, several teachers commented on the impact of the LETRS and Heggerty programs on their instructional practice. LETRS (Language Essentials for Teachers of Reading and Spelling) is a scientifically based literacy approach developed by Dr. Louisa Moats that the District has made a considerable investment in providing teacher training. Heggerty is a curriculum for developing phonemic awareness that complements the LETRS training. Both programs were implemented almost ten years ago, so it would be interesting to conduct a longitudinal study to determine the efficacy of these programs.

Finally, this capstone research study could serve as a framework for other school districts to examine what happens to students after third grade who continue to struggle as readers, and the impact low literacy has on a child's academic trajectory.

Closing Statement

In studying the learning outcomes for three cohorts of students at Parkland School District, with an examination of the connection between third-grade, eighth-grade, and eleventh-grade milestones, the evidence confirms not only the importance of third-grade reading but also the many factors that play a role in the development of a strong early literacy foundation, most notably the role of educators.

Educators can have a ripple effect on students, something they may not always immediately realize. Yet the impact is profound, extending beyond grades and potentially changing a child's educational path.

It is understandable, therefore, that the original inspiration for this research project came from an educator, former Springfield School District Superintendent Dr. James Capolupo, and the site visit a group of Parkland educators made to the Springfield Literacy Center almost a decade ago.

Springfield Literacy Center has won many awards for its innovative design. Some of its architectural elements, such as having the library as the central hub of the building and prominent use of outdoor learning areas, can be found in two of Parkland's elementary schools: Veterans Memorial Elementary School (which opened in August, 2020), and the newly renovated Schnecksville Elementary School (which opened in August, 2022).

Dr. Capolupo himself has won numerous awards for his leadership, including National Superintendent of the Year (2014) and Pennsylvania Superintendent of the Year (2015). When interviewed in 2021, however, Dr. Capolupo cited as his top accomplishment that "every student who started in his district in kindergarten and stayed through fourth grade, read on grade level" (Bjorkgren, 2021, para. 28).

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PIRLS

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PROGRESS IN INTERNATIONAL READING LITERACY STUDY

Teacher Questionnaire

National Center for Education Statistics
U.S. Department of Education
550 12th St., SW, 4th floor
Washington, DC 20202

TIMSS & PIRLS
International Study Center
Lynch School of Education, Boston College

The National Center for Education Statistics (NCES), within the U.S. Department of Education, is authorized to conduct this study under the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C., § 9543). The data are being collected for NCES by RTI International, a nonprofit research organization based in North Carolina. The collected data may be used only for statistical purposes and may not be disclosed or used, in identifiable form, for any other purpose except as required by law (ESRA 2002, 20 U.S.C., § 9573). The collected information will be combined across respondents to produce statistical reports.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless such collection displays a valid OMB control number. The valid OMB control number for this voluntary survey is 1850-0645. The time required to complete this survey is estimated to average 35 minutes per response, including the time to review instructions, search existing data resources, gather the data needed, and complete and review the survey. If you have any comments or concerns regarding the accuracy of the time estimate(s), suggestions for improving the form, or the status of your individual submission of this form, write directly to: Progress in International Reading Literacy Study (PIRLS), National Center for Education Statistics, PCP, 550 12th St., SW, 4th floor, Washington, DC 20202.

OMB No. 1850-0645, Approval Expires 11/30/2017.

Parkland School District has agreed to participate in PIRLS (Progress in International Reading Literacy Study), an educational research project sponsored by PennWest University. **Participation in this survey is optional and there will be no penalty if you choose not to participate.** In addition, please be aware that any information provided will remain anonymous. We are looking at aggregate data only in order to analyze Parkland's current literacy programs.

PIRLS measures trends in student achievement in reading and studies differences in national education systems in more than 50 countries in order to help improve teaching and learning worldwide.

This questionnaire is addressed to teachers of elementary students, and seeks information about teachers' academic and professional backgrounds, classroom resources, instructional practices, and attitudes toward teaching. It is important that you answer each question carefully so that the information that you provide reflects your situation as accurately as possible.

It is estimated that you will need approximately 15 to 30 minutes to complete this questionnaire. We appreciate the time and effort that this takes and thank you for your cooperation and contribution.

If you have any questions or concerns, please feel free to contact the following people overseeing the research study:

Tracy Smith (principal researcher):
SMI7306@pennwest.edu; 484-357-8722
Dr. James Giaquinto: guiaquintoj@parklandsd.org
Dr. Peter Aiken: aiken@pennwest.edu

Thank you.

Approved by the Pennsylvania Western University Institutional Review Board. This approval is effective September 12, 2022 and expires September 11, 2023.

About You

1

What grade(s) do you currently teach?

Fifth Grade

2

At which Parkland school do you teach?

Ironton

3

How many years of teaching experience do you have?

Less than 5

Please check this box if you were a teacher at Parkland during the years 2009, 2010, OR 2011:

☐

4

What is the highest level of formal education you have completed?

*Check **one** circle only.*

- Did not complete high school ---
- Completed high school ---
- Completed a 2-year college or university degree (i.e., Associate's degree) ---
- Completed a 4-year college or university degree (i.e., Bachelor's degree) ---
- Completed a Master's degree, postgraduate certificate program (e.g., teaching), or professional degree (e.g., law, medicine, dentistry) ---
- Completed a doctorate (Ph.D. or Ed.D) ---

5

A. During your college or university education, what was your major or main area(s) of study?

*Check **one** circle for each line.*

	Yes	No
a) Education—Primary/Elementary	○	○
b) Education—Secondary	○	○
c) English	○	○
d) Other	○	○

B. As part of your formal education and/or training, to what extent did you study the following areas?

*Check **one** circle for each line.*

	Not at all	Overview or introduction to topic	It was an area of emphasis
a) English	○	○	○
b) Literature	○	○	○
c) Pedagogy/teaching reading	○	○	○
d) Educational psychology	○	○	○
e) Remedial reading	○	○	○
f) Reading theory	○	○	○
g) Special education	○	○	○
h) Second language learning	○	○	○
i) Assessment methods in reading	○	○	○
j) Early childhood education	○	○	○

School Emphasis on Academic Success

6

In the past two years, how many hours in total have you spent in <u>formal</u> professional development (e.g., workshops, seminars, lesson studies, etc.) that dealt directly with <u>reading or teaching reading</u> (e.g., reading theory, instructional methods)?

*Check **one** circle only.*

- None ---
- Less than 6 hours ---
- 6–15 hours ---
- 16–35 hours ---
- More than 35 hours ---

7

How would you characterize each of the following within your school?

*Check **one** circle for each line.*

	Very high	High	Medium	Low	Very low
a) Teachers' understanding of the school's curricular goals	○	○	○	○	○
b) Teachers' degree of success in implementing the school's curriculum	○	○	○	○	○
c) Teachers' expectations for student achievement	○	○	○	○	○
d) Teachers' ability to inspire students	○	○	○	○	○
e) Collaboration between school leadership (including master teachers) and teachers to plan instruction	○	○	○	○	○
f) Parental involvement in school activities	○	○	○	○	○
g) Parental commitment to ensure that students are ready to learn	○	○	○	○	○
h) Parental expectations for student achievement	○	○	○	○	○
i) Parental support for student achievement	○	○	○	○	○
j) Students' desire to do well in school	○	○	○	○	○
k) Students' ability to reach school's academic goals	○	○	○	○	○
l) Students' respect for classmates who excel academically	○	○	○	○	○

School Environment

About Being a Teacher

8

Thinking about your current school, indicate the extent to which you agree or disagree with each of the following statements.

*Check **one** circle for each line.*

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
a) This school is located in a safe neighborhood	○	○	○	○
b) I feel safe at this school	○	○	○	○
c) This school's security policies and practices are sufficient	○	○	○	○
d) The students behave in an orderly manner	○	○	○	○
e) The students are respectful of the teachers	○	○	○	○
f) The students respect school property	○	○	○	○
g) This school has clear rules about student conduct	○	○	○	○
h) This school's rules are enforced in a fair and consistent manner	○	○	○	○

9

How often do you have the following types of interactions with other teachers?

*Check **one** circle for each line.*

	Very often	Often	Sometimes	Never or almost never
a) Share what I have learned about my teaching experiences	○	○	○	○
b) Observe another classroom to learn more about teaching	○	○	○	○
c) Work together to improve how to teach a particular topic	○	○	○	○
d) Work with teachers from other schools on the curriculum	○	○	○	○
e) Work with teachers from other grades to ensure continuity in learning	○	○	○	○

10

How often do you feel the following way about being a teacher?

*Check **one** circle for each line.*

	Very often	Often	Sometimes	Never or almost never
a) I am content with my profession as a teacher	○	○	○	○
b) I find my work full of meaning and purpose	○	○	○	○
c) I am enthusiastic about my job	○	○	○	○
d) My work inspires me	○	○	○	○
e) I am proud of the work I do	○	○	○	○

About Teaching Reading to the PIRLS Class

11

A. How many students are in this class?

_____ students

Write in the number.

B. How many of the students in #11A are in third grade?

_____ third grade students

Write in the number.

12

How many of your students experience difficulties understanding <u>spoken</u> English?

_____ students in this class

Write in the number.

13

A. How many students <u>need</u> remedial instruction in <u>reading</u>?

☐

Write in the number.

B. How many of the students in #13A <u>receive</u> remedial instruction in reading? ☐

Write in the number.

14

How many students in the class are advanced readers?

☐

Write in the number.

15

In your view, to what extent do the following limit how you teach this class?

*Check **one** circle for each line.*

	Not at all	Some	A lot
a) Students lacking prerequisite knowledge or skills	○	○	○
b) Students suffering from lack of basic nutrition	○	○	○
c) Students suffering from not enough sleep	○	○	○
d) Students absent from class	○	○	○
e) Disruptive students	○	○	○
f) Uninterested students	○	○	○
g) Students with mental, emotional, or psychological impairment	○	○	○
h) Lack of support for using information technology	○	○	○

16

In a typical week, how much time do you spend on English language instruction and/or activities with the students?

Include instruction or activities in reading, writing, speaking, literature, and other language skills.

_____ minutes per week
Write in the number of minutes per week.
Please convert the number of hours into minutes.

17

Regardless of whether or not you have formally scheduled time for reading instruction, in a typical week about how much time do you spend on reading instruction and/or activities with the students?

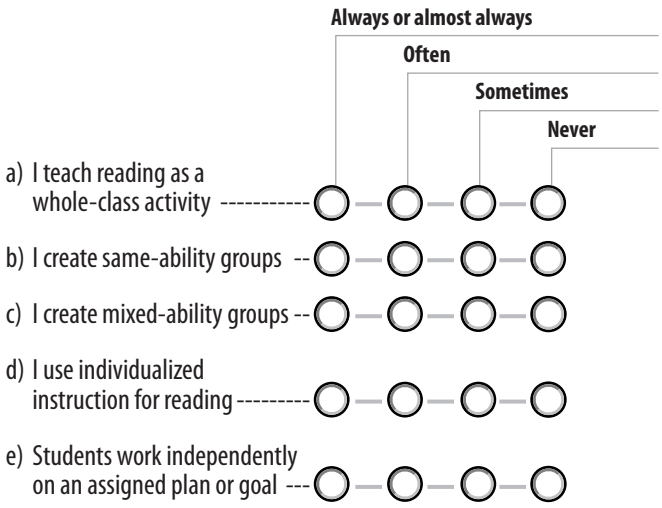
Include things you do across curriculum areas and during formally scheduled time for reading instruction.

_____ minutes per week
Write in the number of minutes per week.
Please convert the number of hours into minutes.

18

When you have reading instruction and/or do reading activities, how often do you organize students in the following ways?

*Check **one** circle for each line.*



About Teaching Reading to the PIRLS Class

19

When you have reading instruction and/or do reading activities with the students, how often do you have the students read the following types of text (in print or digitally)?

*Check **one** circle for each line.*

	Every day or almost every day	Once or twice a week	Once or twice a month	Never or almost never
A. Literary Reading Materials				
a) Short stories (e.g., fables, fairy tales, action stories, science fiction, detective stories)	○	○	○	○
b) Longer fiction books with chapters	○	○	○	○
c) Plays	○	○	○	○
B. Informational Reading Materials				
a) Nonfiction subject area books or textbooks	○	○	○	○
b) Longer nonfiction books with chapters	○	○	○	○
c) Nonfiction articles that describe and explain about things, people, events, or how things work (e.g., newspaper articles, brochures)	○	○	○	○

20

When you have reading instruction and/or do reading activities with the students, how often do you do the following?

*Check **one** circle for each line.*

	Every day or almost every day	Once or twice a week	Once or twice a month	Never or almost never
a) Read aloud to students	○	○	○	○
b) Ask students to read aloud	○	○	○	○
c) Ask students to read silently on their own	○	○	○	○
d) Teach students strategies for decoding sounds and words	○	○	○	○
e) Teach students new vocabulary systematically	○	○	○	○
f) Teach students how to summarize the main ideas	○	○	○	○
g) Teach or model skimming or scanning strategies	○	○	○	○

21

How often do you do the following in teaching reading to this class?

*Check **one** circle for each line.*

	Every or almost every lesson	About half the lessons	Some lessons	Never
a) Provide reading materials that match the students' interests	○	○	○	○
b) Provide materials that are appropriate for the reading levels of individual students	○	○	○	○
c) Link new content to students' prior knowledge	○	○	○	○
d) Encourage students to develop their understandings of the text	○	○	○	○
e) Encourage student discussions of texts	○	○	○	○
f) Encourage students to challenge the opinion expressed in the text	○	○	○	○
g) Use multiple perspectives (among students and texts) to enrich understanding	○	○	○	○
h) Give students time to read books of their own choosing	○	○	○	○
i) Give individualized feedback to each student	○	○	○	○

22

How often do you ask the students to do the following things to help <u>develop reading comprehension skills or strategies</u>?

*Check **one** circle for each line.*

	Every day or almost every day	Once or twice a week	Once or twice a month	Never or almost never
a) Locate information within the text	○	○	○	○
b) Identify the main ideas of what they have read	○	○	○	○
c) Explain or support their understanding of what they have read	○	○	○	○
d) Compare what they have read with experiences they have had	○	○	○	○
e) Compare what they have read with other things they have read	○	○	○	○
f) Make predictions about what will happen next in the text they are reading	○	○	○	○
g) Make generalizations and draw inferences based on what they have read	○	○	○	○
h) Describe the style or structure of the text they have read	○	○	○	○
i) Determine the author's perspective or intention	○	○	○	○

23

After students have read something, how often do you ask them to do the following?

*Check **one** circle for each line.*

	Every day or almost every day	Once or twice a week	Once or twice a month	Never or almost never
a) Write something about or in response to what they have read	○	○	○	○
b) Answer oral questions about or orally summarize what they have read	○	○	○	○
c) Talk with each other about what they have read	○	○	○	○
d) Take a written quiz or test about what they have read	○	○	○	○

24

A. Do the students in this class have computers (including tablets) available to use for their <u>reading</u> lessons?

*Check **one** circle only.*

Yes ○
No ○ → **(If No, go to #25)**

If Yes,

B. What access do the students have to computers?

*Check **one** circle for each line.*

	Yes	No
a) Each student has a computer	○	○
b) The class has computers that students can share	○	○
c) The school has computers that the class can use sometimes	○	○

C. How often do you do the following computer activities during reading lessons?

*Check **one** circle for each line.*

	Every day or almost every day	Once or twice a week	Once or twice a month	Never or almost never
a) Ask students to read digital texts	○	○	○	○
b) Teach students strategies for reading digital texts	○	○	○	○
c) Teach students to be critical when reading on the Internet	○	○	○	○
d) Ask students to look up information (e.g., facts, definitions, etc.)	○	○	○	○
e) Ask students to research a particular topic or problem	○	○	○	○
f) Ask students to write stories or other texts	○	○	○	○

25

A. Do you have a library or reading corner <u>in your classroom</u>?

*Check **one** circle only.*

Yes ---
No ---

(If No, go to #26)

If Yes,

B. About how many books are in your classroom library?

*Check **one** circle only.*

0–25 ---
26–50 ---
51–100 ---
More than 100 ---

C. About how many magazines with different titles are in your classroom library?

*Check **one** circle only.*

0 ---
1–2 ---
3–5 ---
More than 5 ---

D. How often do you give the students in your class time to use the classroom library or reading corner?

*Check **one** circle only.*

Every day or almost every day ---
Once or twice a week ---
Once or twice a month ---
Never or almost never ---

E. Can the students borrow books from the classroom library or reading corner to take home?

*Check **one** circle only.*

Yes ---
No ---

26

How often do you take or send the students to a library other than your classroom library?

*Check **one** circle only.*

At least once or twice a week ---
Once or twice a month ---
A few times a year ---
Never or almost never ---

Reading Homework

27

How often do you assign reading as part of homework (for any subject)?

*Check **one** circle only.*

- I do not assign reading for homework ---
  (Go to #30)
- Less than once a week ---
- 1 or 2 times a week ---
- 3 or 4 times a week ---
- Every day ---

28

In general, how much time do you expect students to spend on homework involving <u>reading</u> (for any subject) each time you assign it?

*Check **one** circle only.*

- 15 minutes or less ---
- 16–30 minutes ---
- 31–60 minutes ---
- More than 60 minutes ---

29

How often do you do the following with the reading homework assignments for this class?

*Check **one** circle for each line.*

	Always or almost always	Sometimes	Never or almost never
a) Correct assignments and give feedback to students	○	○	○
b) Discuss the homework in class	○	○	○
c) Monitor whether or not the homework was completed	○	○	○

Reading Difficulties

30

Are the following resources <u>available</u> to you to work with students who have difficulty with reading?

*Check **one** circle for each line.*

	Always	Sometimes	Never
a) A specialized professional (e.g., reading specialist, speech therapist)	○	○	○
b) A teacher-aide	○	○	○
c) An adult/parent volunteer	○	○	○

31

What do you usually do if a student begins to fall behind in reading?

*Check **one** circle for each line.*

	Yes	No
a) I have the student work with a specialized professional (e.g., reading specialist, speech therapist)	○	○
b) I wait to see if performance improves with maturation	○	○
c) I spend more time working on reading individually with that student	○	○
d) I ask the parents to help the student with reading	○	○
e) I recommend that the student be enrolled in a special reading program	○	○

32

How much emphasis do you place on the following sources to monitor students' progress in reading?

*Check **one** circle for each line.*

	Major emphasis	Some emphasis	Little or no emphasis
a) Assessment of students' ongoing work	○	○	○
b) Classroom tests (for example, teacher-made or textbook tests)	○	○	○
c) State or district achievement tests	○	○	○

33

Approximately how much time (in minutes) are students provided to read for pleasure each week?

Please write in the number of minutes per week.

34

What have you found most beneficial in learning about and providing effective early literacy instruction while at Parkland School District?

Thank You

Thank you for the thought, time, and effort you have put into completing this questionnaire. It is greatly appreciated!

Appendix B
Volunteer Consent Form

Voluntary Consent Form – Pennsylvania Western University

Dear Parkland Faculty Member:

You are being asked to participate in the Progress in International Reading Literacy Study (PIRLS). PIRLS measures trends in student achievement in reading and studies differences in national education systems in more than 50 countries in order to help improve teaching and learning worldwide. Participation in this survey is optional and there will be no penalty if you choose not to participate. In addition, please be aware that any information provided will remain anonymous. We are looking at aggregate data only to analyze Parkland's current elementary literacy programs. It will help the district make progress towards the goal of having students reach reading proficiency.

What will I be asked to do if I take part in this study?
This questionnaire is addressed to teachers of elementary students and seeks information about teachers' academic and professional backgrounds, classroom resources, instructional practices, and attitudes toward teaching. It is important that you answer each question carefully so that the information that you provide reflects your situation as accurately as possible. The questionnaire may be completed electronically and will take approximately 15 to 30 minutes to complete. All data collected will be securely housed and accessible only by the researcher. All information provided will be kept confidential.

Who do I contact if I have questions about this study?
If you have questions about this study, please contact the primary researcher, Tracy Smith, at mailto:SMI7306@pennwest.edu or 484.357-8722. If you would like to talk to someone other than the primary researcher, please contact Dr. Peter Aiken, the PennWest faculty member overseeing the research project, via email at aiken@pennwest.edu.

Acknowledgment and Consent
Any questions I have about participating in this study have been answered. I agree to take part in this study, and I understand that taking part is voluntary and that I may change my mind at any time without penalty. By providing my name and initials below, I agree to participate in the completion of the PIRLS questionnaire study.

Name (Print): _____**Date:** _____

Signature: _____

Approved by the Pennsylvania Western University Institutional Review Board. This approval is effective 09/12/2022 and expires 09/11/2023.

Institutional Review Board
250 University Avenue
California, PA 15419
instreviewboard@calu.edu
Melissa Sovak, Ph.D.

Dear Tracy,

Please consider this email as official notification that your proposal titled "The Impact of Elementary Literacy on High School Learning Outcomes" (Proposal #PW22-035) has been approved by the Pennsylvania Western University Institutional Review Board as submitted.

The effective date of approval is 09/12/2022 and the expiration date is 09/11/2023. These dates must appear on the consent form.

Please note that Federal Policy requires that you notify the IRB promptly regarding any of the following:

(1) Any additions or changes in procedures you might wish for your study (additions or changes must be approved by the IRB before they are implemented)

(2) Any events that affect the safety or well-being of subjects

(3) Any modifications of your study or other responses that are necessitated by any events reported in (2).

(4) To continue your research beyond the approval expiration date of 09/11/2023, you must file additional information to be considered for continuing review. Please contact instreviewboard@calu.edu

Please notify the Board when data collection is complete.

Regards,

Melissa Sovak, PhD.
Chair, Institutional Review Board

APPENDIX D
DISTRICT APPROVAL LETTER

PARKLAND SCHOOL DISTRICT

Educating For Success, Inspiring Excellence.

Administration Center
1210 Springhouse Rd., Allentown, PA 18104
www.parklandsd.org

PSDistrict @ParklandSchools

MARK J. MADSON, Ed.D.
Superintendent of Schools
610-351-5500
Email madsonm@parklandsd.net

MICHELLE MINOTTI, Ed.D.
Assistant Superintendent
610-351-5524
Email minottim@parklandsd.net

TIMOTHY A. CHORONES
Assistant Superintendent
610-351-5505
Email choronest@parklandsd.net

August 3, 2022

4774 Somerset Lane
Macungie, PA 18062

Dear Tracy:

I am pleased to write a letter in support of your doctoral capstone project entitled, "The Impact of Elementary Literacy on High School Learning Outcomes." The proposed research has significant value as it aligns with the district's focus on literacy, its goal of having students reach reading proficiency by third grade, and a desire to provide equitable access to learning opportunities. It also supports the district's mission, ***Educating for Success, Inspiring Excellence***.

I have reviewed the project proposal and understand the following related to participation:

- The study will make use of archived data files from both state assessments (PSSA and Keystone Exams) and local assessments (CDT and STAR data), but at no time will students' personally identifiable information (PII) be accessible or published.
- Teachers have the option to participate in the Progress in International Reading Literacy Study (PIRLS), a survey that will take approximately 15 to 30 minutes to complete, but it is not required.
- The final research project and all data analysis that is a product of this research will be made available to the District as soon as the research project is complete.
- Cetronia Elementary Principal, Dr. James Giaquinto, is acting as the External Committee Member to help provide guidance and oversight for the research project.

Please accept this letter as my formal consent and support of the district's participation in the proposed research project.

Sincerely,

Dr. Mark J. Madson. Ed.D.
Superintendent of Schools
Parkland School District

APPENDIX E

Top 5 Types of Courses and Courses Taken in 2017, 2018, and 2019

(Organized by Third-Grade Reading Proficiency Level)

Third-Grade Reading Proficiency Level (Advanced)	**2009 Cohort Top 5 Types of Courses (2017)**	**2010 Cohort Top 5 Types of Courses (2018)**	**2011 Cohort Top 5 Types of Courses (2019)**	**All Cohorts Top 5 Types of Courses**
	Advanced Placement	Gifted/ High Potential	Honors	Gifted/ High Potential
	Gifted/ High Potential	Advanced Placement	Gifted/ High Potential	Honors
	College Preparatory	Honors	College Preparatory	Advanced Placement
	Honors	College Preparatory	Advanced Placement	College Preparatory
	Project Lead The Way	Project Lead the Way	Project Lead The Way	Project Lead the Way

Third-Grade Reading Proficiency Level (Proficient)	**2009 Cohort Top 5 Types of Courses (2017)**	**2010 Cohort Top 5 Types of Courses (2018)**	**2011 Cohort Top 5 Types of Courses (2019)**	**All Cohorts Top 5 Types of Courses**
	College Preparatory	College Preparatory	College Preparatory	College Preparatory
	Gifted/ High Potential	Gifted/ High Potential	Gifted/ High Potential	Gifted/ High Potential
	Advanced Placement	Honors	Honors	Honors
	Honors	Advanced Placement	Advanced Placement	Advanced Placement
	LCTI (part-time)	LCTI (part-time)	LCTI (part-time)	LCTI (part-time)

Third-Grade Reading Proficiency Level (Basic)	**2009 Cohort Top 5 Types of Courses (2017)**	**2010 Cohort Top 5 Types of Courses (2018)**	**2011 Cohort Top 5 Types of Courses (2019)**	**All Cohorts Top 5 Types of Courses**
	College Preparatory	College Preparatory	College Preparatory	College Preparatory
	Gifted/ High Potential	Gifted/ High Potential	Gifted/ High Potential	Gifted/ High Potential
	Learning Support	Learning Support	LCTI (part-time)	LCTI (full-time)
	LCTI (part-time)	LCTI (part-time)	Learning Support	Learning Support
	Applied	LCTI (full-time)	Honors	LCTI (part-time)

APPENDIX E

Top 5 Types of Courses and Courses Taken in 2017, 2018, and 2019

(Organized by Third-Grade Reading Proficiency Level)

Third-Grade Reading Proficiency Level (Below Basic)	**2009 Cohort Top 5 Types of Courses (2017)**	**2010 Cohort Top 5 Types of Courses (2018)**	**2011 Cohort Top 5 Types of Courses (2019)**	**All Cohorts Top 5 Types of Courses**
	College Preparatory	College Preparatory	College Preparatory	College Preparatory
	Learning Support	Learning Support	Learning Support	Learning Support
	Applied	LCTI (part-time)	LCTI (part-time)	LCTI (full-time)
	LCTI (part-time)	LCTI (full-time)	Seminar	Applied
	Work Experience	Career/Education/ Work Ready	LCTI (full-time)	Career/Education/ Work Ready

It should be noted that neither Advanced Placement (AP) nor Project Lead the Way (PLTW) courses appear in the top 5 types of courses taken by high school students who were either at a third-grade reading level of Basic or Below Basic in 2009, 2010, or 2011.

Third-Grade Reading Proficiency Level (Advanced)	**2009 Cohort Top 5 Courses (2017)**	**2010 Cohort Top 5 Courses (2018)**	**2011 Cohort Top 5 Courses (2019)**	**All Cohorts Top 5 Courses**
	Economics GHP	Economics GHP	Biology Honors	English 3 Language Arts AP
	English 3 Language Arts AP	American Government GHP	English 2 Honors	World Studies GHP
	American Government GHP	American Studies 2 GHP	English 3 Language Arts AP	Precalculus Honors
	English Literature and Composition AP	World Studies GHP	American Studies 1 GHP	English 3 GHP
	World Studies GHP	English 3 Language Arts AP	American Studies 2 GHP	Economics GHP

APPENDIX E

Top 5 Types of Courses and Courses Taken in 2017, 2018, and 2019

(Organized by Third-Grade Reading Proficiency Level)

Third-Grade Reading Proficiency Level (Proficient)	**2009 Cohort Top 5 Courses (2017)**	**2010 Cohort Top 5 Courses (2018)**	**2011 Cohort Top 5 Courses (2019)**	**All Cohorts Top 5 Courses**
	Economics CP	Economics CP	Algebra 1 CP	World Study CP
	World Study CP	American Government CP	World Study CP	Geometry CP
	American Government CP	World Study CP	English 1 CP	English 3 CP
	English 4 CP	Geometry CP	Geometry CP	Chemistry CP
	English 3 CP	English 4 CP	American Study 1 CP	Economics CP

Third-Grade Reading Proficiency Level (Basic)	**2009 Cohort Top 5 Courses (2017)**	**2010 Cohort Top 5 Courses (2018)**	**2011 Cohort Top 5 Courses (2019)**	**All Cohorts Top 5 Courses**
	American Government CP	English 4 CP	Algebra 1 CP	English 3 CP
	English 3 CP	English 3 CP	Biology CP	World Study CP
	Economics CP	Economics CP	English 1 CP	Geometry CP
	World Study CP	World Study CP	American Studies 1 CP	Algebra 2 CP
	Chemistry CP	Algebra 2 CP	Earth Science CP	Biology CP

Third-Grade Reading Proficiency Level (Below Basic)	**2009 Cohort Top 5 Courses (2017)**	**2010 Cohort Top 5 Courses (2018)**	**2011 Cohort Top 5 Courses (2019)**	**All Cohorts Top 5 Courses**
	Study Skills 11	Algebra 2 CP	Study Skills 9	World Study CP
	Economics CP	World Study CP	Biology CP	English 3 CP
	English 4 CP	American Government CP	Algebra 1 CP	Algebra 2 CP
	Study Skills 12	Economics CP	Algebra 2 CP	Study Skills 11
	American Government 12	English 4 CP	English 3 CP	Biology CP

APPENDIX F
PIRLS Open-Ended Responses

PIRLS Question 34: What have you found most beneficial in learning about and providing effective early literacy instruction while at Parkland School District?
Specific instruction using grade-level resources that provide clear guidance on how to implement current topics has been beneficial. For example, discussing text structure and completing TDA's were not part of my undergraduate training, and it is essential that this training is provided by PSD. [Respondent 1]
I feel like as an effective kindergarten teacher I am always working on researching and learning the new and best ways to help my students learn and grow. When I explicitly teach in a structured way with both whole and small groups, I find I get the best results with my students. [Respondent 2]
The sound wall we have posted in the rooms help students read and learn new words to help improve comprehension and also reading and writing fluency. [Respondent 3]
Sound walls and LETRS [Respondent 4]
Science of Reading pd [Respondent 5]
I have found that LETRS and Heggerty have improved my students' phonemic awareness which helps them become better readers. [Respondent 6]
Using a variety of genres and levels so that all students might have success. Also, reading to them and with them EVERY day is beneficial while discussing the story and vocabulary. These are just a few of the many ways early literacy instruction benefits our Parkland students. [Respondent 7]
The district provides teachers with professional development that is current. Some things can be implemented in the classroom right away, and we are provided with resources to help with implementation. [Respondent 8]
LETRS training and a structured literacy program [Respondent 9]
I think the introduction to the science of reading and future training in this area will be very beneficial and an effective form of explicit instruction for students. [Respondent 10]
It is not one size fits all. Resources are very good. [Respondent 11]
The Heggerty program we have implemented as well as LETRS training have been the most beneficial. [Respondent 12]
It's important to start early and to read TO the children, as well as listen to them read. Too many children are not read to and I see a decline in their interest in reading/books. PSD does not have any time "built" into the curriculum for teacher choice read-alouds, but I set aside 15 minutes every single day to do so. Every year, my students say it's their favorite time of day. I can incorporate so many comprehension & vocab skills & strategies during that time & they are a captive audience! [Respondent 13]
I have found the LETRS training beneficial to understand how/why students read how they do. Our reading specialist is extremely helpful when working with all types of student abilities. [Respondent 14]
We are encouraged to differentiate instruction. The information and support from our reading specialist is excellent. [Respondent 15]
I always feel encouraged by my building principal and the staff here is collegial, which helps. We are focused on helping all students learn to read. A focus on phonemic awareness has helped my students grow. This district gets reading instruction. It is a priority in my building. [Respondent 16]
Heggerty was an excellent addition! [Respondent 17]

APPENDIX F
PIRLS Open-Ended Responses

We have support and quality PD. [Respondent 18]
We have many resources and the focus in the primary grades is on developing strong readers through the science of reading. [Respondent 19]
I enjoy the professional development on literacy instruction and appreciate the time to review student data. Reading is important in this school. [Respondent 20]
I feel supported if I have students who are struggling to learn how to read through my colleagues, support staff, and principal. [Respondent 21]

It should be noted that PIRLS Question 34 was optional, not required.
Not every teacher who completed the PIRLS questionnaire chose to answer this question.

8 Courses

- **Foundations: Data, Data, Everywhere**
- **Ask Questions to Make Data-Driven Decisions**
- **Prepare Data for Exploration**
- **Process Data from Dirty to Clean**
- **Analyze Data to Answer Questions**
- **Share Data Through the Art of Visualization**
- **Data Analysis with R Programming**
- **Google Data Analytics Capstone: Complete a Case Study**

Jun 1, 2021

Tracy Elizabeth Smith

has successfully completed the online, non-credit Professional Certificate

Google Data Analytics

Those who earn the Google Data Analytics Professional Certificate have completed eight courses, developed by Google, that include hands-on, practice-based assessments and are designed to prepare them for introductory-level roles in Data Analytics. They are competent in tools and platforms including spreadsheets, SQL, Tableau, and R. They know how to prepare, process, analyze, and share data for thoughtful action.

Verify this certificate at:
https://coursera.org/verify/professional-cert/LZ2NBE9KZWBT

Data Analyst Professional Certificate

Issued by Coursera

Authorized by IBM

This credential earner has demonstrated proficiency in applying different analytical techniques by analyzing real-world datasets, creating visualizations & interactive dashboards, and presenting reports to share findings of data analysis, and is now equipped with skills for an entry-level role in data analytics. The earner has successfully completed 8 courses in Data Analytics and gained hands-on experience with data analysis tools, including Excel, SQL, Databases, Python, JupyterLab and Cognos.

Learn more

Validation | Advanced | Months | Paid

Skills

Cognos Analytics | Dashboards | Data Analysis | Data Science | Data Visualization (DataViz) | Hands-on Capstone Project | IBM Cognos | Jupyter Lab Notebook | Microsoft Excel | Presentation | Python | Spreadsheet | SQL