THE EFFECTIVENESS OF A DISTRICT CREATED PRE-KINDERGARTEN PROGRAM ON STUDENT GROWTH

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Table of Contents

List of Figures

Abstract

The onset of the Covid-19 global pandemic took the world by surprise in the spring of 2020. As the world rapidly changed and adapted to new health and safety measures, school districts were left to decide how they would pivot instructionally, but also plan for an uncertainty that the pandemic would bring from a financial standpoint. The potential financial liability of the pandemic forced schools to make tough decisions on how to continue into the 2021 year and balance yearly budgets. A newly created Pre-Kindergarten program was launched at the start of the 2019-2020 school year, and was nearly eliminated in order to cut costs for the upcoming school year. In the end the school board agreed to continue the program in the 2020-2021 school year, but the fate of the Pre-Kindergarten classroom and program would continue to be revisited for its effectiveness in preparing students for kindergarten. The purpose of this research study is to examine the effectiveness of the district created pre-kindergarten program by examining the growth of student literacy and mathematics skills. Benchmark assessment data was analyzed throughout the school year for pre-kindergarten students, as was the STAR assessment data for students who had previously attended the pre-kindergarten program and were currently enrolled in kindergarten within the district. Teachers also participated in the study to provide qualitative data regarding the effectiveness of the program in preparing students for kindergarten.

Chapter 1

The creation of a public school district pre-kindergarten program was established to provide incoming kindergarten students, from families who meet Federal Poverty Level Guidelines, with more preparation prior to the start of their kindergarten school year. Research has shown that students from families with lower socio-economic status enter school less prepared and those who get off to a poor start rarely catch up (Fox Chapel Area School District, 2020). Providing resources for early intervention is critical to filling learning gaps that may exist upon entrance to kindergarten. Recent school closures and budgetary setbacks have resulted in potential program cuts, including the newly established pre-kindergarten program. Determining the effectiveness of the program's ability to promote student growth and achievement is critical to the continuation of the program moving forward.

Purpose of the Study

While the district's pre-kindergarten program is housed at only one of the district's elementary schools, pre-kindergarten students from across the district are able to join the program, depending on eligibility requirements. The preparation of incoming kindergarten students directly affects each building within the district, and plays a role in the decision making of each elementary principal, including the researcher who currently serves as elementary principal in the school district. Determining the effectiveness of the program's ability to promote student growth and achievement is critical to the continuation of the program moving forward.

Justification of the Study

Determining the effectiveness of the pre-kindergarten program and its role in preparing the district's youngest learners has a large impact on how the district will provide early intervention resources through its Multi-Tiered System of Supports (MTSS). With reading and mathematics being an essential part of all elementary students' programming, providing students with additional background knowledge in reading and mathematics is a critical aspect of the district's pre-kindergarten program.

The school district has faced ongoing budgetary scrutiny and restrictions, and programs are being reviewed to determine their worth for continuation. The Fox Chapel Area School District launched its pre-kindergarten program during the 2019-2020 school year. Although it is only in its infancy, the program was part of a discussion to be discontinued for the 2020-2021 school year following an anticipated budgetary deficit. While the Pre-Kindergarten program was ultimately chosen to continue for the 2020-2021 school year, proving its value to the students and community is necessary to keep the program operational. Research will help to determine the growth and achievement of the students participating in the pre-kindergarten program in order to prove its value in continuing the program in future years.

Budgetary Implications

The Fox Chapel Area pre-kindergarten currently holds an annual budget of $5,695 for supplies and curriculum-based materials. This does not include the costs of the yearly pre-kindergarten teacher salary and a pre-kindergarten instructional assistant, which equate to a combined salary of $158,053 for the 2020-2021 school year and $182,452 for the 2021-2022 school year based on the experience of the instructors and the district's

collective bargaining agreements with the teacher and support staff unions. In addition, the district must also consider the benefits packages of both employees which is a combined $57,871 for the 2020-2021 school year and $60,163 for the 2021-2022 school year. The overall budget for the district's pre-k program is $221,619 for the 2020-2021 school year and $242,615 for the 2021-2022 school year. Burnette (2020) references the economic impact that the Covid-19 pandemic will have on schools by stating,

> Almost half of the nation's 13,000 school districts may be forced to make the deepest cuts to education spending in a generation—slashing programs and laying off hundreds of thousands of administrators, teachers and other staff—to fend off financial collapse brought on by the coronavirus. (p. 12)

While the deletion of the program would result in direct cost savings, it would also require the shifting of staff or the potential for furloughs if there is not an existing open position for the pre-kindergarten teacher and instructional assistant to assume.

Research Questions

1. What impact does a pre-kindergarten program have on a student's growth in literacy skills based on district benchmarking assessments?
2. What impact does a pre-kindergarten program have on a student's growth in mathematics skills based on district benchmarking assessments?
3. What are teacher perceptions of the district's pre-kindergarten program in providing students with foundational literacy and mathematics skills?

Summary

This study will utilize quantitative data in the form of district benchmarking assessments in reading and mathematics, as well as qualitative data pertaining to teacher

perceptions of the district provided pre-kindergarten program. The collection, review and analysis of this data will be used in determining the overall effectiveness of the district's pre-kindergarten program and its overall need as a district offering to the community, while also weighing the financial impact of retaining the program in its current state.

Covid-19 Statement

The project and researcher adhere to all of the district's approved Covid-19 procedures. These procedures have been filed and approved at the state level. If any changes are made to the Covid-19 safety procedures, the project will be modified appropriately to meet all safety requirements. If the study needs to be revised due to Covid-19 restrictions, a request for permission will be submitted to the Institutional Review Board (IRB).

Chapter 2

The Effectiveness of a District Created Pre-Kindergarten Program on Student Growth: A Literature Review

In an effort to analyze the effectiveness of pre-kindergarten programs, the researcher has compiled a number of educational resources to further analyze the effects of preschool or pre-kindergarten programs. This literature review will examine the history of early childhood education in the United States and how it has evolved into the system that exists today. Furthermore, literature and research will be reviewed to determine the outcomes and effects of literacy and mathematics on students who attend pre-kindergarten and/or early childhood education programs. The literature review will also examine the equity and availability of early education systems and how accessible it is for students, specifically those from economically disadvantaged homes. Lasty, literature will be reviewed to determine the impact of the Covid-19 pandemic on schools within the United States.

These themes will then be used to determine the commonalities and differences found within the research and provide context and considerations for the researcher as he/she conducts his/her own research and gathers data to determine the overall effectiveness of the public pre-kindergarten program that has faced potential elimination due to budgetary deficits brought on by the Covid-19 pandemic.

History of Pre-Kindergarten Programs

The development of pre-kindergarten education has a long history in the United States and has evolved and transformed for centuries. While referred to as pre-

kindergarten today, the history of such programs focuses mainly on students between the ages of 4 and 6 years old (Bloch et al., 1989).

The earliest education of pre-kindergarten aged students can be traced back to the 17th century when children, 4 years and older, were taught to read through religious scripture or bible readings. These lessons were less formal and were usually instructed by village elders (Bloch et al., 1989). Public schools were created in early colonial times and lasted through the mid-19th century. At that time schools focused on providing education in moral character. Schools also focused on serving poor children who were believed to not be proficient with such characteristics, while many wealthier children tutored at home or were sent to private schools (Bloch et al., 1989).

Public schools, which included 4 year old students, became more prevalent in the mid-19th century and were modeled off of British schooling programs, including the Lancastrian Monitorial School and "infant schools" (Bloch, et al., 1989). The Lancastrian Monitorial School approach was introduced in New York in the early 1800's by Joseph Lancaster who introduced a model in which large groups of students were in a classroom and those that excelled taught those needing more assistance, which allowed for teachers to better monitor the entire class (Encyclopedia.com, 2020).

Infant schools could be found in the United States in the 1820's, and started as Christian missions operated by charities and later morphed into preparatory schools for wealthy families with a focus on reading (Prochner et al., 2015).

St. Louis was home to the first public school kindergarten, which was established in 1873 as part of the St. Louis public schools led by Superintendent William H. Harris.

Harris, who later became United States Superintendent of Public Education, argued that 4-year-olds fit into the public school system (Bloch et al., 1989).

As the country entered the 20th century, kindergarten classrooms were becoming popular, typically servicing students between the ages of 4 and 6. This also brought more of a push for reform within education. Some pushed for early education of students from poor families, with a focus on public financing for 4-6 year old programs. Others pushed to expand kindergarten as a sub primary class that would allow for students in urban areas to catch up or fill gaps in order to allow them to enter first grade as a more homogeneous group. The end of the century found that other kindergarten professionals pushed for reform within kindergarten curriculums that would reflect new theories about how students learn (Bloch et al., 1989).

Kindergarten programs were more readily available throughout the United States within the mid-1920's, with the argument that such programs had a large impact on reading achievement thus calling for expansion of kindergarten programs. However, as programs expanded the age of students enrolled began to change, with 5-year old's being the focus in kindergarten programs and 4-year old students being removed (Bloch et al., 1989).

One of the major factors in removing 4-year-olds from kindergarten classrooms was the establishment of nursery schools which serviced students between the ages of 1 and 5 years old (Bloch et al., 1989). The expansion of nursery schools and kindergarten saw increased enrollment and popularity following the World War II baby boom by the late 1940's.

However, the 1950's saw a decrease in the number of 4-year-olds attending kindergarten from programs that traditionally served 4-year students, separately from 5 year old students, and focused primarily on traditional play and socialization. There was a greater need for space in order to serve 5-year old students, so many 4-year old kindergarten programs were dissolved. Although some 4-year-olds were still included and admitted to public kindergartens up until the mid 1960's, this usually was only an occurrence in areas where nursery schools were unavailable (Bloch et al., 1989).

The mid-1960's also brought a focus to early childhood education with the initiatives such as the War on Poverty and the Economic Poverty Act of 1964. Early childhood education programs were considered a way to develop economically and socially disadvantaged children through comprehensive educational, health and family services (Cook et al., 2004, as cited in Winter & Kelly, 2008).

One of the key initiatives to surface in light of early education reform was the Head Start Program. Winter and Kelly (2008) note the following about the development of Head Start, "Head Start was one of the most notable outcomes of the War on Poverty Act. This comprehensive model provided an array of social, health, and educational services to young children and their families" (p. 261).

Head Start was designed to work with students for 6-8 weeks in the summer prior to their start of elementary school to provide them with educational and social experiences while providing health care and good nutrition for students (Zigler & Syfco, 2000). Throughout the country different Head Start models were created in order to provide intensive educational programs to low income students (Winter & Kelly, 2008).

One of the more successful adaptations was the Carolina Abecedarian Project.

Winter and Kelly explain the positive outcomes of the program by stating, “The dramatic and sustained effects of the project have included higher cognitive scores through age 21 and better academic achievement in reading and math, compared to children not enrolled in the program” (p. 261).

While the Carolina Abecedarian Project was a successful model of Head Start, the quality of services provided by Head Start programs ranged in success and accountability. It was not until 1975, 10 years following the start of the program, that the development of Program Performance Standards were created for early childhood education programs (Zigler & Styfco, 2000).

Further reform for early childhood education came in the early 1990’s as the focus changed on how to improve previous Head Start models by developing an expanded view of school readiness and how to improve it through the National Goals Panel (Winter & Kelly, 2008). As noted by Winter & Kelly (2008):

> School readiness was characterized as a multidimensional concept that encompassed broader aspects of development beyond specific cognitive tasks and literacy skills. Experts in the field agreed that programs aimed at helping children achieve school success needed to address an array of factors, including motor development, physical health, and dispositions toward learning. (p. 262)

Enrollment in many state run programs was brought to a halt after the 2008 financial crisis, and attendance in Pre-K programs remained at approximately 1.2 million students (Haslip, 2018).

Head Start still remains as one of the leading providers of early childhood education in the United States, but many of these programs are only offered in a part-time

or partial-year basis and coordinated with wrap around (full day) services to help working parents (Magnuson et al., 2004).

Pre-kindergarten and early childhood education programs still remain in the United States, with 43 states that are home to established state funded programs and nearly one-third of all 4-year-olds in the country participating in them (Jung, 2018). Furthermore, Jung (2018) notes that enrollment in state funded pre-k programs has nearly doubled in the past 15 years and now reaches over 1.5 million students.

Effects on Mathematics Development in Pre-Kindergarten Programs

In considering the effects of the mathematical development of students within Pre-Kindergarten programs, one must first look at how mathematics is currently incorporated within such settings. Namkung et al. (2019) states the following regarding the amount of mathematics instruction found in Pre-Kindergarten programs, "Mathematics instruction rarely occurs at or prior to 3 or 4 years of age, and when it does, it is often taught incidentally through play" (p. 89). The curriculums and pedagogical approach for each early childhood education can look very different. While some programs provide explicit instruction, others focus on play and socialization as the primary source of mathematics instruction. Furthermore, when exposure to mathematics is lacking or completely absent, it is often exacerbated even more within economically disadvantaged families, who receive even less mathematical exposure or instruction both at home and in preschool (Klein et al., 2008).

The quality of pre-kindergarten education can also be a key factor in determining how effective mathematics education at an early age can be. Karademir and Akman (2019) state, " The form and quality of preschool math education affect the retention of

math knowledge, learning of mathematical concepts, and development of math skills. Therefore, preschool math education is also associated with students' future achievements or failures in math" (p. 209). Depending on the quality of the program, some students may experience mathematical rich environments, while others receive little experience, thus providing them with less experience and knowledge as they enter kindergarten.

The quality of a preschool program can be assessed by its structure and process, with the structure focusing on the education of instructors, size of the program, and student/teacher ratio. Some programs focus more on student teacher interactions and other place more priority on interactions amongst students (Yoshikawa et al., 2016). While the quality of programs may vary in structure and process, Yoshikawa et al. (2016) describe the success of the higher instructional quality schools in a recent study by stating:

> In a recent set of 14 randomized trials, preschool curriculums that focus on specific child development skills that have a specific scope and sequence, and were supported by high quality teacher professional development such as in classroom coaching, have increased classroom quality and improved many child outcomes. (p. 28)

Professional development and teacher education also plays a major role in mathematics instruction within an early childhood education program. An emphasis on teacher training is emphasized by the National Council of Teachers of Mathematics (2013), which states, "Teacher education programs must include attention to the mathematics component of early childhood programs, and continuing professional

development opportunities should support high-quality mathematics education" (para. 4). The lack of training and quality instruction is also noted by Morgan (2019):

> One problem with American preschool programs is that they vary greatly in quality. The most successful programs not only have personnel with the appropriate qualifications but also include an evidence-based curriculum that is well implemented. In addition, high-quality programs promote active but orderly teaching and provide coaching for teachers to achieve the desired goals. (p.17)

Other research has found that preschool or pre-kindergarten programs with instructional strategies that allow for inquiry-based learning, involve activities that allow for active engagement and develop their own learning have helped to develop mathematical skills (Karademir & Akman, 2019). Results from Karademir and Akman's study (2019) found that preschool students were able to demonstrate newly acquired math skills following hands-on, inquiry-based instruction over those students who were introduced to the same skills through more traditional instructional methods.

The amount, quality, and types of instruction all play a role in the overall effects of mathematical developments of pre-kindergarten age students as they progress through school. In a study of the impact of preschool mathematics on mathematics achievement in later elementary school years, Watts et al. (2018) found that learning mathematics during preschool did lead to improvements in mathematical skills and concepts later in elementary school, but this was limited to the relationship between preschool to 5th grade. The link between early preschool mathematics instruction and its effect on student achievement, within upper-elementary grade levels, is difficult to determine due to the numerous factors that could impact a students. These factors include the quality of

instruction and knowledge of the teacher throughout a student's elementary years (Watts et al., 2018).

Other studies have focused on the effects of early mathematics intervention within preschool or pre-kindergarten programs to determine their effectiveness of improving mathematics skills. Namkung et al. (2019) found that students identified as having mathematical difficulties at an early age were able to show growth and greater acceleration of mathematics skills when provided with more informal instruction compared to those students who already received informal mathematics instruction in their school or at home.

However, it was also found that students with mathematical difficulties, who were given mathematics reading instruction also showed growth, but not at a slower rate than their typically developing peers, thus widening the achievement gap from a young age (Namkung et al., 2019). This strengthens the argument that more needs to be done to ensure equitable and quality mathematics programming in preschool and pre-kindergarten programs in order to close the gap between student mathematics growth and achievement.

Overall the effects of early mathematics exposure and instruction play a major role in the importance of a student's development of methodical skills and concepts as they grow. The National Council of Teachers of Mathematics (2013) states the following regarding the importance of teaching mathematics for early childhood learners:

> Young learners' future understanding of mathematics requires an early foundation based on a high-quality, challenging, and accessible mathematics education. Young children in every setting should experience mathematics through effective,

> research-based curricula and teaching practices. Such practices in turn require that teachers have the support of policies, organizational structures, and resources that enable them to succeed in this challenging and important work. (para. 1)

Mathematics education within early childhood education has also experienced a reform since the Obama administration dedicated $5 billion in funding for child care, Head Start, and Early Head Start programs, which has driven many states to implement mathematics at the preschool or pre-kindergarten level (Hachey, 2013). The push is now to provide specific curricula and pathways for early mathematics learners with a focus on building conceptual depth and understandings within mathematics (Hachey, 2013).

Research shows that preschool and pre-kindergarten programs need to have high quality instruction, dedicated time for mathematics, and opportunities for both informal and formal instruction to effectively reach students. Students who do not receive such training begin their kindergarten year at a disadvantage and students from lower income households are at an even greater disadvantage when they have not received quality mathematics instruction prior to the start of kindergarten (Namkung et al., 2019).

Effects on Literacy Development in Pre-Kindergarten Programs

Since the dawn of pre-k programs in the United States, one of the main components has always been developing student literacy. As early as the 17th century, pre-kindergarten or 4 year old students learned to read through introductions to bible study (Bloch, et al., 1989). As pre-kindergarten programs have evolved, so too has the emphasis for literacy development and instruction. One of the major shifts in early child education regarding literacy was the United States government's "No Child Left Behind

Act", which placed a large emphasis on providing reading instruction for the nation's youngest students (Flippo, 2008).

In more recent years, a number of studies have been conducted to examine the effects of pre-kindergarten literacy instruction on student development in pre-kindergarten programs. While every program is unique, servicing students from different backgrounds, socio-economic status, and using a variety of different teaching methods and curriculums, it is acknowledged that the early development of children (birth through preschool) has an impact on students' literacy and academic development (Flippo, 2008).

Examples of such impact are evident in programs such as Alabama's First Class Pre-K (FCPK) program, which was developed by the Alabama Department of Early Childhood Education to provide a diverse delivery, voluntary, high quality, pre-k program for 4-year old students (Preskitt et al., 2020). In a study of Alabama's FCPK program, Preskitt et al. (2020) found that students who attended the program were statistically more likely to be proficient in reading and math standardized tests in grades 3 through 7.

Furthermore, it was found that there was little evidence of fadeout or regression among the students who attended the FCPK program well beyond the completion of the program into later elementary and middle school grades (Preskitt et al., 2020). Preskitt et al. (2020) attributed the success of students to the FCPK program by stating, "We suggest that these benefits are related to the high quality standards and rigorous implementation of Alabama's FCPK" (p. 9).

In a study to determine the impacts of state funded preschool programs at kindergarten entry, Jung (2018) found that pre-kindergarten participation was associated

with positive effects on basic literacy skills at kindergarten entry, but small gains in vocabulary skills. These findings are consistent with others who have found vocabulary instruction at the pre-kindergarten level to be lacking. Newman & Dwyer (2009) state the following regarding the emphasis on vocabulary instruction at the pre-kindergarten level:

> Given its substantial role in reading development and the significant vocabulary gap prior to age 4, one would expect to find an emphasis on vocabulary early on, especially in the preschool and primary grades years. Paradoxically, this appears not to be the case. (p. 384)

While the impact of basic early literacy may be effective in future years, the aforementioned research suggests that more needs to be done at the early childhood education level to enhance the vocabulary of students in preparation for kindergarten and elementary school.

Successful pre-kindergarten instruction is also reliant on the cohesiveness of curriculum. In 2014, Massachusetts was one of 18 states that was awarded federal grant money to expand upon their pre-kindergarten programing within the state, which they used to provide public and private early childhood education programs with curricular materials, professional development, and coaching (Bornfreund & Loewenberg, 2018).

A key focus of the initiative was developing a curriculum that was transferable among multiple grade levels. The Boston Public School Department of Early Childhood (DEC) had found that the disconnect between curriculums served as a barrier for success when students moved from pre-kindergarten into primary elementary grade levels. Bornfreund and Loewenberg (2018) state,

> DEC knew it needed to address the fact that the district's successful K1 program was largely disconnected from the instruction delivered in later grades. Aligned, evidence-based P–3 curricula did not currently exist, so rather than piecing together various curricula, the early childhood team began writing a new program designed to build on the gains students made in K1 and ensure instructional alignment as students entered K2. (p. 14)

Creating opportunities for teachers and students to build off knowledge from one year to the next allowed for a transfer of understanding and better prepared students as they progressed from a pre-kindergarten program to elementary school.

In addition to aligning curriculum, the way in which data is collected and shared vertically from a pre-kindergarten program to an elementary school has also been studied. Vertical data sharing allows for a transfer of data between the pre-k entity, whether it be an in house public entity or a private pre-kindergarten center, and for educators to use data to effectively gauge students' prior knowledge as they enter kindergarten. In a study of data collection and vertical data sharing between pre-kindergarten and elementary school, Little et al., (2019) state the following:

> Though county officials report that data is used for decision making by themselves and teachers, we detected that the data available could be utilized to a greater capacity. In order to realize this goal, the Local Education Agency (LEA) need to focus on professionally developing their workforce, including teachers and county-level officials, in data application or hire trained data analysts to counsel and coach teachers on data use. (p.20)

The United States is also home to more state-funded pre-kindergarten programs run by school districts than privately or federally funded programs (Barnett et al., 2016, as cited in Haslip, 2018). In a study focusing on the literacy development of students who attended a public school district pre-kindergarten program, compared to students who did not attend a pre-k program, Haslip (2018) found that students who did attend the pre-k program began first grade reading nearly one full text level above students who were not in a preschool group. Further emphasizing the importance of pre-kindergarten literacy instruction, Haslip (2018) notes the following results from his study:

> Children who attended Pre-K are at least risk for reading difficulty than the children who did not attend any type of preschool. Children who did not attend any type of preschool began first grade reading nearly one text level below the expected benchmark. As a result, the no preschool group would have been placed into below benchmark reading groups in their classrooms and qualified for additional reading intervention more often than Pre-K attendees. (p. 12)

This shows the impact that mere attendance within a pre-kindergarten classroom can have on a student's literacy development prior to the start of kindergarten.

However, access and availability to preschool and early childhood education programs, based on their location, has become a challenge for some families. It has been found that there is inequity in attending such programs when students come from lower income families and schools are not available in their communities (Fuller & Liang, 1996).

Literacy instruction in the pre-kindergarten programs has not only been a staple from the start of their existence, but has also been found to be an important piece in

providing students with important literacy development at a young age. However, critical to the quality of any program is the preparation and training given to its instructors. As such professional development and training is a key component to creating an effective literacy program within preschool and early childhood learning programs. Effective professional development includes knowledge- and practice-focused professional development, resulting in knowledge for the educator as well as improved quality and student outcomes (Zaslow et al., 2011, as cited in Waldron & McQueen, 2020).

The need for literacy development at the pre-kindergarten and early childhood education level has been recognized for sustained success, as noted by the General Education Leadership Network (2016), "Prekindergarten education has the potential to improve "reading-by-third-grade" outcomes. Early childhood programs can also help to address disparities in literacy achievement" (p.1).

While the success, quality and outcomes of different pre-kindergarten programs may vary, overall the effects on literacy have been measured as successful based on the previously mentioned studies. Torgesen (1998) expresses the need for early literacy education and intervention:

> The best solution to the problem of reading failure is to allocate resources for early identification and prevention. It is a tragedy of the first order that while we know clearly the costs of waiting too long, few school districts have in place a mechanism to identify and help children before failure takes hold. (p. 32)

Servicing Students in Pre-Kindergarten

From the onset of pre-kindergarten programs or schools who provided educational experiences for 4-year old students, many were established with the goal of educating the

communities' neediest learners, specifically those students who came from families with a lower socio-economic status. 4-year old programs were created in colonial America during the 19th century with the goal of forming public schools to educate and to form good moral character in poor children, based on the perception that these students were lacking those particular skills based on their background and environment (Bloch et al., 1989).

The late 19th century focused on educating those were poor, but also increasing the role of mothers in the process (Rose, 2009). Rose (2009) states the following about the pre-kindergarten reform that took place in the late 1890's:

> The managers of kindergarten and nursery programs shared the essential idea that these schools for children would also teach women how to be better mothers, through mother's meetings, home visits, and involvement in the classroom. By educating mothers, they believed, they would be helping to create families that could climb out of poverty. (p. 223)

Furthermore, the mainstream adoption of public pre-kindergarten or 4-year old classrooms were championed by philanthropists who had financed such programs independently for poor children in urban areas (Bloch et al., 1989). One of the nation's largest movements to educate those believed to be the neediest based on the socio-economic status came as part of the War on Poverty Act and the creation of Head Start, which focused on the development of economically and socially disadvantaged children through comprehensive educational, health, and family services (Winter & Kelley, 2008).

While Head Start put an emphasis on the inclusion of parents within their child's education, it also emphasized the employment of parents and community members within

the program as a way of further supporting the community by providing a paying job (Rose, 2009). However, the idea of providing career opportunity and development for disadvantaged community members meant that some areas were hiring teachers that were not trained or qualified to teach and a college degree and or teaching certification was not required of Head Start's teachers (Rose, 2009).

Zigler and Styfco (2000) describe how the ideas that framed Head Start were lost in other reform efforts that eroded the quality of education within the program:

> The lack of attention to quality over the years, including the lack of consistent monitoring, resulted in an erosion of the value of services delivered. This situation was exacerbated in the 1990s when a period of rapid expansion began. I knew that many Head Start participants were not being served well, and I did not want to see more of them served that way. (p. 70)

While the intent of programs like Head Start were designed to reach those that came from less affluent families, the quality of this program and others has long been in question, which has further expanded the gap between those with versus those without.

Magnuson et al. (2004) note the disproportion in pre-kindergarten enrollment for families who are economically disadvantaged, "Not only are children from economically disadvantaged families less likely to experience stimulating learning opportunities in their home environments, they are also less likely to be enrolled in early education programs and center-based child care" (p. 3).

Although programs like Head Start were started in the mid-1960's, equity and access to quality education for those coming from underserved or low socio-economic status families still remains. Program funding and quality of trained teachers continue to

be a challenge in today's early childhood education programs. While federal (ex. Head Start) and public programs do exist to provide early childhood education, much of the funding that comes for early childhood education centers is directly funded by families and parents enrolling their students in programs, which can be a burden or deterrent for low-income families (Scott et al., 2017). This means that families without financial resources do not always have access to early child education, much less those deemed to be of high quality.

Since the development of Head Start programs in the mid-1960's, many programs have struggled to find highly qualified educators for early childhood education programs, a problem that continues to be a challenge. Scott et al. (2017) describe the requirements and qualifications required for early child education programs and the inequities that exist:

> Early Head Start/Head Start programs require at least 50% of their workforce to hold a bachelor's degree, and Pre-K programs in 24 states require that all lead teachers have a bachelor's degree. However, in child care: 10 states have no educational requirements for center-based lead teachers, and 23 states have no requirements for regulated home-based providers. (p. 79)

The inequity of educational background requirements for employees within early childhood education programs only exemplifies the disparity among programs. Terezakis (2001), notes the following regarding the need for government funded Head Start programs to service all families and communities, " Head Start needs a structured program resilient enough to work in widely different environments, from the Bronx to

Appalachia; it needs clear objectives in guiding children and vesting their families with the resources to continue to guide them" (para, 17).

With parent/family funding being a main source of funding for many of these programs, the quality of education is often based on the cost of the program, which creates a larger gap between students from affluent families and those from low income families (Winter & Kelley, 2008). Morgan (2019) states the following about the inequity in quality pre-kindergarten availability:

> Wealthier parents are much more likely to place their children in higher quality preschool programs because they can afford to pay for the private programs they choose. However, low-income families have no choice but to send their children to state or federally funded programs if they are available in their area. These programs can vary greatly in quality. (p. 18)

Other studies have represented the availability of early childhood education or preschool programs based on their location. In a study to observe the inequity of preschool access for families, Fuller and Liang (1996) found the following:

> First, availability is lower in many working class and middle-income communities. This includes families that have difficulty paying private preschool fees and usually cannot benefit from subsidies. Preschool availability remains greatest in the richest communities. Second, more highly educated parents demand and are more likely to find preschools in their communities, even after taking into account modest family-income effects. Third, local areas with greater shares of single-parent families display lower levels of preschool availability, after taking into account the positive effect of welfare benefits. (p. 45)

While the quality of educational access was already in question, so too is the access to preschool programs as a whole.

The creation and development of pre-kindergarten, preschool, and early childhood education programs has greatly expanded and grown since their first introduction in the 18th century. There has long been a focus on educating those from poor or low-income families, but these problems still remain at the forefront of improving the nation's early childhood education opportunities for all students. There is a call for further funding for these programs, an emphasis on quality of instruction through education of employees and use of research-based curriculums, as well as access to high quality programs for all students (Morgan, 2019).

Effects of the Pandemic on School Budgets

The impact the Covid-19 pandemic will have on school districts may take years to fully understand. However, at this point the effects of the national, state, and local closures have already had an impact on local school districts.

School district revenues are tied directly to funding from federal, state, and local taxes. Within Pennsylvania, a vast majority of public school districts rely heavily on their local tax revenue to support a majority of their budget.

Pennsylvania relies on local millage rates to determine tax contributions within each local school district. Millage rates are used in the state of Pennsylvania to determine the amount of property or local tax that a homeowner must pay to their local school district (Kagan, 2020). One mill is equal to one one-thousandth of a dollar—or $1 for every $1,000—of property value. Millage rates are set by school districts and are calculated based on the tax assessed value of a home (Kagan, 2020). As part of Act 1 of

2006, Pennsylvania sets a base tax index rate for school districts to abide by. The index is the average of the percentage increase in the Statewide average weekly wage and the Employment Cost Index (Pennsylvania Department of Education, 2019).

Local school districts' reliance on local tax revenue could cause budgetary shortfalls in the near future. The rise in unemployment rates during the pandemic could be a sign that districts may not receive the local tax revenue they typically rely on.

The effects of the Covid-19 pandemic were seen as early as the spring of 2020 as the pandemic spread throughout the nation and world. At the time, many school districts were just beginning to set their budgets for the 2020-2021 school year and were faced with challenging financial forecasts. Burnette II (2020) explains the financial challenges districts were facing as the onset of the pandemic hit the United States,

> Almost half of the nation's 13,000 school districts may be forced to make the deepest cuts to education spending in a generation—slashing programs and laying off hundreds of thousands of administrators, teachers and other staff—to fend off financial collapse brought on by the coronavirus. (p. 12)

Schools are also finding increased budget costs, due to the many social distancing guidelines that are in place for schools, and in order to provide students instruction both in person and/or remotely. Baker et al. (2020) state:

> Due to the COVID-19 pandemic, public schools will likely experience even greater revenue losses in the coming years than they did during the Great Recession. Further, it appears that safely reopening schools in the fall of 2020 will itself be costly. (p. 9)

The pandemic has created new and costly needs for school districts to maintain instruction for students. This includes an increase in staff members to keep class numbers lower, an increase in demand for cleaning and sanitization products for staff members, more reliance on substitutes for staff members that are sick, and increased hours to maintain facilities and provide meals for the students and public. Schools have also had to find ways to provide technology and internet access to all students in order to provide equal access for all students (Baker et al., 2020).

The pandemic has also pushed families to reevaluate the way in which their children will attend school and when they will attend school, which has resulted in the changes to the number of students attending school. Some schools and districts have lost students enrollments to private or cyber schools who could offer different programming, fully virtual or more in-person instruction. The loss of students to other schools can directly result in a loss of revenue.

As school districts' opened their doors for the start of the 2020-2021 school year, there were many unknowns, including how they would fund additional costs when federal relief money had been exhausted. Burnette II (2020) states the following in regards to school districts' reliance on federal support to supplement their budgets while opening schools during the pandemic:

> The congressional delay in passing new aid legislation is having real-life impact close to the ground. Any new congressional aid would be funneled to low-income districts across the country, which are heavily reliant on state sales and income tax revenue that has been wiped out by the coronavirus pandemic. (p. 13)

Awaiting additional funding has resulted in many districts diving further into their original 2020 budget much earlier than expected, and with more spending the fear of further deficits for the upcoming 2021 budget season looms for many school districts across the nation (Burnette II, 2020).

While many districts will face budgetary restrictions and deficits as a result of the pandemic, tough decisions regarding what to eliminate will need to be considered. In regards to the effects of budget implications on preschool or pre-kindergarten programs, Barnett (2008) states:

> Increasing public investment in effective preschool education programs for all children can produce substantial educational, social, and economic benefits. State and local pre-K programs with high standards have been the most effective, and such programs need not be provided by public schools. (p. 20)

Conclusion and Synthesis

The evolution of pre-kindergarten programs within the United States has greatly morphed its role and purpose since the 18th century. From the early days of religious-based privatized learning, pre-kindergarten programs have evolved into federal, state, and privately funded learning institutions. While many federal and public programs continue to push for providing services for those who are economically or socially disadvantaged, there has also been a push for additional education for pre-kindergarten programs with enrollment in pre-kindergarten programs doubling in the last 15 years to service more than 1.5 million children in the United States (Jung, 2018).

Despite the existence of pre-kindergarten programs spanning back decades within the country, many of the same issues and questions continue to remain. Pre-kindergarten

programs have long focused on providing for the neediest learners or those who come from low income families, but this still remains a focal point of the federal government, despite the creation of federal programs like Head Start.

An examination of the quality of pre-kindergarten programs has provided differing results from one program to the next. Numerous factors can play a role in the quality of a program, such as teacher education, group size, student-teacher ratio, interactions between teachers, and interactions among peers. These factors can help to create a learning environment of higher or lesser quality, which can be attributed to student gains (Yoshikawa et al., 2016).

Quality of pre-kindergarten and early childhood instruction continues to vary from state to state and program to program. While strides have been made to require more rigorous standards for learning and requirements for health and education, the choice in curriculums and beliefs about the needs of pre-kindergarten students still varies across programs (Winter & Kelly, 2008).

The ability to hire and retain teachers within pre-kindergarten programs has also been shown to vary by programs, as program requirements, including Head Start, have different education and background requirements for their teachers. Many early childhood programs within the country still don't require a degree in education for their instructors. While socialization and social skills are still a mainstay within most pre-kindergarten programs there has been a major shift and focus on the instruction and curriculum that occurs within pre-kindergarten programs. In particular, the development of reading and mathematics skills at an early age have been found to provide students with an advantage over those who did not attend such programs, citing the positive

effects in both basic literacy and mathematics skills upon entry to kindergarten (Jung, 2018).

Based on a study examining the effects of pre-school one year prior to entry into kindergarten, Magnuson et al. (2004) found the following, “Children in center-based preschool programs in the year prior to school entry have better reading and math skills, and this advantage persists through the spring of first grade. These children were also less likely to repeat kindergarten” (p. 18). However, there is still uncertainty to which degree pre-k programs or early childhood programs affect a student’s growth and achievement throughout the duration of their educational experience.

As previously noted, the quality of instruction within both literacy and mathematics is critical to assessing the benefits that such programs have on instruction. While some programs employ rigorous instruction and focus on academic subjects like mathematics and literacy, these subjects take a backseat to socialization within some programs. The philosophy of specific teachers or programs has an impact on the experience that students will receive regarding play, socialization, literacy, and mathematics.

Efforts to sustain quality pre-kindergarten programs rely on the implementation of strategic plans that allow for a flow of curriculum from pre-k through a student’s elementary school years. Bornfreund and Loewenberg (2018) describe the success of the pre-k program with the Boston Public Schools (BPS) by stating,

> The BPS Department of Early Childhood has made slow, deliberate progress toward providing not just high-quality pre-K, but also following it up with kindergarten, first, and second grade. Recognizing that pre-K is no inoculation

> against future struggles and what follows pre-K matters. The department is pushing up early childhood education practices that are so needed — but not often seen — into kindergarten and the early elementary grades. (pp. 28-29)

Pre-kindergarten programs benefit most when a clear vision is in place, curriculum is aligned, and professional development is provided for teachers with opportunities to learn and grow along with the curriculum (Bornfreund & Loewenberg, 2018).

There has also been a call to better improve access and equity to high quality preschool education for all families and communities. The inequities among programs or access to programs remains a focus despite efforts of federal Head Start programs and the War on Poverty Act in the mid 1960's. Barnett (2008) references the importance of quality programming within his study of the lasting effects of preschool education on students:

> Regarding how children should be served, it is clear that all programs do not produce the same gains. Current child care policies and programs do not provide services of the educational intensity needed to produce substantial short-term gains, much less long-term gains. (p.17)

A call for equitable high quality education for the nation's youngest learners calls for increases in funding for preschool education, requiring higher credentials and education for teachers, implementation of research-based best practices and curriculums for programs, and ensuring equitable access and availability to programs for all students regardless of economic status (Morgan, 2019).

Throughout the years, many pre-kindergarten programs were established to service those from low income families or in the early days they were simply deemed as

students from poor families. The idea of educating students within this socio-economic class was based on the principle that by providing those less fortunate financially with an early start they could then close the gap between those with and those without. Although the premise and intention is to improve the status of specific students and families, there have been barriers that have held students from low-income households to advance themselves.

One noted barrier is the lack of access for students from lower income families to attend pre-kindergarten or early childhood programs. Students from areas of poverty do not always have programs available to them, compared to affluent families, as the physical number of programs is fewer (Fuller & Liang, 1996).

Pre-kindergarten schooling for students that come from economically disadvantaged backgrounds shows lasting long-term benefits for students, but these benefits can also be found in all students who attend a pre-kindergarten or preschool programs, regardless of their socioeconomic status (Barnett, 2008). Hachey (2013) notes the disparity in mathematics achievement for students who come from lower socio-economic status families:

> There is ample evidence that the deficits begin early. Prior to elementary school, there are differences in mathematical achievement based on socio-economic status (SES). In comparison to children from middle and upper SES backgrounds in the United States, lower SES preschool children tend not to do as well on a variety of mathematical tasks. (p. 425)

Other barriers include the overall quality of programs based on the funding sources available. While state and federally funded programs are made available to

students from low-income families, these programs do not always have the same quality of teacher or curriculum as those that are privately funded or funded by local school districts. Furthermore, many local school districts are unable to maintain the costs of programs, thus resulting in the cutting of district funded pre-kindergarten or early childhood education programs.

The Covid-19 pandemic has also created major hardships on many schools throughout the nation. Many will and have faced budget deficits as more money needs to be allocated for personal protection equipment, social distancing, online learning, school personnel, and other costs associated with bringing students back to class in a safe and secure manor, while also following the guidelines of the Center for Disease and Control and state and local health departments (Baker et al., 2020).

In addition to extra costs associated with the pandemic, school districts' must also battle anticipated losses in revenue due to local income and sales taxes associated with their yearly budgets. School districts who rely heavily on local revenues may not be able to do so with an increase in unemployment and an inability for some individuals to follow through on payment of their property taxes. When districts do face financial hardships and deficits in their budgets, they must make hard decisions like eliminating staff members, limiting program offerings, or raising taxes. With millage rate systems, schools can opt to raise millage rates that are used to calculate how much homeowners must pay to their local school district, but this action could prove to be highly unpopular given the current financial hardships some families are currently facing (Kagan, 2020).

The schools most likely to suffer financially are those with student populations that are heavily black, Latino and low-income. Many of these schools heavy rely on state

aid, which is typically driven from oil prices and income tax. As a result, they have taken a large hit since the onset of the pandemic (Burnette II, 2020). These are the same areas and families who have already seen less opportunity to access high quality pre-kindergarten instruction, thus widening the gap between rich and poor.

The literature has given further insight to the history of pre-kindergarten and early education programs and their effects of literacy and mathematics. In addition, the review outlined how pre-kindergarten and early childhood programs have historically focused on students from low-income families and how these services would otherwise not be attainable. Lastly the review provided information regarding the fiscal effects that the current Covid-19 pandemic has had on schools, and the potential effects in the future. The literature reviewed will lead the researcher in the data collection and methodology of the project outlined in the next chapter.

Chapter 3

Methodology

This study will collect, review and analyze quantitative and qualitative data based on the district provided pre-kindergarten program to determine its overall effectiveness in preparing students for their kindergarten year. The purpose of the study is to determine if the supporting data shows that the program is effectively preparing its students for their kindergarten year, areas of strength and need within the program, opportunities for improvement, and the financial implications of the program's future within the district. The participants of the study and the setting where the research took place will be described. The study will also be related to supporting literature, as reviewed in Chapter 2. Lastly, the research design, methods used, and data collection processes will also be explained.

Purpose

The Fox Chapel Area School District created a district-based pre-kindergarten program for the start of the 2019-202 school year in a supportive classroom environment designed to maximize students' academic learning, achievement and growth (Fox Chapel Area School District, 2020). The program was created to support students from families with no more than 300% of the federal poverty guidelines. While the program was launched on schedule for the 2019-2020 school year, it was interrupted in March of 2019 by the global Covid-19 pandemic.

During the spring of the 2020 school year, the district was finalizing its 2020-2021 budget, while trying to balance a projected deficit. As a result, the district reviewed

its spending and was considering the elimination of some programs, including the newly launched pre-kindergarten program. While it was ultimately decided to continue the program into the 2020-2021 school year, the program's overall effectiveness in preparing students for kindergarten and its financial impact on the district's overall budget will continue to be reviewed. As the district works to create its preliminary proposed budget for the 2020-2021 school year, an overall budgetary deficit is once again a reality, and projections predict additional deficits in coming years. These realities of the budget once again bring to light the hard decisions that the district must face in working to balance the budget. This study will be used to determine the effectiveness of the pre-kindergarten program regarding students' reading and mathematics growth and achievement, while also taking into account teacher perceptions of the program's effectiveness.

Students attending pre-kindergarten programs have shown both positive short-term and long-term effects across academic skills in both reading and mathematics (Fischer et al., 2020). Other research has noted that developing mathematical concepts for students at an early age is critical to their development, and students identified as having mathematical difficulties at an early age have been found to show accelerated growth when given instruction at an early age (Namkung et. al., 2019).

The goal of the study is to determine the effectiveness of the Fox Chapel Area School District pre-kindergarten program by determining the improvement students attending the pre-kindergarten program have made within specific skill areas in both literacy and mathematics. Additionally, teachers' perspectives regarding the effectiveness of the program will also be used to determine a qualitative data indicator within the study.

The collection and analysis of this data will be used to help determine the overall effectiveness of the program and its continuation as a district offered program.

The research will be guided by the following questions:

1. What impact does a pre-kindergarten program have on a student's growth in literacy skills based on district benchmarking assessments?
2. What impact does a pre-kindergarten program have on a student's growth in mathematics skills based on district benchmarking assessments?
3. What are teacher perceptions of the district's pre-kindergarten program in providing students with foundational literacy and mathematics skills?

Setting and Participants

The Fox Chapel Area School District is a suburban school located approximately 25-minutes from downtown Pittsburgh. The district consists of six municipalities which include the boroughs of Aspinwall, Blawnox, Fox Chapel and Sharpsburg and the townships of O'Hara and Indiana. There are six schools within the district including four elementary buildings, a middle school, and a high school.

Currently the district enrollment is over 4,000 students, and approximately 21.3% fall within the economically disadvantaged criteria (Future Ready PA Index, 2020). The school district is nationally recognized for its high achievement. The district's mission states, "The Fox Chapel Area School District exists to maximize student learning, achievement, and development" (Fox Chapel Area School District, 2020).

The research setting will take place in the Fox Chapel Area School District pre-kindergarten classroom, which is housed at Kerr Elementary School. Kerr Elementary is home to approximately 400 students, with 42.4% of its student population identified as

coming from economically disadvantaged households (PA Future Ready Index, 2020). In 2018, ground broke for construction of a new Kerr Elementary, which was built on the same property as the original Kerr Elementary Building. The construction of the building was complete for the start of the 2019-2020 school year at a cost of approximately 21 million dollars (Fox Chapel Area School District, 2020).

The new Kerr Elementary School provided the district with more space that was designed for new district initiatives, including a new Spanish Immersion Program and a Pre-Kindergarten Program for the start of the 2019-2020 school year. The Pre-Kindergarten program was designed as a 5-day a week program, which followed the district calendar. The Fox Chapel Area School District (2020) cites the following Pathways to Readiness for their students:

- Social-Emotional Development (self-awareness, self-regulation, social competence, and social awareness)
- Oral Language Development (speaking and conversation, listening comprehension, vocabulary, and sentence structure)
- Emergent Reading (concepts of print, phonological awareness, alphabet knowledge, and comprehension)
- Emergent Writing (forming letters, writing conventions, and conveying meaning)
- Math Development (number sense, geometry and spatial sense, measurement, and classification and patterns)
- Scientific Inquiry (ask, imagine, plan, create, improve)

Students also receive breakfast and lunch as part of the program and receive instruction from special area teachers in the areas of art, computer, library, music and physical education.

The program also has specific guidelines in order for students to attend the program. Students enrolling in the program must live within the district, must turn 4 before September 1st, and the family income of the student cannot be more than 300% of the federal poverty guidelines. In addition, attending students must be toilet trained and parents/guardians must be able to provide transportation for their student(s) (Fox Chapel Area School District, 2019).

The classroom has one full time teacher and a full time instructional assistant. The full time-teacher does all planning, preparation, and instruction with students and the instructional assistant aids in these duties on a day to day basis. The pre-kindergarten teacher has been with the district for 15+ years and this is her second school year within the pre-kindergarten classroom. The instructional assistant is new to the district and to the pre-kindergarten program.

The current budget for the Pre-Kindergarten program is $221,619 for the 2020-2021 school year. With 97% of the costs coming from personnel salaries and benefits. Current salaries for the 2020-2021 school year are $158,053 and an additional $57,871 for benefits packages (Figure 1). The cost of materials and resources for the pre-kindergarten program is $5,695 (3%) for the 2020-2021 school year.

Figure 1

2020-2021 Pre-Kindergarten Budget Overview

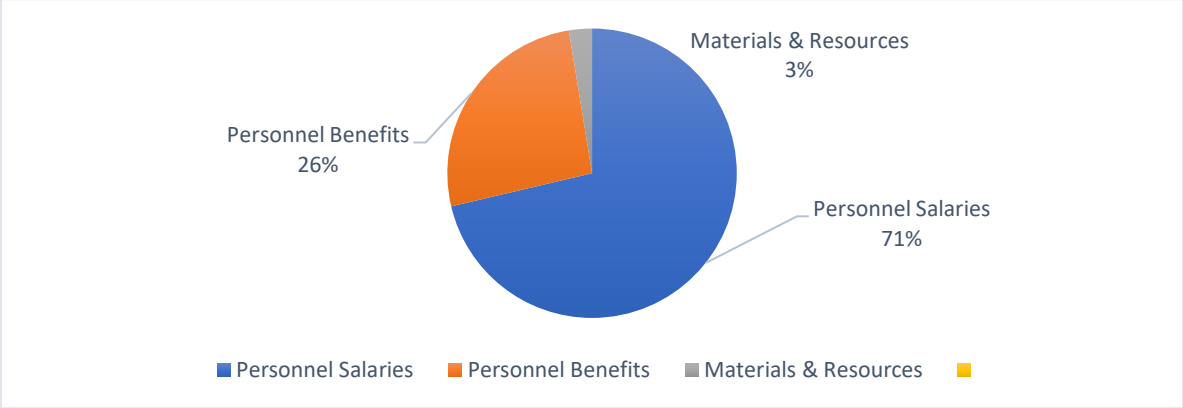

Figure 1. The breakdown of the overall Pre-Kindergarten Budget for the 2020-2021 school year.

The class is currently composed of 20 pre-kindergarten students, ages 4 and 5, from throughout the school district's community. Class size is capped at 20 students and a lottery is used to select students if there are more than 20 qualified applicants. Last year's pre-kindergarten class, the first year of the district's program, also had a total of 20 students. Of the 20 former pre-kindergarten students, 19 of the 20 are now enrolled in a kindergarten classroom at one of the four district elementary schools. The following shows the current breakdown of students who attended last year's pre-kindergarten program and the elementary school they are currently enrolled in for the 2020-2021 school year:

- Fairview Elementary ~ 1 student
- Hartwood Elementary ~ 3 students
- Kerr Elementary ~ 9 students
- O'Hara Elementary ~ 6 students
- Not Attending Kindergarten ~ 1 student

The pandemic has altered the start dates for some of these students, with 4 of the 20 students joining the program in October 2020. Since the start of the 2020-2021 school year, the pre-kindergarten classroom has attended class within a hybrid teaching mode, due to the pandemic. As a result, different cohorts of students attend class in person two days a week and work remotely or virtually on the other three days. The district recently changed the instructional model of the pre-kindergarten classroom to return to a 5-day in person model starting on Monday, March 15th.

The participants within the research study include the pre-kindergarten teacher and the instructional assistant, in addition to 5 other kindergarten teachers throughout the school district who currently have a student in their classroom that attended the district's pre-kindergarten program during the 2019-2020 school year. All participants have agreed to the Participant Consent Form which is available in the Appendix (Appendix I).

Research Plan

The growth and development of pre-kindergarten and early education programs in the United States has continually focused on those students who are considered most at risk, due to their family socio-economic status or coming from economically disadvantaged homes, but the realization now is that all students need access to high quality pre-kindergarten education regardless of their economic status (Morgan, 2019).

This district's pre-kindergarten program was created to serve incoming kindergarten students within the district that come from a targeted socio-economic sub group. All applicants and participants in the district's pre-kindergarten program come from households with a family income less than 300% of the federal poverty guidelines.

While many pre-kindergarten or early education programs have only offered on a part-time or partial-year basis and are coordinated with wrap around (full day) services to help working parents (Magnuson et al., 2004), the school district's program utilizes the same calendar as students attending grades K-12. Students attend school for more than six hours, five days per week.

Literature suggests that there is not only a need for early childhood education prior to kindergarten, but the instruction must be of high quality. They must also include purposefully designed curriculums, professional development provided for teachers, and curriculum and instructional approaches that mirror those being used in the primary elementary grades (Bornfreund & Loewenberg, 2018).

Fox Chapel Area School District's pre-kindergarten program was designed to provide students with exposure to fundamental skills taught through curriculums used within the primary and upper elementary grade levels. Specifically, the pre-kindergarten program uses the pre-kindergarten editions of Fundations, Eureka Math, and Big Day for Pre-K reading, which are all curriculums that align with those used in all of the district's elementary buildings.

The reviewed literature also emphasized the importance of quality educational experiences within pre-kindergarten or early education programs in determining their overall effectiveness. Preschool mathematics should encourage students to learn through questioning, recognizing, and exploring their environment through a clear inquiry based mathematical focus (Karademir & Akman, 2019). The National Council of Teachers of Mathematics (2013) supports the implementation of curricular resources and program

standards at the early childhood level through an engaging and encouraging environment that supports mathematical thinking.

Quality of pre-kindergarten programs are not only measures on the process, curriculum and instruction, but also the quality of structure, which refers to the teacher education, class size, and other qualities that define the make-up of the program itself (Yoshikawa et al., 2016). The structural quality factors can vary from one program to the next, but the literature references the importance of teacher education and professional development in making an impact on pre-kindergarten learners.

The pre-kindergarten teacher within the program being studied has received continued professional development for using the district's provided reading and mathematics curriculums. In addition, the district provides all primary elementary teachers with training in a district developed Primary Teacher Academy that focuses on literacy instruction for students in pre-kindergarten through 2nd grade. The literature notes that effective professional development includes knowledge- and practice-focused professional development, resulting in knowledge for the educator as well as improved quality and student outcomes (Zaslow et al., 2011, as cited in Waldron & McQueen, 2020).

The district's pre-kindergarten program was considered for elimination as a result of budget deficits in the 2020-2021 school year. The pandemic has brought even greater uncertainty for school districts with many facing rising costs and possible budget cuts (Baker et al., 2020). The looming budget deficit for the 2021-2022 school year may result in additional program cuts within the Fox Chapel Area School District, and

determining the value, worth, and effectiveness of each program, including the pre-kindergarten program, will need to be considered when making such decisions.

Research Design, Methods, and Data Collection

This research will be done utilizing a mixed methods approach. This method will allow the researcher to collect and analyze quantitative data, regarding student growth, throughout the school year, followed by the use of qualitative data derived from teacher surveys to assist in explaining and interpreting the findings of the quantitative study.

Following approval of the Institutional Review Board (Appendix A) data was collected using grade level benchmark assessments of students in the pre-kindergarten program to measure their growth in literacy and mathematics skills using benchmark assessments throughout the school year.

Data for each student in the Pre-Kindergarten program was monitored from the start of the 2020-2021 school year to January of 2021, in both literacy and math, with assessments being administered 2 to 3 times during this time span. Assessments were performed in a one-on-one setting with a student and the pre-kindergarten teachers. Directions were given orally to the students with different checkpoints for specific skills being recorded into each student's Pre-K Assessment Booklet (Appendix B).

Data from the Pre-K Assessment Booklets were then shared with the researcher, omitting the names of students and providing each with a code (student #1, #2, etc.) in or to ensure that all data remained anonymous. This data was then compiled into a spreadsheet to determine the trends that may or may not exist within the data. The data collected from the pre-kindergarten students was limited to the skills assessed and

recorded in the Pre-K Assessment Booklet, as these are the only assessments used to assess learning at the pre-kindergarten level.

The following skills are the literacy skills assessed and recorded with the Pre-K Assessment Booklet for each student currently attending the district's pre-kindergarten program:

- Letter Identification - Administered in September, November & January
    - Upper Case Letter Identification - Students are asked to identify specific Upper Case Letters when shown (26 letters total).
    - Lower Case Letter Identification - Students are asked to identify specific Lower Case Letters when shown (28 letters total, a & g).
- Phonological Awareness - Administered in November & January
    - Words in a sentence - Students must attend to, discriminate, remember, and manipulate sounds at the sentence level (3 Points).
    - Blend Syllables - Students must attend to, discriminate, remember, and manipulate sounds at the syllable level (3 Points).
    - Segment Syllables - Students must identify the number of syllables within a given word (3 Points).
    - Recognize Rhyme - Students must determine if two words rhyme when presented to them orally (3 Points).
    - Producing Rhyme - Students must produce a rhyming word when presented with an initial word orally (3 Points).
    - Isolate Initial Sounds - Students must attend to, discriminate, remember, and manipulate sounds at the phoneme (sound) level (3 Points).

  - Blend Phonemes - Students must identify a word when provided with the individual phonemes orally (3 Points).
  - Identify Phonemes - Students must identify phonemes within an individual word (3 Points).

- Letter-Keyword-Sound (Based on the Fundations Curriculum /Administered in November & January) – Students must identify a given letter, its associated keyword, and its sound (ex. a – apple - /a/) (26 Letters)

The following skills are the mathematics skills assessed and recorded with the Pre-K Assessment Booklet for each student currently attending the district's pre-kindergarten program:

- Colors and Patterns - Administered in September, November & January
  - Students must identify a specific color when given (11 points)
- Measurement and Geometry - Administered in September, November & January
  - Rote Counting - Student must count sequentially to 100 (100 possible points)
  - Identifies Numbers 0-10 – Students can identify a number when given (11 points).
  - Identifies Numbers 0-20 – Students can identify a number when given (21 points).
  - One to One Counting – Students use one to one correspondence when counting specific objects (8 points).
  - Identify More or Less – Students can identify if a given number is more or less and a 2nd number given (6 points).

- Sorting - Students must sort objects by color, size, shape, and one other attribute (4 points).
- Shapes - Students must identify different geometric shapes (7 points).
- Position Words – Students must move objects to represent given position words (ex. under, above, beside, etc.) (12 points).

The total number of points for each assessed skill were collected and placed into a spreadsheet. All data was stored in a secured database within the Fox Chapel Area School District.

The data from each student was then examined to determine specific trends within individual skills and/or content areas (mathematics and literacy), specifically examining if students were making growth within specific skills. These trends were then analyzed to determine if specific students were showing more or less growth than others, and to determine if any outliers existed within the group.

Furthermore, the data from the entire class was then compiled and analyzed within specific skill and content area sub-sections. This was used to determine if there were any trends among specific skills to determine areas of strength and or weakness within the program.

In addition, the data of students currently in kindergarten that completed the pre-kindergarten program during the 2019-2020 school year will also be collected and analyzed in comparison to other kindergarten students who did not attend the pre-kindergarten program. Specifically, the researcher utilized data from the STAR 360 Early Literacy assessment to record student growth during the months of September, November, and February.

The STAR 360 Early Literacy Assessment is a customized reading test for students to take on a computer, and is designed for students in grades pre-kindergarten through 2nd grade. STAR 360 Early Literacy Assessment is a computer adaptive test in which the software selects items based on the student's responses. Based on student responses, the computer adapts the questions introduced and the software increases the difficulty level of the next item. The Star Early Literacy Assessment consists of 27 questions and generally takes fewer than 15 minutes for the student to complete (Renaissance Learning, 2017).

The STAR 360 Early Literacy Assessment presents students 27 questions which pertain to the following foundational skills: Alphabetic principle, concept of word, visual discrimination, phonemic awareness, phonics, vocabulary, and early numeracy (Renaissance Learning, 2020).

Upon completion, the assessment provides each student with a scaled score (SS) used to report performance for all students on a consistent scale. This allows all scores and results to be comparable using a common scale, which ranges from a SS of 300–900 (Renaissance Learning, 2017). The STAR 360 Early Literacy assessment also categorizes the SS of each student into one of the following literacy classifications, based on a student's SS:

- Emergent Reader – Scaled Score of 300-674
- Transitional Reader – Scaled Score of 675 – 774
- Probable Reader – Scaled Score of 775 – 900 (Renaissance Learning, 2017)

The data was collected and compiled into a district secured spreadsheet and coded to keep the anonymity of each individual student. The STAR 360 Early Literacy data

will be used to determine the individual growth patterns of individual students who previously attended the pre-kindergarten program in 2019-2020, and will also be compared to the average scaled scores of other kindergarten students within the school district to determine trends or outliers within the data.

Qualitative data was also collected within the research study and was based on two perception surveys given at the start (September) and end (April) of the 2020-2021 school year to both pre-kindergarten and kindergarten teachers to gather their perceptions on the effectiveness of the program. All surveys were approved by IRB and required participants to agree to an informed consent letter (Appendix C). Surveys were completed using a secured Google form survey and participants had the ability to withdraw from the study at any point. Those participants that completed the Initial Student Readiness Survey (Appendix D) were then asked to complete a Pre-Kindergarten Mid-Year Interview(Appendix E) and a Final Student Readiness Survey (Appendix F), which was also administered via Google form. Due to Covid-19 restrictions and district policies, prohibiting in person meetings, the Pre-Kindergarten Mid-Year Interview was offered in a Google Form, allowing participants to type their responses to each of the interview questions.

The purpose of the Initial and Final Student Readiness Survey was to gain teacher perceptions of the program regarding the readiness of kindergarten students entering their classrooms and formerly attending the pre-kindergarten program during the 2019-2020 school year. Perception questions were presented to participants using rating and Likert scales. Open-ended questions regarding overall perception, support and resources needed, and proposed improvements were also asked of each participant.

The first section of the Initial and Final Survey used rating scales of 1 through 5, with 1 representing minimal knowledge of concepts and 5 meaning extensive knowledge of concepts. Questions focused on the teacher's perception of student readiness in both literacy and mathematics. The questions were as follows:

- How would you rate the readiness of incoming kindergarten students who attended the pre-kindergarten program, based on their knowledge of mathematical skills/concepts?
- How would you rate the readiness of incoming kindergarten students who attended the pre-kindergarten program, based on their knowledge of literary concepts?

The second section of the survey used a Likert Scale to gain perceptual opinions on student readiness in mathematics and literacy compared to students who did not attend the pre-kindergarten program. The questions were as following:

- How would you compare the readiness of students who attended the pre-kindergarten program versus those who did not regarding knowledge of mathematics skills/concepts?
- How would you compare the readiness of students who attended the pre-kindergarten program versus those who did not regarding knowledge of literary skills/concepts?

The final section of the Initial and Final Student Readiness survey focused on qualitative perceptions that were asked using open-ended questions. The questions were as follows:

- What improvements would you recommend to help further the development of students' literacy and mathematics skills within the district provided pre-kindergarten program?
- What additional support or resources are needed to further the development of the pre-kindergarten program, in order to develop students' literacy and mathematics skills?
- What is your overall perception of the effectiveness of the pre-kindergarten program in preparing its students for Kindergarten?
- What other factors do you believe play a role in student readiness for kindergarten? Do you feel that the district's pre-kindergarten program addresses these factors? Explain how it does or does not.

This data was collected and compared for trends within each survey (Initial and Final), but was also used to analyze commonalities and differences from the initial to final survey. These same surveys were given to the pre-kindergarten teacher, but were completed from the perspective of incoming pre-kindergarten students.

The Pre-Kindergarten Mid-Year interview administered to district teachers in January/February to further gauge the perception of the teachers' outlook of the pre-kindergarten program's ability to provide students with the necessary literacy and mathematics skills to enter kindergarten. Out of the 7 participants that completed the Pre-Kindergarten initial survey, 6 teachers were willing to participate in the Pre-Kindergarten Mid-Year interview. All questions within the Pre-Kindergarten Mid-Year Interview were presented in an open ended format and were analyzed and compared for trends.

The questions asked in the Pre-Kindergarten Mid-Year interview were all qualitative. There were a total of 6 questions asked during the interview, with 2 of the questions only applying to the pre-kindergarten teacher. The 6 questions asked were as follows:

- What do you believe are the most important skills that Pre-Kindergarten students need to acquire in order to be successful in Kindergarten?
- Follow up question: How effective is the Fox Chapel Area's Pre-Kindergarten program at providing these skills?
- Last year the district piloted the Pre-Kindergarten program, what improvement(s), if any, did you see in students' literacy and mathematics skills from the start of the year to the end of the year? (For Pre-K instructors only. Type N/A if this does not apply to you.)
- How would you compare your students' academic growth in mathematics and literacy at this point in the school year, compared to last year? (For Pre-K instructors only. Type N/A if this does not apply to you.)
- What do you believe are the greatest strengths of the Fox Chapel Area Pre-Kindergarten program?
- In what areas do you think the Fox Chapel Area Pre-Kindergarten program needs to improve?

Validity

Construct validity was used in this study to compare data measures of similar qualities to see how highly correlated the measures are. Considering that the impact or effectiveness of a program can be subjective, with no specific measure, measurements of

students skills in both literacy and mathematics were assessed for each individual student over time to serve as a measurement of effectiveness.

Furthermore, criterion validity was used through the data collected from the STAR 360 Early Literacy Assessment. STAR 360 utilizes criterion validity by comparing student scores to state benchmarks for reading proficiency.

Face validity was used in this study when surveying teachers on their opinions of the impact that the pre-kindergarten program has on students in literacy and mathematics. The survey provides opinions-based qualitative data that will be used in correlation with quantitative data, providing a criterion validity for the data collected.

Credibility within the study was enhanced through triangulation, using both quantitative and qualitative data to determine correlation of results. Multiple forms of data regarding the effects of the pre-kindergarten program were collected through teacher surveys, district benchmark assessment, and STAR 360 Early Literacy assessment data. The researcher ensures that data was carefully collected from reliable sources and reviewed for accuracy. All data and information reported from the study was based on analysis of the data.

All data was collected carefully, ensuring that all questions in the initial, mid-year, and final teacher surveys were asked in the same way. All students who participated in district benchmark skills assessments within a one-on-one setting with the district pre-kindergarten teachers. Students were all asked the same questions and in the same format for each of the benchmark assessments. Furthermore, all students were given the STAR 360 Early Literacy assessment in consistent classroom environments, with headphones provided and sound enabled.

The goal of this research study was to determine the effectiveness of the program in the areas of mathematics and literacy. The techniques used in this study were done with a systematic approach, in which most, if not all, could be replicated and transferable in other school systems or districts. All data sources could be replicated within other schools, but the purchase of STAR 360 software would be necessary to replicate. However, all other survey data and benchmark data could be collected without additional purchases.

Data was collected from various sources throughout the study and all data was double checked for errors. All data collection procedures were outlined and approved by the Internal Review Board and all teacher participants agreed to the informed consent statement, which was included at the start of all teacher completed surveys and the mid-year interview. All kindergarten teachers were asked to complete the survey with knowledge of students who attended the pre-kindergarten program the previous school year. There is a possibility that some responses from teachers were given based on what they believed to be the right answer, potentially masking their true beliefs, thoughts and opinions. Further, teachers knowledge of the pre-kindergarten program, or lack of knowledge, could also have altered their responses.

All student benchmark data was collected by the district's pre-kindergarten teacher and compiled within the student assessment booklets for each student and labeled with a number. STAR data was generated by the software's website and student data was transferred to a data spreadsheet. This data was then transferred to a secured spreadsheet, with no indication of student name or identification.

This research will help to show how effective the district's pre-kindergarten program is in developing students' literacy and mathematics skills prior to entering kindergarten. The study will help to determine the total gains students made in particular literacy and mathematics skills, while also examining how students who previously attended the program are faring in the kindergarten year, with regard to literacy and mathematics. Further, the study will provide insight from teachers, gaining perspective of their thoughts and opinions of the program.

Overall, this study can be used to help the district determine how effective the newly adopted program has been in growing students literacy and mathematics skills and aiding in the decision to continue the program. The researcher will utilize the outlined data collection plan to look for trends and correlations among the different data sources, which will be outlined through data as data analysis and results in the next chapter.

Chapter 4

Data Analysis and Results

Data was collected for the research study within the following areas: pre-kindergarten literacy benchmark assessments, pre-kindergarten mathematics benchmark assessment, kindergarten STAR assessment data, and teacher perspective surveys based on the effectiveness of the pre-kindergarten program. Student assessment data was gathered and analyzed, while also examining growth throughout the school year.

The following research questions guided the study:

- What impact does a pre-kindergarten program have on a student's growth in literacy skills based on district benchmarking assessments?
- What impact does a pre-kindergarten program have on a student's growth in mathematics skills based on district benchmarking assessments?
- What are teacher perceptions of the district's pre-kindergarten program in providing students with foundational literacy and mathematics skills?

Data Analysis

Throughout the data analysis of this study, statistical methods were utilized to gain further insight to the guiding research questions. Based on the data collected, the overall effectiveness of the program on students' growth in literacy and mathematics, combined with teacher perceptions of the program, led to findings about the overall effectiveness of the pre-kindergarten program.

The research first examined the overall average improvement for each literacy and mathematics skill, based on the benchmark data collected throughout the school year. This was then presented as an average percent improvement for each skill area.

Data from the STAR benchmark assessment was then analyzed comparing the data collected for students previously attending the pre-kindergarten program to peers within the district's kindergarten classrooms as well as the national averages generated by the STAR Early Literacy Assessment. Data was also analyzed to show the growth of each student who previously attended the program as they took the assessment throughout the school year, between the months of September and February.

Lastly, teacher perception survey responses were analyzed for differences between the initial and final surveys, while also including perception-based responses from the mid-year survey.

Results

Students within the district's pre-kindergarten class were given benchmark assessments of specific literacy and mathematics skills 2-3 times during the school year. In total, data was collected for all 20 students within the district's current pre-kindergarten classrooms. However, there were 4 students who did not enter the program until October and did not have baseline data for some of the assessed skills. Assessment data was collected on 11 different literacy skills: lower case letter identification, uppercase letter identification, phonological awareness (words in a sentence, blending syllables, segmenting syllables, recognizing rhyme, producing rhyme, isolating initial sounds, blending phonemes, & identifying phonemes), and identifying letter/keyword/sound, based on the Fundations curriculum.

The average number of letters students were able to identify, uppercase and lowercase, was recorded during the months of September, November and January (Figure 2). The classroom average of lowercase letters identified, based on 28 letters, was 13.1%in January, 16.6% in November, and 21.8% in January. Overall, 7 of the 20 students were able to identify all 28 letters during the January assessment compared to 1 student during the September assessment.

Uppercase letter identification showed an average number of letters identified (Figure 2), based on 26 letters, as 14.1% in September, 18.8% in November, and 21.9% in February. There were 4 students in the class that were able to identify all 26 letters in September and 12 students who were able to identify all 26 letters during the January assessment.

Figure 2

Letter Identification (Classroom Averages)

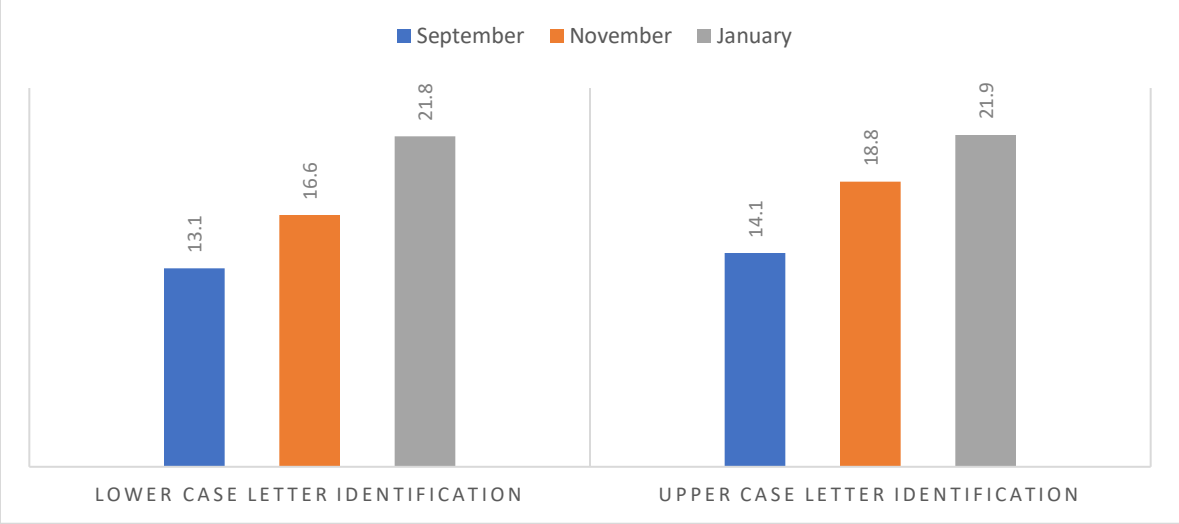

Figure 2. The average number of letters identified on benchmark assessments.

Assessment data on phonological awareness was gathered during the months of November and January. There were a total of 8 skills used to identify students' overall

phonological awareness skills (words in a sentence, blending syllables, segmenting syllables, recognizing rhyme, producing rhyme, isolating initial sounds, blending phonemes, & identifying phonemes). The classroom average for each phonological skill was recorded in November and January (Figure 3). All skills were assessed based on a 3 point assessment. Overall, the assessments yielded improved classroom averages from November to January. The greatest improved average was in the skill area of recognizing rhyme, which had a classroom average score of 1.1 in November and 2.3 in January.

Figure 3

Phonological Awareness Skills (Classroom Averages)

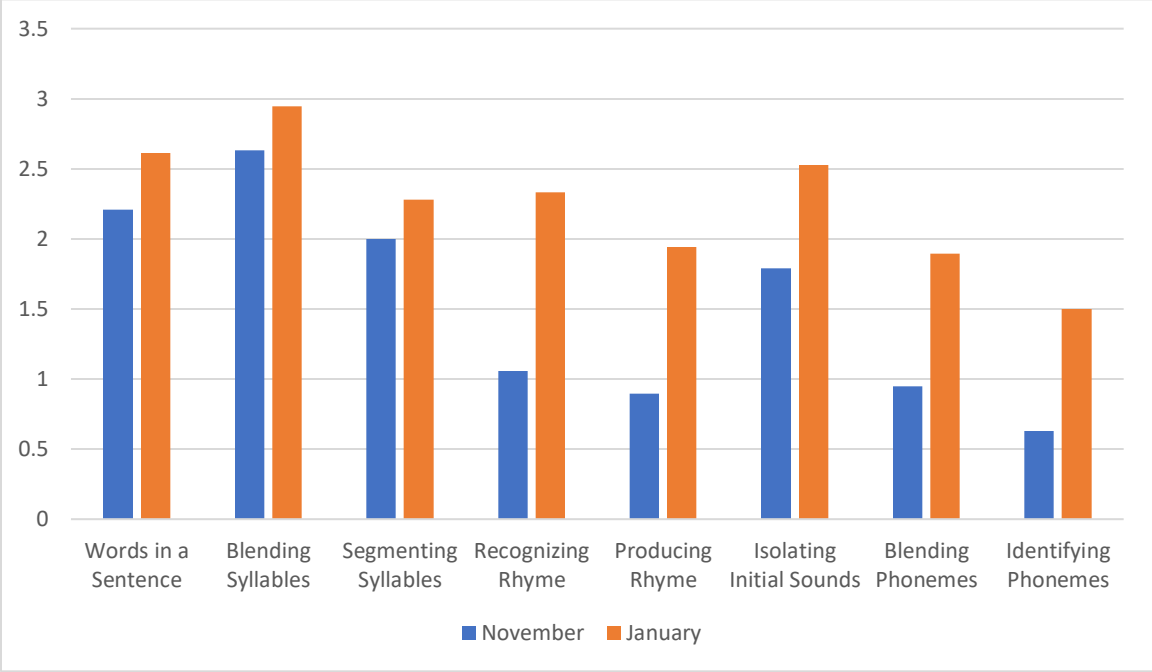

Figure 3. The average number correctly identified for 8 phonological awareness skills.

Data collected for all 8 of the phonological awareness skills is also recorded cumulatively to measure a student's overall phonological ability (Figure 4 & Figure 5). Based on the cumulative scores of each of the 8 skills assessed during the different benchmark assessments, students who answered 0-12 questions correctly are identified

with the “Not Yet Secure” marker. Students with cumulative scores of 13-18 correct answers are identified as “In Process”, and those with scores of 19-24 are considered “Proficient”. Data shows that more students, 14 of 18 students (78%), are either “In Process” or “Proficient” during the January assessment as compared to the November assessment, 7 out of 18 students (39%).

Figure 4

Cumulative Phonological Awareness Skill Categories (November)

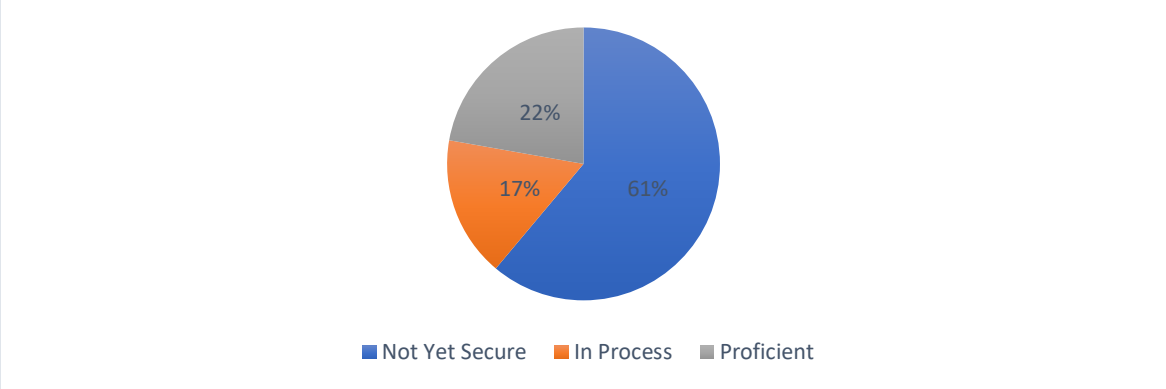

Figure 4. The number of students falling within each identification category for proficiency in phonological awareness skills during the November benchmark assessment.

Figure 5

Cumulative Phonological Awareness Skill Categories (January)

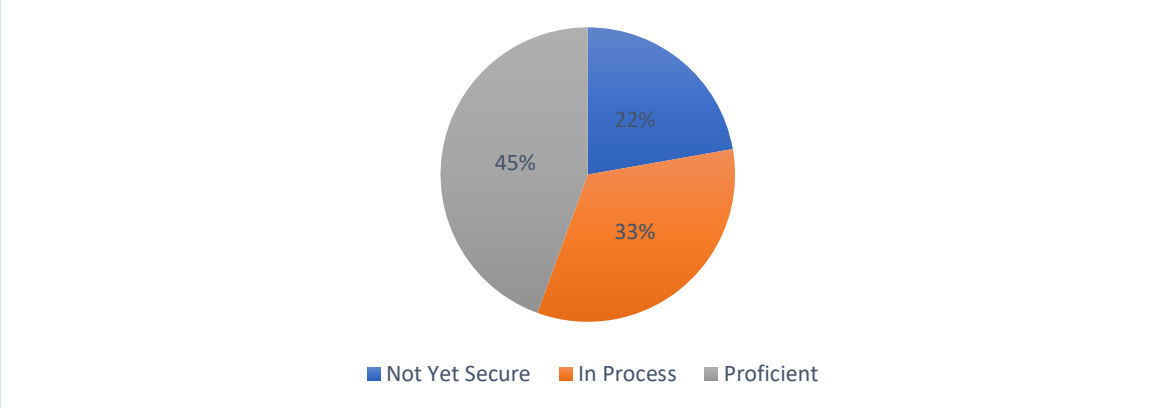

Figure 5. The number of students falling within each identification category for proficiency in phonological awareness skills during the January benchmark assessment.

Cumulative data for each student was recorded during each benchmark assessment and shows that there was an average class cumulative score for phonological awareness skills of 11.9 out of 24 in November and 17.7/24 in January.

The final literacy skill assessed measured students' abilities to identify letters, a corresponding keyword and sound based on the school district's adopted Fundations curriculum (Figure 6). The classroom average of letter, keyword, and sound recognition improved from an average of 14.38 in November and 18.89 in January.

Figure 6

Letter, Keyword, Sound Assessment

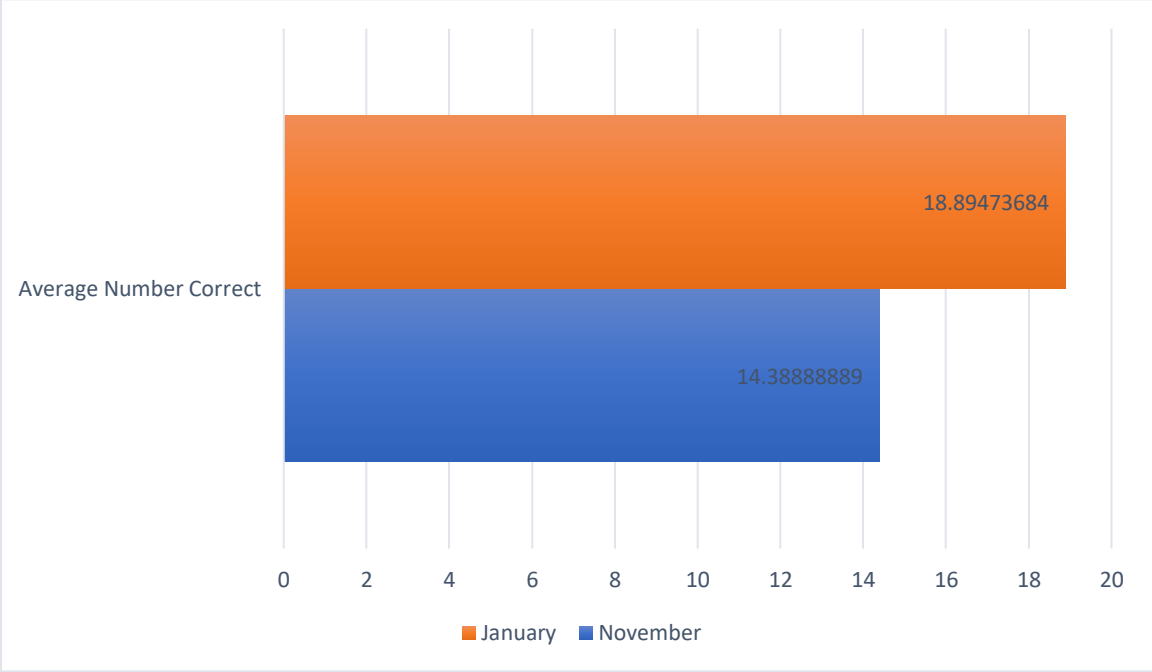

Figure 6. The average number of letter, keyword, and sounds correct out of 26 possible letters. Based on the district adopted Fundations Curriculum.

The data collected for different literacy skills shows overall growth in each skill/competency that was assessed for students during the various benchmarks throughout the year. While the consistency of growth varies between students, the overall average for each skill showed positive growth from initial to final assessments.

Mathematics Benchmark results were also recorded throughout the school year. Assessment data was collected for 9 different mathematics skills: color identification, identifying numbers (0-10, identifying number (0-20), rote counting, one to one counting, identifying more or less, sorting, shape identification, and position word recognition.

Students were assessed for recognition of 11 different colors in September, November, and January. Figure 7 shows the average number of colors identified within each benchmark assessment. Overall the classroom average for color identification was 10.52 in September and improved to 10.95 in January, with only one student who did not correctly identify all colors (11) correctly.

Figure 7

Average Number of Colors Identified (11 Total Colors)

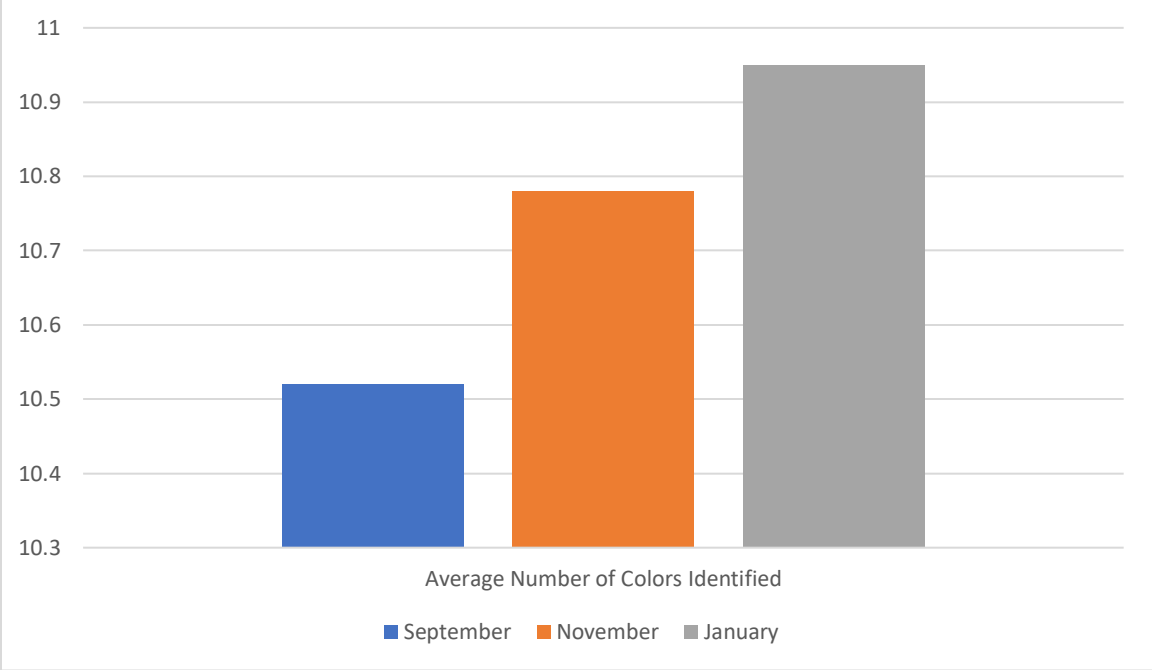

Figure 7. The average number of colors identified, out of 1, based on district benchmark assessments.

Students were also assessed on number identification in September, November, and January. During this assessment students were given numbers that were not in sequential order and asked to identify them. Students were assessed in recognizing

numbers 0-10 and 0-20 (Figure 8). During the September benchmark, the classroom averaged a total 7.15 numbers out of a possible 11 for numbers 0 through 10, and 3.15 for numbers 0-20. These averages climbed to 10.15 for numbers 0-10 and 16.11 for numbers 0-20 by the month of January.

Figure 8

Average of Number Identified (0-10 and 0-20)

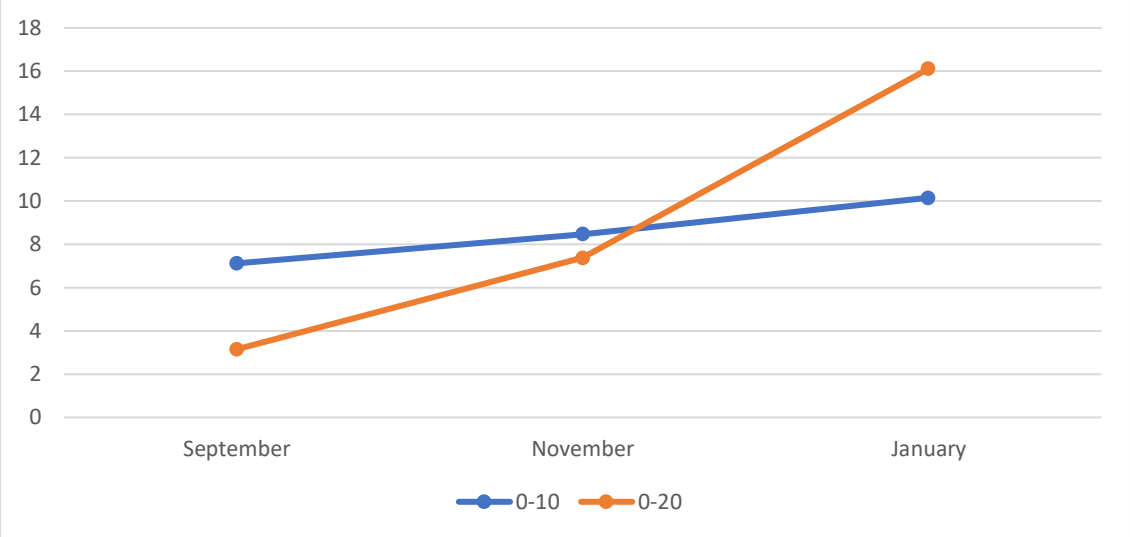

Figure 8. The average of numbers identified between 0-10 and 0-20.

Data was also collected to monitor students' rote counting ability, with the goal being for students to count as high as 100. Figure 9 shows the classroom average for rote counting from the September, November, and January benchmarks. On average students could count up to 27 in September, 31 in November, and 51in January. A total of 6 students (30%) could count to 100 during the January benchmark compared to 1 out of 20 students (5%) in September and 2 of 20 (10%) in November.

Figure 9

Rote Counting

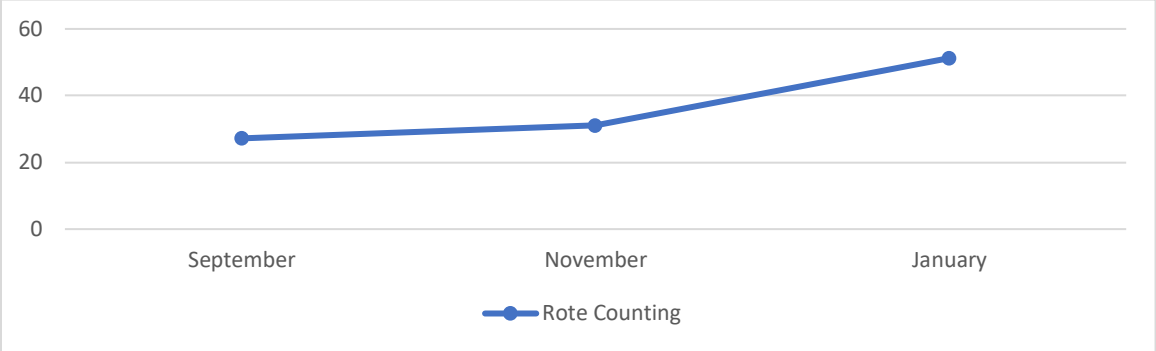

Figure 9. Classroom average for Rote Counting up to 100.

Classroom averages on counting with one-to-one correspondence also showed an increase during each benchmark assessment. Students were asked to count objects using one to one correspondence, with a total of 8 questions (Figure 10). The classroom average increased from 3.56 out of 8 in September to 7 out of 8 in January. There were a total of 12 students who were able to answer all 8 questions correctly during the January benchmark compared to 1 student in September.

Figure 10

One-to-one Correspondence Counting (Classroom Average)

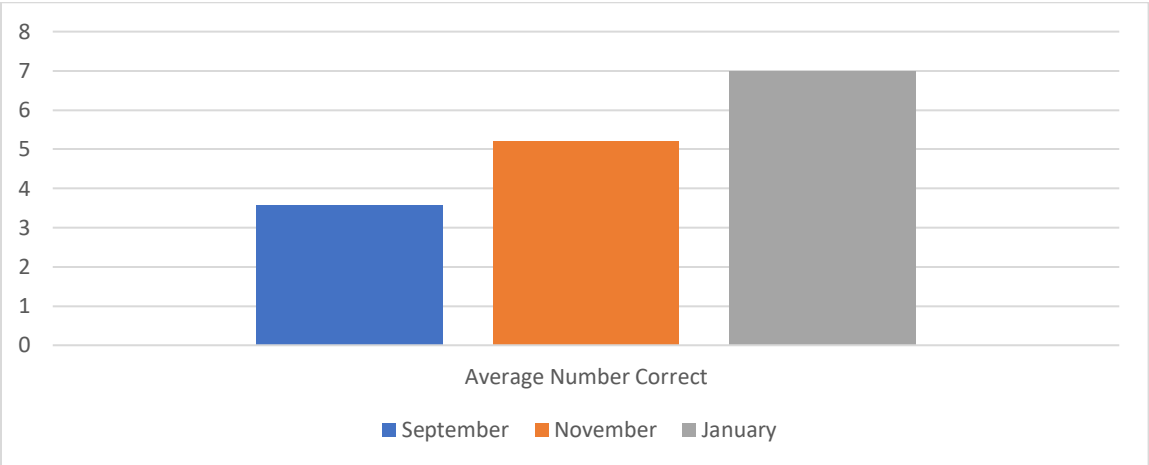

Figure 10. Classroom average for one to one correspondence counting with a total of 8 questions / points.

Students were also assessed in their ability to compare numbers or groups of objects and identify them as more or less (Figure 11). There were a total of 6 questions and 6 possible points. The September benchmark classroom average was less than 1 (0.84), but then rose to 3.05 during the November benchmark. The classroom average increased again during the January Benchmark to 4.45 out of 6. Overall 5 students had correctly identified more or less during the January benchmark compared to 1 in September and 4 in November.

Figure 11

Identifying More or Less

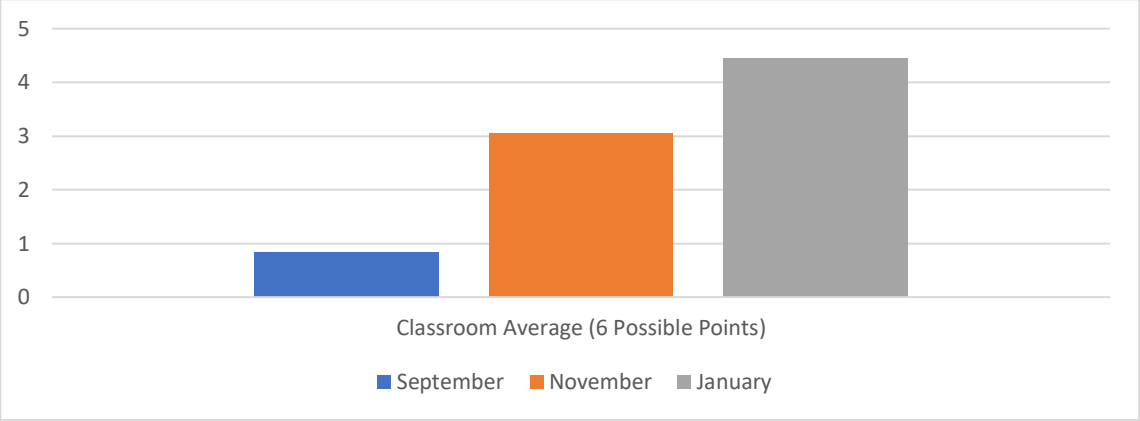

Figure 11. Classroom average for identifying whether numbers or groups of objects are more or less. Based on 6 questions with 6 possible points.

During the November and January benchmarks, students were assessed in their ability to sort different objects based on color, shape, size, and an additional attribute of their choice (Figure 12). Students were awarded a point for each sort that was correctly executed for a total of 4 points. The September classroom average for sorting was 2.21 out of 4 and 2.78 out of 4 in January. One student was able to complete all 4 sorts accurately in November, and 3 students were able to complete all sorts accurately in January.

Figure 12

Sorting Objects (Color, Shape, Size, and other Attributes)

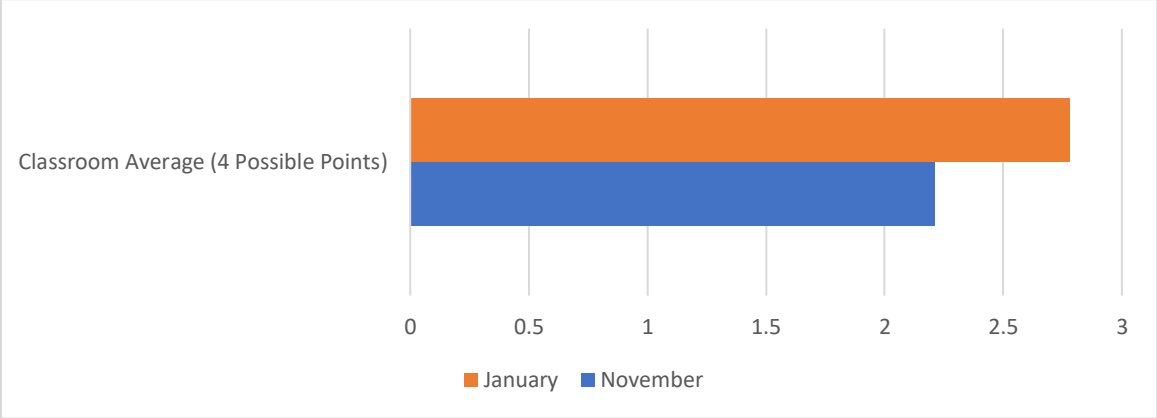

Figure 12. Classroom average for identifying whether numbers or groups of objects are more or less. Based on 6 questions with 6 possible points.

Another assessment that was given to students during the months of September, November, and January assessed their ability to identify 7 different geometric shapes: circle, triangle, oval, square, rectangle, rhombus, and hexagon. Figure 13 shows the classroom average for shape identification grew from 1.95 in September to 6.1 in January, with 13 of 20 students identifying all 7 shapes correctly during the January assessment.

Figure 13

Geometric Shape Identification

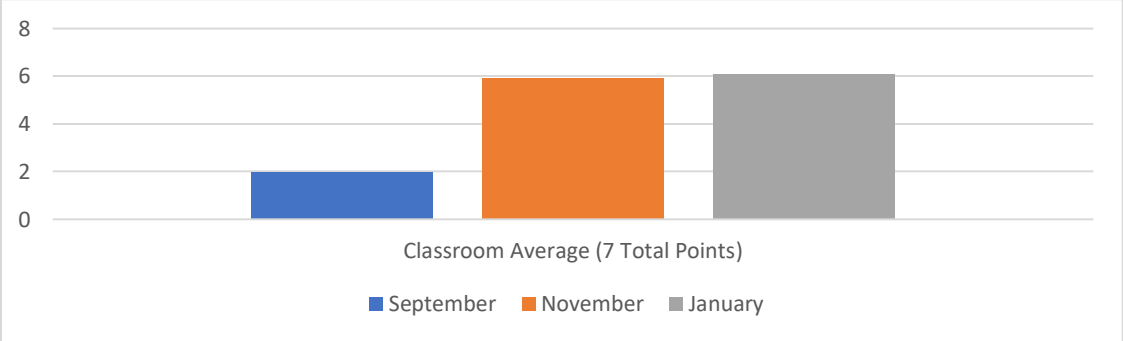

Figure 13. Classroom average for identifying 7 different geometric shapes.

The final skill assessed on the mathematics benchmark assessment focused on students' abilities to identify the position of objects using 12 different geometric or positional words: in, out, under, up, next to, below, beside, above, in front of, behind, first, and last. Students' received one point for every positional word that was correctly identified, for a total of 12 points. Students were able to identify an average of 10.94 positions in November and 11.42 positions during the January assessment (Figure 14). Overall 15 out of 20 students (75%) were able to identify all 12 shapes during the January Assessment.

Figure 14

Identifying Positions of Objects

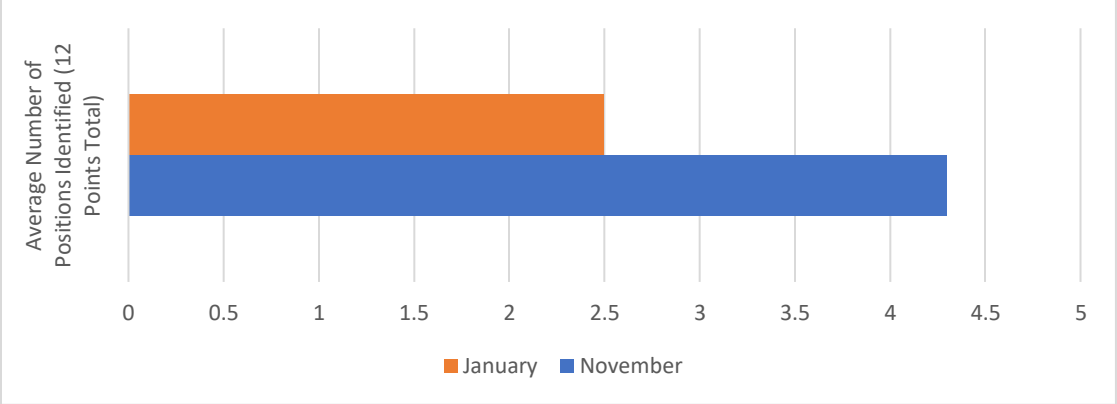

Figure 14. Classroom average for identifying 12 different geometric positions using positional words.

Similar to the results of the literacy skills assessed, the classroom average of each mathematics skill assessed showed improvement from the initial to final assessment. While growth was not consistent for each individual student, all classroom averages showed positive growth from one assessment to the next.

Additional quantitative data was gathered from students who had previously attended the pre-kindergarten program during the 2019-2020 school year. Data was collected from the STAR Early Literacy benchmark assessments that were given to the

students during their kindergarten year (2020-2021). The STAR 360 Early Literacy Assessment presents students 27 questions which pertain to the following foundational skills: Alphabetic principle, concept of word, visual discrimination, phonemic awareness, phonics, vocabulary, and early numeracy (Renaissance Learning, 2020).

Upon completion, the assessment provides each student with a scaled score (SS) used to report performance for all students on a consistent scale, which allows all scores and results to be comparable using a common scale, which ranges from a SS of 300–900 (Renaissance Learning, 2017).

Data was collected for each of the 19 students that previously attended the pre-kindergarten program in the 2019-2020 school year to determine where students stood in comparison to their grade level kindergarten peers that did not attend the program. Using the Star 360 Early Literacy scaled score an average was calculated during the September assessment administration for all kindergarten students enrolled in the district, which was an average of 564 scaled score points. An average scaled score was then calculated for those students who attended the pre-kindergarten program the previous year, which was an average of 593 scaled score points (Figure 15). The students who previously attended the pre-kindergarten program had an average scaled score that was 29 points higher than the average for their grade level peers within the district. Furthermore, 9 out of 19 of the students who previously attended the pre-kindergarten program had scaled scores higher than the district average during the September benchmark assessment.

Figure 15

STAR 360 Scaled Score Averages

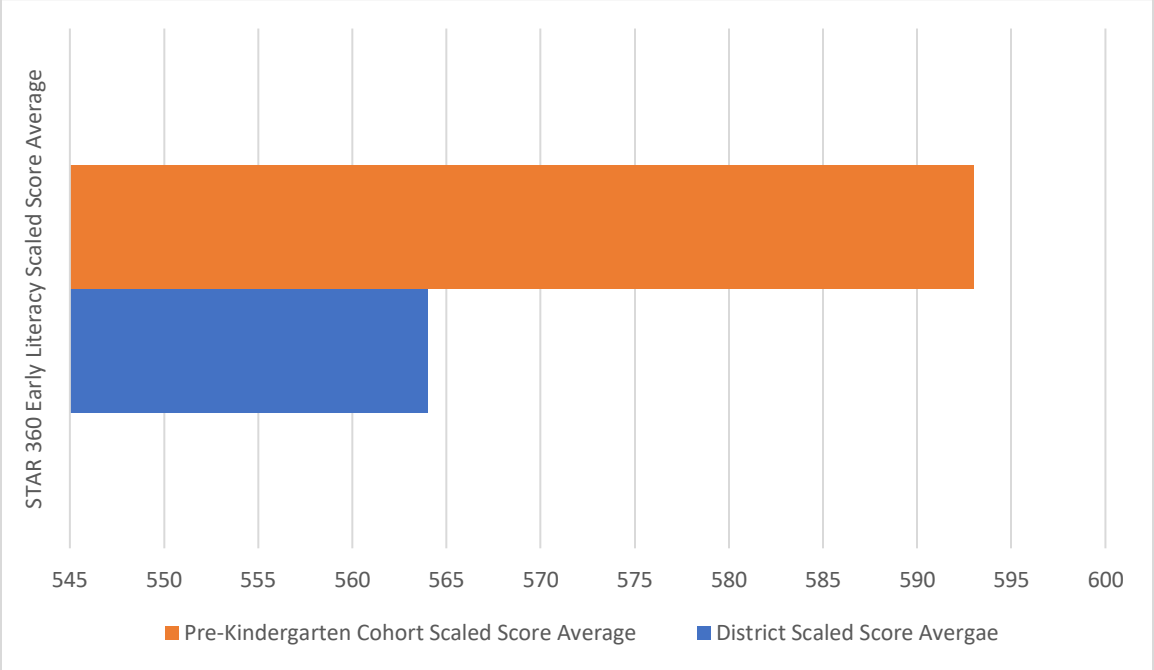

Figure 15. Scaled score averages for district kindergarten students and students who previously attended the district pre-kindergarten program.

The STAR 360 Early Literacy assessment also categorizes the SS of each student into one of the following literacy classifications, based on a student's SS:

- Emergent Reader – Scaled Score of 300-674
- Transitional Reader – Scaled Score of 675 – 774
- Probable Reader – Scaled Score of 775 – 900

(Renaissance Learning, 2017)

Figure 16 shows the breakdown of STAR 360 Early Literacy classifications during the September 2020 assessment for each of the 19 kindergarten students who previously attended the pre-kindergarten program in the 2019-2020 school year.

Figure 16

Percentage of Students by STAR 360 Literacy Classification

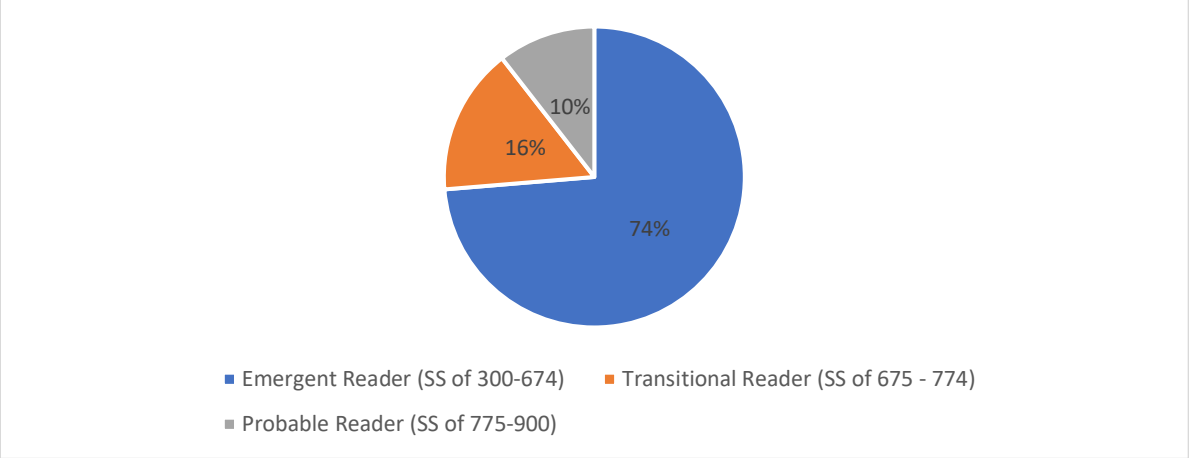

Figure 16. Percentage of students within each STAR 360 Early literacy assessment from the September 2020 benchmark assessment.

Teacher Perception Data

Teacher perception data was also collected during different points in the study to gather feedback from the district's pre-kindergarten teacher and any current kindergarten teacher with students in their classroom that had previously attended the district's pre-kindergarten program during the 2019-2020 school year.

Teachers were asked to complete an initial student readiness survey in September of 2020 and a final student readiness survey in May of 2021. Both surveys asked surveyors to respond to the same 7 questions (Appendix D & Appendix F).

The first question asked of teachers in both the initial and final student readiness surveys stated: *How would you rate the readiness of incoming kindergarten students who attended the pre-kindergarten program, based on their knowledge of mathematical skills and concepts?*

This question utilized a Likert scale to gauge teachers' opinion on students' incoming mathematical skills, with a 1 on the scale representing minimal knowledge of mathematical concepts and 5 representing an extensive knowledge of mathematical concepts. Overall, 57.1% of teacher respondents rated the incoming students with a 3 out of 5 on the Likert scale and 42.9% of respondents rated their students with a 4 out of 5.

The same question was asked on the final student readiness survey and resulted in different results. In the final survey 40% of teacher respondents rated their students mathematical abilities with a 3 out of 5 compared to 60% who rated their students' mathematics ability as a 4 out of 5 (Figure 17). Overall the perception of students', who previously attended the pre-kindergarten programs, knowledge of mathematics skills and concepts increased from the initial to final survey. However, it should be noted that there were fewer respondents for the final survey than the initial survey.

Figure 17

Teacher Perceptions of Students' Mathematical Readiness

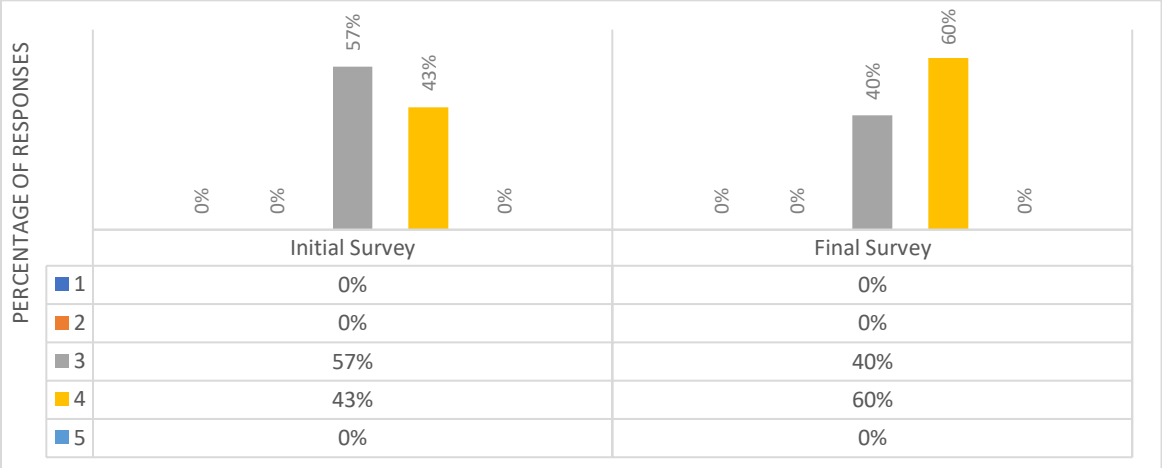

Figure 17. Teacher ratings of knowledge of mathematical skills and concepts for students who previously attended the pre-kindergarten program in the 2019-2020 school year.

Teachers were also asked to use a Likert scale to rate students' knowledge and skills of literacy concepts: *How would you rate the readiness of incoming kindergarten students*

who attended the pre-kindergarten program, based on their knowledge of mathematical skills and concepts?

The question was asked during the initial and final student readiness surveys and utilized a Likert scale to gauge with a 1 on the scale representing minimal knowledge of literacy concepts and 5 representing an extensive knowledge of literacy concepts. Overall, 57.1% of teacher respondents rated the incoming students with a 3 out of 5 on the Likert scale and 42.9% of respondents rated their students with a 4 out of 5.

In the initial survey 28.6% of the respondents gave a rating of 3 out of 5 and 71.4% gave a rating of 4 out of 5 (Figure 18). On the final student readiness survey, respondents rated students' knowledge of literacy skills and concepts with a 3 out of 5 (40%) and 4 out of 5 (60%). Overall the perception of students', who previously attended the pre-kindergarten programs, knowledge of mathematics skills and concepts increased from the initial to final survey. However, it should be noted that there were fewer respondents for the final survey than the initial survey.

Figure 18

Teacher Perceptions of Students' Literacy Readiness

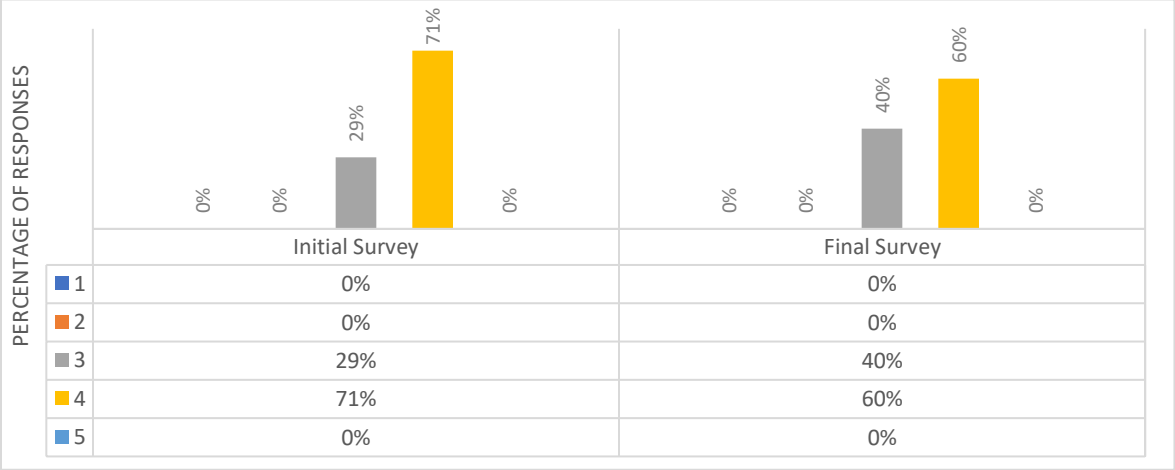

Figure 18. Teacher ratings of knowledge of literacy skills and concepts for students who previously attended the pre-kindergarten program in the 2019-2020 school year.

Respondents were also asked to answer the following multiple choice question on both the initial and final student readiness surveys: *How would you compare the readiness of students who attended the pre-kindergarten program versus those who did not in regards to knowledge of literacy skills/concepts?*

The results from the initial survey showed that 42.9 % of respondents believed that students who attended the pre-kindergarten program are more prepared than their kindergarten peers, another 42.9% responded that their students had the same preparation as compared to their peers, 14.3% responded that they were unable to make the comparison, and 0% of respondents felt that their students who attended the pre-kindergarten program were less prepared compared to their peers (Figure 19).

Figure 19

Pre-Kindergarten Literacy Knowledge (Initial Student Readiness Survey)

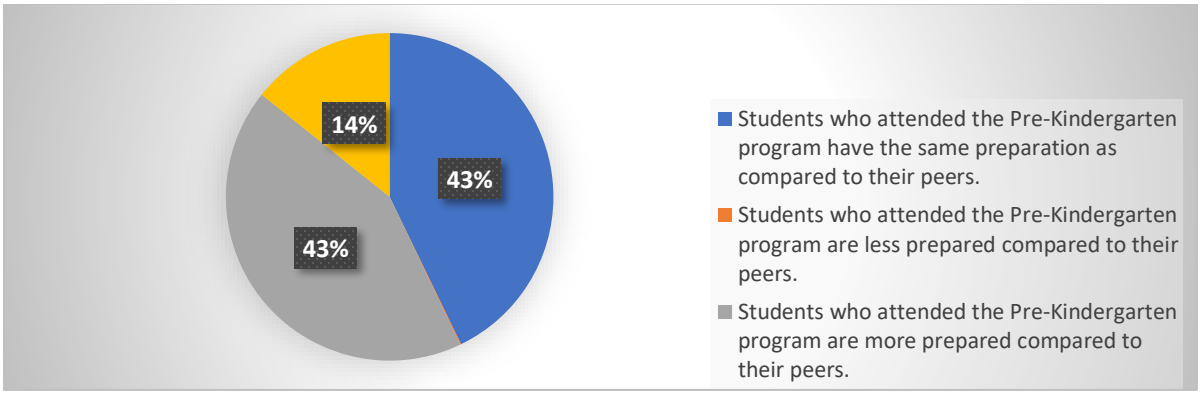

Figure 19. Comparison of students, who attended the pre-kindergarten program, knowledge of literacy skills/concepts compared to other students on the initial student readiness survey.

Results from the final student readiness survey showed different results for the question: *How would you compare the readiness of students who attended the pre-kindergarten program versus those who did not in regards to knowledge of literacy skills/concepts?*

In the final student readiness survey, 100% of respondents responded that their students had the same preparation as compared to their peers (Figure 20).

Figure 20

Pre-Kindergarten Literacy Knowledge (Final Student Readiness Survey)

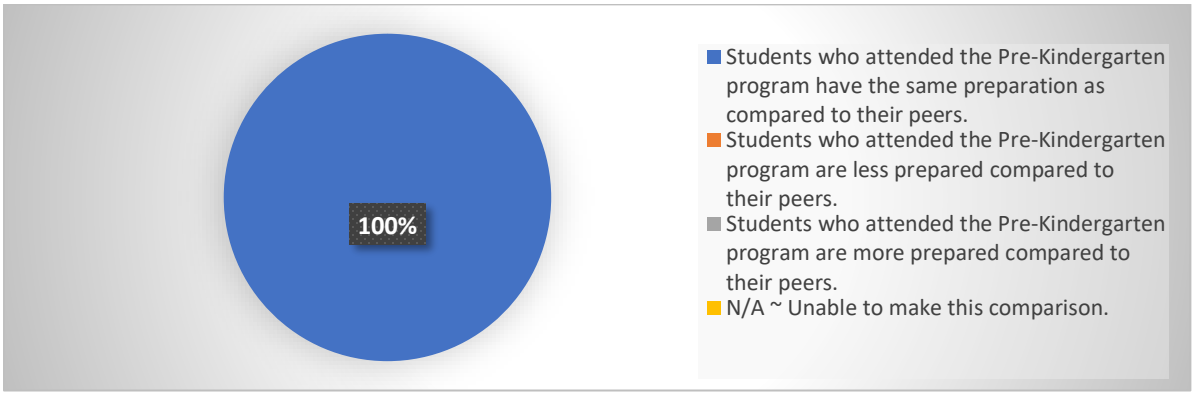

Figure 20. Comparison of students, who attended the pre-kindergarten program, knowledge of literacy skills/concepts compared to other students on the final student readiness survey.

The initial and final surveys also included four open ended questions that respondents were asked to answer. Below is a summary of the response for each of the open-ended questions:

> *What improvements would you recommend to help further the development of students' literacy and mathematics skills within the district provided pre-kindergarten program?*

Within the initial student readiness survey most respondents shared that the pre-kindergarten program appropriately prepared students for kindergarten by providing instruction on foundational skills. In addition, respondents shared that recommendations were hard to make given the school closure that occurred in the spring of 2020, which interrupted the ending to the 2019-2020 school year in which the pre-kindergarten program started.

The responses to the final student readiness survey recommended the continued use of district curriculum to teach foundational skills to students during their pre-kindergarten year. One respondent also shared a need to implement more manipulatives, songs, and rhymes to help with development of literacy and mathematics skills. Another respondent also recommended expanding the program to have one pre-kindergarten classroom within each school.

The responses to this question show that respondents feel that the core curriculum being delivered to students in the pre-kindergarten classroom is preparing students with the necessary literacy and mathematics skills.

What additional supports or resources are needed to further the development of the pre-kindergarten program, in order to develop students' literacy and mathematics skills?

Responses from the initial student readiness survey shared very few recommendations for additional resources and supports, with 43% of the respondents not indicating any additional needs. However, multiple responses emphasized a need to add additional classrooms at each of the four elementary buildings in the district. Another response recommended additional alignment to the district's adopted Eureka math program to provide more stabilization of curriculum.

The final student survey saw similar responses, with some stating that no additional materials/resources were needed. Other suggestions called for the use of more hands-on manipulatives and resources for students to utilize during math class, and others called for additional classrooms to be added at all four elementary schools.

Responses to this question varied, with the most common theme being to expand the program to house a pre-kindergarten classroom at all four elementary buildings in the district. However, the most common theme was that no additional resources were needed.

What is your overall perception of the effectiveness of the pre-kindergarten program in preparing students for Kindergarten?

The initial survey responses for this question were positive, but also shared that more time and experience with the students was necessary before drawing any conclusions. Others' responses shared the value of the foundational skills that students came with to kindergarten as a positive of the program.

The final student readiness survey provided responses that all endorsed the program and its ability to prepare students for their kindergarten year. Responses stated that the program provided students with confidence in literacy and mathematics skills that otherwise may not have been present. Overall the perception of the program from the initial and final survey was positive.

What other factors do you believe play a role in student readiness for kindergarten? Do you feel that the district's pre-kindergarten program addresses these factors? Explain how it does or does not.

Responses from the initial student readiness survey shared the need for parent involvement in the development of a student at an early age, and communication between the school and home. Others also noted how the program has targeted students from low income families, which provides them with opportunities that they may not otherwise have. Another common theme was overall student readiness and their ability to acclimate

to a school setting, especially if they have never experienced one. The final survey included similar responses, but also included the challenge presented by the pandemic, which had an effect on student attendance and how they attended class each day, virtually or in person.

Pre-kindergarten and kindergarten teachers were also asked to take part in a mid-year interview, in which six open-ended questions were asked about the district's pre-kindergarten program. The questions asked and a summary of responses is below:

1. *What do you believe are the most important skills that pre-kindergarten students need to acquire in order to be successful in kindergarten?*

Responses to this question included the following themes:

- Socialization with peers, communication of needs, transitioning from home to school, independence with everyday tasks (buttoning, zipping, toileting, feeding, etc.)
- Overall school readiness
- Motor skills ~ holding a pencil, cutting with scissors
- Letter identification, letter/sound correspondence, foundational phonics skills, phonemic awareness
- Number recognition/identification, rote counting, one to one correspondence

2. *Follow up question: How effective is the Fox Chapel Area Pre-Kindergarten program at providing these skills?*

Responses to this question were all positive ranging from effective to highly effective. All feedback was positive from all respondents when questioned about the effectiveness of the pre-kindergarten program.

3. *Last year the district piloted the Pre-Kindergarten program, what improvement(s), if any, did you see in the students' literacy and mathematics skills from the start of the year to the end of the year? (This question was for pre-kindergarten instructors only).*

Respondents noted the increase in student foundational literacy skills including letter identification accuracy, letter-sound correspondence, phonological awareness skills, and letter formation throughout the pilot year. Improvements in mathematical skills and concepts were also noted. Specifically, improvements in rote counting, 1-1 counting, patterning, and positional words skills were improved throughout the year.

4. *How would you compare your students' academic growth in mathematics and literacy at this point in the school year, compared to last year? (For Pre-K instructors only.)*

The interviewees shared that this question was difficult to answer considering the learning formats had changed due to the pandemic for the current school year. Students were not consistently in the building this school year and at times were joining remotely. This created a lack of consistency, which the instructors believed to be evident in the behavior and social dynamic of the classroom.

5. *What do you believe are the greatest strengths of the Fox Chapel Area Pre-Kindergarten program?*

Responses to this question included the following themes:

- Socialization skills
- Fine motor skills
- Exposure to district provided curriculums

- Confidence in abilities
- Literacy and mathematics skills
- Develops student readiness for kindergarten

6. *In what areas do you think the Fox Chapel Area Pre-Kindergarten program needs to improve?*

Respondents shared that the program could be improved by expanding to all four elementary buildings within the school district, and expanding the eligibility requirements beyond just low-income households. Other responses shared a need for the program to be offered to all pre-kindergarten students within the district.

Discussion

1. *What impact does a pre-kindergarten program have on a student's growth in literacy skills based on district benchmarking assessments?*

Data collected from the study revealed that students enrolled in the district's pre-kindergarten plan made growth in all literacy skills/concepts that were assessed throughout the school year, with classroom averages improving during each benchmark assessment for all 11 skills and areas assessed (lower case letter identification, uppercase letter identification, phonological awareness, and identifying letter/keyword/sound, based on the Fundations curriculum).

Specific indicators for student proficiency within 8 phonological awareness skills (words in a sentence, blending syllables, segmenting syllables, recognizing rhyme, producing rhyme, isolating initial sounds, blending phonemes, & identifying phonemes), showed that 8 students (44%) had proficiently mastered the skills by January. In addition, 6 students (33%) were still in progress toward reaching mastery, while 4

students (22%) were not progressing toward mastery by the January benchmark assessment.

In addition, 9 students who previously attended the pre-kindergarten program in the 2019-2020 school year started their kindergarten school year with a STAR 360 Early Literacy scaled score that was higher than the district average scaled score of 564.

This quantitative data shows that the pre-kindergarten program was successful in growing most students during their pre-kindergarten school year, in terms of literacy skills, and preparing them for kindergarten based on their initial STAR 360 literacy assessment.

2. *What impact does a pre-kindergarten program have on a student's growth in mathematics skills based on district benchmarking assessments?*

Benchmark mathematics data collected for each student attending the pre-kindergarten program throughout the school year showed that the classroom average for each of the 9 mathematics skills (color identification, identifying numbers (0-10), identifying number (0-20), rote counting, one to one counting, identifying more or less, sorting, shape identification, and position word recognition) grew during each benchmark. It was also found that every student in the program showed growth within each of the 9 individually assessed skills/concepts from the initial assessment to the January assessment.

3. *What are teacher perceptions of the district's pre-kindergarten program in providing students with foundational literacy and mathematics skills?*

Teacher perception of the pre-kindergarten programs' effectiveness in improving student literacy skills was also favorable. Teachers shared that students were either more

or similarly prepared for kindergarten based on their knowledge of literacy skills and concepts. Responses to open ended questions also shared that students came to kindergarten equipped with foundational literacy skills at the start of the school year.

Similar feedback was given regarding the program's ability to grow student mathematics skills. Kindergarten teachers reported that students who attended the pre-kindergarten program came equally or more prepared than their grade level peers in regards to mathematical skills including number recognition, rote counting, and one to one correspondence.

Overall teacher feedback for improving the program was centered around an expansion of the program to reach more students in the district. This included creating more classrooms across each elementary building in the district and widening availability beyond the current low-income family requirement that is in place.

Summary/Transition

The effectiveness of the district's pre-kindergarten program in developing students mathematics and literacy skills was a fundamental piece for creating the program. Data and benchmark assessments were created specifically by the district in order to monitor student growth throughout their pre-kindergarten school year. The collected benchmark data shows classroom average growth in all reading and mathematics skills and helps to evaluate the overall effectiveness of the program.

Some student data varied in the number of participants during the various benchmark assessments. There were 4 students out of the 20 students in the pre-kindergarten classroom that did not begin the program until October, which resulted in missing or incomplete data points for some of the assessments.

In addition, teacher perception is a critical piece in continuing the district's pre-kindergarten program. Creating buy-in among the staff and providing them with opportunities to review data regarding program effectiveness will be critical to its success moving forward.

Throughout the study the participation within the surveys and mid-year interview varied. There were a total of 7 responses for the Initial Student Survey that was sent to all kindergarten teachers, currently instructing a student that had previously attended the pre-kindergarten program, and all pre-kindergarten teachers in the school district. The Kindergarten Effectiveness Mid-Year Interview had 6 total participants, and there were 5 total participants for the Final Student Readiness Survey. The decrease of participants resulted in less qualitative data to be analyzed and compared.

The next chapter will share conclusions and recommendations based on the collected data. This information will help to guide the future of the pre-kindergarten program moving forward.

Chapter 5

Conclusions and Recommendations

This study was designed to determine the effectiveness of a district created pre-kindergarten program on student growth. Specifically, the study gathered data to determine how effective the Fox Chapel Area School District pre-kindergarten program was in growing pre-kindergarten students literacy and mathematics skills. The collection and analysis of data from benchmark assessment data for current pre-kindergarten students, STAR 360 Early Literacy assessment data from students formerly attending the pre-kindergarten program, and teacher perception surveys and interviews were used to help answer the study's research questions:

1. What impact does a pre-kindergarten program have on a student's growth in literacy skills based on district benchmarking assessments?
2. What impact does a pre-kindergarten program have on a student's growth in mathematics skills based on district benchmarking assessments?
3. What are teacher perceptions of the district's pre-kindergarten program in providing students with foundational literacy and mathematics skills?

This chapter will address the conclusions from the study and how the data collected was used to determine such results. Applications of the results will also be discussed and how the study can help to guide the district's pre-kindergarten program in the future, as well as other pre-kindergarten programs. This includes the fiscal implications that pertain to the study and conclusions and recommendations of the study.

Future planning will also be discussed based on the results of the study and how they can be used to determine the effectiveness of a pre-kindergarten program and develop other programs to be effective in growing students literacy and mathematics skills.

Conclusions

The purpose of this study was to determine the effectiveness of a district created pre-kindergarten program in growing students literacy and mathematics skills. The financial burden brought on by the Covid-19 resulted in budget uncertainties for many school districts. The need for districts to allocate funds for personal protection equipment, social distancing, online learning, school personnel, and other costs associated with bringing students back to class in a safe and secure manner, resulted in considerations for saving money in other areas (Baker et al., 2020). One consideration for cost savings was the deletion of programs, including the Fox Chapel Area School District's pre-kindergarten program, which was in its first year of implementation. As a result, programs were reviewed for their effectiveness in supporting student growth, which led to this study's focus. Ultimately, the district chose to keep its newly established pre-kindergarten program, but studying the effectiveness of the program would be necessary as more budget deficits are looming in coming years.

The study focused on growth of student literacy skills and was guided by the following question: *What impact does a pre-kindergarten program have on a student's growth in literacy skills based on district benchmarking assessments?* Collection of benchmark data was collected for 11 different literacy skills: lower case letter identification, uppercase letter identification, phonological awareness (words in a

sentence, blending syllables, segmenting syllables, recognizing rhyme, producing rhyme, isolating initial sounds, blending phonemes, & identifying phonemes), and identifying letter/keyword/sound, based on the Fundations curriculum.

The development of early literacy skills within pre-kindergarten are critical indicators of progress in learning to read during a student's early elementary years. Utilizing measures of word reading skill, and having assessment measures to gauge student growth and development along the way, are essential to identifying specific needs of individual students who are not making adequate progress (Torgesen, 1998).

As a result of the study, the district's pre-kindergarten program was effective in improving the overall classroom average in all 11 of the assessed literacy skills from the initial benchmark assessment to the last recorded assessment. This positive growth shows that the instruction and monitored progress led to overall growth in literacy skills within the classroom.

Of the 11 skills assessed, 8 of them fell into the phonological awareness category, which is a group of skills used to assess a student's ability to identify individual letter sounds or phonemes. Of the 8 phonological awareness skills assessed, 17 out of the 18 students assessed, in all areas, showed improvement from the initial benchmark assessment to the final assessment. Based on the cumulative scores of each of the 8 skills assessed (Figure 4) during the different benchmark assessments, students who answered 0-12 questions correctly are identified with the "Not Yet Secure" marker. Students with cumulative scores with 13-18 correct answers are identified as "In Process", and those with scores of 19-24 are considered "Proficient". During the November benchmark, 4 of 18 students were consider "Proficient", 3 of 18 were "In Process", and 11 of 18 were in

the “Not Yet Secure” category for the 8 assessed phonological skills. During the January benchmark (Figure 5) 8 of 18 students were consider “Proficient”, 6 of 18 were “In Process”, and 4 of 18 were in the “Not Yet Secure” category for the 8 assessed Phonological skills. Of the 4 remaining students in the “Not Yet Secure” category, 3 students had a score of 12, which was one below the “In Process” category.

These results are evidence that the district’s focus on the phonics-based Fundations curriculum resulted in student growth for all but one student in the pre-kindergarten program further proving its effectiveness in developing students literacy skills throughout the year.

Additional evidence of literacy growth was shown in students’ abilities to identify upper and lower case letters. Research supports the development of letter and sound recognition within pre-kindergarten classrooms as stated by the General Education Leadership Network (2016), “Research suggests that we should set a benchmark of children naming 18 upper case and 15 lower case letters by the end of pre-K10 and should teach letter-sound associations, rather than letter names or sounds alone” (p. 3).

From the September benchmark assessment to the January benchmark assessment, all students showed growth in their ability to identify upper case letters. By the January assessment 12 out of the 20 students in the pre-kindergarten classroom could identify all 26 upper case letters and the average number of upper case letters students could identify rose to 21.9 out 26 compared to 14 out of 16 during the September benchmark.

During the September benchmark assessment the classroom average for letter identification was 13 letters out of a possible 28, with only 8 students attempting to

identify. This classroom average rose to 21.75 out of 28 during the January assessment with all 18 students showing improvement from their initial assessment.

The progress made by students in the identification of upper and lower case letter sounds is evidence the instruction has been effective for students. Classroom averages for both skills were well above the recommended benchmark for end of year identification of letters (upper case letters – 18 / lower case letters -15) as recommended by the General Education Leadership Network (2016).

In addition to identifying letters, students were also assessed in their abilities to name corresponding letter sounds and keywords based on the Fundations curriculum. During the initial November assessment, the classroom average was 14.38 out of 26 possible letters identified with their corresponding sounds and keyword. The classroom average rose to 18.89 during the January assessment. Out of the 19 students assessed within the pre-kindergarten class, 15 students showed growth in their ability to identify specific letters along with their corresponding sounds and keywords. It should also be noted that 2 of the 19 students maintained the same score between the November and January assessments.

The progress within the Fundations-based letter, keyword, sound assessment is significant in how it demonstrated growth for a majority of the classroom between assessments, as well as growth in the overall classroom average for the skill. In addition, this skill is directly linked to the district's literacy curriculum in kindergarten, 1st, and 2nd grade. Providing students with the opportunity to learn and experience the curriculum prior to entering kindergarten is an advantage that not all students have. The cohesive alignment of curriculum between the pre-kindergarten literacy curriculum,

Fundations, is recommended in providing students with exposure and experience, and also allows for teachers to effectively communicate the needs of students from one year to the next (Bornfreund & Loewenberg, 2018).

The study also examined the effectiveness of the pre-kindergarten program's literacy skills for students who had already completed the program during the 2019-2020 school year. Data from the STAR 360 Early Literacy assessment, given in September of 2020 for all former pre-kindergarten students and were now enrolled in one of the district's kindergarten classrooms, showed that 9 of the 19 students scored above the district's percentile rank average. Furthermore, 12 of the 19 former students scored in a percentile rank above 50 on the STAR 360 benchmark assessment, and only 1 student from the program scored below the 25th percentile. The district views scores above the 50th percentile rank to be in good standing, while those below the 50th need to be monitored, and those below the 25th percentile are most likely in need of additional intervention. This data shows that nearly half the students were performing similarly or above their grade level peers at the start of kindergarten, and only 1 student from the previous class is in need of additional supports.

The data and research suggests that the district's pre-kindergarten program has been effective in growing student literacy skills. The impact of the pre-kindergarten program on students' literacy skills resulted in positive growth for nearly all participating students. With improved classroom averages for all skills between benchmark assessments for all 11 literacy skills, the program can be deemed effective in its ability to provide literacy instruction that results in improved literacy skill development. However, it should also be noted that the data shows an overall class average improvement for all

literacy skills, but some students are still in need of additional support and have not exhibited growth in all skill areas. Based on the research and results from the district benchmark assessments, one can conclude the district created pre-kindergarten program positively impacts students' literacy knowledge and skill development.

The study also examined the effects of mathematics based on the following research question: *What impact does a pre-kindergarten program have on a student's growth in mathematics skills based on district benchmarking assessments?*

Benchmark assessments were used to monitor student growth in 9 different mathematics skill areas: color identification, identifying numbers (0-10, identifying number (0-20), rote counting, one to one counting, identifying more or less, sorting, shape identification, and position word recognition.

Similar to the literacy benchmark results, the data revealed that the classroom average rose during each benchmark for each of the 9 assessed mathematics skills. In addition, all students showed an increase in every skill assessed from the initial assessment to the January assessment in all skill areas except for identifying positions. Watts et al. (2017) state the following in regards to mathematical skill development in pre-school or pre-kindergarten years, "Much of the correlational evidence linking early and later mathematics ability is based on measures of early levels of math skills. Other studies show strong associations between early *gains* in mathematical ability and later success in school" (p. 540). The results reveal the pre-kindergarten program has a positive impact on developing its students' mathematics skills.

Overall, the mathematics benchmark assessment data collected for students attending the pre-kindergarten program showed a positive impact on students'

mathematics skills. The classroom averages for all skills assessed improved from the initial benchmark assessment to the final assessment, demonstrating the program's effectiveness in growing students' mathematics skills and knowledge.

The final question of the study focused on teacher perceptions of the district's pre-kindergarten program: *What are teacher perceptions of the district's Pre-Kindergarten program in providing students with foundational literacy and mathematics skills?* Data collected from initial and final teacher perception surveys examining effectiveness of the pre-kindergarten was favorable. Responses showed that teachers believed that their students came to kindergarten with average to above average literacy and mathematics skills both at the beginning and end of their kindergarten school year.

At the start of school year, 4 of the 7 teachers surveyed felt that their students who had previously attended the pre-kindergarten program had an average knowledge of mathematical concepts, and 3 out of 7 felt that their students had above average mathematical skills. These number changed slightly by the end of the school year with 2 out 5 respondents sharing their students had average mathematical abilities and 3 out 4 stating that their students had above average abilities. Overall, both the initial and final surveys showed that teachers believed that their students came to kindergarten with average or above average mathematical skills.

Similar trends were found in respondents' feelings about the knowledge of literacy concepts for their students who had previously attended the pre-kindergarten program. At the start of school year 4 of the 7 teachers surveyed felt that their students, who had previously attended the pre-kindergarten program, had an average knowledge of literacy concepts, and 3 out of 7 felt that their students had above average knowledge.

These numbers changed slightly by the end of the school year with 2 out 5 respondents sharing their students had average literacy knowledge and 3 out 4 stating that their students had above average abilities.

Additional responses from a mid-year interview provided positive feedback in favor of the program's ability to provide students with the necessary reading and mathematics skills necessary to enter kindergarten. Teachers also shared that along with providing strong skill development in literacy and mathematics, students also developed socialization, fine motor, and confidence in their abilities.

In response to questions comparing the readiness of kindergarten students who had previously attended the pre-kindergarten program compared to their peers who had not, teachers shared that their students entered the school year with either the same preparation or more preparation than their peers. These results show further evidence that the program was successful in preparing students for kindergarten, based on teacher perception.

Teachers also provided perceptive feedback on recommendations for the program moving forward, which provided further endorsement of the program's instruction in foundational skills and how these concepts needed to be continually reinforced within the program. Another common theme was a call for an expansion to the program. Teachers shared that providing more opportunities for additional students to participate in the program would further student readiness and development upon entering kindergarten, including adding an additional pre-kindergarten classroom at each building and expanding the income-based requirements to allow for more students to attend.

Teacher perceptions of the district's pre-kindergarten program showed an overwhelming support for not only continuing the program, but expanding it to reach additional students within the district. The program's ability to provide students with the necessary foundational skills needed for kindergarten, while directly aligning to the district's curriculum, was considered a major strength of the program by all teachers.

Based on the assessment and perception data gathered, along with research outlined in the review of literature, the district's pre-kindergarten program has been successful in growing student literacy and mathematics skills and abilities in order to prepare them for the start of kindergarten. The data shows students are learning from the program and that additional considerations need to be made in regards to continuing the program in the future as well as a possible expansion of the program.

The use of benchmarking and monitoring student progress throughout the pre-kindergarten school year was a valuable source of data. Monitoring student growth allows for teachers to adapt their instruction to better meet student needs, when keying in on areas of strength and weakness. In addition, this data can then be used when students enter kindergarten, providing an overview of what they have learned to this point and areas of strength or need upon entering kindergarten. This data may not be available for students who attended preschool or pre-kindergarten classrooms outside of the school district.

Furthermore, the district's pre-kindergarten program directly aligned its curricular resources with those that are used in their elementary schools, which allows for students to gain experience in the curriculums prior to entering kindergarten. The alignment of curriculums also allows for consistency in scoring, grading, and transferrable data from

one grade level to the next. Teachers can have informed discussion with one another regarding areas of focus or need within the curriculum.

While considerations for expansion of the program may seem intriguing based in the results of the study, careful consideration for budgetary restrictions must always be weighed. The current pre-kindergarten program will cost the district a total of $221,619 for the 2021-2022 school year. While this cost reflects the higher end of personnel costs, including salary and benefits, the district would conservatively need to budget between $100,000 to $220,000 for any additional pre-kindergarten classrooms that would be added. Furthermore, the expansion of the program may also increase a need for transportation of students, which is currently the responsibility of the parent/guardians of the students attending the program. If transportation was added, additional funds would be required in order to transport students.

Further considerations may also be needed to gauge the other skill areas that are not assessed as commonly as those recorded during the district's literacy and mathematics assessments. Research from the review of literature stressed the importance of vocabulary development for pre-kindergarten and preschool learners. Neuman & Dwyer (2009) state the following regarding the importance of vocabulary in pre-kindergarten or preschool year, "Given its substantial role in reading development and the significant vocabulary gap prior to age 4, one would expect to find an emphasis on vocabulary early on, especially in the preschool and primary grades years" (p. 384). While this instruction does occur with the district's pre-kindergarten classroom, further examination into how vocabulary is assessed and monitored for growth should be considered in the future.

The final consideration is for the Fox Chapel Area School District to continue with its pre-kindergarten program. Based on the students results, the program has shown that it effectively grows students' literacy and mathematics skills and knowledge, preparing them for the start of the kindergarten school year. It is also recommended that the district explore alternative ways to fund the program for expansion within the district. The exploration of possible grant money could be advantageous in reducing or supplementing costs in the future. While financial uncertainty still looms following the Covid-19 pandemic, the district should continue to promote the program and its successes and consider how to expand to reach more students in the future.

Limitations

The study was completed during the 2020-2021 school year, which occurred during the global Covid-19 pandemic, which required schools to implement numerous mitigation efforts to maintain health and safety standards. At the start of the school year, the Fox Chapel Area School District utilized a hybrid instructional model for all of its elementary students, including the pre-kindergarten classroom. The hybrid learning format required half of the students in the pre-kindergarten classroom to attend school in person on Mondays and Thursdays, while joining the classroom virtually on Tuesdays, Wednesdays, and Fridays. The remaining students attended school in person on Tuesdays and Fridays with Monday, Wednesday, and Thursday being virtual days. Students in the pre-kindergarten participated in the hybrid instructional model until March when all students returned to the classroom, in person, 5 days a week.

While the data collection from the study was not affected by the implementation of the hybrid model, there are unknown instructional outcomes that may have impacted

the results of the assessments. Teachers were required to instruct students both in-person and online simultaneously, working to engage learners in both platforms. Some challenges that arose from this model included the balancing of instructional platforms, different instructional materials, technology issues, and an inability or challenge to gauge student understanding when they were working virtually. The impact of these challenges was not measured, but should be considered as a limitation of the study.

In addition, the data collected from former pre-kindergarten students that had entered kindergarten was gathered using the STAR 360 Early Literacy assessment. This data was used to make comparisons of readiness for students who had attended the pre-kindergarten program compared to their grade level peers that had not. However, the Covid-19 pandemic also interrupted the pre-kindergarten classroom in the spring of 2020, resulting in an asynchronous virtual instructional model. The Asynchronous model consisted of teachers posting assignments to a website for students to complete independently, without direct instruction from a teacher. The change in instructional platforms may have caused learning loss for students, which could have altered their incoming STAR 360 Early Literacy scores. However, there is no data to explain the potential learning loss that may have occurred.

Baseline assessment data was gathered throughout the school year by the researcher to monitor the progress of literacy and mathematics skill development for students in the pre-kindergarten classroom. However, some students did not join the pre-kindergarten classroom until October, resulting in some missing data points at the start of the school year. Data was missing for these students in the following skill areas: upper and lower case letter identification, color identification, rote counting, and number

identification. As a result, these students were not only missing benchmark assessment data to monitor their progress, but may have also missed curricular instruction that occurred prior to joining the program. This may have resulted in skewed growth or classroom averages during different benchmark assessment windows.

Other key components of early childhood education and pre-kindergarten programs include the involvement of families, community, social and emotional learning, developing fine and gross motor skills, as well as other developmentally appropriate skills. These components are all part of the district's pre-kindergarten program, and can also provide valuable insight into the effectiveness of a pre-kindergarten or preschool program. However, this study's view of effectiveness was limited to the growth of literacy and mathematics knowledge and skills.

Recommendations for Future Research

After completing the action research the results and conclusions of the study have led to recommendations for development of other pre-kindergarten programs and future studies.

The reviewed research supports the development that high quality pre-kindergarten programs have on preparing students to enter kindergarten and elementary school, especially those who come from low socio-economic households. As a result, it is recommended that pre-kindergarten and early childhood education programs use income-based requirements for admission into their programs. While this may limit the number of potential applicants, it also provides opportunities for students who may not otherwise have access preschool or pre-kindergarten programs.

The continued use of progress monitoring through benchmark assessments is also recommended for pre-kindergarten programs. Monitoring student growth of specific reading and mathematics skills provides instructors with data to inform their instruction, track progress, identify areas of need, and accurately plan instructions to most benefit students. Benchmark data was critical in helping to determine the effectiveness of the pre-kindergarten program within the study and could provide other programs with measurable data to determine the effectiveness.

The study also examined students, who previously attended the pre-kindergarten program, performance on the STAR 360 Early Literacy assessment at the start of their kindergarten school year. This data helped compare students the literacy abilities of students who attended the program versus those their peers. It is recommended that other programs use similar benchmarking tools to compare student growth from year to the next. For example, the STAR 360 Early Literacy could also be given to students at the end of the pre-kindergarten school year in order to develop an understanding of their abilities after a year of instruction. Data from this assessment could then be compared to the STAR 360 Early Literacy assessment, given at the start of their kindergarten year, to determine how much content knowledge was retained over the course of the summer.

The research and teacher perception responses also support the need for the pre-kindergarten and preschool programs to align their curriculums with those being implemented within their associated schools or districts. The pre-kindergarten program researched in the study utilizes the Fundations literacy program, Eureka Math, and the Big Day for Pre-K reading program. Each of these programs is directly aligned to curriculums being taught in the district elementary schools, providing students with early

exposure to curriculum content and philosophies. Teachers also benefit from the alignment, by knowing what instruction students have experienced prior to their arrival in kindergarten.

Additional research is needed to examine the effectiveness of other areas of pre-kindergarten or preschool programs, including but not limited to involvement of families, community, social and emotional learning, developing fine and gross motor skills. While these areas were not examined in this study, research shows that all are important aspects of early education programs.

Summary

Early childhood education and pre-kindergarten programs have continually evolved since first being introduced in the United States in the early 1800's. Today pre-kindergartens have become critical in preparing our nation's youngest learners for elementary school. While the focus of these programs is still debated by some, the need for rigorous instruction is necessary to provide students will the literacy and mathematics skills necessary to be successful learners.

This study examined the effectiveness of a district created pre-kindergarten program on student growth. The results of the study show that through carefully designed curriculums with rigorous instruction, students are able to show growth in both literacy and mathematics skills and abilities. Consideration for the creation of new pre-kindergarten programs should consider the findings of this study, as well as areas of learning necessary for child development at the early childhood education age.

While the preschool and pre-kindergarten programs are offered privately through numerous institutions throughout the nation, further studies and examination into the

implementation of district created and aligned pre-kindergarten programs are necessary as an alternative way to instruct the nation's youth.

This study examined the effectiveness a pre-kindergarten program can have on student growth and content knowledge within the areas of literacy and mathematics. The Fox Chapel Area School District's pre-kindergarten program use of benchmark assessments, aligned curriculums, and income-based requirements are all supported by the reviewed literature and are proving to be effective in improving students' literacy and mathematics skills. There are still other areas that need to be examined for effectiveness, such as social and emotional development, development of motor skills, and behavioral data that could all be used to further examine the effectiveness of this or other programs.

The study has provided an overview for how pre-kindergarten and pre-school programs can be monitored to determine their effectiveness in growing students' content knowledge. This study can be used as a framework for reviewing other programs, while also emulating the successes found within this study.

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Appendix A

Institutional Review Board
California University of Pennsylvania
Morgan Hall, 310
250 University Avenue
California, PA 15419
instreviewboard@calu.edu
Melissa Sovak, Ph.D.

Dear Stephen,

Please consider this email as official notification that your proposal titled "The Effectiveness of a District Created Pre-Kindergarten Program on Student Growth" (Proposal #19-086) has been approved by the California University of Pennsylvania Institutional Review Board as submitted.

The effective date of approval is 9/23/20 and the expiration date is 9/22/21. 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 9/22/21 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 B

Uppercase Letter Identification

Letter	September	November	January	May
T				
B				
F				
M				
N				
I				
U				
C				
O				
A				
G				
D				
S				
E				
R				
P				
J				
L				
H				
K				
V				
W				
Y				
X				
Z				
Q				

Lowercase Letter Identification

Letter	September	November	January	May
t				
b				
f				
m				
n				
l				
u				
c				
o				
a				
g				
d				
s				
e				
r				
p				
j				
i				
h				
k				
v				
w				
y				
x				
z				
q				
a				
g				

Phonological Awareness

Words in a Sentence	November	January	May
I like dogs.			
Sit down.			
The cat can jump.			
Score			

Blend Syllables	November	January	May
pop-corn			
bas-ket-ball			
game			
Score			

Segment Syllables	November	January	May
lion (2)			
snake (1)			
elephant (3)			
Score			

Recognize Rhyme	November	January	May
cat, mat			
tree, glue			
house, mouse			
Score			

Phonological Awareness

Produce Rhyme	November	January	May
pet			
pig			
fish			
Score			

Isolate Initial Sound	November	January	May
dog /d/			
sun /s/			
fish /f/			
Score			

Blend Phonemes	November	January	May
/p/ - /e/ - /t/			
/d/ - /o/ - /g/			
/g/ - /a/ - /m/			
Score			

Identify Phonemes	November	January	May
cat, cup			
dog, ball			
game, goat			
Score			

November	January	May
/24	/24	/24

Not Yet 0-12
In Process 13-18
Proficient 19-24

Fundations
Letter-Keyword-Sound

Letter	November	January	May	May - Letter Formation
a - apple /a/				
b - bat /b/				
c - cat /k/				
d -dog /d/				
e - Ed /e/				
f - fun /f/				
g - game /g/				
h - hat /h/				
I - itch /I/				
j - jug /j/				
K - kite /k/				
l - lamp /l/				
m - man /m/				
n - nut /n/				
o - octopus /o/				
p - pan /p/				
qu - queen /kw/				
r - rat /r/				
s - snake /s/				
t - top /t/				
u - up /u/				
v - van /v/				
w - wind /w/				
x - fox /ks/				
y - yellow /y/				
z - zebra /z/				

Colors & Patterns

Colors	November	January	May
red			
white			
green			
orange			
black			
purple			
brown			
pink			
blue			
grey			

Patterns	November	January	May
Copies			
Extends			
Creates Own			
AB			
ABC			
ABB			
Other			

Measurement & Geometry

Rote Counting	Sept.	Nov.	Jan.	May
Skips #				

Counts Objects	Sept.	Nov.	Jan.	May
Demonstrates that the last number counted equals the total counted	yes no	yes no	yes no	yes no

Identifies Numbers 1 - 10

Name:_____

Date:

Your child identified the numbers that are marked.

2	4	6	8
10	3	5	7
1	9	0	

Identifies Numbers 1 - 20

Name:_____

Date:

Your child identified the numbers that are marked.

2	4	6	8	10
3	5	7	1	9
0	17	13	19	15
20	12	16	11	14
		18		

I-I Counting

	November	January	May
5			
7			
2			
10			
20			
25			
12			
15			

Notes:

Identify More or Less

	November	January	May
			
3 5			
			
7 8			
			
			

Measurement & Geometry

Sorting	November	January	May
Color			
Shape			
Size			
Other Attribute			

Shapes							
November							
January							
May							


Measurement & Geometry
Positions
November
January
May
in
out
under
up
next to
below
beside
above
in front of
behind
first
last

Appendix C

Informed Consent Statement: Pre-Kindergarten Effectiveness Mid-Year Interview
The interview that is being conducted is part of a research study to determine the Effectiveness of a District Created Pre-Kindergarten Program on Student Growth. The purpose of this study is to help determine the effectiveness of the Fox Chapel Area School District Pre- Kindergarten in growing its students in fundamental literacy and mathematics skills. The benefits of this study will allow the district to make future decisions for the improvement of the program in future years.
You are invited to participate in this interview because you are currently a Pre-Kindergarten teacher or instructional assistant at Kerr Elementary and participated in the initial student readiness survey given at the beginning of the research study. Your participation in this study is to take part in a mid-year interview regarding your perceptions of the Pre-Kindergarten program, and you will also be invited to complete the post Student Readiness Survey in the spring (May 2021). However, the interview poses minimal risk to participants and is completely voluntary and all information collected will remain anonymous and confidential. If you choose to participate in the interview, and the initial and post Student Readiness surveys, you may withdraw from the research study at any time with no penalty. The time required to anticipate in the interview is approximately 1 hour. If you choose to withdraw from the study and wish to have your responses retracted, please contact the head research, Stephen Edwards. All records and survey responses will remain confidential and kept in a secure location. Interview responses will be kept and seen only by the researcher.
For information regarding the research being conducted or the rights of participants, please contact the researcher, Stephen Edwards, or Faculty Advisor, Dr. Kevin Lordon.
Researcher Info:
Name: Stephen P. Edwards University: California University of PA Email: edw7058@calu.edu
Phone Number: 412-963-9315
Faculty Advisor Info:
Name: Dr. Kevin Lordon
University: California University of PA Email: lordon@calu.edu
***If at any time the research study would be terminated, the Principal Investigator would inform the participants of the termination, but such termination may occur without the participant's consent. Further, the Principal Investigator will also inform the participants of any significant findings during the duration of the study that may influence their participation.
***All data will be stored in secured data bases within the Fox Chapel Area School District.
The research study was Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nn/nn and expires mm/mm/mm.

I have read the Informed Consent Statement and understand that my participation in the following survey is voluntary and all responses will remain anonymous and confidential. Please place an "X" indicating your agreement to participate in the research study.

- ____ I consent to participate in the research-based interview based on the guidelines outlined within the Informed Consent Statement.
- ____ I ***do not*** consent to participate in the research-based interview based on the guidelines outlined within the Informed Consent Statement.

_____ _____ Signature Date

Pre-Kindergarten Effectiveness Mid-Year Interview

What do you believe are the most important skills that Pre-Kindergarten students need to acquire in order to be successful in Kindergarten?

Follow up question: How effective is the Fox Chapel Area's Pre-Kindergarten program at providing these skills?

Last year the district piloted the Pre-Kindergarten program, what improvement did you see in their literacy and mathematics skills from the start of the year to the end of the year?

How would you compare your students' academic growth in mathematics and literacy at this point in the school year, compared to last year?

What do you believe are the greatest strengths of the Fox Chapel Area Pre-Kindergarten program?

In what areas do you think the Fox Chapel Area Pre-Kindergarten program needs to improve?

Appendix D

Initial Student Readiness Survey

Informed Consent Statement: Pre-Kindergarten Effectiveness Survey

The following survey is part of a research study to determine the Effectiveness of a District Created Pre-Kindergarten Program on Student Growth. The purpose of this study is to help determine the effectiveness of the Fox Chapel Area School District Pre-Kindergarten in growing its students in fundamental literacy and mathematics skills. The benefits of this study will allow the district to make future decisions for the improvement of the program in future years.

You are invited to participate in this survey because you are currently a Pre-Kindergarten teacher or Kindergarten teacher of students who have previously attended the Pre-Kindergarten program at Kerr Elementary. Your participation in this study is limited to the completion of this survey, both at the beginning of the research project and at its conclusion, and a mid-year interview. The initial survey will be given in the fall (September/October 2020) and the post survey will be given to participants in the spring (May 2021). All participants that take the initial survey will be invited to participate in a mid-year interview and a post Student Readiness Survey in the spring. However, the survey poses minimal risk to participants is completely voluntary and all information collected will remain anonymous and confidential. The estimated time to complete the Student Readiness survey is 30 minutes. Those who choose to participate in the surveys and interview may withdrawal from the research study at any time with no penalty. If you choose to withdrawal from the study and wish to have your responses retracted, please contact the head research, Stephen Edwards. All records and survey responses will remain confidential and kept in a secure location. Survey results will be kept and seen only be the researcher.

For information regarding the research being conducted or the rights of participants, please contact the researcher, Stephen Edwards, or Faculty Advisor, Dr. Kevin Lordon.

Researcher Info:
Name: Stephen P. Edwards
Affiliated University: California University of PA
Email: edw7058@calu.edu
Phone Number: 412-963-9315

Faculty Advisor Info:
Name: Dr. Kevin Lordon
Affiliated University: California University of PA
Email: lordon@calu.edu

***If at any time the research study would be terminated, the Principal Investigator would inform the participants of the termination, but such termination may occur without the participant's consent. Further, the Principal Investigator will also inform the participants of any significant findings during the duration of the study that may influence their participation.

***All data will be stored in secured data bases within the Fox Chapel Area School District.

The research study was Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nn/nn and expires mm/mm/mm

* Required

Email address *

Your email

Name (First, Last) *

Your answer

I have read the Informed Consent Statement research and understand that my participation in the following survey is voluntary and all responses will remain anonymous and confidential. *

- ◯ Yes, I have read the the overview and agree to participate in the survey.
- ◯ I have read the survey and do not wish to participate in the survey.

How would you rate the readiness of incoming kindergarten students who attended the pre-kindergarten program, based on their knowledge of mathematical skills/concepts? *

	1	2	3	4	5	
Minimal Knowledge Mathematical Concepts	◯	◯	◯	◯	◯	Extensive Knowledge of Mathematical Concepts

How would you rate the readiness of incoming kindergarten students who attended the pre-kindergarten program, based on their knowledge of literary concepts? *

	1	2	3	4	5	
Minimal Knowledge Literary Concepts	○	○	○	○	○	Extensive Knowledge of Literary Concepts

How would you compare the readiness of students who attended the pre-kindergarten program versus those who did not in regards to knowledge of literary skills/concepts? *

- ○ Students who attended the Pre-Kindergarten program have the same preparation as compared to their peers.
- ○ Students who attended the Pre-Kindergarten program are less prepared compared to their peers.
- ○ N/A ~ I am unable to make this comparison.

What improvements would you recommend to help further the development of students literacy and mathematics skills within the district provided pre-kindergarten program? *

Your answer

What additional supports or resources are needed to further the development of the pre-kindergarten program, in order to develop students' literacy and mathematics skills? *

Your answer

What is your overall perception of the effectiveness of the pre-kindergarten program in preparing its students for Kindergarten? *

Your answer

What other factors do you believe play a role in student readiness for kindergarten? Do you feel that the district's pre-kindergarten program addresses these factors? Explain how is does or does not. *

Your answer

Appendix E

Pre-Kindergarten Effectiveness Mid-Year Interview

Informed Consent Statement: Pre-Kindergarten Effectiveness Mid-Year Interview

The interview that is being conducted is part of a research study to determine the Effectiveness of a District Created Pre-Kindergarten Program on Student Growth. The purpose of this study is to help determine the effectiveness of the Fox Chapel Area School District Pre-Kindergarten in growing its students in fundamental literacy and mathematics skills. The benefits of this study will allow the district to make future decisions for the improvement of the program in future years.

You are invited to participate in this interview because you are currently a Pre-Kindergarten teacher or instructional assistant at Kerr Elementary and participated in the initial student readiness survey given at the beginning of the research study. Your participation in this study is to take part in a mid-year interview regarding your perceptions of the Pre-Kindergarten program, and you will also be invited to complete the post Student Readiness Survey in the spring (May 2021). However, the interview poses minimal risk to participants and is completely voluntary and all information collected will remain anonymous and confidential. If you choose to participate in the interview, and the initial and post Student Readiness surveys, you may withdraw from the research study at any time with no penalty. The time required to participate in the interview is approximately 1 hour. If you choose to withdraw from the study and wish to have your responses retracted, please contact the head researcher, Stephen Edwards. All records and survey responses will remain confidential and kept in a secure location. Interview responses will be kept and seen only by the researcher.

For information regarding the research being conducted or the rights of participants, please contact the researcher, Stephen Edwards, or Faculty Advisor, Dr. Kevin Lordon.

Researcher Info:
Name: Stephen P. Edwards
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Faculty Advisor Info:
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University: California University of PA
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***If at any time the research study would be terminated, the Principal Investigator would inform the participants of the termination, but such termination may occur without the participant's consent. Further, the Principal Investigator will also inform the participants of any significant findings during the duration of the study that may influence their

participation.

***All data will be stored in secured data bases within the Fox Chapel Area School District.

The research study was Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective 09/23/20 and expires 09/22/21.
Your email address will be recorded when you submit this form.
Not **stephen_edwards@fcasd.edu**? Switch account
* Required

Name (First & Last) *

Your answer

I have read the Informed Consent Statement research and understand that my participation in the following survey is voluntary and all responses will remain anonymous and confidential. *

- ◯ Yes, I have read the the overview and agree to participate in the survey.
- ◯ I have read the survey and do not wish to participate in the survey.

What do you believe are the most important skills that Pre-Kindergarten students need to acquire in order to be successful in Kindergarten? *

Follow up question: How effective is the Fox Chapel Area's Pre-Kindergarten program at providing these skills? *

Last year the district piloted the Pre-Kindergarten program, what improvement(s), if any, did you see in students literacy and mathematics skills from the start of the year to the end of the year? (For Pre-K instructors only. Type N/A if this does not apply to you.) *

How would you compare your students' academic growth in mathematics and literacy at this point in the school year, compared to last year? (For Pre-K instructors only. Type N/A if this does not apply to you.) *

What do you believe are the greatest strengths of the Fox Chapel Area Pre-Kindergarten program? *

In what areas do you think the Fox Chapel Area Pre-Kindergarten program needs to improve? *

Appendix F

Final Student Readiness Survey

Informed Consent Statement: Pre-Kindergarten Effectiveness Survey

The following survey is part of a research study to determine the Effectiveness of a District Created Pre-Kindergarten Program on Student Growth. The purpose of this study is to help determine the effectiveness of the Fox Chapel Area School District Pre-Kindergarten in growing its students in fundamental literacy and mathematics skills. The benefits of this study will allow the district to make future decisions for the improvement of the program in future years.

You are invited to participate in this survey because you are currently a Pre-Kindergarten teacher or Kindergarten teacher of students who have previously attended the Pre-Kindergarten program at Kerr Elementary. Your participation in this study is limited to the completion of this survey, both at the beginning of the research project and at its conclusion, and a mid-year interview. The initial survey will be given in the fall (September/October 2020) and the post survey will be given to participants in the spring (May 2021). All participants that take the initial survey will be invited to participate in a mid-year interview and a post Student Readiness Survey in the spring. However, the survey poses minimal risk to participants and is completely voluntary and all information collected will remain anonymous and confidential. The estimated time to complete the Student Readiness survey is 30 minutes. Those who choose to participate in the surveys and interview may withdraw from the research study at any time with no penalty. If you choose to withdraw from the study and wish to have your responses retracted, please contact the head research, Stephen Edwards. All records and survey responses will remain confidential and kept in a secure location. Survey results will be kept and seen only by the researcher.

For information regarding the research being conducted or the rights of participants, please contact the researcher, Stephen Edwards, or Faculty Advisor, Dr. Kevin Lordon.

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***If at any time the research study would be terminated, the Principal Investigator would inform the participants of the termination, but such termination may occur without the participant's consent. Further, the Principal Investigator will also inform the participants of any significant findings during the duration of the study that may influence their participation.

***All data will be stored in secured data bases within the Fox Chapel Area School District.

Name (First & Last) *

Your answer

I have read the Informed Consent Statement research and understand that my participation in the following survey is voluntary and all responses will remain anonymous and confidential. *

- ◯ Yes, I have read the the overview and agree to participate in the survey.
- ◯ I have read the survey and do not wish to participate in the survey.

How would you rate the readiness of incoming kindergarten students who attended the pre-kindergarten program, based on their knowledge of mathematical skills/concepts? *

	1	2	3	4	5	
Minimal Knowledge Mathematical Concepts	◯	◯	◯	◯	◯	Extensive Knowledge of Mathematical Concepts

How would you rate the readiness of incoming kindergarten students who attended the pre-kindergarten program, based on their knowledge of literary concepts? *

	1	2	3	4	5	
Minimal Knowledge Literary Concepts	◯	◯	◯	◯	◯	Extensive Knowledge of Literary Concepts

How would you compare the readiness of students who attended the pre-kindergarten program versus those who did not in regards to knowledge of literary skills/concepts? *

- ◯ Students who attended the Pre-Kindergarten program have the same preparation as compared to their peers.
- ◯ Students who attended the Pre-Kindergarten program are less prepared compared to their peers.
- ◯ N/A ~ I am unable to make this comparison.

What improvements would you recommend to help further the development of students literacy and mathematics skills within the district provided pre-kindergarten program? *

Your answer

What additional supports or resources are needed to further the development of the pre-kindergarten program, in order to develop students' literacy and mathematics skills? *

Your answer

What is your overall perception of the effectiveness of the pre-kindergarten program in preparing its students for Kindergarten? *

Your answer

What other factors do you believe play a role in student readiness for kindergarten? Do you feel that the district's pre-kindergarten program addresses these factors? Explain how is does or does not. *

Your answer