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# Technology, Professional Development, and Student Achievement: Using the Tell Survey in a Study of Low Socioeconomic Schools in Kentucky

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# TECHNOLOGY, PROFESSIONAL DEVELOPMENT, AND STUDENT ACHIEVEMENT: USING THE TELL SURVEY IN A STUDY OF LOW SOCIOECONOMIC SCHOOLS IN KENTUCKY

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I dedicate this to the most important people in my life.

To my husband, Bryan Ross, who took over all duties so I could concentrate only on writing. To my brilliant and talented children, Haileigh Ross, who beat me at becoming a doctor, and my son Clifton Ross, who I watched pursue his music dreams from afar while I was writing. You three have been my motivation for completing this journey, and I love you with all my heart.

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In order to compare the accessibility, need, and extent of professional development, technology, and its relationship to low socioeconomic (SES) schools and achievement, data were accessed from the Kentucky Department of Education, Division of School and Community Nutrition Qualifying Data Report to identify schools with a greater than 50% free and reduced lunch rate. Data also came from the TELL Kentucky survey instrument results specific to questions related to professional development and technology. Kentucky Performance Rating for Educational Progress (KPREP) school rankings were also utilized to determine the highest and lowest ranked schools among those with greater than 50% free and reduced lunch rate. Rankings were determined using a formula provided by the Kentucky Department of Education.

Of all low SES schools, the findings indicate a significant difference when comparing higher ranking KPREP versus low ranking KPREP schools, with teachers at higher ranked schools reporting more accessibility to technology, appropriate time available for professional development, and sufficient training to utilize instructional technology as opposed to lower ranked schools according to TELL survey results. Of the three research questions, two had a medium effect size and one had a small to medium effect size, suggesting practical significance to the findings. The findings, however, are limited by two factors: 1) the TELL survey measures teacher *perceptions* about adequacy

of technology access and training; and 2) only a small number of TELL survey items measure these perceptions. Thus, although significant, differences in teacher perceptions in higher-ranking KPREP SES versus low ranking schools are not informative for enacting true school reform. Follow up studies are needed to ascertain whether perceived differences in technology coincide with actual differences in accessible technology resources and training in these schools.

# CHAPTER I: INTRODUCTION

## Background

Since the 1994-1995 school year, Kentucky has consistently kept qualifying data regarding the number of students who qualify for free and reduced lunch. For the past five years, that number has steadily increased (see Table 1.1).

Table 1.1

*Qualifying Data (Rounded) for Free/Reduced Lunch 2013-2018*

| School Year | % Qualified |
|---|---|
| 2013-2014 | 53 |
| 2014-2015 | 64 |
| 2015-2016 | 69 |
| 2016-2017 | 71 |
| 2017-2018 | 73 |

Source: Kentucky Department of Education, Qualifying Data Database, 2018

This report from the Kentucky Department of Education (KDE) is the only tool available to educators to identify students in poverty; therefore, only one piece of data indicates impoverished schools.

In certain areas of Kentucky where high poverty schools are prevalent, a program known as Community Eligibility Provision (CEP) has been put in place so schools with high poverty rates do not have to send home applications to parents/guardians to be eligible for the free and reduced lunch program. Those schools are automatically considered a CEP school, meaning everyone gets breakfast and lunch for free (KDE *Archived Qualifying Data*, 2018).

In 2012, Senate Bill 95 established a task force on student access to technology. Part of the task force's suggestions and plan of action was to provide a mobile computing device (i.e. Chrome Books, iPads) option that would be best for Kentucky students. It was determined that the KDE should facilitate the sharing of this information regarding mobile computing devices in schools, including possible funding sources. The task force also suggested the General Assembly incorporate budget language to maximize technology in schools (Office of State Budget Director, 2018).

In Kentucky, educators are required to complete a minimum of 24 hours of professional development (PD) annually. The state mandates how some of those hours are used, but the district PD plan determines how the remaining hours are used. This leads to much inconsistency in what teachers are learning and how, or even if, they are using what they learn. KDE also has graphics and charts available on its site to evaluate professional learning or PD; however the use of those by districts is not required (Professional Learning, KDE, 2017).

## Conceptual Underpinning for the Study

Current educational technology studies as well as the state of the current budget of Kentucky guided the planning of this study. Results from the most recent Teaching, Empowering, Leading, Learning (TELL Kentucky, 2017) survey, current Kentucky Performance Rating for Educational Progress (KPREP, 2017) rankings, and KDE data to identify students in poverty allowed for analysis of the relationship of school personnel's perception of technology and professional development with student achievement in high poverty Kentucky schools.

Teachers are increasingly expected to teach using a variety of technology tools while using a constructivist method for interactive learning. Studies have been conducted showing the value of using technology in the classroom; however, few studies have been conducted to determine if the persons responsible for implementing the technology in the classroom believe they have received a sufficient amount of training to do so effectively.

Knowledge and skills necessary to implement new teaching methods are dependent upon effective PD to make those tools succeed in the classroom. According to Desimone (2009), effective PD changes the attitudes of teachers, allows them to use new knowledge and skills, and improves their teaching of the content, pedagogy, or both. These changes also promote improved student learning. Desimone also suggests using a core framework to measure the efficacy of PD for teachers.

Figure 1 represents the elements that can affect the relationship between socioeconomic status and technology use, and how those all can potentially affect student achievement. Annual income, parental education, and free/reduced lunch status can all contribute to the identification of low socioeconomic (SES) status. Instructional technology can be affected by the accessibility to technology, professional development needs, and the extent of professional development received. These can all affect academic achievement. Academic achievement can then affect success on KPREP, grade point average (GPA), ACT standardized test scores, and college acceptance rate.

## Significance of the Problem

The problem related to this study centers around the relationship between instructional technology use (including professional development in technology) and how it affects student success in low SES schools. In order to identify interventions that could

affect school success, this study used the TELL Kentucky survey and looked at the following school personnel perceptions related to technology and their relationship to student achievement:

- Reported adequacy of access to instructional technology
- Reported adequacy of the amount of time provided for professional learning among low SES schools
- Reported sufficiency of training required to fully utilize instructional technology in low SES schools

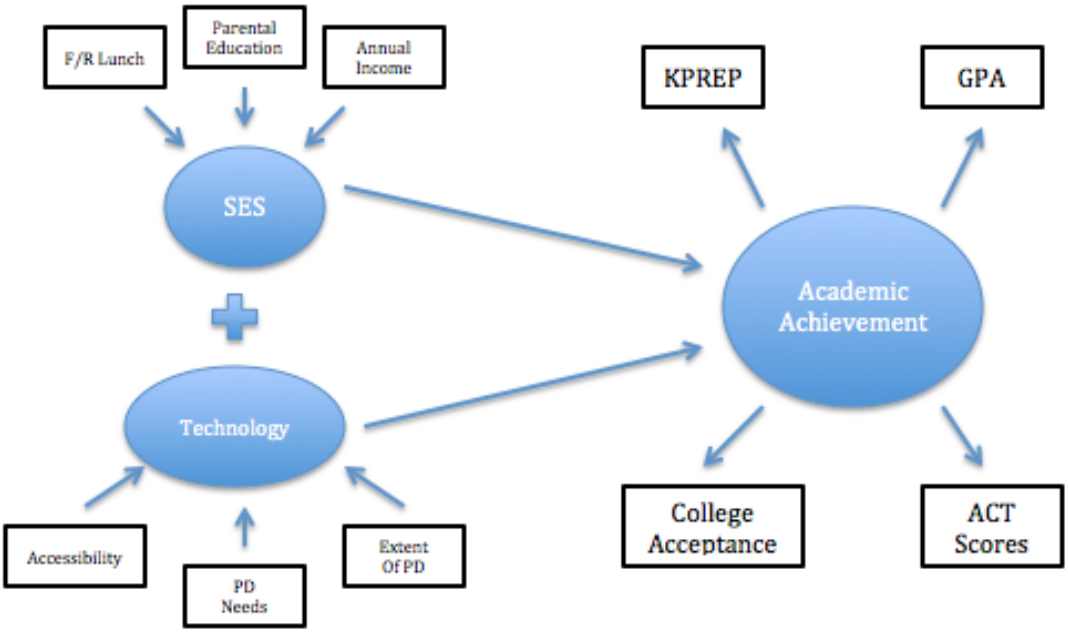


*Figure 1.* Graphic of the possible interaction and relationship between low SES schools, technology, and academic success.

The professional development needed to implement numerous programs in the ever-changing field of technology is difficult to provide when there is no money in the budget to attend trainings. Unless they are offered for free, in many districts the chance

of attending such events is remote. The most recent Kentucky state budget drastically cut funds for teacher professional development by 18 million dollars, allotting no money in the budget for professional development offerings (Office of State Budget Director, 2018).

In the most recent 2015 results of the Program for International Student Assessment (PISA), given every three years, the United States ranked in the average range once again for science (25th in world rankings) reading literacy (24th), and math (40th). These average rankings have been a continual trend for the United States (National Center for Education Statistics, 2015). Given these results, the United States must evaluate whatever data are available to determine the most effective methods used to teach our students in order to ensure, as well as improve, academic success.

## Purpose of the Study

The purpose of this study was to explore the relationship between technology, professional development, and school achievement in low SES schools in Kentucky, as measured by the most recent school KPREP rankings and perceptions of educators from TELL Kentucky survey results. The findings deliver insight into the need for further research, as well as the effect the perceived relationship of professional development and technology is having on achievement. Given the lack of professional development funding in the state of Kentucky, it is hoped that the study informs discussion about how the lack of professional development learning opportunities (as measured by teacher perceptions), particularly in the areas of instructional technology, could be related to lower student achievement in low SES schools.

Previously conducted research studies have investigated connections between some of these variables (Mayled, Martz, Smith, & Young, 2018; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2011; Thieman & Cevallos, 2017), but available research comparing all of them presents a gap in the literature. Determining how these interrelated factors relate to student achievement has the potential to influence budget decisions while also being beneficial to the success of the students of Kentucky.

## Research Questions

**General Research Question 1:** Is there a significant difference in reported accessibility to instructional technology between low SES Kentucky schools ranked high versus low in school achievement (as measured by TELL Survey item 3.1b)?

**General Research Question 2:** Is there a significant difference in the reported appropriate amount of time provided for professional learning between low SES Kentucky schools ranked high versus low in school achievement (as measured by TELL Survey item 8.1b)?

**General Research Question 3:** Is there a significant difference in reported sufficiency of training to fully utilize instructional technology between low SES schools ranked high versus low in school achievement (as measured by TELL Survey item 8.1h)?

## Definition of Key Terms

The use of key terms in this study is based on terminology used in public education.

*Professional development:* According to the KDE (2017) "Professional Learning" website, the term *professional development* means professional learning that is consistent

with standards, is focused on content and pedagogy, is collaborative, facilitated by educators, focused on continuous growth, and on-going. In this study, professional development and professional learning are used interchangeably.

*Technology integration:* According to the International Society for Technology in Education (ISTE, 2002), technology integration is the use and application of technology skills for the purpose of learning and problem solving. ISTE has established technology standards for students, teachers, and administrators to help educators become effective users of technology. The CITE Journal article by Harris (2005) and ISTE (2002) define *technology integration* as:

> Curriculum integration with the use of technology involves the infusion of technology as a tool to enhance the learning in a content area or multidisciplinary setting. . . . Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally. The technology should become an integral part of how the classroom functions—as accessible as all other classroom tools. The focus in each lesson or unit is the curriculum outcome, not the technology. (p. 1)

The George Lucas Educational Foundation (2007) gives the definition as being routine, transparent, accessible, and supportive of curricular goals while helping students reach their goals. Technology integration is a seamless part of learning and students are actively engaged in the learning process.

*Low socioeconomic (SES) schools*: For the purpose of this study, *low socioeconomic schools* are those with a greater than 50% free and reduced lunch rate according to the

Division of School and Community Nutrition Qualifying Report published by KDE (KDE *Qualifying Data*, 2018).

*Instructional technology:* According to Kurt (2017), instructional technology is defined as:

> The branch of education concerned with the scientific study of instructional design and development. The main purpose of instructional designers is to create engaging, effective learning experiences. Instructional technology includes practical techniques of instructional delivery that systematically aim for effective learning, whether or not they involve the use of media. It is a basic purpose of the field of instructional technology to promote and aid the application of these known and validated procedures in the design and delivery of instruction. (pp. 3-5)

## Chapter Summary

While all school districts hope to produce academically successful, high achieving students, the reality is many of them fail to meet that goal. This study explores the relationship of factors such as technology, poverty, professional development, and achievement. All of these elements can have an impact on the administration, students, and faculty in addition to the success of school districts as a whole. These interwoven factors and their potential outcomes are once piece of the puzzle that could perhaps propel schools toward the goal they hope to reach. The question remains, however, if the TELL survey is the best tool to determine the value of this relationship, and if it informs decisions related to school reform as implied by the survey.

# CHAPTER II: REVIEW OF THE LITERATURE

## Poverty

Poverty is often defined as having little or no money, goods, or support. Poverty rates among children in the United States are 1.5 to 4 times higher than that of Canada and Western Europe (Rainwater & Smeeding, 1995). According to the National Center for Children in Poverty (NCCP, 2017), the average poverty rate in the United States is 19%, and another 43% are considered low income. In Kentucky, 25% of children live in poor families and families with a single head of household (65%) tend to have higher poverty rates than two parent families.

When looking at poverty and its effects on education, Payne's definition in *A Framework for Understanding Poverty* (2001) provides the basis from which much research is derived. Payne (2001) identifies poverty as "the extent to which an individual does without resources" (p. 7). Her work provides details of these various resources, including financial, emotional, mental, spiritual, physical, support systems, relationships/role models, and knowledge of hidden rules; all of which affect student success in school. Poverty, as described by Payne, does not focus solely on the lack of money or identify someone as simply poor, but takes into account a variety of resources without which someone could be considered to be living in poverty.

The effects of poverty on school children can be far-reaching and devastating without support structures in place to address their additional needs in the classroom and beyond. Public schools have been tasked with educating all students regardless of background, ability, or socioeconomic status. As research shows, most have been more

successful in educating white students in the middle to upper classes as opposed to poor and minority students.

The achievement gap in the United States continues to grow and is evident in our schools. In a report for the Stanford Center for Opportunity Policy, Darling-Hammond, Zielezinski, and Goldman (2014) found the gap exists between students in poverty and the more advantaged, and between students of color, especially students who are African American, Native American, Latina, and Pacific Islander and white students. The achievement gap between students with and those without disabilities is also very large. When in high school, these achievement gaps are often associated with attainment differences observed in terms of different rates of graduation and college attendance among these demographic groups of students. Nearly half of Hispanics, Native Americans, and African Americans do not graduate on schedule with their classmates. More than one million high school students in the United States drop out of school each year, averaging one student every twenty-nine seconds.

Children in poverty make up close to half of public school students. Minority students also make up almost half of the students in public schools. These same students have access to fewer resources (books, qualified teachers, funding, materials, and computers) than white, affluent students (Darling-Hammond et al., 2014).

Children from poverty also face numerous other challenges, including their own self-image and perceived value when they come to understand the differences between themselves and their peers. Due in part to the limited number of quantitative studies conducted on welfare reform and student outcomes, Trzcinski (2002) conducted a qualitative study about children's perceptions of welfare and poverty with middle school

students in a large metropolitan district which assessed the effects of welfare reform on their daily lives. Most students participating in the study were African American and were part of the free and reduced lunch program. Through a series of interviews with the mother and child, insights are gained about how welfare affects children.

The findings in Trzcinski's (2002) study indicate that poverty and welfare tend to result in negative outcomes for children. Children gave explanations about their impression of welfare and food stamps. Many responses indicated their embarrassment when having to use them, as well as how using them made them feel different from everyone else. Students also commented about how food stamps were not money, and some who used them were more deserving than others. Many of the respondents described awareness of being a target for ridicule and teasing due to their poverty status; even though the student(s) doing the harassing may be on welfare themselves.

Welfare reform has not eliminated welfare or the presence of poverty among children. In addition, the stigma attached to welfare may undermine self-esteem and affect child outcomes. Stereotypes related to welfare and poverty are passed down from adults to children, and in many cases perpetuated by the children themselves in their behavior towards others in school. These stereotypes have a negative effect on the child's perception of welfare and poverty, resulting in an adverse effect on child outcomes.

Socioeconomic status of parents during a student's early childhood years is a prediction of completed schooling and has a great impact on school achievement (Duncan, Yeung, Brooks-Gunn, & Smith, 1998). Duncan et al. (1998) summarized findings from literature contributions, and then conducted two sets of analyses with data

from the Panel Study of Income Dynamics. Earlier studies did not address the actual timing of when children were economically deprived. Findings show the greatest impact on achievement comes from family economic circumstances in early childhood, when cognitive and physical development is affected by family income. Adolescent achievement is also affected by economic pressure within a family, caused by stress and conflicts in the family over finances. This financial struggle is particularly harmful to the achievement and self-confidence of boys.

The effects of poverty on children are not limited to simply achievement but also the motivation to learn (Dyson, Hett, & Blair, 2003). American studies show the effects of family poverty on decreased IQ, verbal ability, and achievement scores of children aged two to eight years (Smith, Brooks-Gunn, & Kelbanov, 1997). Lower income middle school students scored lower on basic academic skills than students from higher income families (Dyson et al., 2003). Neighborhood poverty exacerbates the effect due to the limited availability of socialization with other socioeconomic groups and persistent unemployment serving as models of what is normal for these children (Wilson, 1987).

The research also highlights the value of the mother-child relationship for children in poverty. Children whose mothers worked long or non-traditional hours reported difficulties in maintaining a strong, positive relationship with the mother. Children with younger siblings were forced to take on parenting as a middle school student due to the work schedule of the mother. According to Trzcinski (2002), responsibilities such as childcare and managing the household may present future developmental challenges for children who are charged with these obligations, which will then manifest in the classroom.

Cook et al. (1996) sampled two conflicting populations of boys from four elementary schools in Memphis, Tennessee in their study about motivation. The federally subsidized lunch program was used to identify the two groups from lower income and middle-income schools, which also correlated to predominately black in the lower income group and predominately white in the middle-income group. A random selection process was used to choose who was to be interviewed by one of two interviewers. The total sample of students included 220 boys who were each interviewed around 30 minutes and asked questions regarding occupational aspirations. A MANOVA was conducted with results showing inner-city boys in grades two to eight had lower aspirations in regards to jobs and education when compared to boys in affluent families (Cook et al., 1996).

Student motivation and achievement are just two of the educational components affected by poverty. So, too, is students' emotional wellbeing. Carlson (2006) found that children living with a higher level of poverty suffer a significantly higher exposure to violence. In such environments, concern for safety and wellbeing likely usurps concern for school.

Education is commonly thought to be the catalyst to close the ever-widening gap between rich and poor. However, a problem exists within the educational system itself in how these issues are targeted. The attitudes of parents and students toward schools are affected by class differences, which in turn affect a student's school progress. Social class is a significant piece of the puzzle when molding family-school relationships to benefit student achievement (Lareau, 2001).

Teachers themselves can be part of the issue in how poverty affects students. Educators should be race and class conscious, aware of their own possible bias toward students due to race or class, and how those perceptions affect their teaching. They must understand how poverty impacts student learning, and have a keen awareness of how stereotypes and bias can affect our interaction with students (Ullucci & Howard, 2015). Students should not be defined by what they do not have or what they cannot do. By working toward awareness, teachers can assist students in seeing their capabilities through a new lens.

Along with teacher perceptions, many other factors are associated with poor academic achievement, among them the level of parental education (Hakkinen, Kirjavainen, & Uusitalo, 2003), race or ethnicity, especially African American and Hispanic/Latino (Bali & Alvarez, 2004), as well as what they are exposed to in their home and community.

## The Impact of Poverty on Student Learning

Children who live in poverty long term suffer a far greater impact on their cognitive ability than those who are only in poverty short term. In many cases, this can be attributed to the difference in those from generational poverty as opposed to those from situational poverty (Payne, 2001). Regardless of which type of poverty a child experiences, studies show that poverty has a detrimental impact on school achievement. For children living in poverty from birth to age five, a $10,000 increase in annual income equates to a year increase in overall schooling. While the timing of poverty is significant, so too is the family structure, parental educational attainment, and neighborhood influences (Brooks-Gunn & Duncan, 1997).

Cognitive ability is affected by external factors such as prenatal drug abuse, nutrition, and exposure to violence. Households in poverty experience these more often than those who are not in poverty. Children in poverty also lack other school necessary skills such as impulse control (Evans, 2003), control of emotions, short attention spans (Alloway, Gathercole, Kirkwood, & Elliott, 2009) and knowing how to prioritize tasks, leaving them with difficulties related to academics and behavior, further upsetting their school experience.

Chronic stress, or distress, is experienced much more often by those living in poverty than children in more affluent families. Distress can affect the development of the brain, academic success, and the ability to be competent socially (Evans, Kim, Ting, Tesher, & Shannis, 2007). Building on previous research of socioemotional development and cumulative risk, Evans et al. (2007) looked at socioemotional development, cumulative risk, and allostatic load among 339 children from New York public schools. Unlike many other studies that focus on inner city students, children from this study were from rural areas. The mean age was 9.2 years, with 94% white and 49% female. Half of the families involved were living below the poverty line. The mother and one child from each participating family were interviewed separately and nine risk factors were identified.

The pattern of the data from this study indicates that children who suffer an early introduction to collective risks have the potential to suffer the long term risk for physical morbidity and behavior problems. The pattern of the results also stresses the importance of a multimethodological assessment of the developmental correlates and the exposure to cumulative risk.

Children growing up in poor homes are also disadvantaged in vocabulary attainment. They hear, on average, 33 million fewer words than their upper class peers by the age of four, averaging 13 million words. In middle-class, children hear a vocabulary of 26 million words by age four, and in wealth, 46 million words (Hart & Risley, 1995). Parents who complete higher education and obtain a higher income are more likely to engage their children in conversation eliciting creative responses. They are also more likely to give their children a response and explanations that emulate cause and effect. This is something children in poverty often do not experience, and translates into classrooms where students frequently do not comprehend cause and effect.

Those children who are living in poverty routinely get reprimanded twice as often as they experience positive reinforcement. In contrast, middle-class children hear three positives to every negative (Risley & Hart, 2006). So while the exposure to vocabulary is seriously lacking for children in poverty, the vocabulary they do hear is often of a negative nature.

Students coming from households in poverty are four and a half times more likely to become a high school dropout. Those who are proficient academically are still less likely to obtain a college degree. In the last 20 years, the SAT score gap between wealthy and poor students has increased by a 42% margin (Birdsong, 2017). The achievement gap for income continues to widen while the gap in race and ethnicity narrows. So while advancement is made in one area, poverty continues to divulge questions that compel schools to search for answers.

The detrimental effects of living in poverty are not only manifested in poor test scores, they are also evidenced in brain scans of children from wealth versus children in

poverty. Researchers using MRI brain scans found a difference in the thickness of parts of the cortex in the occipital lobe and the temporal lobe, where the primary role is vision and storing knowledge. The difference in the thickness for this area of the brain revealed a direct correlation with differences in test scores and income (Bergland, 2015).

This is not to say that children in poverty cannot be successful. The brain is malleable and can be rewired for those students who are living in poverty. The key is to offer those students experiences to level the playing field, both in and out of school, to help them achieve and thrive.

## The Impact of Poverty on Educators and Public Schools

Teachers working in high poverty schools often embrace the extensive responsibilities that comes with educating students from low income families. Their satasifaction with work and intrinsic rewards are often dependent upon the success they achieve with these students. Many of these students have not had a successful education experience, and often lack a valuable support system, making student success an uncertainty (Kraft, Papay, Johnson, Charner-Laird, Ng, & Reinhorn, 2015).

In their study, Kraft et al. (2015) conducted intensive interviews with 95 teachers and administrators from six urban schools in one district. All of the schools were high poverty, high minority schools. The high poverty schools were chosen based on the percentage of free and reduced lunch participants in the school, along with having varied student achievement. The study looks at the organizational support necessary to benefit the students from high poverty, urban schools. It also examines the schools' function as an open or closed system, and how that affects the work of teachers.

Teachers in these schools had large percentages of students with Individualized Education Plans (IEPs), students who were often several grade levels behind, and English as a Second Language (ESL) students, all of which contributed to a disrupted learning experience. Teachers also reported other challenges associated with their school environment, including truancy, tardiness, and violence in the surrounding community which affected the students' capability to concentrate and persevere in school.

Some of the reported issues in the study affecting these impoverished students include several factors out of the teachers' control, such as hunger, medical needs (dental work and eyeglasses), and other services lacked because of poverty, but consistent with other studies about the effects of poverty on student success. Nonetheless these have an adverse affect on their educational experience. Students from these high poverty schools are unlike their peers in wealthier schools who come to school prepared, well fed, and socially confident.

Teachers from these schools reported playing a large role in their students' lives beyond that of just teacher. They find support services to connect with their students, they work on socioemotional needs, and they develop supportive relationships with them so they will be more likely to succeed. Obviously, not all of this occurs just during the school day. Many teachers are working after hours to meet the needs of their students.

The study found that individual teachers could not possibly manage all the challenges alone when faced with working with students in high poverty schools. Though principals were inclined to view their school as more of an open system, the study found many were not truly open systems, i.e., interacting freely with other agencies, services, and the community. Most were a mixture of an open and closed

system, where a closed system includes practices that treat students as if they all are equally prepared and the expectation that all students would react positively to standardized expectations.

The study identified four common areas of concern among teachers: instructional supports to meet various learning needs, social and psychological resources to assist in developing personal strengths and skills, ways to create orderly and disciplined environments conducive to teaching and learning, and strategies to encourage parental engagement. Each of these areas were addressed in the schools participating in the study, and a plan was developed. For example, in the area of parental engagement, the principal began requiring teachers to make two home visits per year and offered to go with them to the first one if they were uncomfortable. Teachers felt the principal's support was vital to establishing better partnerships with parents.

Kraft et al.'s (2015) findings provide important lessons for schools operating with large populations of students in poverty. Students from poverty require the school to respond to the uncertainty they bring to school every day. Administrators and teachers need to become active participants in the school community, while seeking to understand what the needs are and where the resources are located. The school should be approached as an interdependent organization with everyone learning from their peers, not as a group of independent classrooms who do not communicate.

Schools who were able to depend on their administrators and colleagues for support were more optimistic about achieving success. Support systems within the organizational structure of high poverty schools are essential. The study determines that

serving these students well demands effective leadership, effective teachers, and effective organizations (Kraft et al., 2015).

While the above study focused on urban schools, poverty affects all schools and educational settings. Regardless of where the school is located, poverty significantly affects students, especially those who are dealing with homelessness. Sometimes schools are unaware of the housing situation of a student, but when they are aware, it is vital that they have a plan in place for how to respond.

The role of schools is often recognized as a place of structure and stability for homeless students. The school may be the only consistency available to them. According to Wiley and Ballard (1993), districts should have a task force in place consisting of teachers, administrators, and community agencies to coordinate services needed by these families. They should also partake in regularly scheduled shelter visiting days where they are able to go and recruit children who need to be enrolled in school.

Teachers may need to teach skills related to self esteem and self care, which are often missed lessons among homeless students. In addition, after school tutoring is regularly needed for these students. Schools have become the front line when addressing issues with homelessness. The responsibility of educating students in poverty in order to break the cycle falls into the hands of schools who must address the problems when faced with students who have an unstable home environment (Wiley & Ballard, 1993).

Schools alone, however, cannot solve the issue of poverty. Factors affecting poverty begin the moment a child is born and schools/teachers often become the beacons of hope for those students. The gaps faced by educators when trying to meet the needs of these students are often out of reach and unattainable by a school alone, as poverty is not

exclusively a school problem (Ullucci & Howard, 2015). One successful piece of the puzzle are schools who have adapted an open system to meet the needs of their students through utilizing community assets.

## High Poverty Schools Beating the Odds

In a study by Cunningham (2006) six schools were visited in five different states. All had high levels of poverty and all had success on state tests. The free and reduced lunch rate was between 68% and 98% in every school. Each school also had large numbers of ESL students and diverse populations. The standardized tests all varied according to the state in which they were administered.

The study identified 12 factors these schools had in common. Among them were student engagement, instruction, leadership, parent participation, perseverance and persistance, professional development, and real reading and writing. These schools had all adopted a literacy program to help their students read and write. The children spent time reading and writing every day, both as part of the instructional time and free reading. At every grade level, students had a words block focusing on fluency, sight words, spelling, and phonics. A guided reading block focusing on comprehension strategies, a block for process and focused writing, and a reading block for reading aloud by the teacher and independent reading were part of every school day. Most had afterschool programs where additional reading and writing took place, and most students attended. The reading materials included a vast array of mediums to encourage reading in high interest categories appealing to all students.

All the schools had ongoing professional development to successfully implement the literacy program. They attended workshops and had demonstration lessons taught in

their classrooms. The also had instructional coaches to guide them in the classroom lessons. The study found that by making literacy a priority, these high poverty schools found success (Cunningham, 2006).

The Prichard Committee (Kannapel, Clements, & Prichard Committee for Academic Excellence, 2005) conducted a study on high performing, high poverty schools. They looked at schools in Kentucky and identified eight characteristics of the schools who were high performing and considered high poverty schools.

- The belief that all students can succeed at high levels
- High expectations
- Collaborative decision making
- Teachers accept their role in student success or failure
- Strategic assignment of staff
- Regular teacher-parent communication
- Caring staff and faculty
- Dedication to diversity and equity

All of the schools in this study by the Prichard Committee (Kannapel et al., 2005) were strongly focused on instruction, academics, and learning. Of the eight schools who were chosen to be audited, the schools differed from their counterparts on 22 of 88 indicators in a statistically significant way. They concentrated on high expectations for the staff as well as the students. Relationships between staff, faculty, students, and families were respectful, caring, and nurturing. Leadership among the schools differed; however, all employed a collaborative model, with staff involved in most decision making. While technology was not used as effectively as it could have been in these

schools, it was used. To what extent it affected the success of the schools in this study is not stated.

Microsoft's School of the Future in Philadelphia, Pennsylvania opened in 2006 with hopes aimed at a school to prepare students for a changing world surrounded by technology. Faced with many challenges in the first years of operation, they are now exhibiting success. In the first six years, criticism regarding inefficient use of technology and the inability to integrate it successfully in the classroom plagued the school. The leadership of the school was also continuously changing during this time, causing even further adversities for the students and staff.

With consistent leadership finally at hand, the faculty developed a plan as a consequence of the realization that not all students have natural skills in technology. The school realized students need to be able to solve problems with technology, not just play games. As part of the plan, students were expected to not just regurgitate information, but to apply the information learned using problem solving skills. In order to accomplish this, they placed students in an immersive environment to problem solve. Skills they used had to be learned, internalized, and processed for the purpose of problem solving using technology.

Due in part to the staff training to embrace technology and learning and to practice flexibility, student math and reading scores have increased yearly. Students reaped the benefit of the increased staff professional development by learning to use embedded technology to problem solve, resulting in a 100% acceptance rate to college and trade schools for seniors (Hertzler, 2012).

Schools with large numbers of students in poverty report a variety of interventions that have helped them succeed. Building vocabulary skills is essential as most students in poverty are often weak in this area. Taking students on field trips to expose them to new places they have never been able to visit as a result of poverty can help with vocabulary building. Other successful schools report allowing teachers to meet together in order to encourage them to interact for the purpose of sharing knowledge and expertise to better assess their students. High poverty, high performing schools in Wisconsin have common traits including student centered instruction, small class sizes, project based instruction, staff initiated professional development, parental involvement, and proactive administrator leadership (Morgan, 2012).

High performing schools work to close the achievement gap between the 'haves' and the 'have nots'. According to Morgan (2012), for schools to experience sustained improvement, they need to look at what type of infrastructure and organizition is in place for successful, high achieving schools around the world. In many cases, one of the most important factors is having a skillful teacher.

## Technology

Fouts (2000) suggested technology is serving a minimum of four purposes in schools. Those include the following: teach, drill and practice, provide simulations, access to information, and as a productivity tool to use applications such as spreadsheets and word processors. He recommends that administrators and teachers should be given adequate professional development about how to best integrate technology, and be evaluated on such technology. The success of technology in the classroom is dependent upon teacher training, having adequate technological support, and a well-defined

purpose. These findings are similar to the Microsoft School of the Future (Hertzler, 2012), where it was determined that a plan needs to be in place in order to fully utilize the available technology.

Providing access alone is not enough to ensure technology integration will take place or have an impact on student achievement. Using technology is not the same as integrating technology. Simply having it available will not guarantee it to be used in an effective manner, as is shown in Philadelphia's Microsoft School of the Future (Hertzler, 2012). For ongoing success, training with objectives needs to be in place, as well as plans for evaluating its effectiveness. Without goals and structures for its application, it is unlikely to be effective in impacting student achievement or changing teacher beliefs. Some states have gone so far as to adopt technology requirements in order to acquire a teaching certificate, and in some cases, in order to recertify (Noeth & Volkov, 2004).

According to a report from the Alliance for Excellent Education by Darling-Hammond et al. (2014), technology access disparities exist across socioeconomic groups. A recent survey from the report stated that both young people of color and low-income students are less likely to own a computer and have Internet access than higher income white students. However, at-risk students who are given more access to thought-provoking technology can make significant gains in both learning and technology skills.

The 2017 National Technology Education Plan (NETP) is published by the U.S. Department of Education (USED) and distributed by the Office of Education Technology every five years, although the last publication was in 2010. The purpose is to "set a national vision and plan for learning enabled by technology through building on the work of leading education researchers; district, school, and higher education leaders; classroom

teachers; developers; entrepreneurs; and nonprofit organizations" (USED, 2017, p. 3). It is considered both a call to action in response to a vital national priority and a source for recommendations with real world examples. The plan describes specific actions that should be taken by the United States to ensure growth and guarantee competition in a global economy, while also explaining how to offer all learners from all ages opportunities for personal growth and prosperity using technology.

The NETP (USED, 2017) identifies much progress that has been made since the last report was published; nonetheless there is still much work to be done. There is a large area where growth is needed to keep moving forward. Among the areas where work and progress is still required: eliminating the digital use divide between students using technology creatively and actively to support their knowledge, and those students using technology for simply passive content consumption; schools using technology to improve student learning on a daily basis; schools making decisions regarding educational technology actively involving families with development and implementation when deciding how to incorporate the technology; numerous schools missing the opportunity to support learners in out of school learning experiences using technology; educating pre-service teachers in using technology effectively when they transition to the classroom; protecting the privacy of students; and network security (USED, 2017).

The NETP offers several recommendations to achieve the goals necessary to move the country forward in the integration of technology, including using technology to equip all learners with access to improved learning opportunities, regardless of socioeconomic status or other factors that have traditionally put them at a disadvantage.

Teachers should also be skilled in the best use of emerging technologies to support digital learning and integration, with access to current, research based information.

Professional learning opportunities for pre-service and in-service teachers should be aligned with technology expectations within the state standards. These should be sufficient to help teachers create captivating learning activities that result in the improvement of assessment, instruction, teaching, and learning. Technology should be used to transform and increase student learning through seamless integration and not be separate from core content area learning (USED, 2017).

In Kentucky, technology academic standards are in place for teachers and schools to access online. The standards are broken down into different academic levels such as primary, intermediate, middle, and high school. They are developed to align with the Kentucky Academic Expectations, and are designed to integrate into each curricular area. Each level has the same three big ideas from which individual standards are developmentally appropriate. According to Content Area Standards from KDE (2015) the big ideas are:

- Information, Communication and Productivity
- Safety and Ethical/Social Issues
- Research, Inquiry/Problem-Solving and Innovation

At each level, students build upon the knowledge they gained at the previous level. By building upon their technology knowledge, the hope is to make them productive and competitive members of a global economy.

Successful use of technology in schools has faced numerous challenges. One significant factor affecting effective technology immersion is school leadership. Some

principals provide strong leadership and support, while others are simply cheerleaders. According to Wynn (2008), some of the challenges come from changes in administration. While one administrator at his school was supportive, developed a plan, and created innovative change, the next administrator could not see technology integration as an advantage to student learning. The encouraging principal supported teachers with extra time and pay to develop curriculum maps, unit plans, and set department as well as teacher goals. Money was also provided to attend state and national educational technology conferences. Visits were made to schools and universities who were known for their technology programs. The principal expected the change to be seen by the students and the public, noting that the way things were done in the past was not the way to the future.

The administrator that followed had reservations concerning the importance of technology, expecting the teachers to prove that their technology plan meets the needs of the students. The teachers developed another plan to demonstrate the necessity of using technology integration and provide the burden of truth. Some of the plans these educators put in place were to invite the media to cover after school activities related to technology, showcase student activities in the school newspaper and radio, have students present at school board meetings, PTA meetings, city council meetings, and open house, make community connections, set up at local festivals and fairs, and compete in technology based or science, technology, engineering, and mathematics (STEM) competitions. They also invited local leaders from a variety of professions that use technology to speak to students about their occupation. Greenfield-Central High

School's technology program has been a three-time recipient of the Technology Program Excellence award (Wynn, 2008).

Another reason for this lack of fully effective use of technology is considering what exactly will help teachers understand the technology and what is involved in helping them to implement and integrate the technology into their classroom (Hall, 2010). Yet in other schools, like the Microsoft School of the Future, inconsistency in leadership played a significant role. In Greenfield Central High School, the change in leadership had the potential to devastate the progress they had made with technology integration; however, the staff was united in demonstrating its effectiveness and impact. Each variable can affect the progress of the effective use of technology.

Though schools may have an abundance of computers, this does not guarantee they will be used to impact student learning. Much depends on the planning, preparation, and evaluation of a technology plan. The goal is to continue developing technology as an essential part of learning instead of simply a means of delivering instruction. In Table 2.1, a comparison is given between simply using technology and technology integration. States are now, more than ever before, providing guidelines for using technology in education effectively (Noeth & Volkov, 2004). Professional development is vital to ensure teachers are learning how to use the technology effectively in order for the technology usage to be a seamless and successful.

## Technology and Professional Development

Many classrooms today have interactive whiteboards, or Smart Boards, hanging in the classroom. For some, the whiteboard is used simply to project information, and therefore has no advantage over a regular dry erase board. Interaction with the content is

part of using technology effectively, and it is not consistently occurring. It is argued that teachers are not given support beyond just basic skills to learn to use a particular piece of

Table 2.1

*Comparison of Using Technology and Technology Integration*

| Using Technology | Technology Integration |
|---|---|
| Usage is random, arbitrary and often an afterthought | Usage is planned and purposeful |
| Rare or sporadically used in the classroom | A routine part of the classroom environment |
| Used purely for the sake of using technology | Used to support curricular goals and learning objectives |
| Used to instruct students on content | Used to engage student with content |
| Mostly being used by the instructor | Mostly used by students |
| Focus on simply using technologies | Focus on using technologies to create and develop new thinking processes |
| More instructional time is spent learning how to use the technology | More instructional time is spent using the technology to learn |
| Used to complete lower order thinking tasks | Used to encourage higher order thinking skills |
| Used solely by individuals working alone | Used to facilitate collaboration in and out of the classroom |
| Used to facilitate activities that are feasible or easier without technology | Used to facilitate activities that would otherwise be difficult or impossible |
| Used to deliver information | Used to construct and build knowledge |
| Peripheral to the learning activity | Essential to the learning activity |

*Note.* Retrieved from https://www.teachthought.com/technology/difference-technology-use-technology-integration/

technology (Llorens, Salanova, & Grau, 2002). The PD required to embed technology into practice is deficient (Koehler & Mishra, 2009). If, however, adequate technology support beyond the basics is offered, and the board is used in an interactive manner to engage students, technological integration and learning will likely take place (Kim, Kim, Lee, Spector, & DeMeester, 2012).

A four-year professional development project contributed to Kim et al.'s (2012) mixed methods study that explored how the beliefs of teachers was linked to practices in technology integration. Twenty-two teachers participated in the four-year professional development project financed by the U.S. Department of Education as part of a school reform program. The goal was to expand technology competency and capability of teachers in rural K-8 schools in the southeastern United States who were not performing well according to state testing standards. The other end goal was to determine why integration occurs differently among teachers.

Schools were supplied with technical and pedagogical assistance for their new equipment, which included laptops, interactive whiteboards, cameras, recorders, and other technology. The teachers attended weeklong professional development training workshops every summer, as well as workshops during the school year on topics such as Web resource integration (Kim et al., 2012).

The findings of the study show that in order to facilitate technology integration, teacher views should be considered, especially as it relates to learning and knowledge that influence their beliefs about teaching effectively. Teacher beliefs about the speed of learning and the source of knowledge strongly affect their decisions on how to teach overall and specifically how to teach with technology. The study also points out that

modifications in teacher beliefs are recommended as a critical component for facilitating the change in technology use among educators. Professional development plays a large part in changing teacher beliefs about the use of technology.

In an experimental study (Shapley et al., 2011) of 42 middle schools using the Technology Immersion model, laptops were given to every student and teacher, along with professional development, resources for teaching and learning, and technical support in 21 of the 42 schools, while the other 21 served as the control group. The 21 schools receiving the technology were chosen through a competitive grant process, whereby 25% of the funds received were directed toward professional development in technology integration. Shapley et al. (2011) found a positive effect related to the Technology Immersion. It improved proficiency and frequency of technology used for class activities and additionally resulted in a decline in disciplinary actions, further offering evidence of the impact of technology on student behavior as well as achievement.

Shapley et al. (2011) reported on a similar study in Beaufort County, West Virginia where a 1:1 laptops project was evaluated. The evaluation found that those students who participated in the project for two years showed an increase in reading, math, and language scores when compared to those who did not have access to a laptop. The clearest evidence of the positive outcomes for using laptops in the 1:1 program was the improvement in writing scores. Writing components such as organization, style, ideas, and content among students in a middle school 1:1 program showed a statistically significant difference between the test group and the control group.

In another study using professional development to enact technological change within a school, Roschelle et al. (2010) evaluated SimCalc to see the effect on student

learning for advanced middle school math at the eighth grade level. SimCalc integrates a paper curriculum, interactive technology, and teacher professional development into the teaching of advanced math.

Math is an area where students tend to fall behind as they progress through school, with evidence of an achievement gap indicated between those qualifying for free and reduced lunch and those who do not qualify. Only 13% of those students who qualified for free and reduced lunch were able to reach proficiency in eighth grade math. In a pretest given to students in various schools before beginning the SimCalc program, schools that had a higher percentage of students qualifying for free/reduced lunch, equated to a lower score on the pretest. The goal of SimCalc is to enable a broad range of diverse students to learn advanced math concepts and skills, while still maintaining basic math skills.

A key component of the SimCalc program was to tightly integrate curriculum, software, and professional development so everyone involved in the program would receive an aligned intervention. Professional development was provided through a train-the-trainers model based on other successful programs using the same paradigm. Teachers were offered PD to reinforce math content knowledge and to learn how to specifically use the curriculum materials.

Teachers first attended a two-day workshop addressing mathematical knowledge, then later attended a three-day summer workshop and worked through the SimCalc lessons as learners, while also acquiring practice using the software. In the fall, teachers attended another full day workshop to make plans and determine when to use the

SimCalc units in the classroom. Working in pairs, they wrote lesson plans and worked through the logistics of using the program.

Roschelle et al. (2010) found the workshops enabled the teachers to effectively use the SimCalc materials, but did not significantly influence teachers' current pedagogies. Teachers all received the same amount of high quality PD experiences and materials, presented in the same style to help ensure internal validity. More importantly, the researchers found a causal relationship existed between implementation of SimCalc and student learning of advanced math. Learning gains were equitable among all groups, including gender, ethnicity, and socioeconomic status. Consistent gains during the study supports the conclusion that it is effective in increasing student learning among an array of teachers and settings.

Capraro et al. (2016) conducted a study that found sustained professional development could support reform for Science, Technology, Engineering, and Mathematics (STEM). The effect of teacher professional development on student achievement was dependent on the quality of the PD and the specific features. High quality, sustained PD was shown to have statistically significant positive effects on student learning and teaching. However, research also shows high quality PD is not experienced by many teachers (Desimone, Porter, Garet, Yoon, & Birman, 2002).

In 2009, Saunders, Goldenberg, and Gallimore conducted a longitudinal study comparing nine schools receiving PD to six control schools within the same district. The findings revealed the PD schools had greater growth and achievement than the control schools during three years of state testing. This is consistent with research conducted in other studies (Capraro et al., 2016; Roschelle et al., 2010) showing participation in PD

activities is associated with continuous growth on state testing and with improved student achievement.

The three diverse urban schools in Capraro et al.'s (2016) study focused on developing professional learning communities (PLCs), project based learning (PBL), and student achievement using qualitative and quantitative data. During the three-year study of sustained professional development, the results showed the students who experienced the greatest fidelity of implementation made the highest gains on standardized test scores. Teachers reported positive aspects of the sustained PD, including having the time to work with other teachers in developing PLCs and turning their ideas into curriculum for their classrooms.

Capraro et al.'s (2016) study demonstrated that high quality, STEM related PD could lead to key gains in student learning when developed with high quality implementation. Particularly affected by this were math and science outcomes, areas where American students have been consistently falling behind. The findings of the study support that high quality PD can change the classroom behaviors of teachers in ways that improve student learning; however, fewer than 14 hours of PD did not have a statistically significant effect on student outcomes. Positive outcomes were related to 14 plus hours of PD. The study shows professional development can be used as a tool for student achievement when used effectively; however, in order to garner the support of teachers, the PD must be high quality.

The 2005 Prichard Committee study of high poverty, high performing schools in Kentucky found professional development in those successful schools to be ongoing and connected directly to student achievement data. One of the differences between those

schools and the other lower achieving schools, was the study indicator for professional development showed PD to be ongoing and job-embedded in the successful schools. This result supports the findings of Darling-Hammond and McLaughlin (2011) concerning the need for professional development to be sustained and ongoing.

## Technology and Student Achievement

With billions of dollars invested in school technology, the effect on student achievement continues to be an important topic and subject of considerable research. However, if improving test scores on standardized tests is the only justification for the investment, results will likely be disappointing (Shapley et al., 2011).

According to Noeth and Volkov (2004) the evidence is unclear when looking at the probability of a positive impact on student achievement and technology on the achievement gap. However, findings indicate student learning can be increased with computer use when combined with traditional instruction. Findings also suggest students retain more when aided with computers and it positively affects their attitude. Especially affected by technology integration were low achieving, at-risk students. Once again, teacher training was vital to success.

In some studies measuring student use of computer software programs, no growth has been indicated. Some approaches, however, have been much more productive. Darling-Hammond et al. (2014) reported that with at-risk students, there are three important variables that impact student success when learning new skills. Those include interactive technology, using technology to create and explore, and having the right mix of teachers and technology. Practicing effective technology use and student engagement garners much more positive results than the drill and practice routines seen in many low

SES schools. At-risk students also learn more when they are able to design the content themselves, rather than just receiving content others have designed. Students who are provided with a fun, exciting, flexible, environment where the teacher uses a variety of interaction programs tend to outperform peers who are not considered at-risk. These are the same students with high failure rates and behavior problems who are now highly motivated by the new active learning strategies.

Darling-Hammond et al. (2014) described how similar strategies have been used in a school district in Talladega County, Alabama, where 73 percent of the students qualify for free/reduced lunch. Their dropout rate was high and their college entrance rates were low. In a case study conducted there, they chose one high school to begin with and focused on increasing student engagement using active project-based learning. The leadership team integrated technology tools to support instruction and worked to train teachers in making required pedagogical shifts. This systematic approach was used over the course of two years, which resulted in a graduation rate improvement of 63 to 87 percent, and college acceptance went from 33 to 78 percent. Decreases in suspensions, dropout rates, and alternate school referrals also occurred during this same time period. As a result of these improvements, failures were prevented (Darling-Hammond et al., 2014).

Chang, Quintana, and Krajcik (2010) studied the impact of using a learner centered animation tool to create simple flipbook like animations to show molecular models and dynamic processes. Their study involved 271 seventh grade middle school students who were randomly assigned to three treatment groups. The first group was to design, interpret, and evaluate animations. The second group would only design and

interpret animations, and the third group could only view and interpret teacher made animations.

The study used a 2-factor analysis of covariance and computed effect sizes to examine the impact of the three treatments on post-test performances. The results determined that learning gains made by students increase more with technology-enriched innovations and peer evaluation than with textbooks as a stand-alone teaching tool. However, the efficacy of permitting the students to design without peer feedback is questionable in comparison to just allowing students to view the animations (Chang et al., 2010).

A mixed methods study conducted over a span of three years (Blanchard, Leprevost, Tolin, & Gutierrez, 2016) examined the effects of technology enhanced professional development (TPD) on twenty teachers. Educators in two high poverty, rural, middle schools participated and learned how to integrate technologies over three summers. Scores for math and science assessments of 2,321 students were analyzed over the course of three years from both TPD schools and those schools without TPD. Survey and video data were also collected, as was the Teacher Belief Interview (TBI; Luft & Zhang, 2014), Science Teaching Efficacy Beliefs Instrument (Riggs & Enochs, 1990), pedagogical discontentment measurement (Southerland et al., 2012), Reformed Teaching Observation Protocol (Sawada et al., 2002) and technology familiarity survey (Blanchard & Albert, 2012).

Analysis was made using paired t-tests to compare original and final scores on the TBI, and there was a significant difference between the initial and final scores. This indicated more transitional student-centered teaching beliefs after the project. A simple

linear regression analysis indicated the number of TPD teachers a student had was a prediction of their eighth grade math and science end of course grades. The student score increased by 0.07 levels in math and by 0.08 levels in science with each additional TPD teacher the student had in class.

Blanchard et al.'s (2016) findings indicate teachers using TPD had enhanced efficiency and effectiveness in the classroom. Significant gains were specifically made among African American students who had TPD teachers over a longer period of time. According to Blanchard et al., educators who integrate technology into their teaching do not need to make large changes in instructional practices to enhance student learning (Blanchard et al., 2016). Embedding technology for student achievement impacts student learning.

In their three year, mixed methods study, Thieman & Cevallos (2017) conducted research in a high poverty, extremely diverse high school to investigate the impact of 1:1 iPads on students who were racially diverse, came from poverty, or spoke English as a second language, when exposed to high quality instructional technology. Specifically, the researchers examined how reducing the disparity of technology access can improve attendance and student learning on those students.

There was no equity of access in this study as not all students were issued an iPad. Students who were female, white, eligible for free/reduced lunch, and had a stable enrollment were more likely to have an iPad during all three years. Those who were given an individual iPad were reported to have greater satisfaction, along with an ease and frequency of technology usage. They also exhibited better attendance and grade point average than those without an assigned iPad. Professional development was

minimal for this study, as teachers mainly tracked survey results and did not require extensive training to participate in the project. The accessibility to technology alone contributed to improved student achievement (Thieman & Cevallos, 2017).

In their causal-comparative study, Mayled et al. (2018) compared low SES STEM students who received increased technology enabled active learning (TEAL) with a group of low SES STEM students who did not receive the additional technology. The study utilized 343 Freshman Algebra students attending an urban Title One high school who were divided into intervention and control groups. The study compared student achievement data by looking specifically at gain scores from pretests and posttests plus pass/fail rates over two consecutive school years.

Mayled et al.'s (2018) results showed a statistically significant difference between the intervention and the control groups. The control group scored lower on gain scores, and the pass/fail rates also demonstrated a significant difference between the two groups. The results are consistent with other studies showing that active learning and implementation and integration of technology can be beneficial to low SES students in the classroom.

Teacher attitudes toward technology can also affect student achievement. In a survey (Nagel, 2018) 38% of teachers indicated technology has an extremely positive impact on education. Another 37% indicated a mostly positive impact. The 25% remaining indicated technology has both positive and negative effects. None of the respondents indicated a completely negative response. This means three-quarters of the teachers surveyed indicated a positive attitude toward technology.

Improvement in teaching and learning is expected in schools, and student centered technology is the best hope for providing equity among gaps in racial, gender, and geographic divides. It has been found to have a positive impact on students using it for projects, and on the attitude and achievement of special needs populations. Students experience higher achievement and self-esteem when computers are used to train them in collaborative learning. According to Noeth and Volkov (2004), this is particularly true for female and low achieving students.

In its nationwide survey in which 6,929 educators responded, School Improvement Network (2012) discovered that 48% of educators allow students to use their own technology in the classroom, and 80% said allowing this improves student performance. Devices most often used in the classroom according to the survey were laptops, tablets, and cell phones. The top three states to allow this were Iowa, Idaho, and Minnesota. Another 11% of teachers surveyed reportedly text their students as part of their classroom routine. Of those teachers who text or email students, 75% say it affects the homework return rate for their class. All the educators surveyed, both those who do and do not allow students to bring in their own devices, say there is a connection between the use of technology in the classroom, student performance, and attendance. Thus, studies suggest technology is having a positive impact on student achievement.

## Using the TELL Survey to Study Teacher Perceptions of Technology

The literature review reveals that students and schools are affected by their socioeconomic status in numerous ways. Poverty has a significant effect on student achievement regardless if the child lives in a rural or urban area. Nearly half of all public school students live in poverty (Darling-Hammond et al., 2014). For many children, the

disparity caused by poverty begins before they ever reach school, yet the effects are far reaching and can extend throughout their school career.

The literature shows students living in poverty are at a disadvantage cognitively due to their lack of exposure to vocabulary, minimal positive reinforcement, and possibly their exposure to violence. The family structure and parental education can also negatively affect students living in poverty. While other inequalities have improved over time, the score gap between students who are low SES and those who are high SES has increased significantly over the past 20 years on standardized tests. Despite efforts to reduce the achievement gap for students from poverty, low SES eighth graders score a full standard deviation below peers who are from a higher SES background (Lyon, Jafri, & St. Louis, 2012).

According to evidence in the literature, schools must adjust to meet the needs of their students who come from poverty. Teachers in these schools often find it rewarding to work with these students and connect them to the various services they need, but are often required take on a role much more than just a teacher. Organizational structure, effective leadership, and effective teachers are just a few of the important elements schools should who have in place who have a significant number of students in poverty (Kraft et al., 2015).

Much of the literature suggests successful schools with a high poverty population have similar traits. Among those are high expectations, a caring and nurturing faculty and staff, and strong leadership. Leadership exemplified by a pattern of collaborative decision-making and the acceptance of innovative ideas is the most successful leadership traits in an educational setting.

The leadership of successful schools identified in the literature provides professional development that is beneficial to both students and teachers. With technology, professional development is only beneficial if the technology is used effectively and consistently as an essential part of learning. It should follow the constructivist model to make learning more interactive for students. In doing so, improved student achievement is a likely result.

The literature indicates technology practices improve with sustained, in depth professional development. Educators need appropriate and sufficient training to effectively embed technology seamlessly into instruction. Long-term professional development shows the most success among studies. Research by Darling-Hammond and McLaughlin (2011) indicates it takes 30-60 hours of professional development over 6-12 months to affect change in the classroom. With the budgetary crisis affecting countless schools, the 24 hours of required PD in the state of Kentucky will likely be all that is available to teachers. Lack of sustained quality PD is one of the key barriers for schools that desire technology immersion for their students. The required 24 hours teachers receive will likely be inadequate to stay abreast of new technology innovations and the ability to acquire the knowledge needed for seamlessly embedding technology.

A tool that Kentucky and other states have embraced to gather perceptions from teachers and other school personnel about working conditions is the TELL survey (New Teacher Center, 2017). The current study sought to take advantage of this existing, statewide data source to learn more about teacher perceptions about technology in their schools and how these perceptions might relate to student achievement. The advantages of using these data were that the KDE required all schools to complete the survey and

provided incentives for schools in order to achieve high response rates. It should also be noted that, as described below, these data were considered of research value because Kentucky school leaders and teachers were encouraged to use school results to make actionable decisions in the school improvement plans.

The TELL survey used in this research study is based on eight research-based teaching conditions known as constructs:

- Use of Time: Time-to plan, provide instruction, collaborate, eliminate barriers to maximize instructional time
- Facilities and Resources: Teachers have instructional technology, communication, and school resources
- Community Support and Involvement: Communication with and influence of the community and parent/guardians
- Managing Student Conduct: A safe school environment is ensured by addressing student conduct and having policies and practices in place
- Teacher Leadership: Teachers are involved in decision making affecting classroom and school practices
- School Leadership: School leaders address teacher concerns and create a trusting, supportive environment
- Professional Development: Quality learning opportunities are available to enhance teaching
- Instructional Practices and Support: Teachers have data and support to improve upon student learning and instruction

The New Teacher Center (2011) and other researchers (Ferguson & Hirsch, 2013; Ladd, 2009) report that differences in school personnel ratings on each of these constructs are related to important school outcomes, including student achievement and teacher retention.

Schools with data from the survey are expected to use the data to identify issues and develop school improvement plans to address challenges identified in the results. The New Teacher Center, KDE, and the TELL Kentucky Coalition developed tools to be used by educators and posted them on the TELL survey website to help schools better understand teaching conditions and how to improve upon them. The goal was that using this report, educators, stakeholders, and practitioners would be able to apply the tools and target reform strategies most likely to influence teacher effectiveness.

According to the New Teacher Center (2011) and TELL Kentucky data (Hirsch, Sioberg, & Dougherty, 2011), improving teaching conditions likely yield positive results in teacher retention and student learning. Challenges in retention and support facing many districts are mitigated by sustained efforts to improve teaching conditions, which are essential to provide students with the best possible education.

As stated in the TELL Kentucky Report (Hirsch et al., 2011) the following are recommendations for what should be done with TELL survey results:

> Recommendation 1: Support schools and districts in understanding and improving teaching conditions. The data should be part of a comprehensive school improvement planning process and aligned with other strategies to ensure schools are staffed with high-quality, effective teachers.

- Teaching conditions data should be used as part of the improvement planning.
- Professional development opportunities should be provided for school leaders to assess and use their TELL Kentucky results to inform decisions for school improvement planning.
- Utilize schools with varying demographics, excellent teaching conditions, and successful students as models of best practices for all schools in the state.
- Provide incentives for schools that create data driven plans to improve teaching conditions.

Recommendation 2: Help school leadership establish positive teaching and learning conditions in every school.

- Have clear standards for what school leaders need to know in recruiting and retaining teachers and how to create positive teaching and learning conditions.
- Partner with higher education institutions to ensure the knowledge and skills needed by new principals support positive school climates.
- Provide professional development for school leaders to support positive teaching and learning.

Recommendation 3: Support schools in engaging the broader community in efforts to understand and improve working conditions. The strongest correlations with the survey constructs and student achievement reside in the area of Community Support and Involvement. Engaging parents and the community at

large to improve teaching conditions and student learning should be a state priority.

- Teaching conditions analysis and reform should be a community effort.
- Examine teaching conditions data to identify and document successful practices in community engagement.

Recommendation 4: Ensure that every new teacher is inducted into the profession and receives more frequent support to improve instruction. Roughly 15 percent of beginning teachers in Kentucky were never assigned a mentor.

- Kentucky leaders should look at expanding KTIP beyond the first year. (This recommendation is dated as Kentucky has now removed funding for KTIP.)
- The Education Professional Standards Board (EPSB) should strategize to ensure new teachers receive a qualified mentor.

Recommendation 5: Continue to provide systemic opportunities for teachers to grow professionally and participate in decisions that impact their schools and classrooms. The TELL survey results indicate a strong positive relationship between effective School Based Decision Making (SBDM) Councils and project an atmosphere of trust with teachers who are problem solvers.

Recommendation 6: Use TELL Kentucky and other mechanisms to collect educators' views on teaching and learning conditions to inform local and state human capital decisions. While important data are collected with this survey, it is only a single means to capture educators' perceptions at that time. Schools have rapid change and turnover in some schools is chronic. Evidence from North

Carolina indicates teaching conditions improved in schools where they used prior TELL results. (pp. 54-58)

The report (Hirsch et al., 2011) also states that the state of Kentucky should also consider:

- Establishing an oversight committee to oversee aspects of documenting and improving teaching conditions.
- Gathering, reporting and monitoring other data sources that influence the teaching and learning conditions in schools to illuminate the perceptions of educators in areas such as student/teacher ratio, technology, safety, expenditures and evaluation of professional development and new teacher support.
- Utilizing survey questions from TELL at the district or school level to monitor and track how faculties are responding to reforms.
- Providing teacher leaders and principals with other opportunities and incentives to conduct action research on similar topics through case studies
- Using additional data to better understand areas the school contexts in which educators work in areas identified on the survey such as community engagement. (p. 58)

Thus, this study sought to provide evidence of a relationship between teacher perceptions on TELL items related to technology and schools' KREP ranking (a measure of student achievement) in low SES schools in Kentucky. In particular, this study looked at the following three constructs related to instructional technology, professional development, and training:

- Facilities and Resources: Reported adequacy of access to instructional technology [TELL Survey question 3.1b]
- Professional Development: Reported adequacy of the amount of time provided for professional learning among low SES schools [TELL Survey question 8.1b]
- Instructional Practices and Support: Reported sufficiency of training required to fully utilize instructional technology in low SES schools [TELL Survey question 8.1b]. (Hirsch et al., 2011, pp. 7-10)

## Chapter Summary

In this chapter, research literature related to poverty and its effect on student learning, educators, and schools, technology integration and instructional technology in schools and professional development, and the relationship of technology and student achievement was reviewed. This review gives context and provides rationale for the three research questions of this study:

**General Research Question 1:** Is there a significant difference in reported accessibility to instructional technology between low SES Kentucky schools ranked high versus low in school achievement (as measured by TELL Survey item 3.1b)?

**General Research Question 2:** Is there a significant difference in the reported appropriate amount of time provided for professional learning between low SES Kentucky schools ranked high versus low in school achievement (as measured by TELL Survey item 8.1b)?

**General Research Question 3:** Is there a significant difference in reported sufficiency of training to fully utilize instructional technology between low SES schools ranked high versus low in school achievement (as measured by TELL Survey item 8.1h)?

# CHAPTER III: METHODOLOGY

The current study was conducted to explore the relationship between technology, professional development, low SES schools, and achievement in Kentucky schools, as indicated by educator perceptions on the TELL Kentucky survey. The study specifically looked at whether there is a difference in school personnel perceptions regarding adequacy of access to instructional technology, adequacy of the amount of time provided for professional learning, and sufficiency of training required to fully utilize instructional technology in low SES schools who were higher ranking KPREP schools versus low ranking KPREP schools.

Researchers have conducted numerous studies to determine the effectiveness of technology use in public schools. Schools labeled as low SES schools have also been the subject of a plethora of studies to determine what variables affect achievement in those schools (Thieman & Cevallos, 2017) and how to make them successful. Professional development is the subject of frequent studies to improve teacher effectiveness resulting in improved student achievement (Kim et al., 2012)—more importantly, how the PD teachers receive will impact student achievement. Putting all of these together to establish their interaction and relationship upon one another would assist in drawing conclusions about the value of these variables upon student achievement.

The results of this study offer some evidence to indicate the perceived need for and access to adequate professional development sufficient to fully utilize instructional technology in all schools, regardless of the socioeconomic status of the students attending. The findings may assist district professional development coordinators in making valuable, quality decisions when planning professional development for their

school. It may also be used to assist with budgetary decision-making at the school, district, and state levels. In addition, the findings may be used as one piece of research to support decisions concerning technology purchases and the essential training that is inevitably needed for successful technology plans.

## Research Questions

The following general research questions were used to guide the study:

**General Research Question 1:** Is there a significant difference in reported accessibility to instructional technology between low SES Kentucky schools ranked high versus low in school achievement (as measured by TELL Survey item 3.1b)?

**Hypothesis 1:** It is predicted that, on average, a larger percentage of school personnel at high ranked KPREP schools will report more accessibility to quality technology integration than low ranked KPREP schools.

**General Research Question 2:** Is there a significant difference in the reported appropriate amount of time provided for professional learning between low SES Kentucky schools ranked high versus low in school achievement (as measured by TELL Survey item 8.1b)?

**Hypothesis 2:** It is predicted that, on average, a larger percentage of school personnel at high ranked KPREP schools will report an appropriate amount of time is provided for professional learning than low ranked KPREP schools.

**General Research Question 3:** Is there a significant difference in reported sufficiency of training to fully utilize instructional technology between low SES schools ranked high versus low in school achievement (as measured by TELL Survey item 8.1h)?

**Hypothesis 3:** It is predicted that, on average, a larger percentage of school personnel at high ranked KPREP schools will report sufficiency of training to fully utilize instructional technology than low ranked KPREP schools.

## Data Sources

### KPREP

KPREP, or the Kentucky Performance Rating for Educational Progress, is an assessment program for public schools in Kentucky enacted by Senate Bill 1 and beginning with the 2011-2012 school year. The test was developed with the intent of having an all-inclusive testing and accountability system. The test is based on academic standards for Kentucky, and therefore customized for Kentucky schools by NCS Pearson, the company that distributes and scores the test materials.

The assessment begins at grade three and is a criterion-referenced test made up of multiple choice, extended response, and short answer questions. There is also an on demand writing component for certain grade levels. The areas assessed include math, science, social studies, reading, and writing. Administered in the last 14 days of the school instructional calendar, the assessment is timed and must be completed within a five-day testing window.

The results are given in student performance levels of novice, apprentice, proficient, and distinguished. The level achieved describes how well a student performs on the standards for Kentucky schools. Scores provided to schools offer a score for each core area in comparison to all Kentucky schools, as well as individual student scores to be used for curricular planning.

For this study, 402 public schools who had a greater than 50% free and reduced lunch rate were assigned a designation as a high or low ranking school based on their 2017 KPREP rank among all low SES schools. The schools were divided in half, with the 201 schools having the highest rankings rated as a high SES school and the 201 schools ranked the lowest being designated as a low SES school. The high-ranking schools had actual ranks from six to 694 on the KPREP test results. The low ranking schools had actual ranks between 703 and 1262 when looking at the KPREP test results.

The ranking of schools was conducted using a formula provided by KDE. For elementary and middle schools, three areas were used with each weighted an equal percentage. Achievement points, gap points, and growth points were all 33 percent of the overall score and rank. For high schools, four areas were identified and each area accounted for 25 percent of the overall score and rank. Those were achievement points, gap points, college/career readiness points, and graduation rate.

**TELL**

Data were also accessed from the 2017 Teaching, Empowering, Leading, & Learning (TELL Kentucky, 2017) survey results. The TELL survey is a process used for collaborative school improvement and planning in the state of Kentucky. The survey is anonymous and is completed online. The results of the survey indicate the quantitative correlation between student learning, teacher retention, and teaching and learning conditions, i.e., the teacher perception of teaching and learning conditions and how that affects teacher retention and student learning.

TELL was developed from the extensive effort of the North Carolina Professional Teaching Standards Commission (NCPTSC) starting in 2001. Based on the research

conducted by NCPTSC, certain factors were identified as related to teacher satisfaction and employment trajectories. Those are time, empowerment, leadership, decision-making, and facilities and resources. Standards were created by the Commission and aligned with those factors.

Validity and reliability tests were conducted externally and internally to ensure the test is accurately measuring what is expected (teaching and learning conditions) and that results are reproduced across settings. The Rasch Rating Scale Model was used to examine item measure correlations, rating scale functioning, item fit, and generalizability of the survey instrument. The internal analyses verify the stability of the survey instrument using industry standards found in the Standards for Educational and Psychological Testing (TELL Kentucky, 2017).

The data used for the analyses included over 43,000 respondents with an 87 percent response rate. As seen in table 3.1, included were 88% teachers, 5% administrators, and other groups such as librarians and school psychologists made up the other 7%.

Table 3.1

*Response Rate by Group to TELL Survey based on 2013 Data*

| Respondents | Response Rate (N) |
|---|---|
| Teachers | 88.3% (38,621) |
| Administrators | 04.5% (1,986) |
| Other Education Professionals | 07.1% (3,086) |

*Note*. The respondent category "teachers" includes instructional coaches, department heads, literacy specialist, etc. The respondent category "administrators" includes principals and assistant principals. The respondent category "Other Education Professional" includes school counselors, school psychologists, social workers, etc. Retrieved from TELL Kentucky Research (2013). https://tellkentucky.org/uploads/File/KY13_val_rel.pdf

Analyses for validity were calculated to see to what degree the survey measures the eight constructs it was intended to measure. Criteria used for these analyses were based on eigenvalue. Eigenvalues reveal how much disparity each factor or component can explain. The criteria included scree plot, Kaiser criterion, and variance explained (TELL Kentucky, 2013).

The analyses for reliability produced Cronbach's alpha coefficients ranging from .86 to .95. Greater internal consistency is indicated on coefficients closer to 1.00 for items in the scale. Alpha coefficients normally range between zero and one, although .70 is considered acceptable.

Questions on the survey relate to eight constructs, which were determined from validity and reliability tests. As stated by TELL, those constructs are:

- Time—Available time to plan, collaborate, provide instruction, and eliminate barriers in order to maximize instructional time during the school day
- Facilities and Resources—Availability of instructional, technology, office, communication, and school resources to teachers
- Community Support and Involvement—Community and parent/guardian communication and influence in the school
- Managing Student Conduct—Policies and practices to address student conduct issues and ensure a safe school environment
- Teacher Leadership—Teacher involvement in decisions that impact classroom and school practices
- School Leadership—The Ability of school leadership to create trusting, supportive environments and address teacher concerns

- Professional Development—Availability and quality of learning opportunities for educators to enhance their teaching
- Instructional Practices and Support—Data and support available to teachers to improve instruction and student learning (TELL Survey, 2013, p. 2)

This study uses TELL based research questions and will focus only on the constructs related to facilities and resources, professional development, and instructional practices and support.

The TELL survey uses a Likert scale for responses. The percentage noted in the data for the TELL survey questions represent the percent in agreement to the combined Likert scale responses of *agree* and *strongly agree*. The remaining percentage does not necessarily mean the response was *disagree* or *strongly disagree*. The respondent could have also marked *don't know* as a response on the survey. The four point Likert scale was chosen after validity and reliability tests determined it would be more reliable than a six-point scale.

Survey results are considered perceptual data obtained from educators regarding the presence of vital teaching conditions, and their perceptions are their reality. Perceptual data do not indicate that the data are unimportant or invalid when compared to other data sources. Perceptions of educators about the culture and context of their school setting have been linked to future employment, student learning, motivation, and efficacy. TELL recommends that survey results should be used to analyze and improve schools as one component of possible reform efforts at the school and district levels.

The survey is conducted every two years, beginning in 2013, with 2017 being the most recent year data were collected. During the 2017 year, the response rate was 91%,

an improvement over the 89% from the previous survey. A 50% response rate with at least five respondents is required for the survey to be included in the published results. For this study, the three questions used from the TELL (TELL Kentucky, 2017) survey were:

- 3.1b Teachers have sufficient access to instructional technology, including computers, printers, software and Internet access.
- 8.1b An appropriate amount of time is provided for professional learning.
- 8.1h Teachers have sufficient training to fully utilize instructional technology.

## Population and Sample Selection

The population for this study included all 1220 public schools from the 173 public school districts in Kentucky. From this list of schools, qualifying data from the Kentucky Department of Education (KDE) free and reduced lunch (FRL) program from 2017-2018 were used to determine the schools with greater than 50% of the student population qualifying for the program. Eligibility for the FRL program is based on income poverty guidelines provided by the Federal Government and is based on household size. For 2018, a family of four is considered living in poverty if their income is at or below $25,100 per year according to the Department of Health and Human Services (2018). These guidelines are used to determine what federal services are provided to applicants and vary by year.

Of the 844 schools that fit into the greater than 50% category, state KPREP rankings for each school were accessed and recorded. The KPREP rankings could rank from 1 (highest in the state) to 1262 (lowest) and were out of a total of 1220 schools

instead of 1262 because some private and parochial schools are included in these rankings; however, these schools were not part of this study.

Collection of state KPREP rankings for schools with greater than 50% FRL revealed school rankings from 3 (third highest in the state) to 1262 (lowest) with a median rank of 695. Schools above the median ($n$ = 422, rank range 3-695) were considered the high achieving group. Schools below the median ($n$ = 422, rank range 696-1262) were considered the low achieving group.

## Research Design

The research design was quantitative in nature, and included descriptive and inferential statistics. Descriptive statistics allows for the analysis and description of data in a meaningful way, such that patterns might emerge. Inferential statistics allow generalizations to be made about the populations from which samples were acquired. (Descriptive and Inferential Statistics, 2018).

Analyses were conducted using independent sample *t*-tests to make predictions based on the data set population. A *t*-test is used to test the means of two groups or two variables at a time (Connelly, 2011). Achievement served as the dependent variable while the independent variables were the TELL survey questions. The results detect if there is a significant difference between the means of two groups when comparing each question to achievement in the form of KPREP rank.

## Data Collection Procedures

Prior to collecting data, application was made to the Institutional Review Board (IRB) for conducting research and approval was granted (see Appendix A). All data used were available to the public and results were readily accessible.

Because scores for the three TELL items of interest had to be individually located and recorded, a sampling of schools was conducted. To minimize sampling error, a sample size of 402 schools, 201 per achievement group, was randomly selected from the population of 844 schools. This sampling rate allows calculations in this study to be accurate at a 95% confidence level, estimating results that are within five percentage points, plus or minus, of the population data.

TELL survey result data on three questions, 3.1b, 8.1b, and 8.1h were then added for each school. In order for school results to be reported, at least 50% and a minimum of 5 respondents of that school's personnel (school based, licensed educators; instructional staff; and administrators) had to respond to the survey.

Preliminary descriptive analysis of the selected sample revealed five schools with FRL rates less than 50%, so these were removed from further analysis; thus, $N = 395$. Schools excluded from the *t*-test analysis and other group comparisons included three high-ranking schools that were multiple level schools and three high-ranking schools and seven low ranking schools with no TELL data available. Therefore, the numbers of schools actually included in comparative analyses were 192 high ranking and 192 low ranking schools (Total $N = 384$).

## Analysis of Data

Statistical *t*-tests were conducted to analyze the variables of each TELL survey question related to technology access and professional development when compared to low SES schools. Low SES schools were those with a higher than 50% FRL in the state of Kentucky. The schools were then labeled as either high or low based on their state

KPREP rank and a sample (Total $N = 384$) was randomly selected from the population of 844 schools to minimize sampling error.

The purpose was to determine what effect on achievement, if any, existed when analyzing the TELL survey responses from three identified questions related to technology and professional learning. The TELL questions chosen for the study look specifically at teacher perceptions related to access to technology, the amount of professional development provided, and the extent of professional development necessary to fully utilize instructional technology.

## Limitations

With any study conducted, limitations do exist and addressing these is essential. In regards to this study, the first limitation is the sample size. While many schools in Kentucky were used as the sample, the only schools used were in Kentucky. Due to the use of the TELL survey results as part of the data collected, the school sample had to come from the state where those results were available, and that was Kentucky.

Another limitation of the study involves the TELL survey itself. The survey collects perceptual data, and while they are considered legitimate data, the survey is based on the subjective opinion of the respondent. Also, only a small number of questions in the survey actually measure the perceptions of respondents about the adequacy of technology access and training. In addition, the survey results for each school could have a varying number of people responding. As long as the response rate was above 50% with five respondents, the results were included in the TELL results. Therefore, schools with barely over 50% response would have the same weight as schools with 100% response rate, without considering the actual number of respondents.

The same is true for the schools used in the study. Schools were chosen based on their free and reduced lunch status (greater than 50%) and their responses to the TELL survey. While the enrollment for each school is available, the total enrollment was not considered when determining the schools who would be part of the data. Small and large schools had an equal chance of being part of the data for the study, and therefore are given equal weight in the study.

With this study being based on perceptual data, and specifically the perception of the respondent at that moment in time, findings could be limited by those respondents who want to make their school look good or bad in the survey results. Evidence of this shows in the discrepancy between principal and teacher responses. Principal responses regarding their perception of teaching, learning, and leading conditions were an average of 27 percent higher than the same responses by teachers. Similar discrepancies in the results apply to school leadership efforts (Hirsch et al., 2011).

# CHAPTER IV: RESULTS

## Introduction

The current study was conducted to explore the relationship between technology, professional development, low SES schools, and achievement based on KPREP rankings in Kentucky schools using responses from the TELL Kentucky survey results. The study specifically looked at whether there is a difference in accessibility to technology and instructional technology in low SES schools who ranked high on KPREP versus low ranked KPREP schools. Professional development was examined to determine if the amount of time allotted for PD is appropriate and if sufficient technology training PD was provided. This was then compared to low SES schools who are considered high performing schools and those considered low performing schools according to KPREP ranking to establish if a discrepancy exists between those economic groups and in the training each group receives.

## Research Questions

The following research questions were used to guide the study:

**General Research Question 1:** Is there a significant difference in reported accessibility to instructional technology (as measured by TELL Survey item 3.1b) between low SES Kentucky schools ranked high versus low in school achievement?

**General Research Question 2:** Is there a significant difference in the reported appropriate amount of time provided for professional learning (as measured by TELL Survey item 8.1b) between low SES Kentucky schools ranked high versus low in school achievement?

**General Research Question 3:** Is there a significant difference in reported sufficiency of training to fully utilize instructional technology (as measured by TELL Survey item 8.1h) between low SES schools ranked high versus low in school achievement?

For this study, the three questions used from the TELL survey were:

- 3.1b Teachers have sufficient access to instructional technology, including computers, printers, software and Internet access.
- 8.1b An appropriate amount of time is provided for professional learning.
- 8.1h Teachers have sufficient training to fully utilize instructional technology.

## Descriptive Statistics

Table 4.1 provides descriptive statistics on the key school variables related to the study. As can be seen, the sample numbers differ among variables. This is due in part to the schools that did not have TELL data available. The KPREP rank ranges from six (ranked high at $6^{th}$ in the state) to 1262 (ranked lowest in the state) among the sample. The FRL rate had to be greater than 50% to be included in the study, and the actual rate ranged from 50.95 to 100. The TELL survey mean was similar for each question used and this table includes high and low SES schools, however there was a variance in the standard deviation for each question. The school size of schools used in the study varied greatly from 126 to 1675 for student enrollment. The random sample taken from all low SES schools did not consider student enrollment when choosing schools as part of this study. Therefore, schools with a wide range of student enrollment are included in the study.

Table 4.1

*Descriptive Statistics of Key School Variables*

| Variable | *N* | *M* | *SD* | Minimum | Maximum |
|---|---|---|---|---|---|
| FRL % | 397 | 87.72 | 14.24 | 50.95 | 100.00 |
| KPREP Rank | 397 | 534.72 | 266.02 | 6.00 | 1262.00 |
| School Size | 397 | 668.21 | 373.94 | 126.00 | 1675.00 |
| TELL 3.1b | 384 | 84.50 | 13.87 | 20.00 | 100.00 |
| TELL 8.1b | 384 | 89.27 | 9.02 | 56.50 | 100.00 |
| TELL 8.1h | 384 | 82.98 | 12.15 | 40.00 | 100.00 |

*Note.* School size = student enrollment

Table 4.2 provides descriptive statistics on the key school variables related to the study with schools divided into high and low KREP rank. As can be seen, the number of schools used in the final data analyses was 192 low SES and 192 high SES, or $N = 384$. The KPREP rank range for high SES schools was 6-694 and the rank range for low SES schools was 703-1262. The mean school sizes were comparable for each level at 557.72 and 511.64 respectively. While the TELL survey questions all had means within a ten point range, the minimum score for each showed that high ranked low SES schools had a higher minimum score on each question when compared to the same questions for low ranked SES schools. The mean for FRL was slightly higher for low SES schools at 90.30, while the high-ranking low SES schools had a mean of 85.15.

Table 4.2

*Descriptive Statistics of Key Variables in High versus Low Schools*

| Variable | Variable | *N* | *M* | *SD* | Minimum | Maximum |
|---|---|---|---|---|---|---|
| HIGH | FRL % | 198 | 85.15 | 14.79 | 50.95 | 100.00 |
| | KPREP Rank | 198 | 340.57 | 206.76 | 6.00 | 694.00 |
| | School Size | 198 | 557.72 | 311.87 | 126.00 | 1675.00 |
| | TELL 3.1b | 192 | 87.44 | 11.91 | 42.90 | 100.00 |
| | TELL 8.1b | 192 | 90.72 | 8.14 | 65.90 | 100.00 |
| | TELL 8.1h | 192 | 85.74 | 10.83 | 44.80 | 100.00 |
| LOW | FRL % | 199 | 90.30 | 13.22 | 52.17 | 100.00 |
| | KPREP Rank | 199 | 994.20 | 151.58 | 703.00 | 1262.00 |
| | School Size | 199 | 511.64 | 209.08 | 140.00 | 1434.00 |
| | TELL 3.1b | 192 | 81.56 | 15.05 | 20.00 | 100.00 |
| | TELL 8.1b | 192 | 87.82 | 9.63 | 56.50 | 100.00 |
| | TELL 8.1h | 192 | 80.22 | 13.22 | 40.00 | 100.00 |

*Note.* School size = student enrollment

**Findings for Research Question 1**

To answer the question, is there a significant difference in reported accessibility to instructional technology (as measured by TELL Survey item 3.1b) between low SES Kentucky schools ranked high versus low in school achievement?, an independent sample *t*-test was conducted. A Cohen's *d* was also calculated to determine effect size. Table 4.3 presents results, suggesting a significant difference between high versus low ranked KREP Schools, with a medium effect size. Thus, a larger percentage of school personnel (≈87% on average) in low SES Kentucky schools that rank high in KREP student achievement reported accessibility to instructional technology than school personnel (≈82% on average) in low SES Kentucky schools that rank low in KREP student achievement.

Table 4.3

*Differences in High versus Low Ranked KREP Schools in Accessibility to Instructional Technology: t-test Results*

| | *t* | df | Sig. (2-tailed) | Cohen's *d* |
|---|---|---|---|---|
| TELL 3.1b | 4.24 | 362.83 | <.001 | .43 |

*Note.* Test for Equality of Variances showed significance. Equal variances not assumed.

**Findings for Research Question 2**

To answer the question, is there a significant difference in the reported appropriate amount of time provided for professional learning (as measured by TELL Survey item 8.1b) between low SES Kentucky schools ranked high versus low in school achievement?, an independent sample *t*-test was conducted. A Cohen's *d* was also calculated to determine effect size. Table 4.4 presents results, suggesting a significant difference between high versus low ranked KREP Schools, with a small to medium effect size. Thus, a larger percentage of school personnel (≈91% on average) in low SES Kentucky schools that rank high in KREP student achievement reported appropriate amount of time provided for professional learning than school personnel (≈88% on average) in low SES Kentucky schools that rank low in KREP student achievement.

Table 4.4

*Differences in High versus Low Ranked KREP Schools on Appropriate Time for Professional Learning: t-test Results*

| | *t* | df | Sig. (2-tailed) | Cohen's *d* |
|---|---|---|---|---|
| TELL 8.1b | 3.18 | 371.64 | .002 | .32 |

*Note.* Test for Equality of Variances showed significance. Equal variances not assumed.

## Findings for Research Question 3

To answer the question, is there a significant difference in the reported sufficiency of training to fully utilize instructional technology (as measured by TELL Survey item 8.1h) between low SES schools ranked high versus low in school achievement?, an independent sample *t*-test was conducted. A Cohen's *d* was also calculated to determine effect size. Table 4.5 presents results, suggesting a significant difference between high versus low ranked KREP Schools, with a medium effect size. Thus, a larger percentage of school personnel (≈86% on average) in low SES Kentucky schools that rank high in KREP student achievement reported sufficiency of training to fully utilize instructional technology than school personnel (≈80% on average) in low SES Kentucky schools that rank low in KREP student achievement.

Table 4.5

*Differences in High versus Low Ranked KREP Schools in Sufficient Instructional Technology Training: t-test Results*

| | *t* | Df | Sig. (2-tailed) | Cohen's *d* |
|---|---|---|---|---|
| TELL 8.1h | 4.57 | 372.01 | <.001 | .47 |

*Note.* Test for Equality of Variances showed significance. Equal variances not assumed.

## Chapter Summary

The data analysis served to determine if a discrepancy exists between low SES schools ranked high and low as it relates to instructional technology access, professional learning, and training when compared to school success displayed in the form of KPREP rankings. The independent sample *t*-test results suggest a statistically significant difference does exist between the levels examined. A Cohen's *d* was calculated to determine effect size for each TELL survey *t*-test result. All questions fell into the

medium or small to medium range of effect. The scale for Cohen's *d* is: $d = 0.2$ represents a small effect size; $d = 0.5$ represents a medium effect size; and $d = 0.8$ represents a large effect size. No large effect sizes were found in this study.

For Research Question one, the *t*-test result suggests a significant difference between the high and low SES schools' (Table 4.3) average scores on TELL 3.1b. This confirms the hypothesis that a larger percentage of personnel from high ranked KPREP schools will report more accessibility to technology than was reported by personnel from low ranked KPREP schools. The Cohen's *d* result is .43 for this research question, so it is closest to a medium effect size.

On Research Question two, the *t*-test results again suggest a statistically significant difference between the high and low SES schools' (Table 4.4) average scores on TELL survey question 8.1b. This confirms the hypothesis that a larger percentage of school personnel from high KPREP schools will report the amount of time allowed for professional learning was acceptable. The Cohen's *d* calculated result is .32 for this research question, so it falls between a small and medium effect size.

On Research Question three, the *t*-test results again suggest a significant difference between high and low SES schools' (Table 4.5) average scores on TELL survey question 8.1h. This confirms the hypothesis that a significantly larger percentage of personnel from higher ranked KPREP schools will indicate receiving sufficient training for instructional technology. The Cohen's *d* result is .47 for this research question, so it is closest to a medium effect size.

# CHAPTER V: DISCUSSION

## Introduction

Schools are seemingly always searching for the magic bullet to improve student achievement, increase performance, and counteract the effects of poverty. Numerous schools have enacted widespread initiatives in an attempt to confront the various challenges our students face and offset their impact. Frequent studies show school districts and educators have attempted to tackle low achievement (Cunningham, 2006), race issues (Darling-Hammond et al., 2014), crime (Carlson, 2006), behavior issues (Evans, 2003), budget shortcomings, and much more in the struggle to break the cycle of poverty. Unfortunately, there is yet to be found a "one size fits all" fix to this problem faced by many schools.

School districts deal with an extremely diverse population, where teachers are expected to educate students with different ability levels, from varying home situations, having little or no support systems, with an often unpredictable future. Educating this wide array of student groups who represent the diversity within our schools is a formidable task. In order to offer all students the education they deserve, changes and adaptations are often necessary. One way this can perhaps be enhanced is through the use of instructional technology and professional development.

This study looked at schools from poverty, identified by FRL status, and focused on teacher and other personnel perceptions about access to technology, the time provided for professional learning, and whether school personnel received sufficient training to fully utilize instructional technology as reported by the TELL survey results. A comparison was made using a sampling of low SES schools in Kentucky identified by

FRL and KPREP rankings, divided into high and low achieving schools, and subsequently ranked as high and low schools for the study. The relationship between these variables was explored using the TELL Kentucky survey results to determine the extent to which they may influence achievement.

## Discussion of Major Findings

**General Research Question 1:** Is there a significant difference in reported accessibility to instructional technology (as measured by TELL Survey item 3.1b) between low SES Kentucky schools ranked high versus low in school achievement?

For Research Question one, the findings suggest a significant difference when comparing high versus low ranked KPREP schools. This study shows that schools that ranked higher on KPREP results reported more accessibility to instructional technology than schools that were ranked low on KPREP results. All schools were considered low SES schools based on FRL status, but a discrepancy exists between those that had higher ranks and those with lower ranks. Instructional technology is not explicitly defined in the TELL survey except to say it includes computers, printers, software, and Internet access, therefore the response was based on the respondent's interpretation of instructional technology beyond these parameters. Given the perceptual data approach used by TELL, naming specific technology in the survey was not really appropriate and could skew results for the survey question related to technology.

Student-centered learning and active learning instructional techniques have been shown to benefit low SES students in the classroom, as evidenced by Freeman et al. (2014) who conducted a comprehensive meta-analysis study of active and passive

learning techniques. Students who are actively involved in their learning will experience more retention of the content and increased achievement.

Instructional technology as a means of active learning has been demonstrated to increase student achievement regardless of the influence of SES within the school (Darling-Hammond et al., 2014). While it is of vital importance that teachers know how to facilitate the use of instructional technology, in order to do that, it must be made available to the students. One of the most effective means to level the playing field for impoverished students is to offer them the same level of student engagement as their higher SES peers. The TELL survey, however, does not provide information regarding student engagement.

**General Research Question 2:** Is there a significant difference in the reported appropriate amount of time provided for professional learning (as measured by TELL Survey item 8.1b) between low SES Kentucky schools ranked high versus low in school achievement?

According to the findings for Research Question two, a significant discrepancy is suggested between high and low ranked schools. A greater number of personnel in higher ranked schools reported on the TELL survey that an appropriate amount of time was provided for professional learning than in lower ranked schools. This does not imply that all or a specific percentage of professional learning received is in technology, but infers that professional learning could be in any topic deemed necessary by the school district or approved by the professional development coordinator.

In order for teachers to become comfortable with using instructional technology, they must have the training needed to use it effectively. Seamless use of technology is

only possible with adequate professional learning. Creating a learner centered classroom as opposed to a teacher centered classroom requires a level of student engagement that can only be accomplished with teachers who are confident in their ability to use the tools available to them in the classroom, and that only happens with sustained professional development. Once again, the TELL survey does not provide an interpretation of the type of professional learning, only that it is or is not adequate.

**General Research Question 3:** Is there a significant difference in reported sufficiency of training to fully utilize instructional technology (as measured by TELL Survey item 8.1h) between low SES schools ranked high versus low in school achievement?

In Research Question three, the outcome once again suggested a significant difference in high versus low SES schools. Schools that ranked higher reported sufficient training to fully utilize instructional technology as opposed to the results acquired from personnel in lower achieving schools. Lower ranked schools had more school personnel who did not think the amount of training was sufficient to fully utilize instructional technology. Therefore, use of instructional technology is likely to take place more frequently in higher ranked schools who are receiving a suitable amount of time for professional learning related to utilizing instructional technology as opposed to the lower ranked schools as perceived on the TELL survey. This is not meant to imply that use of instructional technology does not take place in the lower ranked schools, but it infers the teacher perception that use of instructional technology may occur less often or less effectively due to the lack of sufficient training.

In rural, high poverty classroom settings, teachers who receive adequate professional development in technology have higher achieving students (Blanchard et al., 2016). Teachers reported the positive impact on their students after embedding technology, and student scores were impacted significantly. Teachers recounted increased interest, excitement, and enjoyment of students while using technology to solve problems on interactive tablets, or complete WebQuests with a partner. Exposing students to a variety of learning opportunities in technology can open up a whole new world to them, which is especially important for impoverished students.

The appropriate level of teacher facilitated technology use affecting student engagement can pique the interest of students who might not otherwise have benefitted from the teaching taking place. The potential long-term effects of this include better student achievement, lower retention rates, and higher graduation rates, all of which may result in a more successful school.

## Limitations

Several limitations exist in this study. The study focused on a specific population of schools within Kentucky. A sample of high poverty schools, based on FRL rates, were part of this study. Schools were not chosen or rejected based on budgetary restrictions, school size, demographics, or location. Leadership or pedagogical strategies among schools were also not taken into consideration. Focus groups and interviews were not used to gather further data.

The TELL data collected were based on individual perceptions, and while considered to be authentic measurable data, those perceptions can vary greatly from school to school based on extenuating factors such as leadership and school culture.

Perceptions of what instructional technology consists of, the amount of instructional technology training that would be considered appropriate, and the frequency of using instructional technology could all vary based on the attitude of the respondent at the time of the survey. The TELL data acquired came from schools of all sizes, as long as at least 50% responded and included at least five participants. Therefore, school size was not considered when choosing schools who were part of the sample.

The Cohen's *d* conducted for each research question gives an effect size slightly below medium for RQ 1 and RQ 3, and between small and medium for RQ 2. Effect size was analyzed because of large sample sizes, which can conflate statistical significance and practical significance. While these results do suggest *some* level of practical significance to the findings, one has to wonder how different high and low ranking schools really are when vast majorities of teachers and other school personnel believe their school is providing sufficient tools and training in technology.

While this study suggests statistical (and practical) significance, it was based on perceptions related to TELL Kentucky survey data. However, the survey itself along with the results do not provide strong evidence to conclude beyond a doubt that a strong relationship between all variables actually exists. Respondents who want to make their school look good or bad can skew the results. While these data are meant to inform school improvement plans, there is not any true guidance after the data come back to the school. A few online tools, which a school may or may not choose to use, are not going to provide the guidance needed to enact true school improvement. The recommendations provided after the survey are all quite generic in nature, and there is no plan for how to accomplish what is suggested. While TELL is marketed as one component to aid in

school improvement, the state of Kentucky seems to have no plan for what to do with the results other than providing them to the schools to use however they choose.

## Recommendations

This study was conducted using only Kentucky schools, so replicating the study or using the results from other states to see if the results are generalizable could be important to future decisions for technology and professional development. It would also be beneficial to have a standardized definition for instructional technology and technology integration for the state so all technology use could be identified in the same capacity for educators.

The development of a technology based school survey for educators and students using standardized definitions for integration and instructional technology could be beneficial to schools hoping to provide more insight into the use and advantage of instructional technology. Using that information to measure the impact on student learning could be transformational for schools. At the very least, it would provide more data to determine the value of the results of this study, given the weakness of the TELL survey instrument.

Furthermore, effectively educating preservice teachers with technology should be a substantial focus of teacher preparation programs. New educators need to come prepared with all the tools necessary to effectively use purposeful, student centered technology. Knowing how to use it will not necessarily increase student achievementl; however, the affect on student engagement could be noteworthy.

## Implications for Further Study

This study discovered several gaps in the literature when comparing the variables of poverty, achievement, use of technology, and professional development. Several studies from the literature review focused on a combination of some of these variables, but only a very limited number included on all of them. Future studies initiated to measure the effects of these variables with added variables (grade, age, gender, parental income) upon one another and their impact on student achievement could be beneficial to school districts when working on school improvement plans.

Other potential areas of research to expand the study include a comparison of the current TELL survey to the one prior. The growth and change identified could be used as a piece of the data to be utilized in more extensive research projects and to add to the predictive validity of the survey as a research tool. Another piece of research that could be beneficial is to compare the school demographics in the high versus low achieving schools among the schools selected for the study. Within the demographics research, identifying factors impacting poverty such as parental employment and family income could be valuable pieces of the puzzle when looking at poverty and achievement. Graduation and college acceptance rates among the study schools could also provide some telling evidence to substantiate the results from the study.

School culture as an added variable could potentially shed additional light on the results. School culture can affect the perceptions of personnel who are taking the TELL survey, therefore affecting attitudes and results. What may have been a positive one day, may be seen as a negative the next week. Because of this, following up the survey by conducting teacher interviews about the results for their school would go a long way to

explain why a school produced the results provided by TELL, and how accurate they truly are.

Along with school culture, incorporating leadership into the study could be another valuable component of the study to examine the effect on school success. That could take the form of administrators or include other forms of leadership within the school.

While this study looked at a sample of all qualifying low SES schools divided into high and low achieving, future studies may find it advantageous to further divide the schools based on their status as rural, suburban, or urban schools. An added factor would be to look at only elementary, middle, or high schools, instead of lumping them all together as in this study, especially since the criteria used to determine how an elementary/middle school ranks are different from how a high school is ranked. Based on the classification, it would be helpful to look at how much money each school is allotted for instructional technology use, and if any of the schools participate in any technology related grants to see if those elements have any affect on their status as a high or low performing school.

## Implications for the Field

The President's Council of Advisors in Science and Technology has recommended a 33% increase in STEM related bachelor's degrees each year (Freeman et al., 2014). Research indicates the best way to accomplish this is through active learning and validated teaching practices, especially when utilizing technology. In order to reach that goal, STEM programs must begin during elementary or middle school. STEM classes have been consistently growing in schools, but in order for those to be

implemented, sustained, and successful, qualified and technologically trained teachers are essential.

While access to instructional technology, adequate professional development, and training have an impact on STEM implementation, the benefits are even more far reaching. For impoverished students, learning in an interactive, student centered classroom could provide them with the necessary tools to be one of the 33% earning a STEM related bachelor's degree. Poverty, more than anything else, explains why academic discrepancies exist among various groups of students (Ullucci & Howard, 2015). Students from poverty are not "lesser than" students from affluent homes. They are not less able, less intelligent, or less worthy than their peers. They simply have experienced less opportunities for success. Technology is simply one area of opportunity for them, and this study is not implying technology causes every student from poverty to achieve success.

Schools as an institution are not equipped to negotiate the myriad consequences of poverty. The best hope for these students falls into the hands of the teacher who sees the promise in them and offers them the opportunities to show their ability to be a leader, to adapt, or be resourceful—all qualities they learn in poverty. A teacher with the tools, training, and resources to effectively use technology has the ability to effect change in the lives of all students, but most notably, students living in poverty. Equality in education can be improved through training, technology, and quality teaching.

The results of this study should be taken cautiously due to the use of the TELL survey and perceptual data as the primary indicator of the relationship between poverty, technology and achivement. While schools should work to provide the tools and the

training for teachers to use technology effectively, it may or may not be what a school needs for school improvement and planning. Further studies are needed to determine if the relationship between the variables in this study represent "real" school differences or if the perception approach used by TELL caused weak results.

Colleges should also align their curriculum to be more purposeful in teaching with technology, especially in training pre-service teachers, as another possible improvement. The eventual impact on student learning could create a trickle down effect representing a model for school success, and could serve as another potential study.

While the budget of Kentucky has removed all funds for professional learning, schools are still required to complete 24 hours, and some of those hours need to be used for instructional technology. Many resources available for use in the classroom are free as long as one has access to computers and internet; therefore, resourceful teachers and administrators must take the initiative to determine what is available and share it with one another—utilize the human and technology resources available to give students the best advantage possible.

## Conclusions

Again, the results of this study indicate that increased technology and training have a positive impact on student success, but that conclusion should be taken guardedly. Given that TELL Kentucky provides perceptual data about what educators believe about technology with no concrete observations or follow up to see how it is actually used, the ability of the research presented to guide policy and indicate needs in the areas of training and resources for low SES schools is weak at best as it stands. In a time of budgetary constraints handed down from the state, especially in the area of professional

development, support for this study in the form of teacher interviews and case studies could add strength to this study and provide the evidence needed to indicate the importance of training teachers to use technology tools effectively.

In order to overcome the obstacles some of the students in Kentucky face, it will likely take more than instructional technology, training, and access to effect change. Teachers who are willing to take risks by learning to use and apply the latest technology tools for the benefit of all students and who enter the profession with a passion for teaching could be the biggest asset of all. Ultimately, the end goal for Kentucky students should be to provide a balanced playing field for all, regardless of their socioeconomic status, where they live, or what school they attend.

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**APPENDIX A:** IRB Letter of Approval

*INSTITUTIONAL REVIEW BOARD*
*OFFICE OF RESEARCH INTEGRITY*

| | |
|---|---|
| DATE: | September 25, 2018 |
| TO: | Holly Ross, MEd |
| FROM: | Western Kentucky University (WKU) IRB |
| PROJECT TITLE: | [1326843-1] The impact of technology integration and technology professional development on schools with 50% or greater free/reduced lunch rate. |
| REFERENCE #: | IRB 19-087 |
| SUBMISSION TYPE: | New Project |
| ACTION: | APPROVED |
| APPROVAL DATE: | September 25, 2018 |
| REVIEW TYPE: | Exempt from Full Board Review |

Thank you for your submission of New Project materials for this project. The Western Kentucky University (WKU) IRB has APPROVED your submission regarding pre-existing data analysis only. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Exempt from Full Board Review based on the applicable federal regulation.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Robin Pyles at (270) 745-3360 or irb@wku.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Western Kentucky University (WKU) IRB's records.