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The Effects of Personalized Learning on Student Achievement

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THE EFFECTS OF PERSONALIZED LEARNING ON STUDENT ACHIEVEMENT

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THE EFFECTS OF PERSONALIZED LEARNING
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Abstract

Although many studies have been conducted on personalized learning strategies, teacher attitudes and perceptions, and student engagement, few studies have focused on personalized learning and its impact on student achievement when compared to the traditional classroom. The purpose of this study was to determine if personalized learning increased student achievement in three school districts by analyzing student assessments for three consecutive school years. The study utilized data from three school districts located in Western Kentucky for the 2016-2017, 2017-2018, and 2018-2019 school years. The data were collected from Renaissance Learning for math and reading. In addition to examining the students' achievement scores, the study also included interview responses from teachers in one school district who taught personalized learning and traditional learning. The information collected from the interviews focused on the teaching strategies used in each model and the professional development each teacher attended. There was no significant statistical difference between the achievement of students who received instruction in the personalized learning classrooms versus those who were taught in traditional learning classrooms. Results also showed that the teachers of both models used similar teaching strategies to increase student achievement and engaged with similar professional development opportunities that they felt increased student achievement.

DEDICATION

This dissertation is dedicated to Minos Cox, my grandfather. He was the person who first encouraged me to go back to school. He said it would mean so much to him to see me go all the way. He passed away before this study could be finished. I will cherish him always. I know he would have been proud.

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CHAPTER I: INTRODUCTION

As of 2019 the United States had a high school graduation rate of only 88% (Kerr, 2021) as compared to other countries, such as Japan and Canada, who graduated nearly 100% of their high school students (National Center for Educational Statistics, 2021a). According to a recent study conducted by Linda Darling-Hammond of the Learning Policy Institute and the National Center of Education and Economy, countries like China, Singapore, and Finland are developing new policies to incorporate 21st Century Skills into their education systems which are yielding higher results and achievement as compared to the United States (Darling-Hammond et al., 2017). Those students who had graduated in the United States were finding themselves ill-prepared for success because of an educational system which did not provide the skills employers were looking for in new hires (De Villiers Scheepers et al., 2018). With the world changing and growing at speeds faster than ever, companies and industries are seeking and retaining viable employees who have graduated from high school and possibly college. To keep up with the fast-paced global market, education systems across the world have become more strategic at educating our youth to compete with not only others in the United States, but with other nations. Job opportunities which used to be reserved for those living in the United States can now be offered to a wide variety of populations across countries, with newer technology and faster travel allowing for instant communication and relocation. Students who drop out of high school find themselves in low paying jobs with little chance of advancement. Low-paying jobs often lack security because they require no experience or skill (Kim, 2015). Government officials are continuously adding pressure to school systems to improve their delivery of services and to target at risk students with educational interventions.

School districts have grasped at ways to improve education so that students enjoy learning and feel as though they are not wasting their time. Some school districts and their administrations have used the Danielson Framework (2014) to gauge classroom effectiveness and placed high importance on increasing student engagement with the intent to then decrease student drop-out rates (Hunzicker, 2017). When targeting how to improve student engagement, researchers look at what holds the interest of students today. One of the biggest motivational factors is student-centered activities (Nouri, 2016). Some research showed that student-centered activities (also known as active learning) increased retention of information and gave students a deeper understanding of content (Bonwell & Eison, 1991). Active learning involves a combination of activities such as listening, writing, and engaging in the lesson through problem solving. Studies show that active learning is beneficial to students; for instance, Bonwell and Eison (1991) found that a study involving two groups of students, one with lecture only and one with breaks in the lecture, the group of students who were given breaks throughout the lecture to have discussions and/or participate in other activities with peers had a mean score of two grade levels above the other group who were not offered breaks in the lecture or other activities.

One way to incorporate student-centered activities into the curriculum is by using technology (Rickabaugh, 2016). Today's youth are surrounded by technology. Not only do most youth own a cell phone, but they have access to tablets, computers, smart TVs, and video games. Everything around them can be personalized to their wants and interests using technology. Generation Y, and those born after them (Generation Z) have access to all types of technology, allowing them instant access to breaking news, ordering food and other items online without leaving their house, and communication with others around the world on many social media platforms (Seemiller & Grace, 2019). School districts provide the best technology they can

afford to incorporate new media into the curriculum by spending millions each year on software and hardware to pique the specific interests of students and motivate their learning (Frick, 2020).

When public schooling was developed in the U.S., it was aimed at educating as many students as quickly as possible. The goal of public education was to teach students reading, writing, and mathematics. There was little competition since all students were given the same opportunities and taught the same set of skills in a one-room schoolhouse which many times also doubled as a church or community center (Goldsborough, 2014). A few students went on to further their education after high school, but it was not necessary to have an advanced education to be successful. Promotions and job security were given based on job performance and loyalty to the company. Many jobs provided an internship or apprenticeship which alleviated the need for additional schooling (Jacoby, 1991). People did not even have to graduate from high school to be given the opportunity of job placement. Many children followed in the footsteps of their parents and were awarded jobs based on the necessity of providing for their family (Lyson, 1989).

Over the years job opportunities became fewer and more challenging to obtain without adequate training or education. Jobs, which at one point did not require a high school diploma or advanced degree, now required more education and specialization. Previous experience alone was not enough to obtain another job. The younger generation who did not want to continue their education because of loss of interest or lack of success were finding themselves not marketable and struggling with job security. To offset this dilemma, government agencies and politicians were calling for continuous changes to educate our population (Zajda, 2018). Education no longer provided the basic reading, writing, and arithmetic. Education now encompassed 21st Century job skills including critical thinking, communication, collaboration, problem solving,

and global citizenship (Care et al., 2018). The number of classes and programs offered by a school system are now meant to target a wide variety of interests, social classes, job opportunities, and student diversity. Curriculum was developed by school districts wanting to promote 21st Century Skills which included critical thinking and problem solving while trying to foster the needs of students with barriers to their educational success (Jacobson-Lundeberg, 2016).

The educational system of today must meet more needs than the education of the past. In order to provide students with more opportunities, skills have to be taught to allow students to survive in a competitive world whether they choose to enroll in college, enlist in the military, or go straight into a job (Garcia-Aracil et al., 2021). In order to keep increasing student success by graduating more students and providing them with the skill set needed to join the workforce or go on to college, schools have to determine ways to keep students interested and engaged in learning to complete school by including relevant and engaging activities (Balint et al., 2020).

The changes required for public education today have predecessors in the history of the United States. Public education shifted as the social and political landscape of the nation evolved; one of the most notable changes was the 1954 U. S. Supreme Court case, *Brown v. Board of Education* (Wraga, 2006). This case declared the practice of segregating schools based on skin color to be unconstitutional. The success of this case gave students from all races the opportunity to further their education and have a more equal right to books, supplies, and qualified teachers (Frankenberg & Taylor, 2018; Martin & Brooks, 2020). Another key moment in the history of access to public education in the U.S. was the adoption of the Rehabilitation Act of 1973 (Pub. L. No. 93-112, 87 Stat. 394 (Sept. 26, 1973), codified at 29 U.S.C. § 701), specifically Section 504, a civil rights statute, which prohibited discrimination against students

with disabilities in any program funded by the federal government. Further, school districts had to provide reasonable accommodations to students with disabilities who did not qualify for special education services under the Individuals with Disabilities Education Act (IDEA, 1990) or risk losing federal funding (deBettencourt, 2002).

In 1975, Congress enacted Public Law 94-142 (also known as the Education for All Handicapped Children Act, 20 U.S.C. 1400), (Education for All Handicapped Children Act, 1975). This law provided a free, appropriate education to all students with or without a disability. In 1990, the Education for All Handicapped Children Act (1975) was renamed Individuals with Disabilities Education Act (IDEA). Under IDEA, a student could qualify for additional services if they had one or more of the following conditions: autism, specific-learning disability, speech or language impairment, emotional disturbance, traumatic brain injury, visual impairment, hearing impairment, deafness, mental retardation, deaf-blindness, multiple disabilities, orthopedic impairment, or other heath impairment (Lengyel, 2021).

The U. S. Department of Education was established in 1979 and began operations in 1980. The department was established to take on many of the education-related functions that had been covered by other departments previously. The vision for the department was to establish policies, provide funding, and collect data on school systems (U.S. Department of Education, 2010a). In 2001, President George W. Bush rolled out No Child Left Behind (NCLB, 2002), which held school districts accountable for students not meeting their annual yearly progress. NCLB was a reauthorization of the 1965 Elementary and Secondary Education Act (Neely, 2015). According to NCLB, by the year 2014, all students were to be proficient in the areas of reading and math. Not only did NCLB hold school districts more accountable, it also promoted the use of scientifically based research programs in schools specifically for reading

and math. It also encouraged all school districts to hire highly qualified teachers with completed college degrees in their area of teaching (Husband & Hunt, 2015).

The American Reinvestment and Recovery Act of 2009 (P. L. 111-5) set aside $840 billion to help boost the American economy and to reform areas such as education, healthcare, unemployment assistance, family services, and energy. As part of this act, President Obama announced a new initiative called Race to the Top, which allowed states who implemented certain educational policies to compete for part of a $4.35 billion grant in the hopes of turning around low performing schools (Stern, 2013). When President Trump took office, he made proposals for a student-first budget aimed at increasing student achievement. He also proposed, if elected for a second term, to expand school choice and begin an initiative titled Teach American Exceptionalism (Ujifusa, 2020). Studying how U.S. education has changed over the years can help clarify where public education may be headed in the future.

Statement of the Problem

According to the National Center for Educational Statistics' 2018 survey (2021a), there were over two million students who were considered a high school dropout (they did not earn a high school diploma or equivalent). Only about 67% of high school graduates furthered their education in college (National Center for Education Statistics, 2021b). The number of students who entered as college freshman drastically decreased by one fourth of those who graduated with their classmates. One of the reasons for students to drop out of high school was lack of engagement. Students found other interests outside of school which led to decreased attendance, less classwork completion, and less satisfaction in continuing to attend (Larrier, 2017). Students felt as though they were being forced to complete work they did not understand, or felt was not relevant in their life, even though they knew the consequences meant lower wages or job

opportunities, possibly poorer health in the long run, and other negative effects such as being arrested (McDermott, 2018). Allowing for more student ownership in their educational path led teachers to rethink everything they learned in college and had been taught over the years (Zmuda et al., 2015). Schools were trying to change teacher perception by implementing a growth mindset to build a more positive approach to the learning process in the hopes of increasing student achievement and success by taking into account students' interests (Patrick & Joshi, 2019).

To increase the engagement of students, some school districts were implementing new strategies. One of the strategies was the inclusion of personalized learning in the curriculum. Personalized learning could be described as an education which focused on the individual needs of students by using a student-centered approach (Jones & McLean, 2018). Personalization within a school setting allowed students to set personal goals, achieve at their own learning level, choose topics that were of interest to them, use computer-based programs for individualized instruction, and possibly increase their own interest in learning because they set their own learning path. It also allowed for the teacher to be the facilitator. When implemented correctly, students became an educator themselves and learned to problem solve and think critically without having to always seek out the teacher for answers (Sun, 2016).

Conceptual Framework

With school systems working on increasing effectiveness of programs and teaching strategies to improve student achievement, deciding which programs to use can be difficult without research to guide decision-making. There are few studies aimed at the success or failure of personalized learning on student achievement, and most research tends to focus on the teaching strategies of personalized learning. With many school districts using Danielson's

Framework to evaluate their teachers and teaching strategies, personalized learning was a program which incorporated many of the characteristics found in the Framework. Danielson's Framework (Morris-Mathews, et al., 2021; Danielson, 2014), developed by Charlotte Danielson, is a research-based set of components of instruction which can be used across all content-areas. School district administrators were trained to evaluate teacher performance based on the Framework which was composed of four domains (planning and preparing for student learning, creating an environment for student learning, teaching student learning, and professional responsibilities). The purpose of the Framework was to not only evaluate, but also to aid administrators in giving relevant feedback on instruction practices (Kettler et al., 2019). Danielson's Framework supports the use of active learning or personalized learning in a classroom. The structure of the Framework encourages teachers to be leaders in their school and to teach other educators how to incorporate active learning strategies into the curriculum (Bishop et al., 2020). Understanding the Framework was important to help shape the research questions in this study since all three school districts used it to develop their professional learning for the school year and determine what strategies were used in the classrooms.

Purpose of the Study

The purpose of using quantitative methods was to determine the relationship between personalized learning and academic achievement compared to traditional classroom instruction. The purpose of the qualitative interviews was to explore teacher perceptions of teaching strategies and professional development for both traditional and personalized instruction. By examining preexisting test scores this study investigated a relationship between the end scale scores of students in their placement in the two different learning environments. The independent variables for this study included the instructional model, gender, and age of students. Gender was

used as a variable to determine if one gender had a higher level of achievement over the other gender in each subject area, especially if one model had significantly more of one gender participating in the class. The age of the student was important to determine if a large number of students in either classroom model was significantly older than the average kindergarten student due to retentions or students who started school at an older age. If personalized learning did not increase achievement, then a traditional classroom was just as effective.

The study also explored whether the instructional strategies used in the classroom and the professional development offered by the school districts were perceived by the teachers as increasing student achievement. The study also aimed to determine if both the strategies were used, whether the professional development offered was utilized by both the personalized learning teachers and the traditional teachers.

Research Questions

With few studies conducted on personalized learning in the United States at the elementary level, this study was constructed to determine if personalized learning had a positive effect on improving student achievement. The following research hypotheses directed the quantitative component of this study:

$H_0$1 There is no relationship between the effect of personalized learning on achievement in the area of math versus a traditional classroom.

$H_0$2 There is no relationship between the effect of personalized learning on achievement in the area of reading versus a traditional classroom.

$H_0$3 There is no multivariate relationship between math scores and the following independent variables: Instructional model, gender, and age of students.

$H_0$4 There is no multivariate relationship between reading scores and the following independent variables: Instructional model, gender, and age of students.

The required level of significance for testing each null hypothesis was set at $\alpha = .05$.

The following research questions were related to the qualitative component of the study:

1. What strategies do teachers in personalized learning classroom and in a traditional classroom perceive as increasing student achievement?
2. In personalized learning classrooms and traditional classrooms, did the teachers perceive the professional development they received as increasing student achievement?

General Methodology

The methodology for the study was mixed methods. The quantitative portion of the study was conducted to determine if personalized learning made a difference in academic achievement gains in reading and math scores on the Renaissance Star assessments in elementary schools in three districts located in western Kentucky. The methodology for this study was chosen because it measured the relationship between the independent variables of a personalized learning classroom and a traditional learning classroom and the dependent variable of student achievement. The study also measured the relationship on the independent variables of gender and age of students to determine if there is a causal effect on student achievement. According to Dunkin and Biddle (1974) the variables of a classroom are part of the environment which teachers cannot control. By including the gender and age of students in the study, they can be ruled out as contributing factors (Abramo et al., 2018). ANOVA, MANOVA, and MANCOVA statistical designs were used to test the null hypotheses. The qualitative portion of the study allowed for personal experiences and perspectives of teachers teaching regarding engagement.

The qualitative portion of this study was conducted to explore which elementary teaching strategies were used most often in a personalized learning classroom and the traditional classrooms and the professional development the teachers attended which teachers perceived as increasing student achievement. The purpose of the interviews was to determine which teaching strategies and professional development offered were perceived to increase student achievement in students in both the personalized learning classrooms and the traditional learning classrooms.

Significance of the Study

The strategy of personalized learning was incorporated in several school districts with the hopes that students would become more engaged in their education and therefore more likely to complete their degree. There are still many educators who do not teach using personalized learning strategies because they make assumptions about how students learn and see it as irrelevant to invest the time or energy into something new which may not last. Obtaining buy-in to implement something new in a school district has always been difficult and cumbersome without preparation and planning (Rickabaugh, 2016). Since little research has been conducted on personalized learning, findings from this study may serve to motivate an educational change in local school districts and aid administration and school leaders to move in the direction of incorporating more personalized learning or invest in other programs.

Limitations

When a study includes data collection such as interviews, the investigator has to make sure the participants feel safe, and their answers are kept confidential. Without the trust between the interviewer and the participants, the answers obtained in the study would not be ethically sound and should not be included in the study. The participants have to be able to trust the

investigator in order to give truthful answers and be willing to participate without giving biased answers which may change the outcome of the study (Saldana, 2021).

A limitation to this study was the recent outbreak of Covid-19. Teachers were working and possibly putting their health at risk since the outbreak of cases has grown high in number. Teachers may have answered questions in the interviews differently based on their current situation and their fear of not wanting to get sick while being asked to work and be in contact with others on a daily basis. To help alleviate fear of exposure to the virus, data was collected from interviews through a technology-based meeting room. Only teachers from one school district, who offered both personalized learning and traditional learning classrooms, agreed to be interviewed. Eight teachers from both models agreed to be interviewed. The number of COVID cases was still high in the area which might account for lack of participation. The answers to the interviews might have been more detailed and provided more insight into the classroom strategies and professional development if more teachers had participated.

Definition of Key Terms

For the purposes of this study, the following terms are defined:

Personalized learning -

> According to the Kentucky Department of Education, personalized learning is a student-centered, customized learning model that addresses the diversity of a student's background and needs and sets high expectations for all students. This may entail a formalized plan and process that requires students to set learning goals based on personal, academic, and *career* interests with the close support of adult mentors that include teachers, parents, and other members of the community. (Kentucky Department of Education, 2020, para. 1)

Ability grouping - "…the practice of grouping learners together based on their strengths and talents within a learning environment" (Khan, 2021).

Baseline data - **"**Baseline data are information about students' level of performance at the start of the interval of instruction" (Center for Assessment, n.d., p. 5).

Blended learning - "Any formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path and/or pace'' (Horn & Staker, 2017, p. 9).

Competency-based learning - "… desired abilities, skills, or dispositions that students should learn in an educational program" (Kallick & Zmuda, 2017, p. 33).

Growth mind-set - "The understanding that abilities and intelligences can be developed" (Dweck, 2007, para. 1).

Multi-sensory strategies - "…when information is presented, the learner is simultaneously using multiple senses (The Literacy Nest, 2018).

Project based learning - "… a teaching approach, a mindset, and a framework for teaching skills and content" (Lenz et al., 2015, p. 68).

Student engagement - **"…** the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education" (The Glossary of Education Reform, 2016, para. 1).

Student choice - "… the practice of providing real, significant, and authentic choices for learners, the learning environment, and the strategies and approaches that they will use" (Rickabaugh, 2016, p. 43).

Student voice - “When students have opportunities to share their perspectives, participate in making decisions, set goals, and take ownership of their progress, their commitment to and confidence in learning grow” (Rickabaugh, 2016, p. 42).

Summary

With few studies and published literature on the topic of personalized learning, its success or failure has yet to be determined. To discover the answers as to whether or not personalized learning was worth the time, money, and effort, this research was designed to determine if students in a personalized learning classroom have shown academic gains in reading and math when compared to their counterparts in the traditional classroom setting. Using personalized learning strategies in a classroom can be found embedded in Danielson’s Framework (Morris-Mathews, 2021) especially if a teacher encourages students to have a voice in the classroom and in the development of their learning path. Allowing Danielson’s Framework to guide an educator in developing their curriculum will not only strengthen their classroom success but will also guide the educator to be a leader in their school and district. They can demonstrate leadership roles by modeling positive teaching strategies which increase the success of their students and play a key role in determining student achievement and whether personalized learning played a role.

CHAPTER II: REVIEW OF THE LITERATURE

"What if we dedicated time each day to explore new ideas and took off our kids' training wheels to see how far they could go?" (Nesloney & Welcome, 2016, p. 14). The main premise of personalized learning is allowing students to have ownership over their learning progress and to have a voice in how they show mastery of the skills they learn. When students have ownership and voice in their learning, they are more engaged to complete tasks (Rickabaugh, 2016). According to the U.S. Department of Education's National Education Technology Plan (2010b),

> Personalization refers to instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interest of different learners. In an environment that is fully personalized, the learning objectives and content as well as the method and pace may all vary. (p. 12)

According to Rickabaugh (2016), this definition does not include an important aspect of personalized learning: allowing student choice and including the student in the development of their learning path (along with the teacher). "Personalized learning is a progressively student-driven model in which students deeply engage in meaningful, authentic, and rigorous challenges to demonstrate desired outcomes" (Zmuda et al., 2015, p. 7). Personalization has also been described as helping prepare students for the future using innovative approaches and technology (Bray & McClaskey, 2015).

In one room schoolhouses years ago, teachers personalized learning out of necessity due to the limited number of resources and the wide variety of students they were expected to teach. Most students only had access to the *Bible*. Teachers had to rely on whatever books were available which might mean each student had a different textbook. Students in the same class could range from approximately first grade to 8th grade. Students would come and go based on their home life and what was expected of them. Girls, if allowed to attend, were usually only

taught to read, but not to write (Day, 2009). Older students, especially boys, might come to school for a month or two, and then be absent for a couple of months to help with the crops and harvesting on the farm (Morgan, 1982). Teachers had to do their best to educate these students from all backgrounds and all grade levels in one room. With so many gaps in their education, having all students on one level was not feasible. Also, with limited supplies such as books, teachers had to be as resourceful as possible to educate the students.

As the need for public education grew, so did the demands of getting students in and out in an orderly fashion. In the post-industrial United States, schools were formed which mimicked the factory lines and structured environment of workplaces (Rickabaugh, 2016). This system of having students in neat orderly rows with all students learning the same content at the same time in a class has become what we know as modern education (Schrager, 2018).

Before personalized learning took hold in public schools, the introduction of 21st Century Skills was slowly being recognized. The Secretary of Education, Terrel H. Bell, released a report in 1983 known as *A Nation at Risk* (National Commission on Excellence in Education, 1983). In this report, the U.S. National Commission on Excellence in Education examined the failures of the education system in the United States and showed how students were not being prepared for entering a competitive workforce. In this report the Commission noted United States college achievement tests and SAT scores had declined and businesses, including the military, were having to spend millions of dollars to educate high school graduates on basic reading, writing, spelling, and math. They also noted growing industries were searching for potential candidates for employment with computer skills, robotic skills, and technology experience which were academic areas not stressed or even offered by many school districts. The report recommended public schools offer at least four years of English, three years of math, three years of social

studies, and a half year of computer sciences. The Commission also made the recommendation for schools to offer a foreign language. The Commission called for a seven-hour school day and a 200 to 220-day school year for students. Colleges and other higher education institutions were asked to raise their enrollment standards to motivate high school students to reach a higher level of achievement (National Commission on Excellence in Education, 1983).

Because of this report, school districts and the U.S. Department of Education began taking a deeper look at the skills workplaces were expecting in potential employees. Toward the end of the 20th Century, employees focused their job searches on stability. They were looking for a job which could sustain them throughout their adulthood and help support their family. With the turn of the century and digital literacy becoming the norm, employers began searching for employees who were knowledgeable in not only content, but also soft skills. In 2012, in the 44th Annual Gallup Poll (Bushaw & Lopez), 400 employers were surveyed about the soft skills they deemed most important when hiring. The top picks were good oral and written communication skills, critical thinking and problem-solving skills, and basic knowledge in math and reading. It was determined that less than 10% of high school dropouts and less than 20% of high school graduates possessed the skills needed to succeed in the current workforce. Less than 33% of high school graduates possessed the skills needed to be successful in post-secondary education programs (Bushaw & Lopez, 2012). Larson and Miller (2011) defined 21st Century Skills as "… the skills, knowledge, and expertise students need to successfully enter today's workforce" (p. 121). The Partnership for 21st Century Skills, which was developed to help promote 21st Century Skills into education through communication, collaboration, and technology began working to integrate the skills into the current standards. The purpose was to better prepare students for the future (Larson & Miller, 2011).

With all states supporting the public-school system, students were graduating from all over the United States with varying levels of education and skill. The National Governors Association and the Council of Chief State School Officers (along with the non-profit company Achieve) met to focus on developing an international education system in the hopes of bringing some uniformity to the public education system. They also hoped to increase graduation rates and competency in students wanting to attend college (Greer, 2018). This group emphasized overall inequality of educational services across the states. To bring all states on par would entail more rigorous content and setting higher standards for not only students but teachers. This group developed a list of expectations students needed to master to move on to the next grade level and eventually graduate from high school. This list, called the Common Core State Standards (Council of Chief State School Officers, n.d), was released in 2010 after additional input from the public. States were not required to adopt these standards for their public education systems, but 43 states did adopt them to provide a more uniform education and have a measurement system for student success (Deas, 2018).

As the push for a more rigorous educational system in the United States to compete globally emerged, the gap between those students who had succeeded and those who could not keep up with the learning defined in the Common Core Standards widened. The Standards did not address students with challenges and did not outline interventions to be used for those students failing or falling behind in their achievement (Butterfield & Kindle, 2017). With the introduction of the Education for All Handicapped Children Act in 1975 (20 U.S.C. 1400) more students with disabilities were educated in the public school than were institutionalized. The gaps in achievement and problems with addressing individual student needs was still evident. The Individuals with Disabilities Act (IDEA) worked at improving special education even more by

providing funding for schools which gave access to free and appropriate education to students with disabilities (IDEA, 1990). Schools could then hire special education teachers and staff to collaborate with general education teachers to meet the individual needs of students with disabilities. Even with additional help for students with disabilities, those students who did not meet the eligibility requirements of special education but were still failing needed support not outlined in any of the legislation. The introduction of No Child Left Behind (Ruff, 2019) in 2001 put additional pressure on schools to perform and ensure proficiency in students. State tests scores were used to ensure schools were making adequate yearly progress towards proficiency. Schools that were not making adequate progress were in jeopardy of losing funding (Ruff, 2019).

The gaps between those students who stayed focused and learned at a steady pace and those who missed concepts and never really caught up was consistently growing. The prospect of those "gap" students reaching proficiency was dim. This growing gap had increased the number of students placed in special education or being retained without trying possible interventions first. To help reduce the number of students in these gap areas, school districts implemented programs such as Response to Intervention (RTI) (Jimerson et al., 2016), a movement encouraged by the Individuals with Disabilities Education Act of 2004. The purpose of RTI was to provide interventions to prevent reading, math, writing, and behavior failure. Students who were progressing well academically and behaviorally, who were not identified as at risk, and were in no need of interventions were placed in Tier 1. Students who were identified as struggling in an area might be placed in Tier 2 and given one set of interventions. If those interventions did not work, a student would then proceed to Tier 3 where more intensive interventions were introduced. Those students who were not successful with Tier 3 interventions in place might be referred at this point for special education (Jimerson et al., 2016). Even with

the implementation of RTI in most schools, there were some school programs which were not using the program with fidelity. A study conducted by Spear-Swerling and Cheesman (2011) deduced the schools they studied needed additional professional development in order for RTI to be implemented correctly and successfully.

In order for RTI to be implemented with fidelity, many school districts would like to hire additional staff to work with students who were identified to receive RTI interventions (Engels, 2015). Because of low funding the money was not always available to hire staff to carry out the RTI groups. RTI also requires monitoring of student progress and advanced professional development for teachers to carry out the actions, which increases funding needs. The gap in resources and staff meant many general education teachers developed creative ways to implement RTI interventions into their curriculum without leaving out any standards (which are required teaching under current legislation). Since the RTI interventions were individualized to student's needs and weak areas, finding the time within the school day to have RTI interventions can be a burden. With the introduction of a personalized classroom setting, teachers look to not only individualize a student's targeted weak areas (RTI), but also their strengths. Personalized learning allows the teacher flexibility when developing individual plans with students to include their RTI interventions (Bray et al., 2015).

When examining today's youth and their use of technology and how they can learn to accomplish almost anything from making a video to learning a second language, it is not surprising to note almost 62% of teenagers go online for more than four hours a day with up to 29% being online more than eight hours a day, not including homework (Rideout & Robb, 2019). The use of technology is one of the ways to incorporate 21st Century Skills into the current standards to make classrooms more engaging and increase creativity. "Using technology

in the classroom provides students with foundational knowledge and skills that make them employable upon graduation" (Reddy et al., 2020, p. 46). The list of 21st Century Skills is long when based on student needs for the workplace. They include, but are not limited to, the following: critical thinking, problem solving, information and technology, communication skills, collaboration, and contextual learning skills (Kaufman, 2013). To be identified as a 21st Century Skill, it would need to be deemed necessary to be successful in the workplace (van Laar et al., 2020). The best way for teachers to promote these skills in the classroom while embedding them into the curriculum is to enhance the creativity of students by allowing them to be expressive when completing projects, not just passive learners. Students can learn to problem solve and collaborate with others when given a deadline and end goal while allowing them freedom to create their own learning-path. The teacher must be there to guide the process without monitoring each step (Yoo & MacDonald, 2014).

Statement of the Problem

Parents and students frustrated with public education, but still committed to degree completion, often seek alternative methods of schooling outside the brick-and-mortar school structure. According to the National Center for Education Statistics (2018), "In 2017, there were 2.1 million status [students] dropouts between the ages of 16 and 24 and the overall status [students] dropout rate was 5.4 percent" (para. 1). To target students who were dropping out and the future students at our schools (to decrease dropouts and increase public school enrollment), many educators were looking for alternate ways to provide instruction and an education to our youth. Since teachers were now competing with technology and the era of instant gratification, being able to personalize a student's learning and target their interests had become popular. School districts were seeking ways to allow students to have more ownership in their learning

and to be somewhat in charge of their own goals and success. Because of this shift, some districts were implementing personalized learning to allow students to become more engaged in their educational journey. Personalization allowed students to explore their own passions and interests while learning. It made them an advocate for themselves without having all their actions micro-managed by a teacher. Personalized learning helped develop the skills of problem solving and creative thinking in our youth (Bray & McClaskey, 2015). With very few studies focused on the success of personalized learning, the purpose of this study was to determine if students receiving instruction in a personalized learning classroom had a higher level of achievement than students receiving instruction in a traditional classroom.

Conceptual Framework

Personalized learning was not a new concept or way of teaching. Similar concepts can be found in John Dewey's interest in developing programs for students that addressed their individual needs. According to Dewey, "all genuine education comes about through experience" (Dewey, 1938, p. 8). Students should be exploring through active experiences in an on-going and continual process. Dewey felt that in order for the classroom tasks to be educational they should be delivered in a way which enabled further lessons and questioning which related to real life concepts (Dewey, 1938).

Bloom (1984) conducted research using similar techniques found in personalized learning. He used a control group where students were taught in a traditional classroom setting and an enhanced group where students were taught using more active learning activities and provided with more feedback. Student engagement was shown to increase with the control group 57% of the time and with the enhanced group 75% of the time. The enhanced group scored one

standard deviation higher academically than the control group. These findings were based on experiments performed over thirty years ago when modern technologies were not available.

Psychologist Piaget (1972) conducted research on the child-centered learner, which led to the development of four stages of cognitive development including the sensory motor stage, the preoperational stage, the concrete operational stage, and the formal operational stage. His studies concluded children move from one stage to another at different paces. How and when they move from one stage to another was based on their previous experiences, their background knowledge, and their understanding of the world around them. Like the concept of personalized learning, children will learn at different timeframes because they are active learners.

A teacher's effectiveness to deliver content, to engage students, to attend professional development, and to receive administration support were also factors in the success of incorporating personalized learning in a classroom. To adequately gauge a teacher's effectiveness, school districts tended to look at a teacher's education and credentials. Teachers with a solid resume were assumed to be more adept at increasing student achievement. Danielson's Framework was first published in 1996 and has since been revised three additional times. Developed by Charlotte Danielson (2014), the Framework was utilized by over 1,000 organizations in 45 states in 12 countries to aid in assessing teachers and their ability to deliver content. The Framework (2014) was composed of four domains including planning and preparation, the classroom environment, instruction, and professional responsibilities. The Framework also included descriptors of each domain and included four levels of performance including unsatisfactory, basic, proficient, and distinguished. By using Danielson's Framework, teachers could self-assess their teaching ability. Administrators in turn could use the Framework

to observe teachers and gather data which led to open conversations and allowed for a shared vision for a developing teacher (Danielson, 2014; Hunzicker, 2017).

Danielson's Framework utilized terminology which encompassed not only a traditional classroom setting but also a personalized classroom setting. In the third domain of the Framework, a teacher could exhibit high quality teaching by engaging students not only in discussion and questioning with the teacher, but by guiding the questioning to be between students. The Framework encouraged students to have a voice in the classroom and in the development of their learning path. It also encouraged teachers to have a voice not only in their classroom but in their school. In the fourth domain teachers could demonstrate their leadership qualities and have a voice. The fourth domain wanted evidence of a teacher's participation in a professional community, evidence of how they grow and develop professionally, and evidence of how they exhibited professionalism. According to Dunkin and Biddle (1974) most educators had a commitment to improving their teaching and used previous research or professional development to guide this improvement in their careers. In most school districts there were limited opportunities for teachers to hold a leadership role which was compensated, but there were other ways to demonstrate leadership within a school including advocacy, modeling of teaching practices, and having a voice in decision-making within the school (Hunzicker, 2017).

Kentucky's Department of Education's Education Professional Standards Board office (Division of Educational Preparation, Assessment, and Internships, n.d.) was assigned the responsibility of keeping track of educator credentials and certifications and investigating any misconduct by an educator. They had standards for not only principals and teachers to follow, but also teacher leaders who may one day strive to be a building or central office administrator. When reviewing these standards, the teacher leader, educational leader, and teacher standards all

contained similar strands. All three sets of standards guided educators from all levels to cultivate a culture of learning and success, be professional, guide assessments which promoted academic success, be organized and responsible when performing duties, and foster a relationship with community members. The Department developed sets of standards which not only guided a teacher on how to be effective, but also how to become a leader in their field. To become a teacher leader in the education field many districts required additional certifications or professional development. However, by following the Danielson Framework and striving for accomplished and possibly exemplary status, an educator would be more adept at moving into the role of a leader in the building and central office. School leaders, especially teacher leaders, were essential when deciding which programs school districts would try to implement.

Personalized Learning

Implementing personalized learning in a school district required substantive changes in a classroom. These changes could be positive or negative based on various factors many of which involved the teacher and their characteristics. Some of the characteristics which influenced the outcome of implementing personalized learning could be a teacher's years of experience, the quantity and quality of professional development and training they have received, their personal beliefs and background experiences, their knowledge of the pedagogy which accompanied their job assignment, and their overall satisfaction with their current teaching position (Hughes, 2012).

Even though many educators had heard the term personalized learning and thought they understood what it meant, this term has often become confused with other, similar concepts such as differentiation, individualization, blended learning, and project-based learning. For school districts to make a shift to offering personalized learning classrooms, understanding the different concepts was necessary. Differentiation is similar to personalized learning by including student

voice and choice into the lessons. However, even though students have a voice in how they learn, they are usually choosing from a predesigned curriculum based on the individual needs of a group of students versus the individual student. The teacher still maintains control of the content delivery (Kallick & Zmuda, 2017). Individualization in learning is based on the needs of the individual student; however, the tasks or assignments are created by the teacher. The student can set his/her pace but has limited input on how mastery of the content is delivered (Weichel et al., 2018). Blended learning is "any formal education program in which a student learns at least in part through online learning with some element of student control over time, place, path and/or pace'' (Horn & Staker, 2017, p. 9). Blended learning allows for a variety of projects to be introduced into the class curriculum while utilizing technology as a support for additional practice and to target weak areas in a students' learning. The student may have limited voice and choice in how the standards are mastered. Technology can also be used to create or work on projects whether on an individual assignment or as part of a collaborative effort in a small group. When project development is part of the curriculum or included in a student's learning plan, students can use technology to help problem solve or develop ideas to use. However, the use of technology in blended learning is still planned by the teacher (Zmuda et al., 2015). Project-based learning, not to be confused with just completing projects, is a way for students to explore real world problems and build on 21st Century Skills with a deeper meaning. Projects completed have to be intentional and include rigorous activities which encompass numerous standards and subject areas. Projects can be completed by individual students, small groups of students, or whole grade levels. What makes the project valuable is allowing students to be involved in all aspects of development, research, and the decision on whether the final product is a presentation, paper, or design (Bray & McClaskey, 2015).

Bray and McClaskey (2015) note the biggest difference between differentiation, individualization, and personalized learning is the teacher's role. In differentiation and individualization, the teacher still maintains most of the control and makes the decisions about learning. Personalized learning goes one step further and allows the student to make decisions not only about their learning, but how they achieve mastery and show they know the content. The student has an active role in creating their learning plan and setting their own goals. This model allows for the teacher and student to co-design the learning which takes place in the classroom. It encourages the students to become invested in their learning and choose topics which they have an interest in. Personalized learning promotes independence and self-directed learning. Students can access the curriculum themselves and be assessed in multiple ways by their teachers. Students can then look at their current progress and determine whether they have met their personal goals. According to Bray and McClasky (2015), if the goals are not attainable, they can then set new goals which will allow for success without frustration. The goal setting helps keep the student focused and engaged. They can also determine how they will reach their goals and work with a teacher or other educator to collaborate on the best way to achieve their goals. When learners are actively engaged and critical assessors of their learning, they make sense of information, relate it to prior knowledge, and use it for new learning (Bray & McClaskey, 2015). In order to proceed with personalized learning, there are three factors to consider which could cost a district money and support. These include whether to use technology and how much to purchase, getting buy-in from staff and parents, and whether to incorporate flexible seating in the classrooms.

Technology

To accomplish personalized learning, some schools use technology as one way to help individualize the content (even though it is not required). Schools which use the Montessori Method utilize similar methods to personalized learning such as encouraging individualized learning and encouraging deeper learning skills without the use of technology (Aljabreen, (2020). The teacher still maintains the role of facilitator; however, the technology allows for students to work on critical thinking and problem solving either with a small group or individually. By using technology as a resource in personalized learning, students can be on their own level and work at their own pace to enhance the skills already introduced by the teacher. It allows for additional practice and a way to show mastery. Most students use technology outside of school and are very versed in how to manipulate their way through the programs. The learning curve to implement technology into the curriculum is minimal since most students possess high levels of digital skills. Implementing technology into the classroom with traditional teaching can enhance the learning experience of students and allow more time for one-on-one instruction and small group time with students who are struggling with specific concepts. These digital learners can then learn to collaborate, share, and connect not only with other peers, but their teachers. It allows students to problem solve by reaching out for help not only from their teachers, but also from other students and online resources. Classrooms can use a variety of resources including audio books, books on a variety of levels and languages, writing assistive technology, and online learning games (Bray & McClasky, 2015). Personalized learning uses a combination of all these types of learning to enhance the educational delivery of content (Weichel et al., 2018).

Flexible Seating

An optional factor of personalized learning that is not always included in the literature is the incorporation of flexible seating in the classroom as noted by Bray and McClaskey (2015). Flexible seating looks very different from personalized classroom to personalized classroom. It also varies greatly from kindergarten up to the high school level. The types of seating and the amount of seating is usually based on teacher preference and comfort level. Not all teachers are comfortable with their students sitting on the floor or bean bags. Whereas some teachers do not care where their students sit if they are actively engaged and learning. Flexible seating is to promote more active learning versus a passive class (Detlor et al., 2012). Flexible seating has been shown to increase student engagement, promote collaboration between students, and assist students in becoming more social. It also targets students who may have ADHD or autism by allowing them more movement throughout the day (Sorrell, 2019). Since children are now learning in a variety of areas at home, they feel more at ease learning in a variety of areas at school where they can have a choice in where they sit (Julian, 2013; Kariippanon et al., 2017). For those teachers who lecture or strive for a more divided space, flexible seating is not an option. Those educators usually have rows of desks and chairs, and all learning takes place in a structured environment. Some educators want to assign desks to certain students to reduce the chance of disruption or unnecessary talking. In a personalized learning classroom, there may not be any desks or traditional chairs. The tables may be of different heights with stools or chairs. Some students may have rugs to sit on the floor. Beanbag chairs or couches may be visible. Some classrooms may have balls or milkcrates for students to use as seating. Unless there is a continuous behavior issue, most students do not have any assigned seating areas. They choose their seat based on where they were currently learning in the room. During whole group

instruction, they may all be seated on the floor. During small group instruction, the students may be based all around a small table. The active learning spaces may have chairs on wheels or colorful areas to look more inviting. Students, overall, are given the freedom to choose their learning space. (Basham et al., 2016; Harrington & Libby, 2016; Sorrell, 2019).

Buy-In

To introduce personalized learning into a school, there has to be buy-in from many levels of the educational structure. According to Kallick and Zmuda (2017), whether introduced by the superintendent or board office staff or a building level principal, the staff who implement personalized learning need much guidance and support. Schools may send teachers or staff to other schools using personalized learning to observe classrooms or talk with other educators. They may participate in professional development, read books, or join professional communities geared at teaching personalized learning strategies (Lenz et al., 2015). Personalized learning is a hard concept to start using and requires much preparation to implement in a classroom or a school. Teachers who start using personalized learning in their classrooms may fail many times and revamp their strategies or plans. What worked in one classroom may not always work in another classroom (Kallick & Zmuda, 2017).

Change is very hard to accept in a school district without proper planning and sharing a vision with all staff at all levels. A good leader can bring about change without upsetting the opponents. A bad or inexperienced leader can fail miserably when trying to bring about change before even getting the plan off the ground. According to Hall and Hord (2019), leaders can make all the difference in a school district by how they approach bringing about changes in the school. A good leader does not lead alone. A good leader models great leadership and gives power to others below them to build a great leadership team within their school. There are three

components to leadership and making changes in a positive way. These are concern for people, organizational efficiency, and strategic sense. Good leaders pay attention to their co-workers. They listen, find out about their employees, and build positive relationships with their staff. They encourage participation and feedback about work issues and keep them in the loop from the beginning when trying to implement change. A good leader does not have to be in charge of all aspects of work. They encourage others to step up and be leaders and praise them for their leadership roles. A good leader stays focused on the vision of the new changes and addresses problems directly to keep the team moving in the same direction (Hall & Hord, 2019).

One of the first decisions a school leader or administration has to make when deciding to implement personalized learning is whether to use multi-aged classrooms or single aged classrooms. Multi-aged classrooms usually involved having two or more teachers in a large room with students from different grades. For example, a kindergarten class and a first-grade class would be combined into a large room with two teachers. A single-aged class would be similar except only have two of the same grade classes combined with two teachers. A single-aged classroom still allowed students to receive personalized instruction as they progressed through the standards. They would only be in groupings with other students their same grade level. However, a multi-aged group of students allowed students to progress through their standards but be exposed to either a set of standards above or below their grade level (Bailey et al., 2016). There are pros and cons of both ways. Students exposed to the multi-aged classrooms could progress through their standards while being introduced to more challenging standards. They may also participate in groups targeting low level skills where they exhibit a weakness without everyone in the class knowing they are in a lower group. The barrier to having a multi-aged grouping is the ability of the teachers to target everyone on their own level. Students may have

progressed too fast through one set of standards and be through with most of the next set of standards before exiting the classroom at the end of the year only to find themselves even more bored the following year if not given the opportunity to move ahead. Planning on the part of the teachers in a personalized setting was crucial to ensure that all students receive the educational level they need (Bray & McClaskey, 2015). Another drawback to having multi-aged groups is the delivery of content in a tested area. If a class is multi-aged with second and third graders together, then the teachers had to ensure not only to teach the standards to all students, but to target those who would have been state tested at the end of the year and ensure they did not miss out on opportunities to challenge them when needed. Again, it is crucial for the teachers of these classes to be well-prepared and knowledgeable about the standards and what was expected of their students for the school year. This type of teaching is not the old way of teaching from a company bought book. Personalized teaching requires utilizing many resources and having input not only from other teachers, but from the students on how to assess and deliver the content (Pardini, 2005).

Attributes of Personalized Learning

Student Voice

In a personalized classroom, student voice is an important attribute. Students are in control of their learning process (Kallick & Zmuda, 2017). This includes being able to give assessments in a variety of ways. Students can choose to show mastery of content learned by writing it, verbalizing it, completing a project, or showing what they learned using manipulatives or drawings. They can create an online platform displaying their knowledge or create a speech. The avenue of showcasing their learning is unlimited. Students can help develop rubrics by which their learning is measured. With personalized learning, students show mastery of a variety

of standards, not just the current ones learned. Being allowed a choice in how a student shows mastery helps those who are not good test takers or have anxiety. This allows a student voice and choice in their learning while making personal connections to what they learned (Bray & McClaskey, 2015).

Co-Creation

Another attribute in personalized learning, according to Kallick and Zmuda (2017), is co-creation. In a traditional classroom, all the learning, planning, assessments, and delivery of content is developed by the teacher. The teacher develops the pacing at which learning takes place and decides how deep to delve into each part of the standards. The class has a whole group goal, and the teacher determines how much to challenge the students. Most of the outcomes in a traditional classroom are based on the assessments and how well students score (Kallick & Zmuda, 2017). The bottom line is most teachers are teaching to a standardized state test because that is what has been expected of them for so many years. Teachers are ranked and assessed on how well their students for the current year can memorize content on a state exam and not whether students understood what they were learning. Our colleges have based students' admission into college on standardized scores. It is a continuum of assessments based solely on memorization and practice of skills. The premise behind personalized learning is to teach students how to not only memorize content but make personal connections to it through a variety of projects and experiences. By allowing students to co-create their learning goals and outcomes, students become more interested in their learning and want to perform well to achieve their own personal goals. The outcome would be students showing critical thinking and problem-solving skills (Zmuda et al., 2015).

Social Construction

Kallick and Zmuda (2017) note a third attribute of personalized learning is social construction. Traditional classrooms have promoted quiet areas to work and learn. Communication in a traditional classroom is mostly teacher-led with students raising their hands to answer a variety of questions. Most of the conversation is directed towards the teacher and is in response to a question or scenario introduced by the teacher. Students are sometimes allowed to participate in groups where discussion is led by the students, but the topic is usually pre-chosen by the teacher and the conversation is similar in all groups since the content delivered was shared by all students. Social construction promotes working collaboratively with others and building on the knowledge of other students (Kallick & Zmuda, 2017).

In personalized learning, the social construction takes on a whole new look. Students are taught and encouraged to speak up and share their own ideas. Questions are not only to be asked by the teacher, but also by the students. Students are encouraged to ask other students their opinions or answers to questions. Students are encouraged to discuss with their peers versus always using their teacher as the only one with the answer. The teachers encourage group discussions without close-ended questions. Collaboration is encouraged for students to learn from each other and share their own personal experiences. These active discussions must be taught by the teachers at first, but as the students are exposed to experiences with collaboration and conversations, they become more independent in their responses (Rodman, 2018).

According to Mahn (1999), the basis of social construction is from Vygotsky's sociocultural theory. It is the theory that students need to learn through conversations, interactions with others, and active learning. It states that knowledge is derived from the process of having students answer their own questions, without regard to whether they are right or

wrong. Students would develop their knowledge through social interaction and shared experiences by observing the world and taking an active role in participating in creative activities. They would try out new ideas and be encouraged to learn from their errors. Students should explore, solve problems, and interpret what they already know through past experiences. They should be able to reflect on what they have learned and be able to apply the knowledge they have acquired to future lessons (Mahn, 1999).

In social construction, students participate in small groups working towards an instructional objective. Each student can take on a role within the group and the teacher facilitates by supporting and guiding. Teachers should discourage competition and promote active participation and interaction. Students build on the knowledge by understanding what they already know, what they need to know, and how they need to access new information which might lead to the resolution or answer they seek. Students within the group can come up with their own answers and work collaboratively with others to investigate new ideas or concepts for meaningful learning (Jaramillo, 1996).

Self-Discovery

The last attribute of personalized learning, according to Kallick and Zmuda (2017), is self-discovery. In a traditional classroom, student success is based on a final grade on homework or an assessment. If the student is satisfied with their grade, then that part of the lesson is over and new content is introduced. Even if the student is not satisfied with their grade, there is not much they can do about it. They can try to study harder or better prepare themselves next time, but they cannot change the outcome. There is very little self-reflection or self-assessment of how to improve themselves (Kallick & Zmuda, 2017). The recognition of strengths and weaknesses is not usually a part of the learning process. In personalized learning, self-reflection, which is part

of self-discovery, takes place on a continuum. Students, along with the help of the teacher, are discussing the progress on assessments or their learning plan, determining their strengths and weaknesses, writing personal goals, and then determining if their goals are being met, whether they need to be rewritten or amended, and the timeframe in which they will meet their individual goals. By using self-discovery as part of the learning process, it keeps students on target to complete their necessary skills and learn the standards they do not already know. In a traditional class, all students must learn or sit through the teaching of each standard for the school year even if they know it. A student who already knows how to compute single- and double-digit multiplication must listen, take notes, and practice the content being delivered on something they mastered before the lesson started. In a personalized setting, students can show mastery of a standard or set of standards and then move on to the next standard. They do not have to be bored by a lesson they already know. They can move onto an area of weakness or a challenging area of need.

Seven Key Elements

According to Zmuda et al., (2015), for personalized learning to be successfully implemented, seven key elements must be addressed. These include goals, inquiry or idea generation, task and audience, evaluation, cumulative demonstration of learning, instructional plan, and feedback. As stated before, teachers must allow students to be a part of personal goal setting. These goals should encompass not only a student's strengths, but target weaknesses such as listening skills or focus. Inquiry or idea generation allows students to help develop ways to explore the curriculum. Not all classroom assignments or tasks should be created by the teacher. Using a student's input allows for more creativity and ownership in work. When developing a plan with a student, each task needs an authentic audience to target. Most work completed in a

classroom has a target audience of the teacher. Students need to be able to create work tasks that aim for a larger audience than just inside the school. They need to experience working with community members, other students, and other adults in the school or district. An extension of a student's ability to address different audiences with their work would also include having others evaluate their finished product. Students themselves should also be included at times in the evaluation process of other students and themselves. A student will be able to reflect more accurately on their successes or failures by being able to express how they felt they performed. As a student becomes more familiar with their own learning preferences, they can adjust their instructional plan. Even though this plan is developed early in the year jointly with the teacher and student, self-assessments and reflections help a student stay on course and make changes in their plan as needed. The final element is feedback. In traditional classrooms, most feedback is given to students after completing work that is turned in. The feedback may not be received until the next day or even days later. By this time, it has lost its relevance. Feedback needs to be immediate and intentional. A student not only needs to hear what they did wrong, but what they did right (Zmuda et al., 2015). It needs to be relevant to the current lesson with the opportunity for the student to ask questions and possibly tell how they could change the work to improve it (Kallick & Zmuda, 2017).

Personalized Learning versus Traditional Learning

When a school district makes the decision to implement a new program, they have to decide which model can bring them the most success. To understand which model would work for a particular school system, one must consider all the variables which impact outcomes. Dunkin and Biddle (1974) developed a teaching model which included four variable types: presage, context, process, and product variables. Presages are the variables which influence a

teacher and their teaching behaviors. These include their formative experiences, their training experiences, and their teacher properties. Context variables are those variables which cannot be changed such as background, personality traits, number of students, age, gender, and learning preferences. Process variables are the activities of the classroom and the interactions (positive and negative) between students and teachers. The product variables were the direct outcomes from the teaching process. This includes student growth, or the attitude towards the teaching based on the classroom interactions. Presage and context variables influence process variables and process variables directly influence product variables (Dunkin & Biddle, 1974).

The success and failure of both traditional and personalized classrooms cannot be attributed to just the teaching model. As included in Dunkin and Biddle's model (1974), there were many variables which were considered before determining one classroom model was better than another, in this case traditional classrooms versus personalized learning classrooms. When defining a traditional classroom, Rickabaugh (2016) stated traditional classrooms were where the teachers made all the decisions. Students had little say in what and how they learn, very little voice and choice. In this model, teachers base their classroom curriculum around students listening, memorizing content, and using whole class instruction to deliver the content. Students continue through the standards at the same time. A traditional classroom does not focus on individual creativity of students and problem solving. The desks are usually in rows facing forward or in small groups. The following are characteristics typically observed in a traditional classroom: teacher-led instruction, grouping by age, learning at the same rate, using the same instruction for all students, waiting for a student to begin to fail before providing needed interventions, using letter grades, using an external reward system not integrated into the curriculum, and using recall to determine mastery on assessments (Rickabaugh, 2016).

Traditional classrooms were born during the industrial revolution when factories and fast production were popular. The curriculum focuses on rote memorization and content recall.

With many school districts trying to transform traditional classrooms into personalized classroom settings, scholars have tried to define what personalized learning means and what it should look like once implemented. No two programs had the same definition or components in place. Zmuda et al., (2015) defined personalized learning as "a progressively student-driven model in which students deeply engage in meaningful, authentic, and rigorous challenges to demonstrate desired outcomes" (p. 7). Rickabaugh (2016) defined personalized learning as "an approach to learning and instruction that is designed around individual learner readiness, strengths, needs, and interests" (p. 6). According to Kallick and Zmuda (2017), there were four main elements that were required for personalized learning to be a success. These included student voice, co-creation, social construction, and self-discovery. Student voice goes hand-in-hand with a student being able to define their educational path and goals.

In a traditional setting, students show mastery of a set of skills or standards based on teacher choice. Most teachers use a standardized quiz or test to determine whether the student learned the content or needs additional support or reteaching. Some students internalize what was tested and make a connection to the real world or personal experiences and retain the information for some time after the test. Other students did not make connections with the content, and therefore, forgot what was taught and moved on to new content to be memorized. By allowing students to have a voice and help co-create their learning plan and how they will show mastery of the standards, students are more engaged. They follow a plan which includes their own interests and their strengths (Zmuda et al., 2015). The structure of the classroom is usually designed with few desks and no rows. According to Sorrell (2016), a personalized classroom

uses flexible seating with anything from bean bag chairs to mats on the floor. The idea surrounding flexible seating was to give students a choice in where they sit since not all students concentrate well sitting at a desk (Rickabaugh, 2016).

The overall differences between the two programs are student choice and voice. With traditional classrooms having the curriculum set by the teacher, students had little to no input in how the standards were taught. With personalized classrooms having students help develop their learning plans for the curriculum, students had input into how they learned.

Personalized Learning Models

Honeycomb Model

One of the ways to begin implementing personalized learning into a school system is by using the Honeycomb Model. The Model, developed by Rickabaugh (2016), is based on three components. These are learner profiles, customized learning paths, and proficiency-based progress. On paper the model represents a visual which looks like a bee's honeycomb. The three components are placed in the middle and are the core behind the Model. All decisions and frameworks are based around these three components. Each student in a personalized classroom needs a learner profile to begin their journey. Their learner profile will include their demographic data, their academic status, their learning-related skill set, and their potential learning drivers.

Learner Profile

Demographic Data. A student's demographic data is usually the easiest to collect. This not only includes their living environment, but possible barriers to their learning as well. The student may have an IEP or other learning or physical disabilities which may affect their ability to learn when compared with their peers. The teacher may need to share or obtain information with other related service providers including a special education teacher, speech teacher,

therapist, or outside educational resource. A student may need modifications and/or accommodations in the classroom to help them be successful and ensure they receive equal access to learning (Rickabaugh, 2016).

Academic Status. The next component to the Honeycomb Model is academic status. Schools have very different ways to determine the data collected for academics. Many schools use standardized testing or grade cards, but even these may be different from school to school or even state to state. Some schools use standardized grading scales which vary from traditional grading scales of the past. Standardized grading scales look at the individual standards and how a student mastered each standard versus looking at a group of standards and taking a grade based on how many points were scored for an assessment. Overall, schools use a variety of data points to gauge a student's growth which includes not only classroom assessments, but computer-based testing and progress data. Using this data helps teachers determine what level a student is currently on and what they need to learn from this point on (Rickabaugh, 2016).

Learning-Related Skill Set. The third component of the Honeycomb Model is the learning-related skill set. By using the data from the academic status of a student to see what they need to learn, the learning-related skill set looks at how they need to learn. Teachers use a variety of instruments to determine how a student learns best. They can use learning preferences, anecdotal notes from previous teachers, and observations. Students do not learn all the same way. Some students require more independence than others. Some students require more manipulatives or micro-managed time. For a teacher to offer a variety of learning strategies in the classroom, they need to know their students and what their individual strengths and weaknesses are in the learning environment (Rickabaugh, 2016).

Potential Learning Drivers. The last component of the Honeycomb Model is potential learning drivers. These include their likes, dislikes, what they want to be when they get older, possibly what their parents do for a living, what type of background experiences they have, and how exposed they are to other options of after school choices such as military, on-job training, college, and trade school. This component becomes even more important as a student gets older and much closer to leaving school behind. To better prepare them for a diverse world, they need to have the experiences which will get them ready to conquer their next phase of life. Younger students may have limited access to a variety of information when it comes to career goals. Most of them want to be a fireman, policeman, teacher, or dancer because of their exposure to children's books and who they deem as heroes. The options a teacher can provide to those younger students in a personalized classroom can help foster those interests and help them open up new ones they have not experienced before (Rickabaugh, 2016).

Customized Learning Paths

Giving students a choice in how they show mastery or progress of their understanding of the standards ensures not all students are following the same learning path. Students learn at different rates and levels, and by customizing a learning path for each student, the student has the autonomy to excel at their pace while demonstrating what they have learned by incorporating their interests into the curriculum (Rickabaugh, 2016).

Proficiency-based Progress

When implementing any program into a curriculum, teachers must develop a plan of how to assess a student's progress. A student's progress must not be based on how much time they spend at school or on a project but on how well they show mastery of the standards. Giving a

student a choice on how they show mastery should include options which challenge the student and are based on relevant content, and not simply a task to be completed (Rickabaugh, 2016).

Learning and Teaching

The next set of strategies in the Honeycomb Model surrounding the three core concepts are based on the learning and teaching of the personalized model. After a teacher gathers the information about their students, they must then progress towards the strategies and tools they are going to use to provide that instruction in the classroom. The teacher will want to incorporate multiple learning and instructional methods into the curriculum while also giving the students voice and choice in their learning path. The teacher will want to incorporate a system of opportunities for deeper learning and feedback while addressing each student's goals and collaborative efforts to determine mastery of the standards being taught (Rickabaugh, 2016).

Relationships and Roles

The outside parts of the Honeycomb Model are based on relationships and other collaborative resources. These could include other educators, outside community resources, computer-based programs which collect data, professional partnerships, and professional development. A school that is integrating personalized learning for the first time in their school system should not attack this endeavor alone. They must be willing to ask for help and seek out resources that give them support when things need to be changed or enhanced in some way. There are many school systems that have successfully integrated personalized learning classrooms into their schools. The strategies and methods they use may not work for all schools, but their continued support and recommendations of how to improve a personalized learning setting can only help lend ideas to others (Rickabaugh, 2016).

Optimal Learning Model

The Optimal Learning Model is another way to implement personalized learning strategies into a school curriculum. This model was developed to meet the needs of students through their own interests and needs. The purpose of the model is to place more emphasis on experiences shared with students versus rushing through the content, and to build independence in the students. Some examples of Optimal Learning experiences would be having students work in small groups, students practicing a task together with teacher guidance, or students demonstrating a task before the class (Routman, 2012).

The model focuses on steps to student independence by beginning with a lot of teacher involvement which is slowly reduced to minimal involvement – as students take the lead. An example of using the Optimal Learning Model in writing would be to begin by the teacher introducing the style of writing to be studied. The teacher would hold a teacher-led discussion with input and questions from the students about the technique of writing and purpose. The next step would be modeling the writing for the students. The teacher would demonstrate the appropriate technique used in a way where all students could visually see such as on an overhead or large paper. The third step would be a shared writing where the teacher would once again write for the entire class to see while getting much input from the class and guiding them in the correct format. The fourth step would then be independent writing where students develop their own version of the paper with input from the teacher only when necessary. The final step would be feedback from the teacher to aid in editing for a final draft (Newman & Bizzarri, 2011).

The Optimal Learning Model was introduced into the Summit Public Schools in California, the Whittemore Park Middle School in South Carolina, and in the New York City public schools. The Summit schools began a pilot program based on the use of personalized

learning. At the time only 39% of their graduating students were eligible to attend a four-year college, and those who attended college were having to take remedial courses because they were not prepared. The Optimal Learning Model focused on three principles. These were blended learning, competency-based learning, and student choice. The program began by targeting math since this was deemed one of the weaker areas for students. They expanded personalized learning to encompass all subject areas. They also offered one-on-one tutoring because of the results of parent and student feedback. Since using the Optimal Learning Model, almost all the graduating students have been accepted to a four-year college and their test scores have increased (Childress & Benson, 2014).

The Whittemore Park Middle School was the lowest-performing school in their school district riddled with gang activity and with one of the nation's lowest graduation rates. To make a change the school officials received a grant and implemented their version of personalized learning and the Optimal Learning Model which they called ICAN (Individualized, College and career readiness, Aspirations of students, and Network of support). The purpose was to meet students where they currently performed, interact in smaller groups and give students the chance to gain a deeper understanding of the abilities (Childress & Benson, 2014).

New York City officials implemented their version of the program which they called iZone (Innovation Zone) which combined technology and teacher instruction to promote student-led learning. They started with 81 schools throughout New York and hoped to reach 400 schools. This program also incorporated personalized learning with the Optimal Learning Model in the hopes to individualize learning and engage students to increase student achievement (Childress & Benson, 2014).

Barriers

Clear Vision

Not being able to define personalized learning with one definition was one of the greatest barriers to implementation. New strategies and programs are continuously being introduced to teachers each year with required professional development and multiple hours spent on trying to incorporate a new program into their fast-paced curriculum. Before a district could begin to implement a program, there needed to be clear vision, a clear definition of personalized learning, and how and why it would be used meaningfully. Being able to answer the question of "why" a district was making a change was crucial before developing a plan (Zmuda et al., 2015). "Providing students with why the learning is relevant is a critical component to their understanding and motivation" (Almarode & Vandas, 2019, p. 33). This statement also rang true for school districts. Buy-in came not only from the school staff, but also the parents who wanted to know how this affected their children (Jenkins & Kelly, 2016). With many different personalized learning approaches and methods available, a district had to define what they wanted personalized learning to accomplish in their schools and the steps to get there. This process needed to include the community and outside stakeholders to develop a system which was to be self-sustainable (Bray & McClaskey, 2015).

Budgets

After determining why, a school district that wanted to undertake the task of implementing personalized learning, had to determine how they were going to fund it, how they were going to provide professional development, and how they would get buy in from teachers, parents, and students. Budgets were already tight in most school districts with administrators doing their best to stretch their resources and trying to raise money through donations or

fundraising. Even with fundraising as an option, poorer school districts could not compete to raise enough money for technology which led to different amounts raised by schools (Winton, 2018). With technology being a key component to personalization, the price tag on education went up tremendously. Technology in personalized learning was a way to enhance the learning, not substitute for a teacher. Integration of technology had to be meaningful and an improvement on teaching (Weichel et al., 2018). Many schools could not afford to go one-to-one and provide every student with their own device. Those who could, not only took on the price tag of new computers or laptops, but the leasing, upkeep, and maintenance of all the devices. Those school districts who did not have the budgetary means to supply devices to all their students, had to then work out a system of sharing amongst classrooms which can lead to scheduling conflicts.

Professional Development

Once a district determined how much they would invest in technology for personalized learning, they had to determine what schools and teachers would be chosen to start this new path. Most often schools had personnel who were more than willing to take on a new challenge, especially recent college graduates. Even with a barrage of teachers willing to undertake the new journey, providing the means to instruct them on what and how to start personalizing in their classroom became the next challenge. As stated before, school districts were already stretching their budgets as far as they could go. With or without the implementation of new technology, providing professional development was becoming quite costly when having to bring in outside trainers or pay for visits to other school districts with successfully implemented personalized learning classrooms. Professional development was crucial in getting around the stigma of "working it into the schedule." School districts also wanted teachers to be tech savvy versus technologically illiterate. Teachers had to be prepared to work with students who were already

tech savvy and guide them towards being prepared for 21st Century Skills (Raulston & Alexiou-Ray, 2018). Professional development choices should be made which are directly aligned to personalized learning versus sending staff to conferences offering a wide variety of options, many not related to individual school demands (Lenz et al., 2015). Schools that had the funding to provide additional technology in their classrooms were finding their schedules were more flexible. Teachers and administrators who did not have the extra technology were having to be creative in scheduling in order to still meet the needs of students using a personalized learning model. According to Kallick and Zmuda (2017), a lot of time and work would be required not only from the teachers, but the students as well. Personalized learning was a commitment that required a growth mindset. Elementary settings had a more fluid schedule; however, high schools that had purchased additional technology were seeking out programs and software which would work with the rigorous schedules they offered (Schwartz, 2019).

Marketing

After preparing the masses for their new adventure in teaching, another barrier to implementing personalized learning had to be overcome. Teachers and building administrators had to decide how to "market" personalized learning to their parents and key stake holders. With open communication with stakeholders and community members from the introduction, the transition to the rest of the community could go smoothly. Many parents only knew school by what they experienced themselves. School districts located in more rural areas did not have the competition with charter and private schools which boasted programs such as personalized learning. Being able to explain what personalized learning looked like and how it would benefit the school and their students was a huge hurdle when introducing anything new. There were many opponents to introducing new concepts into schools. The mindset is "if it ain't broke, then

don’t fix it.” Being able to include the community by keeping the communication open helped build and keep those connections (Kallick & Zmuda, 2017). Allowing parents to ask the hard questions and being able to provide them with what the school looks like now versus how it will look in the future is crucial (Zmuda et al., 2015).

Opposition to Personalized Learning

Not all students or parents were on board with the move to personalized learning environments. The premise was that student-centered approaches to learning allowed the student to have too much independence and did not teach enough structure. According to opponents, in a personalized classroom, the student had much more control than a traditional classroom which could lead to chaos in the learning environment and in the student’s learning. Students in a personalized class were spending too much time on a computer and the teacher was not providing enough direct instruction (Weichel et al., 2018). Students were not learning patience since the emphasis was on instant gratification. Since students were not all learning at the same pace and on the same standards at the same time, some educators and parents felt the learning environment did not foster mastery. Those against personalized learning stated there were gaps in the learning of students (Zmuda et al., 2015). Those who did not fully understand the concept of personalized learning and only based their opinion on what they observed, may have seen chaos, noise, and movement in a classroom where the norm had been students in rows of desks, quietly working with limited interaction.

Personalized learning was chaos, it was noisy, and it involved much movement. The chaos, noise, and movement were encouraging learning. Students were continuously working on their own plan or goals at different paces. Communication was encouraged from the teachers and educators in the room. Students were problem solving, working on projects, or actively engaged

in group discussions or learning. To the outside observer only familiar with the traditional classroom, a personalized learning classroom appeared to lack control from the teacher and unstructured learning when in fact, much learning and collaboration was taking place (Bray & McClaskey, 2015).

Findings Supporting Study

With a nation of students dropping out of school or turning to online learning, changing how students are educated is a necessity. Some school districts are incorporating personalized learning into their schools to help address some of the issues where traditional education has fallen short. Some students have more success by having a choice in how, when, and what they learn and by having ownership over their improvement. Some administrators and educators believe personalized learning can be the key to increase engagement and student achievement. To date, a few studies have been conducted looking at the success or failure of personalized learning in education. These studies (excluding the Bill and Melinda Gates Foundation study) targeted the perceptions of personalized learning, how to best implement personalized learning, and the success of personalized learning in colleges and universities. Very few formal studies utilizing data from public school systems in the United States comparing students receiving instruction in a personalized learning classroom to those receiving instruction in a traditional classroom setting have been conducted. Additionally, those studies which did compare student achievement in personalized learning classrooms were able to look at subgroups within the data to determine if one group, such as gender or age, were to have an effect on the outcome. By analyzing subgroups, the studies can rule out any contributing factors when investigating relationships between student achievement and personalized learning (Abramo, 2018).

Gates Foundation

Wanting to make a difference in the world, especially in healthcare and education, Bill and Melinda Gates founded the William H. Gates Foundation in 1994. This Foundation, now known as the Bill and Melinda Gates Foundation (BMGF), works at not only improving healthcare, but increasing technology in schools and giving more opportunities to students. One of the ways BMGF sought to improve education was to fund an initiative of $12 million to support personalized learning in schools. Partnering with the Rand Corporation to conduct the study, they collected data on 11,000 students in 62 schools (which were chosen) to evaluate whether the use of personalized learning was successful. Out of the 62 schools, about 10% were public schools and 90% were charter schools. All the schools except for two were considered rural. Around 75% of the students in the study were of color and around 80% qualified for the free or reduced lunch program. The schools were comprised of 46% elementary schools, 32% middle schools, 21% high schools, and 2% were K-8 schools. Since there are many definitions of personalized learning and no one accepted format for implementation, the Foundation chose to focus on five strategies of personalized learning. These included learner profiles, personal learning paths, competency-based progression, flexible learning environments, and competency on college and career readiness. Each year of the two-year study students were given the Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) (Pane et al., 2015) for math and reading. The MAP test is a comprehensive assessment which tracks students' growth from year to year. It focuses on students from kindergarten to twelfth grade in the areas of reading, language usage, mathematics, general science topics, and science concepts. This test is aligned with the Common Core State Standards and the Next Generation Science Standards. The NWEA MAP assessment was used in a study to investigate the effectiveness of the Stepping

Stones elementary program implemented in a school in the midwestern United States. The data collected from the NWEA MAP program was used to determine there was no significant difference between a control group and a group of students using the Stepping Stones program (Corcoran, 2018). According to the study, the two-year effect size across all schools in math (0.27) and reading (0.19) scores increased by about 3 percentile points when compared to the median score of students in a comparison group not in a personalized learning setting (statistical significance of $p < 0.05$). The study compared test scores of those who attended schools offering personalized learning (also called Next Generation Schools) with those of students who attended traditional schools. Both sets of schools were similar in terms of gender, grade levels, educational level, and geographical areas. By the second year of the study about 60% of the students who participated in the study had effect scores in math (0.34) and reading (0.22) which were higher than the students in the comparison group. One conclusion drawn from the study was the inconsistency with which each school implemented personalized learning. It was noted there was too much variation from school to school (Pane et al., 2015).

Whitney Study

The Whitney study (2021) conducted in Virginia comprised of four public schools compared state standardized test scores of sixth-grade students in reading and math in personalized learning classrooms versus traditional classrooms. Two of the schools were recognized by the school district as offering personalized learning and the other two were recognized as offering traditional classrooms. The district developed a personalized learning plan that was to be implemented over a five-year time frame. The plan also outlined the components of personalized learning that were to be implemented in two of the schools which would make them different from the traditional schools. The study was comprised of three years of data

(2016-2017, 2017-2018, 2018-2019) and not only compared the personalized learning classrooms to the traditional classrooms, but also focused on the subgroups for race, economically disadvantaged students, students with disabilities, and English language learners. The data showed there was not a statistical significance between the state scores of sixth-grade students in personalized learning classrooms and traditional classrooms for any of the groups including subgroups. However, there were large enough differences in the effect sizes for race and economically disadvantaged students which demonstrated personalized learning had an impact on student achievement in the area of math.

The subgroup consisting of students who identified their race as white had a large effect size in reading (.904) and math (.942). Those students identified as black on the state test had a small effect in reading (.124) but a large effect size in math (.828). Hispanic students also had a small effect size in reading (.118) but a large effect size in math (.800). Those students identified as economically disadvantaged had a small effect size in reading (.025) but a large effect size in math (.883). Lastly, students with disabilities had small effect sizes in both reading (.179) and math (.185). Based on the results of the study it was determined personalized learning did positively impact student achievement with a medium effect size for reading at .536, $p>.05$ and math at .419, $p>.05$ (Whitney, 2021).

Wood Study

Another study focusing on personalized learning was conducted to compare the engagement of students in personalized classrooms versus the engagement of students in traditional classrooms. The students were chosen from 2nd and 3rd classes in a rural elementary school located in the southeast part of the United States that was identified as personalized learning classrooms. The school developed a personalized learning community to determine

what they wanted their personalized learning classes to offer. This group, made up of teachers and administrators, took part in two different book studies to gain an understanding of what personalized learning strategies they wanted to implement. They then conducted regular classroom observations to monitor strategies were being used regularly. The students chosen were 83.5% Caucasian (167 students), 5.5% Hispanic (11 students), 2.5% African American (5 students), 7.5% Asian (15 students), one multiracial student and two American Indian or Alaska Native students. Forty-seven of the students qualified as free or reduced lunches and 12 students were receiving special education. The author used the Motivation and Engagement Scale (Wood, 2018, p. 14) to compare student engagement in the month of January to the month of May. The findings from this study did not indicate a significant difference in third grade class engagement between students participating in personalized learning and those participating in traditional classrooms. The ANCOVA results indicated no significant differences found between approaches [$F(1,55) = 0.46$, $p > .05$], gender groups [$F(1,55) = 0.22$, $p > .05$], or the interaction between gender and approach [$F(1,55) = 1.29$, $p > .05$] in 2nd grade. The ANCOVA results indicated no significant differences found between approaches [$F(1,69) = 0.92$, $p > .05$], gender groups [$F = 0.00$, $p > .05$], or gender groups within the approach groups [$F(1,69) = 0.71$, $p > .05$] in 3rd grade. Even though there was no significant difference overall in engagement, there was a trend towards higher engagement in the future (Wood, 2018).

Dinkins Study

Dinkins released a study in 2017 that looked at teacher perceptions of implementing personalized learning in urban schools. Five teachers were chosen for this study from a Wisconsin school serving 369 students in kindergarten through 8th grade. The school was comprised of 57% males, 43% females, and 64% economically disadvantaged students. There

are 72.6% African Americans, 10.8% Caucasians, 6.2% Asians, 6% Hispanics, and .9% Indigenous people. This elementary school has been utilizing personalized learning for the past four years with all teachers having one to four years' experience implementing the concept. To prepare for the implementation of personalized learning in the school district, a personalized learning task force was developed. This group conducted two book studies and developed a plan which consisted of the elements of personalized learning they wanted to offer in the classrooms.

The study included 165 students in the second and third grades and 11 out of 40 educators in the district. The students chosen to participate were those whose parents signed a consent form giving permission to be included in the study. The teachers included were those who volunteered. The data collected for this study was mostly through observations using a checklist. The observer collected data on purposeful learning, learner efficacy, ownership for learning, flexible pace, learner choice infused, learner choice presented, learners serving as resources for learning, space for learning flexibility, commitment focus, collaboration, technology supported, and learner independence. The study revealed collaboration and learners serving as resources for learning was evident in all classrooms. Space for learning flexibility was evident in all but one. Flexible pacing was evident in three classrooms. Learning efficacy was partially evident in two classrooms. Purposeful learning, ownership for learning, learning voice infused, learning choice infused, and commitment focus were only partially evident in one class. Learning independence was partially evident in all classes, however, students were still relying on teacher participation to guide their learning and help them make choices. Overall, the study concluded the participants felt ongoing professional development was essential to implementing personalized learning. There was no consistent support for the program from administration other than the building principal after the first two years. Lack of support from the higher

administration hindered consistency in the program throughout the school and classrooms (Dinkins, 2017).

Sereno Study

In Wisconsin (Sereno, 2018) ten middle school English/language arts teachers and four middle school math teachers were studied using data from surveys concerning the impact of personalized learning on their student achievement. The survey focused on the personalized learning elements of personal learning goals, learner choice incorporated, cultural responsiveness, customized responsive instruction, progressions towards deeper learning, standards guided learning, assessment of/for/as learning, rapid cycle feedback, multiple instructional methods/modes, and learner voice infused. According to the data, multiple instructional methods/modes, progressions toward deeper learning, and rapid cycle feedback were used most frequently. Personal learning goals and infusing learner voice into instruction were the least used elements of personalized learning. Further data collection determined that both classroom settings were consistent in their use of personalized learning elements. Data was collected on students taking classes utilizing the personalized learning methods. However, the data collected was determined to be inconclusive due to a small sample size. Whether or not personalized learning impacted student learning could not be confirmed based on the data collection at this time (Sereno, 2018).

Kappel Study

A more current study (Kappel, 2020) conducted in a middle school in the United States focused on teachers who were currently using personalized learning in their classrooms and how successful they felt their implementation of personalized learning has been. Each teacher interviewed had taught for no less than seven years and had received no formal training to

implement personalized learning in their classroom. After conducting interviews with each teacher and compiling the data based on codes (reoccurring words or phrases), patterns were pulled together within the answers given by the teachers. Kappel found that overall, the teachers were very content with using a personalized model in their classroom with three of the teachers even stating they would never go back to traditional teaching again. The positive outcomes that were gained from the teachers were they felt personalized learning increased engagement in their students, helped develop a strong relationship with their colleagues, and gave them the freedom to be more creative in their planning of the curriculum. The negative impacts of implementing personalized learning in the middle school classrooms were having to develop chaos into organized chaos with direction, not having any professional development to help them prepare including a descriptor of what personalized learning should look like, not having enough feedback from colleagues or administration (even though the administration was supportive, no one was prepared to give advice or guidance on personalized learning), and how to manage student behavior. The factors the participants learned which would help others who want to implement personalized learning are how essential it was to get to know the students and their interests and building those relationships (Kappel, 2020).

Vogler Study

Another study released by Vogler (2020) looked at the most effective teaching strategies for improving reading in personalized learning classrooms in an elementary school. The study surveyed six educators who have all been in education for three years or more. The outcome of the study concluded all six participants felt that students' reading achievement was increased due to personalized learning. The outcomes were based on common assessments used by the educators. Even though the students in the personalized learning classrooms did not all achieve

grade level mastery, the teachers determined through assessments and observations there was an overall increase in reading achievement. They felt the largest benefit from implementing personalized learning was allowing students to reach individual goals based on their individual levels. The reading strategies used most often were guided reading, small group instruction, one-on-one conferencing, and allowing students voice and choice. They felt the biggest weakness of implementing personalized learning was the lack of professional development and the overall definition of personalized learning (Vogler, 2020).

Summary

When implemented correctly, the intent of personalized learning has been to enhance education by allowing students' needs to be met through individualizing lessons and targeting their interests. As shown throughout the literature review, many changes have occurred over the years as different groups and policymakers have tried to increase student achievement and teacher expectations. While reviewing the literature, it is evident that little research has been conducted to determine personalized learning's effects on success. The studies summarized in the chapter focused more on the perception of personalized learning versus the impact of success. One study did determine personalized learning did not increase student achievement significantly, but showed small gains in some subgroups (Whitney, 2021).

Proponents of personalized learning made efforts to define exactly what it should look like with everything from student choices in how the curriculum had to be delivered to how to demonstrate mastery of the content. Upon reviewing the literature, school districts which try to implement personalized learning chose which components worked for them which left no consistency in how personalized learning looked overall.

CHAPTER III: METHODOLOGY

This study used both quantitative and qualitative methods. By using two methods of research the findings were enhanced by not only combining data but also by using different perspectives which gave a deeper understanding to the study (Regnault et al., 2018). Quantitative methods were used to determine the relationship between personalized learning and academic achievement compared to traditional classroom instruction. The purpose of the qualitative interviews was to explore teacher perceptions of teaching strategies and professional development for both traditional and personalized instruction. There were very few studies examining the influence of personalized learning on student achievement. Most of the studies completed on personalized learning focused on teacher perspectives or teaching strategies utilized in a personalized learning classroom.

Purpose of Study

The purpose of this study was to examine whether a personalized learning class setting increased student achievement in the areas of math and reading as measured by Renaissance Learning Reading and Math assessments and to explore teacher perceptions of teaching strategies and professional development. The three school districts included in the study all used the Danielson Framework to evaluate their teaching staff on instruction, curriculum delivery, and classroom management (Danielson, 2014). By examining preexisting test scores this study aimed to determine if there was a relationship between the end scale scores of students in the two different learning environments. The independent variables for this study included the instructional model, gender, and age of students. As Dunkin and Biddle posited (1974), "teachers, school administrators, and teacher educators" (p.41) have very little control over the context variables gender and age. The purpose of analyzing data containing gender was to

determine if the subgroups of boys or girls performed differently. The age of the student was important because to determine if older students, such as those retained or who started school later, had an effect on the overall outcome of the study. If personalized learning did not increase achievement because students were more engaged in learning, then a traditional classroom was just as effective. The interviews were used to determine if both the personalized learning teachers and the traditional learning teachers were using similar teaching strategies and attending similar professional development.

Research Questions

The following research questions directed the quantitative component of this study:

$H_0$1 There is no relationship between the effect of personalized learning on achievement in the area of math versus a traditional classroom.

$H_0$2 There is no relationship between the effect of personalized learning on achievement in the area of reading versus a traditional classroom.

$H_0$3 There is no multivariate relationship between math scores and the following independent variables: Instructional model, gender, and age of students.

$H_0$4 There is no multivariate relationship between reading scores and the following independent variables: Instructional model, gender, and age of students.

The required level of significance for testing each null hypothesis was set at $\alpha = .05$.

The following research questions were related to the qualitative component of the study:

1. What strategies do teachers in a personalized learning classroom and in a traditional classroom perceive as increasing student achievement?

2. In personalized learning classrooms and traditional classrooms, did the teachers perceive the professional development they received as increasing student achievement?

Description of the Problem

To increase graduation rates and keep students engaged in their learning three school districts in Western Kentucky began implementing personalized learning into their elementary schools. The purpose was to allow students to have more ownership in their education and give them more choices over how they mastered the curriculum as defined in the Danielson Framework. Since there were very few studies published on student success in personalized learning classrooms, this study was designed to determine whether personalized learning had an impact on achievement of students when compared to students in the traditional classrooms. This study utilized an intact data set (ex post facto) of Renaissance Learning Star scores in reading and math from students during the school years of 2016-2017, 2017-2018, and 2018-2019 and interviews of teachers who taught in a personalized learning classroom and traditional classroom during these same school years.

Research Ethics and Human Subject Protection

When conducting research using human subjects there are ethical issues which may arise. Professionalism and ethics must be maintained throughout the entire research process. The first part of this process was to submit a proposal to the Institutional Review Board to obtain their consent to continue the study. Next, when considering using interviews, one had to consider whether the interview participants would trust the person interviewing them. The trust must be present for the interviewees to feel safe and protected when answering questions.

When collecting the reading and math scores from the elementary schools, the data was obtained from a district employee with all identifying markers removed. The data contained no identifying codes such as student names, school identification codes, or personal information. This maintained the integrity of the study. Data was not used from the 2019-2020 or the 2020-2021 school years because of the COVID outbreak and the limitations set forth on the schools with many students attending classes virtually.

Another ethical consideration was the potential bias which could be possibly included in the study without intent. The data used for the study was analyzed by a former employee at one of the school districts who was an assistant principal. The former employee had worked for the school district first as a special education teacher for six years at one the middle schools before taking another position in a nearby school district working at an elementary school. This employee was then hired back as an assistant principal and had held this position for five years. Although no one involved in the collection or analysis of the data would benefit personally or professionally from the outcomes of the research, precautions had to be taken in the collection of data. No one involved in the research evaluated or participated in the evaluation process for any teacher included in this study. The teachers used in the interviews were evaluated directly by the head principal. Before conducting interviews or gathering any data from the school districts, letters of approval were received from each of the three school superintendents (see Appendix A).

Population/Participants

All nine elementary schools participating in this study were from three school districts in rural western Kentucky. The three school districts were all introduced to personalized learning through professional training offered by the University of Kentucky titled NxGLA (University of

Kentucky's Next Generation Leadership Academy) and implemented the Honeycomb Model. NxGLA was a cohort of school districts that wanted to move away from the industrial style of classroom teaching and lead their school districts to create more opportunities for innovation and 21st Century Skills. During each meeting, the University of Kentucky provided attendees the opportunity to be educated in new approaches to teaching which involved less teacher-led strategies and more student-led strategies based on 21st Century Skills (University of Kentucky, 2017).

The first district, called Meadow Springs for the purpose of this study, had six elementary schools. The elementary schools employed 150 highly qualified teachers. Students ranged in age from five to eleven years old at the elementary schools. The schools were lower performing and were at the bottom one-fourth of the elementary schools in the state. Because of the high percentage of children who qualified for free and reduced breakfasts and lunches, the district was a part of the National School Lunch Program which allowed for no cost meals to be provided to all students in 2017 to 2021. Meadow Springs gave the option to incoming kindergarteners to be in a personalized learning classroom or the traditional classroom.

During the spring and summer before the school year began in August three informational meetings were held to allow parents to be fully informed concerning the two models offered. Parents were then given a survey or feedback page to be turned into the school with their decision about which model they chose for their student. This was the only school district that allowed parents to choose which model was the best fit for their child. Twelve classrooms were identified by the school district as personalized learning classrooms and twelve classrooms were identified as traditional learning classrooms for the kindergarten classes. Each of the twenty-four classrooms were assigned one teacher. The twelve personalized learning

classrooms were placed in large classrooms with two classes in one room. Each of the large, personalized learning classrooms contained two teachers. There were 134 students from the personalized learning classes and 132 students from the traditional classes.

The second school district, Sunny Pastures, had one elementary. The elementary school employed 28 highly qualified teachers. Sunny Pastures Elementary Schools ranked in the top 50% of elementary schools in the state. This school district qualified for free and reduced breakfasts and lunches provided by the state. Students were assigned to classroom teachers by the school principal and the guidance counselor. Teacher recommendations were taken into consideration when assigning students. There was one personalized learning classroom with one teacher assigned and one traditional classroom with one teacher. There were 34 students from the personalized learning classes and 36 students from the traditional classes.

The third school district, Springfield, was comprised of two elementary schools. The elementary schools employed 70 highly qualified teachers. Students ranged in age from five to around eleven years old. The school was lower performing and ranked in the bottom fifty percent of the elementary schools in the state. Springfield School District also qualified for free and reduced breakfasts and lunches provided by the state. Students were assigned to classrooms in this school district by the building principal with teacher input on student placement. There were two personalized learning classrooms with two teachers in each and two traditional learning classrooms, each with one teacher. There were 32 students from the personalized learning classes and 37 students from the traditional classes.

Table 1 summarizes the enrollment, gender population, races, and special services of each of the elementary schools located in the three school districts used in this study. The personalized learning and traditional classrooms chosen for this study were very similar in make-

up at all three school districts. They each had about half males and females. All the teachers at Meadow Springs school district, the Sunny Pastures school district, and the Springfield school district who taught both models were highly qualified in their area. There were 24 teachers in the Meadow Springs school district who taught kindergarten personalized learning classrooms and traditional classrooms, two teachers at the Sunny Pastures school district, and four teachers at the Springfield school district. The total number of students in the kindergarten personalized learning classrooms and the traditional learning classrooms was 405 students, 205 students in the traditional classroom and 200 in a personalized learning classroom. There were 266 students from the first school district, 70 from the second school district, and 69 from the third school district. Also, all the teachers had obtained a KY teaching certificate in the area of elementary education and at least one Master's degree in another education area. About half of the teachers had a second Master's degree or were National Board Certified. After meeting with all three superintendents, some teachers in both the personalized classrooms and the traditional classrooms were given the choice of which model they wanted to use, however, some teachers were just assigned their teaching placement by the school principal.

The data used for this study were from students at the classroom level in the kindergarten, first, and second grades out of 15 personalized and 15 traditional classrooms from the nine schools for the school years of 2016-2017, 2017-2018 and 2018-2019. The classrooms included in the study were defined by the principals as being personalized learning classrooms or traditional learning classrooms based on the district's definition of each model. The personalized classrooms consisted of two teachers in a large classroom co-teaching. Students were assessed at the beginning of the school year just like the traditional classrooms to determine the current levels in reading and math for each student. The students in the personalized learning

Table 1

Demographic data of Meadow Springs (6 elementary schools), Sunny Pastures (1 elementary school), and Springfield (2 elementary schools)

Demographics	Meadow Springs			Sunny Pastures			Springfield		
	2016-17	2017-18	2018-19	2016-17	2017-18	2018-19	2016-17	2017-18	2018-19
Enrollment	2359	2326	2293	528	539	532	956	941	972
Male	1182	1157	1152	276	271	268	481	472	488
Female	1177	1169	1141	252	268	264	475	469	484
Caucasian	2259	2230	2192	481	482	478	798	776	788
African American	4	3	3	10	10	8	65	65	74
Hispanic	42	38	44	6	9	13	24	27	28
Asian	18	14	13	0	1	1	6	5	6
Two or more races	36	41	41	31	37	32	63	68	76
Special Education	521	524	517	117	115	121	213	215	221
504 Plan	6	6	7	2	2	1	1	1	1

classrooms, in conjunction with the teachers, developed a learning plan which consisted of goals for math and reading. The students were then placed in groups based on their strengths and weaknesses. As the year progressed, students could move in and out of specific groups as their skills increased and new goals were set. Each group focused on particular standards and were addressed as a whole group. To show mastery of a set of standards, the students in the personalized learning classrooms could use a variety of methods. This could range from a presentation, a written assessment, a project, or an oral speech. The student would decide how they were demonstrating mastery with their teacher. The students could also progress through the standards at their own pace. Once they showed mastery of a particular standard or group of

standards, they would set new goals with the teacher and move on to another set of standards. The students in the traditional classrooms progressed through the standards together. The teacher formed groups based on strengths and weaknesses of the students, but the groups remained the same most of the school year unless a student excelled and needed to be challenged more or fell behind and needed different supports. More of the instruction in the traditional classrooms was whole group versus small group. The students also did not develop individual learning plans. Students also showed mastery for standards in the traditional classrooms the same way which was chosen by the teacher for each unit.

Instrumentation

The nine elementary schools included in the present study collected data in the areas of math and reading. The quantitative portion of this study used data previously collected from Star assessments given at school three times a year in reading and math for 405 students, 205 students in the traditional classroom and 200 in a personalized learning classroom. There were 266 students from the first school district, 70 from the second school district, and 69 from the third school district. Quantitative data was used in this study because these standardized scores would be a reliable way to determine student success in the areas of math and reading. Quantitative data also allowed for more direct findings which were collected by a third party and were not manipulated by personal bias or beliefs (McCusker et al., 2015).

Star Assessment

The quantitative portion of the study utilized standardized scores in reading and math as measured by the Renaissance Star computer program. Renaissance Star is a computer-based program developed by Renaissance Learning, Inc. used in over one-third of United States schools and in more than 60 countries (Renaissance Learning, 2021a) (Renaissance Learning,

2021b). Star Reading measures word knowledge and skills, comprehension strategies and constructing meaning, analyzing literary text, understanding author's craft, analyzing arguments, and evaluating text (Renaissance Learning, 2021a). Star Math measures numeration concepts, computation processes, word problems, estimation, data analysis and statistics, geometry, measurement, and algebra (Renaissance Learning, 2021b).

Star assessments contained multiple choice questions which increased in difficulty as the students answered correctly and decreased in difficulty if the student answered incorrectly. The questions from the Star assessments are aligned with the state standards and provide a report on each student showing the following areas:

Scaled Score (SS) – This figure is based on the difficulty of the questions and how many the student answered correctly. The scale score range is from 0-1400.

Percentile Rank (PR) – This rank is used to compare students to other students nationally in the same grade.

Grade Equivalent (GR) – The grade equivalent is used to show how a student compares to other student nationally in all grades.

Zone of Proximal Development (ZPD) – This score shows the range of books which a student should be able to read which are not too easy or too difficult (Renaissance Learning, 2021a).

Validity

Validity is "the extent to which the scores from a measure represent the variable they are intended to" (Jhangiani et al., 2019, p. 402). Renaissance Learning's assessments in reading and math measure have undergone numerous validity studies and correlate their test questions to over 50 different state assessments in the U.S. Their validity studies have included over 1.45 million

student test scores and include over 2.8 billion real-world data points. The analyses have resulted in more than 400 concurrent and predictive validity studies conducted for Renaissance Star, involving more than 400,000 students. The average correlations observed in these studies range from .55 to .80, which are considered to be respectable correlations. They noted concurrent validity, using a meta-analysis of 276 correlations, suggested a correlation in the moderate range, with an overall average across grades reported as .64 (Renaissance Learning, 2021a) (Renaissance Learning, 2021b). There are limitations to the validity of this study due to the fact there could be other factors which affect student achievement other than a student participating in a personalized learning or traditional classroom.

Reliability

Reliability is "the consistency of a measure" (Jhangiani et al., 2019, p. 395). Renaissance Learning (2021a; 2021b) reports three different reliability coefficients for their reading and math assessments. The overall generic reliability of Star Reading was r = .94 (2021a) and Star Math was r = .97 (2021b). The overall split-half reliability of Star Reading was r = .98 (2021a) and Star Math was r = .97 (2021b). The overall score for alternate form reliability on the Star Reading was r = .94 (2021a) and Star Math was r = .94 (2021b).

Studies Supporting the use of Star Assessments

Several studies have been conducted by elementary school districts to determine the correlation between Renaissance Star Assessments and other assessments used by their district. One study aimed to determine if there was a correlation between an early literacy test given to their second graders and the STAR Reading Assessment given to the students at the end of the year. The findings from the study determined there was a significant correlation ($r = .81$, $p < .001$; 65.61% of the variance explained) between the two assessments given (Sutter et al., 2020).

A second study was conducted to determine if there was a correlation between the Renaissance Star Reading Assessment and the Fountas and Pinnell Benchmark Assessment System. It was determined there was significant correlation between the instructional levels within the same assessment in the fall and winter sessions when both assessments were given (fall $r = .79$ and winter $r = .84$, $p<.001$) (Bongle, 2018).

A third study conducted in Pennsylvania was designed to determine if there was a correlation between the Pennsylvania System of School Assessments (PSSA) and the Renaissance Star Math Assessment. According to the findings of this study, there was a significant correlation between the Renaissance Star Math Assessment and the PSSA used by this school district (4^{th} $r = .85$, $p<.005$; 5^{th} $r = .84$, $p<.005$; 6^{th} $r = .86$, $p<.005$) (Holub, 2017).

Interviews

The qualitative part of this study used interviews from 16 teachers who taught in a personalized learning classroom or a traditional classroom for the 2016-2017, 2017-2018, and 2018-2019 school years. All teachers that participated in the interviews were from the same school district. Teachers from the other two school districts did not respond to the invitation to participate. Eight of the teachers taught in a personalized learning classroom for the three school years used in the study and eight of the teachers taught in a traditional learning classroom for the three school years used in the study. An email was sent to teachers asking if they would participate. The purpose of using an interview was to gather information about professional development experiences, the teaching strategies used in the personalized learning and traditional classrooms, and to determine how much support teachers had from administration and board office personnel. Interviews are the most popular form of data collection in qualitative data (Saldana, 2021). Using interviews allowed for information to be collected by interacting directly

with the teachers so they could share their experiences. Interviews also allowed for more detailed answers and possible follow up questions (Barbour & Morgan, 2017).

The interview questions developed for this study were submitted to a panel of experts consisting of two Supervisors of Instruction and four principals at a local school district for content validity. A list of potential questions (see Appendix B) was emailed to each expert in a Google Form. Each person rated each question on a Likert scale of 1 (not relevant); 2 (somewhat relevant); 3 (quite relevant); and 4 (highly relevant). Out of the six experts, four had two Master's degrees or a Rank 1, one had one Master's degree or a Rank 2, and one of the principals had a doctorate degree in education. All experts had been in education for over 19 years.

A content validity index (Kappa value) was computed for the interview questions using ratings from a list of experts (see Appendix C). This statistic is used to measure inter-rater reliability for qualitative items to measure the agreement between raters. All questions except one received a Kappa value of .0.816 or greater (see Table 2), which was judged to be excellent (Polit et al., 2007). Expert ratings less than a 3 did not enter into the calculated values. The overall modified kappa statistic was .927. Parameters in effect for data analysis in can be found in Appendix D.

Data Collection

Before collecting data, IRB approval was obtained (see Appendix E). A second IRB approval was requested for an extension in order to collect additional data which would include the student's dates of births (see Appendix F). The Star data used for this study was provided by the Instructional Supervisor at each school district. The data was collected in a spreadsheet and shared to be used for the study. Achievement data collected through standardized testing was more consistent than using data from teacher-made assessments (Duckworth et al., 2012). By

Table 2

Evaluation of Interview Questions and Overall CVI Ratings

Rated Item	Number of Experts	Ratings >=3	I-CVI	Pc	K*	Evaluation of Kappa
CVI 1	6	6.0	1.00	.016	1.00	Excellent
CVI 2	6	6.0	1.00	.016	1.00	Excellent
CVI 3	6	6.0	1.00	.016	1.00	Excellent
CVI 4	6	6.0	0.83	.094	.816	Excellent
CVI 5	6	4.0	0.67	.234	.565	Fair
CVI 6	6	5.0	0.83	.094	.816	Excellent
CVI 7	6	6.0	1.00	.016	1.00	Excellent
CVI 8	6	6.0	1.00	.016	1.00	Excellent
CVI 9	6	5.0	0.83	.094	.816	Excellent
CVI 10	6	6.0	1.00	.016	1.00	Excellent
CVI 11	6	5.0	0.83	.094	.816	Excellent
CVI 12	6	6.0	1.00	.016	1.00	Excellent
CVI 13	6	6.0	1.00	.016	1.00	Excellent
CVI 14	6	6.0	1.00	.016	1.00	Excellent
CVI 15	6	6.0	1.00	.016	1.00	Excellent
CVI 16	6	6.0	1.00	.016	1.00	Excellent
Overall	6	5.625	0.94	.049	.927	Excellent

collecting and analyzing data from each of the models (personalized learning classrooms and traditional classrooms), determinations could be made regarding personalized learning.

An email was sent to teachers at all three school districts who taught in personalized learning classrooms or traditional classrooms in the kindergarten grade in the 2016-2017 school year, 30 in all, asking if they would participate in the interviews for the study. Those teachers who replied that they would participate were then sent consent forms. The teachers who responded were all from one school district (16 teachers). No teachers responded from the other two school districts. Consent forms from all participants were collected prior to the meetings (see Appendix G). Because of Covid the interviews were held via Zoom or another similar program. A person not associated with the study was present to take notes in case the technology failed during the recording of the Zoom meeting. The note-taker signed a confidentiality agreement (see Appendix H).

Data Analysis

The quantitative *ex post facto* part of this study used a multivariate analysis for null hypothesis 1($H_0$1), null hypothesis 2 ($H_0$2), null hypothesis 3 ($H_0$3), and null hypothesis 4 ($H_0$4). An ANOVA was used to describe analyses with a single response variable. The MANOVA was used to analyze continuous response variables. The MANCOVA was used to analyze the effect of more than one independent variable on two or more dependent variables (Chen, 2012; Whitney, 2021). The purpose of using Renaissance Star data (ex post facto) in this study was to determine if differences existed between two distinct groups, personalized learning classes and traditional classes. The differences were calculated from the students who participated in traditional classroom settings and the students who participated in personalized learning classrooms. The independent variables for this study included pretest scores in reading and math

given at the beginning of the kindergarten, first, and second grade school years in the month of August to serve as the base score for the school year, the type of teaching model, the gender of the students, and the age of the students. The age of the students was determined by using their birthday to determine how old each student was when in kindergarten. The dependent variables for the study were the posttest Renaissance Star scores for reading and math students received for every assessment after the first kindergarten assessment.

After collecting the answers to the interview questions, codes were identified in the collected data, particularly which teaching strategies teachers felt were most often used in the personalized learning and traditional classrooms. “A code in qualitative analysis is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldana, 2021, p. 5). The interviewees’ answers were used to seek out patterns (themes) in the codes to determine if any of the information gathered had an effect on the success of personalized learning classrooms and could have impacted the study results.

Summary

The purpose of this chapter was to detail the study design chosen for this research. The study included both quantitative and qualitative data collection to determine if personalized learning was a positive in student achievement. The research included standardized scores collected from both students in personalized learning classrooms and traditional learning classrooms. Data was also collected from interviews made up of highly qualified teachers both in the personalized learning classroom and traditional classrooms. By using a mixed method study the study included not only information from a data set, but also personal experience data from teachers who have taught in a personalized learning classroom and traditional classrooms.

CHAPTER IV: RESULTS

The purpose of this study was to examine whether a personalized learning class setting increased student achievement in the areas of math and reading as measured by Renaissance Learning Reading and Math assessments when compared to the traditional classroom setting. Performance of students was examined by giving them the Renaissance Learning Assessment during their kindergarten year in the fall during the month of September to develop a baseline score. The assessment was given in both reading and math. The assessment was then given again in December and April.

The quantitative part of the study was a quasi-experimental design. It measured the cause/effect relationship to determine if placement in the personalized learning classroom or the traditional classroom had an effect on the achievement of students as displayed by their Renaissance Star reading or math scores. The data was analyzed by conducting an ANOVA test to compare the means of the math and reading scores for both personalized learning and traditional learning from the baseline scores of the kindergarten year in 2016. The MANOVA AND MANCOVA tests assessed the statistical significance of the effect of the instructional model, age, and gender variables on the student's math and reading scores at the baseline and at the end of the 2019 school years. By examining preexisting test scores this study was conducted to examine if there was a difference between the scores of students in the two different learning environments. The independent variables for the study included the type of instruction, gender, and the age of students. The dependent variables for the study were the posttest scores for reading and math students received for every assessment after the first kindergarten assessment for the school years of 2016-17, 2017-18, and 2019-20.

The study also collected answers to interview questions of teachers who taught in personalized learning classrooms and traditional classrooms to determine themes in teaching strategies and professional development in both settings. The purpose of the interviews was to determine if teachers employing one method of teaching were offered more professional development than the other method or if certain teaching strategies were used in one teaching model that were not used in the other model.

Quantitative Analysis

A quasi-experimental design was used to examine whether there is a difference between the identified explanatory variables and the explained variables. Students were assessed in the fall (September), in the winter (November), and then finally in the spring (April) to determine academic growth and areas of weakness. A one-way Analysis of Variance (ANOVA) was used for the quantitative data to determine the differences calculated from one group of students from three different school districts who participated in traditional classroom settings and one group of students from three different school districts who participated in personalized learning classrooms over the course of the 2016-17, 2017-18, and 2018-19 school years. One-way analysis of variance (ANOVA), multivariate analysis of variance (MANOVA), and multivariate analysis of covariance (MANCOVA) tests were used to address the research questions. ANOVA is an extension of an independent sample *t*-test (Ewing & Park, 2020) and was used to compare the means of students' math and reading scores for both personalized learning and the traditional classroom from baseline kindergarten in 2016 to 2018-2019.

Prior to conducting the analysis, the groups were compared to determine if there were group differences among the three schools. A larger *F*-value from the analysis undertaken implied the means of variables under consideration greatly differed from each other compared to the variations within groups (Ewing & Park, 2020). At $\alpha = 0.05$, there was no statistically

significant difference in the age of students across the three district schools, *F*-value = 1.964 with *df* = 403, *p*-value = 0.142. There was a statistically significant difference in students' math scores in at least one of the three district schools, *F*-value = 5.33 with *df* = 403, *p*-value = 0.005. Lastly, there was a statistically significant difference in the students' reading scores at baseline in at least one of the three district schools, *F*-value = 3.049 with *df* = 403, *p*-value = 0.049.

Upon establishing statically significant differences in the baseline math and reading scores in at least one of the three schools, a *post-hoc* evaluation was conducted. Starting with the student's math scores at baseline, the Bonferroni pair-wise comparison results indicated no statistically significant differences between the first and the second district schools (p-value=0.224) and between the second and third district schools (p-value=0.960). For the students' baseline reading scores, the Bonferroni pair-wise comparison results also indicated no statistically significant differences between the first and the second district schools (p-value=1.000) and between the second and the third district schools (p-value=0.138). The results from the *post-hoc* analysis indicated that students' math and reading scores from the three district schools could be combined for further analysis to address the research questions.

The MANOVA and MANCOVA analyses were conducted to address the third and fourth research questions. The MANOVA and MANCOVA tests were used to assess the statistical significance of the effect of the instructional model, age, and gender explanatory variables on the students' math and reading scores at baseline and the end of the study (Chen, 2012). The MANOVA test was thus extended from the ANOVA to effectively assess the relationships between instructional model, gender, and age of students with the students' math and reading scores simultaneously (Chen, 2012).

Descriptive Statistics

In terms of instructional model, 205 students took part in the traditional classroom, while 200 were in a personalized learning classroom. The students had a math mean score of 250.41 at baseline and 446.61 in the spring of 2018-19. The students had a reading mean score of 85.83 at baseline and 281.15 at the end of the study. A total of 405 students participated in the study, with 266 students from the first school district, 70 from the second school district, and 69 from the third school district. This data is shown in Table 3.

Table 3

Baseline Scores of Participants

Subject	Baseline mean score	Range	Std. Deviation	End Score
Math	250.41	644	88.497	446.61
Reading	85.83	415	43.998	281.15

Note: Mean scores of 405 students

Research Question $H_0$1

$H_0$1 There is no relationship between the effect of personalized learning on achievement in the area of math versus a traditional classroom.

The MANOVA test was used to examine the impact of the personalized learning classroom on students' math scores as compared to the traditional classroom. The MANOVA technique was preferred as this test allowed the comparison of means of students' math scores with the type of instructional model used (Ewing & Park, 2020). The purpose of using the MANOVA test was to examine for significant differences between multiple math scores based on the instructional model utilized through the analysis of variance. It was assumed that the observations were independent of each other and were normally distributed with similar variances. Thus, the MANOVA procedure was used to compare variations between the sum of

squares for groups to variations within samples for students' math scores based on the instructional model utilized (Ewing & Park, 2020).

The results from the MANOVA test indicated no significant differences in the students' math scores between the personalized learning classroom and traditional classroom instruction models (*p*-value = .766, .529, .203, .512, and .239). At α = 0.05, the *F*-test value was .88, .397, 1.629, .431, 1.391, and .299 with 1 *df* for math scores. Therefore, the null hypothesis was accepted, and it was concluded that there were no statistically significant differences in students' math scores between the personalized learning classroom and the traditional classroom. The results from the analysis undertaken are presented in Table 4.

Research Question $H_0$2

$H_0$2 There is no relationship between the effect of personalized learning on achievement in the area of reading versus a traditional classroom.

The MANOVA test was also used to assess the relationship between students' reading scores based on the instructional model used. The results from the MANOVA test indicated no significant differences in the students' reading scores between the personalized learning classroom and traditional classroom instruction models (*p*-values = .848, .956, .248,.104,.104, .107, respectively). At α = 0.05, the *F*-test value was .037, .003, 1.336, 2.660, 2.660, and 2.605 with 1 *df* for reading scores. Therefore, the null hypothesis was accepted, and it was concluded that there were no statistically significant differences in students' reading scores between the personalized learning classroom and the traditional classroom. The results from the analysis undertaken are presented in Table 4.

Table 4

Relationships Between Math and Reading Scores by Instructional Model

MANOVA					
Dependent Variable	Sum of Square	df	Mean Square	F	Sig.
Math 2017-18 Fall	702.711	1	702.711	.88	.766
Math 2017-18 Winter	3680.095	1	3680.095	.397	.529
Math 2017-18 Spring	16379.101	1	16379.101	1.629	.203
Math 2018-19 Fall	4230.996	1	4230.996	.431	.512
Math 2018-19 Winter	15138.821	1	15138.821	1.391	.239
Math 2018-19 Spring	3705.241	1	3705.241	.299	.585
Reading 2017-18 Fall	202.009	1	202.009	.037	.848
Reading 2017-18 Winter	29.289	1	29.289	.003	.956
Reading 2017-18 Spring	18709.573	1	18709.573	1.336	.248
Reading 2018-19 Fall	45605.866	1	45605.866	2.660	.104
Reading 2018-19 Winter	56407.385	1	56407.385	2.660	.104
Reading 2018-19 Spring	64118.282	1	64118.282	2.605	.107

Research Question $H_0$3

$H_0$3 There is no multivariate relationship between math scores and the following independent variables: Instructional model, gender, and age of students.

A MANCOVA test was used to quantify the strength of the relationship between students' math scores with age, gender, and instructional model explanatory variables (Chen, 2012). The MANCOVA technique was used to avoid committing Type I error of using multiple ANOVAs and to determine whether the explanatory variables were related to the combination of the dependent variables (Chen, 2012).

The gender variable was not statistically significant for math (p-value = 0.025, F=2.434). There were no significant differences between students' math scores and the age variable (p-value=.328, F=1.157). From the analysis undertaken, the test statistics indicated no significant relationship between math scores and the instructional model used (p-value=.715, F=.619). We accepted the null hypothesis and concluded that there was no statistically significant relationship

between the instructional model used and students' math scores. Results from the analysis are presented in Table 5 below. Before controlling covariates, the MANCOVA output indicated no significant relationship between students' math scores and the instructional model used (*p*-value = 0.647).

Table 5

MANCOVA Output for Math Scores Including Age, Gender, and Instructional Model Variables

Multivariate Tests

Effect		Value	F	Hypothesis	Error df	Sig.
Intercept	Wilk's Lambda	.973	1.814[b]	6.000	395.000	.095
Age	Wilk's Lambda	.983	1.157[b]	6.000	395.000	.328
Gender	Wilk's Lambda	.964	2.434[b]	6.000	395.000	.025
Instructional Model	Wilk's Lambda	.991	.619[b]	6.000	395.000	.715

a. Design: Intercept+ AgeinDaysasofJune12022 + GenderF1M2+InstructionType1Traditional 2Personal
b. Exact statistic

Research Question $H_0$4

$H_0$4 There is no multivariate relationship between reading scores and the following independent variables: Instructional model, gender, and age of students.

A MANCOVA analysis was also undertaken to evaluate the strength of the relationships between students' reading scores and instructional model explanatory variables with age and gender covariates (Chen, 2012). The age and gender variables were incorporated into the analysis to minimize error terms and eliminate covariates' effects in the relationship between the instructional model used and both math and science scores (Chen, 2012).

At $\alpha = 0.05$, the test statistics were not statistically significant for reading and the age covariate (*p*- value = 0.405, F=1.030). The gender variable was not statistically significant for reading (*p*-value=.596, F=.767). From the analysis, the instructional model held no significance on reading (*p*-value=.153, F=1.576). We accepted the null hypotheses and concluded that there were no statistically significant relationships between the instructional model used and students' reading scores. The results from the analysis are contained in Table 6 below. Before controlling

covariates, the MANCOVA output indicated no significant relationship between students' reading scores and the instructional model used (p-value = 0.135).

Table 6

MANCOVA Output for Reading Scores Including Age, Gender, and Instructional Model Variables

Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Wilks' Lambda	.987	.892[b]	6.000	395.000	.500
Age	Wilks' Lambda	.985	1.030[b]	6.000	395.000	.405
Gender	Wilks' Lambda	.988	.767[b]	6.000	395.000	.596
Instructional Model	Wilks' Lambda	.997	1.576[b]	6.000	395.000	.153

c. Design: Intercept+ AgeinDaysasofJune12022 + GenderF1M2+InstructionType1Traditional 2Personal
d. Exact statistic

Despite introducing age and gender as covariates in the relationship between students' math and reading scores with the instructional model used, MANCOVA analysis undertaken indicated no significant relationship. Therefore, the null hypothesis was accepted, and it was concluded that there is no statistically significant difference between students' reading and math scores based on the instructional model used. Thus, the personalized learning classroom did not have a significant impact on students' math and reading scores versus the traditional classroom.

Qualitative Analysis

Interview Questions

The qualitative part of the study focused on the answers to interviews from 16 teachers (8 from each teaching model) in both the traditional and personalized learning classrooms. After collecting the answers to the interview questions, codes were created then collapsed into themes. Interviewee's answers were used to seek out patterns (themes) in the codes to determine if any of the information gathered had an effect on the success of personalized learning classrooms and could have impacted the outcome of the study results.

Research Question 1

Research Question 1: What strategies do teachers in a personalized learning classroom and in a traditional classroom perceive as increasing student achievement?

The interviewees were asked about what strategies were used their classroom that were perceived as increasing student achievement. The information from this research question was important to determine which strategies were used in each classroom model that could potentially affect student achievement. The common themes revealed in this research were the following: multi-sensory strategies, project-based learning, and guided reading.

The first theme was *multi-sensory strategies*. Multi-sensory strategies "model for students how to use all learning channels (visual, auditory, kinesthetic-tactile) in learning new vocabulary patterns by using think-alouds, concrete demonstrations with manipulatives, movement, touch, and/or images" (Schneider & Ming, 2019, p. 11). The personalized learning teachers stated the multi-sensory strategies were used every day in their classroom. They were able to plan lessons even for their ability groups based on the data collected while using these strategies in class. The traditional teachers used the multi-sensory strategies to present new words and/or phonics sounds and were able to model how to use these new words in speaking, reading, and oral activities while providing students a variety of ways to practice them for future recall. Participant 9, a traditional classroom teacher (T) commented, "I believe the strategies were relevant to improving the achievement of students. The multi-sensory strategies helped my students improve their phonics skills. I was also able to use manipulatives in the small groups to individualize the lessons to each group and meet them on their own level." Participant 7 and 8, who both taught in a personalized learning classroom (PL), stated, "We used the multi-sensory strategies in our small groups. It helped us to increase our scores especially in phonics."

The second theme was *project-based learning*. Project-based learning (PBL) is defined as "a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic, questions and carefully designed projects and task" (Markham et al. 2003). Students begin PBL with a driving question or problem they want to answer or solve. As students begin to address the question or problem, connections are made to the curriculum and real-life situations. PBL is driven by soft skills students need to be successful such as communication, problem-solving, collaboration, and building relationships. As the project begins to develop, students should begin to question, organize, and analyze data related to the project (Lee & Golindo, 2021).

The traditional and personalized learning teachers used project-based learning strategies in their classrooms for different reasons. Participant 9 (T) stated, "Project-based learning helped to incorporate more projects into class and helped put a stronger emphasis on science and social studies." Participant 7 (PL) commented, "PBL was a big part of our classroom. It allowed us to work on 21st Century Skills with the students." Project-based learning was also utilized to relate the standards to real-world scenarios while practicing the soft skills needed in order to be successful. The traditional teachers stated project-based learning was a way for them to personalize the learning more in the classroom. By introducing a project into the curriculum, they were able to give students more choice in a group setting on how to demonstrate mastery. Participant 10 (PL) stated, "project-based learning helped teach 21st Century Skills, better communication, and problem-solving skills." Participant 1 (T) stated, "I tried to go out of my comfort zone for PBL. I tried a hands-on approach to things and let my students have more choice and voice in the classroom." Participant 8 (PL) commented, "PBL was a big part of our

classroom. We did a lot of projects so that the students can work together using those future ready skills."

The third theme was *guided reading*. Guided reading was a strategy whereby teachers break students into small groups to help scaffold them during reading. During this time the teacher may incorporate or teach individual strategies to students to improve their reading, fluency, comprehension, or word recall (Mikita, 2019). Both the traditional and personalized learning teachers stated guided reading was used weekly in their lessons. Participant 16 (T) stated, "Guided reading helped us to differentiate, use multi-sensory strategies, and plan our small group instruction." Participant 14 (PL) stated, "By using guided reading in the classroom I could see more success with my students in their small groups." The personalized learning teachers stated guided reading enabled the students to increase their reading levels by allowing the teachers to place the students in ability groups and target weaknesses in their reading. Participant 8 (PL) stated, "We used guided reading in our small groups and when we tried to differentiate lessons. We were able to separate our classes into flex groups. Some of the students would work on IPads or technology, some with peers, and some one-on-one or in small groups with the guided reading strategies."

Research Question 2

Research Question 2: In personalized learning classrooms and traditional classrooms, did the teachers perceive the professional development they received as increasing student achievement?

The common themes for professional development were project-based learning (PBL) and school visits. The most prevalent reoccurring theme was *project-based learning*. Almost all the teachers attended a three-day professional development on project-based learning. Since all the responding teachers were from the same district, the training was provided there. The

response from the teachers of both personalized learning and traditional learning was that project-based learning was perceived to increase student achievement. They determined it helped them to reach students in different ways and helped to target the soft skills needed for students to be successful not only in school but in the workforce. Most of the participants stated that they used project-based learning in their curriculum, but that it was difficult and took time and effort to plan. Participant 6 stated, "The PBL was helpful to understand how to personalize some of the learning for our students to be successful." Participant 7 (PL) stated, "We had PBL training. We learned how to modify down to younger students. It helped us work on future ready skills with our students such as problem-solving, communication, and building relationships or working together." Participant 16 (T) stated, "The PBL was relevant for student achievement. It helped me meet their needs."

The second theme was *school visits*. The personalized learning teachers all had school visits as part of their professional development the summer before school started. The visits were to schools who had full implementation of personalized learning in some or all their classrooms. The personalized learning teachers either went to visit a school in Wisconsin which had fully implemented personalized learning throughout the school or to Atlanta to visit a school which had both personalized learning and traditional learning in their school district. The traditional teachers either also visited the same school in Wisconsin or did classroom observations in schools closer to their home school district. Participant 11 (T) and Participant 12 (T) stated that although the visits did not help with increasing student achievement, the visit did help them plan centers for their students and helped them to understand how it was supposed to look. Participant 3 (PL), 7 (PL) and 8 (PL) stated they went to Wisconsin and got to experience the classrooms in

action. They fell in love and knew this was the way to teach kids. They felt the visits helped in planning their curriculum more effectively which would lead to student success.

Summary of Research Findings

The results of the research were to determine if students who participated in personalized learning classrooms had greater student achievement than students who participated in a traditional classroom. The findings determined there were no significant difference in students' scores on the Star assessment in math or reading in the two different classroom models. The study also determined there were no significant impacts on reading and math scores in the two classroom models when adding in the independent variables of gender and age.

The findings from the interviews of teachers who taught in a personalized learning classroom and a traditional learning classroom determined teachers in both models used similar classroom strategies and perceived that these strategies helped to increase student achievement. The results also concluded some of the teachers in both the personalized learning classrooms and the traditional learning classrooms experienced similar professional development and perceived the professional development to help increase student achievement.

CHAPTER V: DISCUSSION

The purpose of using quantitative methods was to determine the relationship between personalized learning and academic achievement as compared to traditional classroom instruction. The purpose of the qualitative interviews was to explore teacher perceptions of teaching strategies and professional development for both traditional and personalized instruction. The scores represented the student's baseline score in their kindergarten year and their testing the following two years in the fall, winter, and spring sessions. The study involved students from three school districts in western Kentucky. All three districts provided opportunities for students to participate either in a personalized learning classroom or in a traditional classroom.

The study compared the scores of students in the personalized learning and the traditional classroom, along with the gender and age of the student. A MANOVA test was performed to determine the statistical significance as it related to the two different classrooms. A MANCOVA was performed to determine if there was a significant difference in the scores for math and reading when adding in the independent variables of instructional model, gender, and age. The results of the data analysis found there were no significant differences in end scores between the students who were taught in the personalized learning classrooms and the traditional learning classrooms in the areas of reading and math. It was also determined there were no significant differences in scores between the age of the students and their gender.

The study also included interviews with teachers from both the personalized learning and the traditional learning classrooms. The interviews revealed most of the teachers from the personalized learning classrooms and the traditional learning classrooms perceived the strategies they were taught to use in class were effective at increasing student achievement. Most of the

teachers from both models also perceived the professional learning they participated in during the summer before the 2016-17 school year helped to increase student achievement. The interviews were conducted to determine if both the personalized learning teachers and the traditional classroom teachers were using similar strategies in their classrooms and were offered similar professional development.

Interpretation of Result

Research Question $H_0$1

Research question one was determining if personalized learning had an effect on achievement in the area of math versus a traditional classroom. The results from the MANOVA test indicated no significant differences in the students' math scores between the personalized learning classroom and traditional classroom instruction models (*p*-value = .766, .529, .203, .512, and .239). At $\alpha = 0.05$, the *F*-test value was .88, .397, 1.629, .431, 1.391, and .299 with 1 *df* for math scores. When looking at previous studies about personalized learning, the findings do not support the concept of personalized learning increasing student achievement across all subjects and subgroups. In the Whitney study (2021), the increases in reading and math achievement due to personalized learning was contained in the subgroup of white students. Black, Hispanic, and economically disadvantaged students also had increases in math. In the Gates' study (Pane, 2015), math scores of students in personalized learning classrooms increased by 3 percentile points when compared to the median score of students in traditional learning classrooms.

Research Question $H_0$2

Research question two was determining if personalized learning had an effect on achievement in the area of reading versus a traditional classroom. The results from the

MANOVA test indicated no significant differences in the students' reading scores between the personalized learning classroom and traditional classroom instruction models (*p*-values = .848, .956, .248,.104,.104, .107, respectively). At $\alpha = 0.05$, the *F*-test value was .037, .003, 1.336, 2.660, 2.660, and 2.605 with 1 *df* for reading scores. When comparing the results from this study to other studies which used reading data from personalized learning, the findings were different in that some studies reported gains in reading. In the Whitney study (2021), the biggest increases in reading in the personalized learning classrooms were the white students in reading (.904) while the other subgroups had small effect sizes; Black (.124), Hispanics (.118), and economically disadvantaged (.025). The Gates study (Pane, 2015) also noted increases in reading achievement in the personalized learning classrooms with an increase of about 3 percentile points when compared to the median score of students not in the personalized learning class.

Research Question $H_0$3 and $H_0$4

Despite introducing age and gender as covariates in the relationship between students' math and reading scores with the instructional model used, the analysis undertaken indicated no significant relationship and the null hypothesis were accepted for research questions three and four. The implications of these findings are that age and gender did not have a greater impact on student success in the personalized learning classrooms any more than the traditional classroom setting. This study did provide insight into the impact when students were a part of personalized learning practices. The biggest insight was that even though the personalized learning classroom aimed at individualizing the learning for all students, it did not have a significant difference on their test scores. The Bill and Melinda Gates study (2015) referenced in this study did show an increase of student success in those students who participated in personalized learning classrooms with about 3 percentile point increase over students in traditional classrooms. The

Whitney study, which used a public school for its data collection, did show some significant gains in the personalized learning classrooms, but only in the subgroups of race and economically challenged students (Whitney, 2021).

Research Question 1

The interview results determined that both the personalized learning classrooms and the traditional learning classrooms used similar teaching strategies in their classrooms which teachers perceived to increase student achievement. The strategies used in both classrooms were those which encouraged the use of problem-solving techniques and individualization through small group instruction. The common strategies used in both the personalized learning classrooms and the traditional learning classrooms were multi-sensory strategies, project-based learning, and guided reading. According to the Vogler study (2020), the outcome was that personalized learning did increase reading achievement. The strategies the teachers used most often were guided reading, small group instruction, one-on-one conferencing, and allowing students to have voice and choice in their learning. The Kappel study (2020) determined teachers felt the personalized learning strategies improved student engagement in their classrooms and helped them develop a strong relationship with their colleagues which, according to Rickabaugh's Honeycomb Model, is an important component of personalized learning (2016).

Research Question 2

The results for the second research question determined whether the teachers using each instructional model were offered similar professional development opportunities which they perceived to increase student achievement. These opportunities allowed teachers to differentiate instruction in the classroom and encourage students to have some choice in how they mastered skills. The Dinkins study (2017) determined that even though the teachers had professional

development to learn how to incorporate personalized learning strategies into the classroom, ongoing professional development was essential. This study did not determine whether teachers were receiving on-going professional development for personalized learning after the first year. Continued professional development might have yielded a different outcome for student achievement.

After determining personalized learning had no significant impact on student learning in this study, the results are similar to the studies found in the literature review (Pane et al., 2015; Sereno, 2018; Wood, 2018). Previous research indicated no significant impact on students who were in personalized learning classrooms, even though research supported teachers perceiving their students were achieving at higher levels. As posited by Dunkin and Biddle (1974), there are also variables which could influence a teacher and their teaching style. These might include previous experience, past trainings, and a teacher's personality. These factors might influence the outcome and perception of student achievement by a teacher.

Implications

The results of this study could be valuable to stakeholders or any school district planning on implementing personalized learning into their classrooms or schools. Even though the results of this study did not determine there was a significant impact on student achievement from personalized learning, results from future studies at different school districts might show increased student achievement. The three school districts used in this study developed their own definition of personalized learning and used the personalized learning strategies even in their traditional classrooms. There was an increase in student achievement in both models, so there is a possibility that the personalized learning strategies which were used by both models helped to increase achievement. The strategies used in both classroom models were multi-sensory

strategies, project-based learning, and guided reading. School districts which had strictly personalized learning classrooms and traditional classrooms without the shared strategies might show increased achievement in the personalized learning classrooms.

Before any administrator determines to implement a personalized learning environment, they must weigh all the pros and cons of such an endeavor. The school districts in this study spent much time, effort, and training to offer personalized learning classrooms without showing increased student achievement. The question then arises as to whether the resources spent on training teachers and administrators on personalized learning could have been better utilized on other initiatives to enhance student achievement. The question also arises if universities who provide education preparation programs should invest in personalized learning training for their teachers. Without studies that show personalized learning models increase student achievement, there may be a need to revisit the concept at the university level. There needs to be more studies aimed at whether personalized learning increases student achievement through quantitative data to validate the effectiveness of the model.

Study Limitations

There were limitations on the current research study including (a) the study sample size included three school districts located in the same geographical area; (b) the difference in delivery of instruction at all three school districts; (c) traditional teachers attending the same professional development as personalized learning teachers', and (d) the outbreak of Covid-19. The first limitation of the study sample is significant in that the study examined three school districts located in rural western Kentucky. The sample size was small because of the rural location of the school districts.

The second limitation was the difference in delivery of instruction at all three school districts. Based on the design of the study, it was impossible to measure whether all the teachers implemented personalized learning strategies in the same manner and with fidelity. It is also impossible to determine if traditional learning classrooms used elements of personalization in them. Each school district assigned classrooms based on their interpretation of whether the curriculum delivery was a personalized learning class or a traditional learning class. Without observations of each classroom throughout the three school years included in the study, there is no way to ensure each personalized learning classroom and traditional learning classroom was using the teaching strategies defined by the district for each model consistently. There was no common definition of personalized learning across the three school districts.

The third limitation was the exposure of traditional teachers to the same professional development as personalized learning teachers. The traditional teachers would utilize similar strategies in their classrooms that the personalized learning teachers would use according to their interview answers. This would affect the outcome of student achievement if students in both traditional and personalized classrooms were exposed to similar instructional strategies.

The fourth limitation was the outbreak of Covid-19. Because of the pandemic, the interviews and data collection were delayed. Focus groups were not applicable due to social distancing. All data collection was also held through Zoom due to Covid. Focus groups might have increased responses and information received from the participants. The interviewees who participated were also employed in one school district. No one from the other two school districts agreed to be interviewed. Those interviewed might have given more detailed answers if they were with others discussing the same content. Those interviewed might also have been under more stress due to the situation and having more instructional challenges than if not quarantined.

Recommendations for Future Research

The results of this study point to many opportunities for further research. One option is to look at individual student scores and special education status and ethnicity, including subgroups. This would require the identification of districts with greater diversity. This would allow for a more in-depth analysis to determine if there is a statistically significant difference between personalized learning classrooms and traditional learning classrooms. A second option would be to conduct a longitudinal study that followed students through middle school and high school to see the long-term impact of exposure to personalized learning and whether there was a greater increase in student achievement as compared to students who were taught in traditional classrooms. By following students for several years and getting individual student scoring and demographic data, information collected could be used to examine the impact of personalized learning more closely.

A third option would be to use case studies, or an in-depth study specifically aimed at collecting specific information about personalized learning from either teachers or students who were taught in the personalized learning classrooms and traditional classrooms (Saladana, 2021). In addition to observations, this would provide opportunities for one-on-one interactions with the classroom teachers and help determine if personalized learning strategies were used with fidelity.

Summary

After conducting a literature review on personalized learning and finding few studies which focused on student achievement versus teacher perceptions, the findings of the study became significant in order to determine if all the hard work and emphasis placed on implementing a personalized learning opportunity in school districts made an impact. The results of the study were that there was not a significant difference in student achievement in the

personalized learning classrooms and the traditional learning classrooms. Personalized learning classrooms did not significantly increase (α=.05) student achievement when comparing their 2016-17, 2017-18, and 2018-19 math and reading scores. A question then arises as to whether there was too much emphasis placed on the labels of personalized learning and traditional learning. Also, would more community involvement have made a difference when implementing the two models.

The limitations of Covid-19 and the lack of participation from teachers at all three districts did impact the amount of information which could have been collected for the qualitative part of the study. Future studies would need more participation from teachers in order to gauge whether teaching strategies and professional development impacted the results. A recommendation for a future study would be to collect data in a longitudinal study or conduct case studies which would possibly yield more in-depth results.

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APPENDIX A: LETTERS OF SUPPORT

MARSHALL COUNTY SCHOOLS

LEARNING TODAY

LEADING TOMORROW

TRENT LOVETT
SUPERINTENDENT

MARSHALL COUNTY BOARD OF EDUCATION

April 26, 2021

To Whom It May Concern:

I give permission for Keile Phillips to conduct research using STAR Data from the Marshall County School District. It is my understanding no student identifying information will be used in the study. Mrs. Phillips also has permission to conduct a focus group discussion with teachers involved in the use of STAR data.

If I can be of any further assistance on Mrs. Phillips' behalf, please do not hesitate to contact me.

Sincerely,

Trent Lovett

Trent Lovett
Superintendent
Marshall County School District

TRIGG COUNTY

#TRIGGWILDCATPRIDE

June 8, 2021

To whom it may concern:

I give permission for Keile Phillips to conduct research using STAR Data from Trigg County Public Schools. It is my understanding that no student identifying information will be used in the study. Mrs. Phillips also has permission to conduct a focus group discussion with teachers involved in the use of STAR Data.

If I can be of further assistance on Mrs. Phillips' behalf, please feel free to contact me.

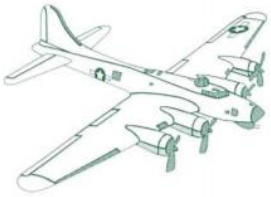
Sincerely,

Bill Thorpe

Bill Thorpe

Superintendent

Trigg County Public Schools



Ballard County Schools

3465 Paducah Road • Barlow, Kentucky 42024
Phone: (270) 665-8400 • Fax: (270) 665-9844
Casey Allen, Superintendent

April 30, 2021

To Whom It May Concern:

I give permission for Keile Phillips to conduct research using STAR data from Ballard County School District. It is my understanding that no student identifying information will be used in the study.

If I can be of further assistance on Mrs. Phillips' behalf, please feel free to contact me.

Sincerely,

Casey Allen, Superintendent
Ballard County Schools

APPENDIX B: CONTENT VALIDITY INDEX QUESTIONAIRE

Rater name: _____
Rater job title: _____
Rater's years of employment as administrator: _____

Content Validity Index for the interview study on personalized learning classrooms and traditional classrooms

Please rate each of the following questions as the extent each is relevant to teachers who teach in a personalized learning classroom or a traditional classroom.

1 = Not Relevant 2 = Somewhat Relevant 3 = Quite Relevant 4 = Highly Relevant

Questions	**1 Not Relevant**	**2 Somewhat Relevant**	**3 Quite Relevant**	**4 Highly Relevant**
Q1 How long have you taught?				
Q2 What certifications do you hold?				
Q3 Do you teach in a personalized learning classroom or a traditional classroom?				
Q4 Why did you choose this setting?				
Q5 Were you given the option to choose which setting to teach?				
Q6 What types of professional development did the school district offer?				
Q7 Was the professional development relevant to what you teach?				
Q8 What types of professional development did you choose to attend?				
Q9 How did the professional development influence your teaching practice?				
Q10 Did you attend any professional development about personalized learning?				
Q11 What is your perception of the effect				

of personalized learning in your classroom?				
Q12 What types of teaching strategies do you use?				
Q13 What types of technology do you use in the classroom?				
Q14 How do you incorporate technology into your curriculum?				
Q15 What is your perception of support from your building administration?				
Q16 What is your perception of support from your central office administration?				

APPENDIX C: CVI ANALYSIS DATA SET

Content Validity Index Analysis Data Set

Rater	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
1	4	3	4	2	2	2	3	3	3	3	3	4	4	3	4	4
2	4	4	4	4	3	3	4	4	4	4	3	4	4	4	4	4
3	4	4	4	3	3	3	4	3	1	4	3	4	3	4	4	3
4	4	3	3	3	3	3	3	4	4	4	3	4	4	4	3	3
5	4	4	3	4	1	4	4	3	3	4	4	4	3	4	4	4
6	4	3	4	3	3	4	4	3	3	4	2	4	3	4	4	4

APPENDIX D: CVI PARAMETERS IN EFFECT

CVI Parameters in Effect

Number of Items to Evaluate	Number of Raters	Minimum Data Value to Rate
16	6	3

APPENDIX E: IRB APPROVAL LETTER

WKU

INSTITUTIONAL REVIEW BOARD
OFFICE OF RESEARCH INTEGRITY

DATE:	November 17, 2021
TO:	Keile Phillips
FROM:	Western Kentucky University (WKU) IRB
PROJECT TITLE:	[1839178-1] Increasing Student Achievement with Personalized Learning
REFERENCE #:	IRB# 22-131
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	November 17, 2021
EXPIRATION DATE:	April 30, 2022
REVIEW TYPE:	Expedited Review

Thank you for your submission of New Project materials for this project. The Western Kentucky University (WKU) IRB has APPROVED your submission. 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 Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a *signed* consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the consent document.

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. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of April 30, 2022.

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.

APPENDIX F: IRB CONTINUING REVIEW REPORT

WESTERN KENTUCKY UNIVERSITY

Institutional Review Board
Continuing Review Report

If this is your third year for your Continuing Review Request, please complete a new application.
Otherwise; DO NOT include the complete application in describing modifications and requests for additional time to collect data.

Name of Project: Increasing Student Achievement with Personalized Learning
Name of Researcher: Keile Phillips
Department: Leadership and Professional Studies

How many total subjects have participated in the study since its inception? #0

How many subjects have participated in the project since the last review? #0

Is your data collection with human subjects complete? ☐ **Yes** ☒ **No**

1. Has there been any change in the level of risks to human subjects? (If "Yes", please explain changes on a separate page). ☐ Yes ☒ No

2. Have informed consent procedures changed so as to put subjects above minimal risk? (If "Yes", please describe on a separate page). ☐ Yes ☒ No

3. Have any subjects withdrawn from the research due to adverse events or any unanticipated risks/problems? (If "Yes", please describe on a separate page). ☐ Yes ☒ No

4. Have there been any changes to the source(s) of subjects and the Selection criteria? (If "Yes", please describe on a separate page). ☐ Yes ☒ No

5. Have there been any changes to your research design that were not specified in your application, including the frequency, duration and location of each procedure. (If "Yes", please describe on a separate page). ☒ Yes ☐ No

6. Has there been any change to the way in which confidentiality of the Data is maintained? (If "Yes", please describe on a separate page). ☐ Yes ☒ No

7. Is there desire to extend the time line of the project? ☒ Yes ☐ No
On what date do you anticipate data collection with human subjects to be completed? March 31, 2022

WESTERN KENTUCKY UNIVERSITY

Institutional Review Board
Continuing Review Report

The original project submitted to IRB requested data be collected through focus groups from teachers who taught in personalized learning classrooms and traditional classrooms. Those focus groups were to be completed by January 31, 2022. In December of 2021 a tornado swept through the area which caused internet issues for weeks. Then when school resumed, Covid hit the area again and being able to complete focus groups was impossible because several teachers or their families were sick. I was not able to get the participation I anticipated to schedule focus groups. I would like to continue with my research; however, I would like to gather the qualitative data through interviews held via Zoom or another similar platform. I anticipate the participation of both teachers who taught in personalized learning and traditional classrooms to be greater than before. My goal is to interview 20 teachers, half who taught personalized learning and half who taught the traditional class, during the 2016-17, 2017-18, and 2018-19 school years. These interviews will take place between IRB approval and March 31, 2022.

APPENDIX G: LETTER TO PARTICIPANTS/CONSENT

From: Keile Phillips, WKU educational leadership doctoral candidate

To: Current Teachers

Regarding: Your potential participation in a study of personalized learning classrooms and traditional classrooms

Hello, _____:

I am sending you this letter in hopes you will participate in a study of personalized learning classrooms and traditional classrooms.

I will be holding interview sessions with teachers who have either taught in the personalized learning classroom or a traditional learning classroom. These interviews will meet via Zoom or another similar platform if Zoom does not work. The interviews will be held at a date and time to be determined by the researcher and convenient for the participants. I plan to complete this process during the month of August or September 2021.

I have enclosed an informed consent form for your review with a small questionnaire attached to the bottom.

All information gathered will be kept confidential and secure.

If you are interested in participating in this study, please return the enclosed informed consent form along with this letter with your answers to the questionnaire.

Thank you for your cooperation in this study!

Keile Phillips
170 Cactus Drive
Benton, KY 42025
270-527-0796

The enclosed sheet is a consent form. I have also enclosed a self-addressed stamped envelope for you to return.

Please return this form in the enclosed self-stamped envelope.

Your name: _____

Do you teach in a personalized learning classroom or a traditional classroom?

What grade do you currently teach?

I, _____, do give consent to participate in the study conducted by Keile Phillips, via Zoom. I give consent for my information to be included in the study about personalized learning.

_____

Name Date

Thank you for your willingness to participate in this study on personalized learning. Your participation is crucial to a successful study!

Keile Phillips WKU Educational Leadership Doctoral Candidate

APPENDIX H: CONFIDENTIALITY AGREEMENT FOR NOTE-TAKER

CONFIDENTIALITY AGREEMENT

THIS CONFIDENTIALITY AGREEMENT (the "Agreement") dated _____day of _____ 2021.

Keile Phillips of 170 Cactus Drive, Benton, KY
(Individually and collectively the "Information Provider")

AND

Darcie Egner of 115 Jim Goheen Drive, Benton, KY
(the "Recipient")

I, _____, agree to serve as the co-moderator/notetaker for Keile Phillips' doctoral research study titled "Personalized Learning."

As co-moderator, I agree to assist Keile Phillips in conducting interviews (i.e., audio and/or video recording).

Furthermore, as co-moderator I agree not to divulge the names of interview participants, demographic information related to the participants, nor any information shared during the interview session with any third party, verbally or in written form.

_____ _____

Darcie Egner, co-moderator/notetaker Date

_____ _____

Keile Phillips, moderator/information provider Date

Copyright Permission

Name: Phillips, Keile Rae

Email (to receive future readership statistics): keile.phillips924@topper.wku.edu

Type of document: ['Dissertation']

Title: The Effects of Personalized Learning on Student Achievement

Keywords (3-5 keywords not included in the title that uniquely describe content): education study elementary

Committee Chair: Dr. Gary Houchens

Additional Committee Members: Dr. Sam Evans Dr. Antonia Szymanski

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