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The Beliefs of Secondary Teachers on Personalized Learning for Students Through the Use of Instructional Technology

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A Dissertation submitted to the Education Faculty of Lindenwood University in partial fulfillment of the requirements for the degree of

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This Dissertation has been approved as partial fulfillment of the requirements for the degree of Doctor of Education Lindenwood University, School of Education

Dr. Brad Hanson, Dissertation Chair — Date: 4-2-18

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Declaration of Originality

I do hereby declare and attest to the fact this is an original study based solely upon my own scholarly work at Lindenwood University, and I have not submitted it for any other college or university course or degree.

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Abstract

Personalized learning for students has been an emerging trend which seeks to support teaching and learning in the 21st century (Netoch, 2017). This study identified beliefs of secondary educators on the different aspects of personalized learning for students. Areas covered in this study included teacher professional development on the personalized learning process, amount or quality of teacher support for the implementation of personalized learning, the impact of technology on personalized learning with classroom instruction, and any obstacles to the personalized learning process. Findings from this study were compared to identify connections between responses as they related to the research questions. Many teachers surveyed indicated they felt instructional technology was needed but not necessary for all aspects of personalized learning. Most secondary teachers indicated some form of personalized learning was prevalent in their school. The majority of teachers indicated their students seldom or never utilized assistance on problem-solving help from automated tutoring services. In another related area, less than 50% of teachers reported students seldom or never used personalized learning systems feedback from automated systems regarding their own learning strengths and weaknesses. A majority of teacher respondents valued professional development offered to them through the school, as well as the support they received. A majority also somewhat or strongly agreed the professional development aided them in implementing technology for personalized learning in the classroom. Finally, one of the major obstacles reported by teachers was the excessive time needed to develop content for technology-based instruction.

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Chapter One: Introduction

There are noticeable differences when comparing schools in contemporary America with educational institutions in the past, such as the presence of new digital technologies in classrooms and ways of accessing information (State University, n.d.). Former United States Secretary of Education Arne Duncan stated:

> What do I mean when I talk about transformational productivity reforms that can also boost student outcomes? Our K-12 systems largely still adhere to the century-old, industrial-age factory model of education. A century ago, maybe it made sense to adopt seat-time requirements for graduation and pay teachers based on their educational credentials and seniority. Educators were right to fear the large class sizes that prevailed in many schools. However, the factory model of education is the wrong model for the 21st century. (as cited in Watters, 2015, para. 1)

Upon closer examination, many similarities between schools of different eras remain (State University, n.d.). Technology in schools of today does not look substantially different from educational institutions of the past (Ronan, 2017).

Senge stated, "A simple question to ask is, how has the world of the child changed in the last 150 years?" (as cited in Newcomb, 2015, para. 14). Senge continued by saying, "It is hard to imagine any way in which it has not changed when they are immersed in all kinds of stuff that was unheard of 150 years ago" (as cited in Newcomb, 2015, para. 12). In 1899, Jean-Marc Côté painted a series of images of what he imagined the world would look like in the year 2000 (Swanson, 2015). One of Côté's depictions of the future shows an image of students sitting in a traditional classroom with the teacher inputting text into

a machine and the machine appearing to be grinding up knowledge from books (Swanson, 2015). In a description of this illustration, Corrigan (2013) detailed how wires from the machine run up and over a wall and plug into helmets on students' heads. Côté's painting from the 19th Century projects schools in the future will have information piped directly into students' brains (Corrigan, 2013). Although schools are not yet at the stage where knowledge is directly imported into students' heads, the education sector has invested heavily in new digital technologies which suggest Cote's machine is not simply a product of fantasy (Earley & Greany, 2017). Indeed, new technologies providing customized educational experiences for students have become prevalent in the contemporary classroom (Racen, 2017).

Background of the Study

Bloom (1984) published a study entitled, *The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring*. In Bloom's (1984) study, students were compared in three methods of instructional practices: conventional classroom, mastery learning, and tutoring. Bloom discovered when students were in the setting of a small group or individual tutoring, with formative assessment and feedback, those students performed two standard deviations higher than students who received conventional classroom instruction (Paiva, Ferreira, & Frade, 2017; VanderVeen, 2014).

In a related study, Harvard's Edlab used low-performing schools in the Houston School District to measure student growth by increasing instructional time, hiring high-quality educators, using data-driven instruction, implementing tutoring, and developing a culture of high expectations (Samuels, 2012). Results of the study, known as the *Apollo 20 Study*, also showed increases in the achievement of students who participated in one-

on-one tutoring or personalized learning (VanderVeen, 2014). Edlab's study, though successful, reported a cost of over 29 million dollars for nine schools in the Houston School District (VanderVeen, 2014). Consequently, school districts must develop a plan of action to duplicate effectiveness of personalized, one-to-one instruction in a more cost-effective and consistent application (Reigeluth et al., 2015; Samuels, 2012). With a better understanding of high-yielding instructional practices, districts are now turning to new educational tools in the search for solutions to Bloom's study (Elearning!, 2016).

Personalizing learning, in some respects, is an age-old concept (Bentley, 2017). For generations, "teachers have sought to craft instruction to meet individual student needs—a manageable challenge when working with a relatively small group, but much more difficult for a class of 20 to 30 students" (Cavanagh, 2014, para. 18). According to Hill (2012):

> Although there has been a long history of distance education, the creation of online education occurred just over a decade and a half ago—a relatively short time in academic terms. Early course delivery via the web had started by 1994, and this was soon followed by a more structured approach using the new category of course management systems. Since that time, online education has slowly but steadily grown in popularity to the point that in the fall of 2010, almost one-third of U.S. post-secondary students were taking at least one course online. (para. 1)

School districts continue to see the potential in personalized learning to meet demands of a student population with more diverse needs than previous student populations (Walker, 2017). According to Cavanagh (2014), "Technology offers a powerful tool for achieving

this goal. They point to the myriad digital devices, software, and learning platforms offering educators a once-unimaginable array of options for tailoring lessons to students' needs" (para 4).

Conceptual Framework

The driving force behind this study came from a recent study funded by the Bill and Melinda Gates Foundation (Hanover Research, 2012). The work, completed by the Hanover Research Group, served as the conceptual framework (Hanover Research, 2012). Personalized learning for students has been an emerging trend to support teaching and learning in the 21st century (Hanover Research, 2014). Over the past century, significant changes have occurred in communication technologies, methods for information access, modes of education delivery, use of technology in the classroom, and the art of teaching (About Personalized Learning, n.d.).

Personalized learning is intended to "meet each child where he is and help him meet his potential" and to "educate the whole child" (Hanover Reserach, 2012, p. 4). Different learning opportunities are encouraged, as customized study occurs both inside and outside of the classroom (Basye, 2016). Thus, teacher relationships and technology innovation are frequently used to improve learning opportunities (Hanover Research, 2014).

Coinciding with those innovations, the United States Department of Education (2012) identified personalized learning as their highest priority in the "Race to the Top" initiative. Members of the United States Department of Education (2012) listed four areas schools should focus on to receive financial assistance from the "Race to the Top" initiative. Authors of the initiative stated:

> [The] LEA (Lead Educational Agency) or consortium's application must coherently and comprehensively address how it will build on the four core educational assurance areas in Race to the Top to create student-centered learning environment(s) that are designed to: significantly improve teaching and learning through the personalization of strategies, tools, and supports for teachers and students that are aligned with college- and career-ready standards; increase the effectiveness of educators, and expand student access to the most effective educators in order to raise student achievement; decrease the achievement gap across student groups; and increase the rates at which students graduate from high school prepared for college and careers. (United States Department of Education, 2012, p. 4)

The core areas outlined by the United States Department of Education (2012) were further addressed by the findings of the Hanover Group.

The Hanover Research Group (2012) identified several important factors to the personalized learning approach. Key findings in the Hanover Research Report (2012) encompassed a large area of teaching and learning, including:

1. Personalized learning to emphasize student-led learning, learning outside the classroom, and increased parental involvement. (p. 5)
2. The creation of personalized learning plans for all students to increase student motivation. (p. 5)
3. The use of technology to support personalized learning in multiple ways. (p. 5)

4. The use of technology to also facilitate assessment and monitoring of student progress in real-time. (p. 5)
5. Professional development for educators regarding the implementation of personalized learning in the blended learning classroom model. (p. 27)

Furthermore, the Hanover Research Report (2012) generated a general picture of each schools' efforts to implement a personalized learning environment and comprehend the outcomes resulting from these teaching and learning practices. This study on personalized learning helped guide the direction of this research project.

Statement of the Problem

The educational system of today was designed at the end of the 19th century with a plan to standardize the way teachers teach and assess students (Kamenetz, 2016). Schwahn and McGarvey (2012) stated, "The Industrial Age educational system is an assembly line where the time for learning is the constant and the quality of the learning is the variable" (p. 6). As a result of increased pressure from all stakeholders, education stands at a crossroad in how students are taught in the classroom (Burke, 2013).

According to Horn and Staker (2015), educators have debated what practices negatively affect schools and have offered different solutions to the problem. Educators are now seeking opportunities to engage students in learning processes proven to yield greater gains in student learning outcomes (Snyder, 2013). Boardman (2012) stated, "As education embarks on the second decade of the 21st century, technology is becoming more sought after than ever before as schools work to make students college and career ready" (p. 19).

Research on personalized learning and its impact on teaching and student engagement was explored through a review of literature (Oflaherty & Phillips, 2015). Pane stated, “Personalized learning holds promise, but there's still a lot of work to do to figure out how well this is working” (Pane, Steiner, Baird, & Hamilton, 2017, p. 6). Consequently, school districts are facing challenges regarding implementing personalized learning strategies effectively, as well as determining how best to evaluate the true impact of those strategies on student learning (Cavanagh, 2014).

Purpose of the Study

The purpose of this quantitative study was to identify beliefs of secondary educators regarding different aspects of personalized learning for students. The aspects covered in this study included teacher professional development on the personalized learning process, the amount and quality of teacher support for implementation, the impact of technology on personalized learning, and inhibiting roadblocks in the education process. This study focused on teachers’ experiences during the 2016-2017 school year.

The United States Department of Education defined personalized learning as “instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interests of different learners” (as cited in Netoch, 2016, para. 3). According to Dicerbo (2016), “In an environment that is fully personalized, the learning objectives and content, as well as the method and pace, may all vary” (para. 5). The excitement students could experience from different types of instruction based on their needs and desires, make personalization an intoxicating and compelling option for educators (Dicerbo, 2016).

With this new sense of urgency to improve, school leaders have turned to instructional strategies proven to influence student achievement (Johnson, 2013). According to Darwin Stiffler (Mesecar, 2016), Superintendent of Yuma, Arizona School District 1:

> The outcomes we are seeing from schools who are using high-quality personalized learning models are extremely encouraging. To achieve their potential, it is critical personalized learning be implemented strategically, with as strong a focus on pedagogy and addressing students' specific educational needs as on the technology itself. (para. 7)

Along with a narrowed focus on instruction in the classroom, educators have begun to use technology to increase student engagement and performance (Moeller & Reitzes, 2011). Encouragingly, the use of technology in the classroom has provided fundamental change important to achieve significant improvement in productivity (United States Department of Education, 2017a). John Pane, the author of the report funded by the Nellie Mae Education Foundation, stated, 'Technology can equip students to organize their learning process independently. Instead of being passive recipients of information, students using technology become active users" (as cited in Moeller & Reitzes, 2011, p. 6).

Technology is a tool students can utilize to organize their learning in an independent environment (Moeller & Reitzes, 2011). Furthermore, new expectations have been presented in technology initiatives and have caused a shift from traditional instruction to dynamic self-discovery (Johnathan, 2012). Obviously, there is growing agreement among educators that improving training of students for 21st-century skills,

including education and careers, changes how secondary education is organized (Moeller & Reitzes, 2011). Shifts in society involving the use of technology have affected the way educators utilize resources to more effectively instruct students in the classroom (Kurzweil Blog Team, 2015). Through the utilization of technology, students are now becoming active learners instead of passive recipients of their learning (Moeller & Reitzes, 2011). Understanding these shifts is key to developing teaching and learning cultures best suited to meeting the needs of students while improving how teachers connect with other stakeholders (Sheninger, 2014). There are still questions to be answered for educators on their quest for the development of personalized learning for students (Klau, 2017).

Research questions. The following research questions directed this study:

1. What are the beliefs of secondary teachers concerning personalized learning with the use of instructional technology in their classrooms?
2. What are the beliefs of teachers concerning their professional development experiences designed to assist in utilizing instructional technology to provide personalized learning for their students?
3. What are the beliefs of teachers concerning the barriers they experience in facilitating a personalized learning environment for students through instructional technology?

Significance of the Study

The findings of this study may provide guidance to secondary teachers who want to personalize student learning at the secondary level. Demand for teachers to improve student growth from school administrators justifies the need to look for more efficient

means of teaching and learning in the classroom (Mertler, 2017). Thus, teachers who apply results of this research project will be able to improve the teaching and learning process using personalized learning (Walker, 2017).

A study of personalized learning using technology can provide secondary teachers information to improve instruction in their classroom (Good, 2017). This study was designed to help educators improve teaching pedagogy, remove roadblocks to student success, and help decision makers understand the role of professional development in teacher growth. Therefore, insight may be gained by secondary educators on the teaching and learning process through the utilization of personalized learning.

Definition of Key Terms

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

Blended learning. Blended learning is a concept by which leveraging the internet affords students personalized learning experiences, including increased student control over the time, place, path, and pace of learning (Horn & Staker, 2015).

Personalized learning. Personalized learning is a variety of educational structures, student learning experiences, instructional focuses, and responses to intervention to address learning needs, interest, and goals of each student (The Glossary of Education Reform, 2015).

Professional development. Professional development is a wide variety of specialized training, formal education, or advanced professional learning intended to help administrators, teachers, and other educators improve professional knowledge, competence, skill, and effectiveness (Lehtomäki, Janhonen-Abruquah, & Kahangwa, 2017).

Technology-rich instruction. Technology-rich instruction shares the features of traditional instruction but has digital enhancements such as electronic whiteboards, broad access to Internet devices, document cameras, digital textbooks, internet tools, Google docs, and online lesson plans (Horn & Staker, 2015).

Traditional instruction. Traditional instruction entails grouping students by age and promoting them from one grade to the next in batches, offering all students in each cohort a single, unified curriculum (Horn & Staker, 2015).

Limitations and Assumptions

The following limitations and assumptions were considered within this study because of the chosen study population:

1. Results of this study were limited to the responses by teachers at the secondary level.
2. Secondary schools participating in this study were in the southwest Missouri region.
3. Data on personalized learning were limited by teacher perception.
4. Data attained through the survey were generalized only to the sample used in this study.
5. The interpretation and definition of personalized learning by respondents of the survey were a limitation. Although the definition was provided to respondents, there was room for a different interpretation for each respondent who took the survey.
6. Secondary teachers of varying subject areas may not use similar approaches to instruction.

7. The responses of the participants were honest and without bias.

Summary

Researchers have shown students who learn in a non-conventional classroom, (tutoring and small groups) perform better (Bloom 1984; Samuels, 2012; VanderVeen, 2014). Since the earliest introduction of online learning, educators have been aware of technology's potential to provide a more personalized instructor-educator experience and have sought to leverage said potential to achieve a more efficacious learning model to meet the needs of each student (About Personalized Learning, n.d.). Therefore, personalized learning has received growing attention as a concept, centered around a student-led learning plan and empowered by advances in communicative and educational technology (Wolf, 2010). Thus, allowing the learning experience to be relatively boundless, occurring within and without the classroom (About Personalized Learning, n.d.; Hanover Research, 2012; Wolf, 2010).

This conventional system of education, relatively unchanged and unreformed, dates back to the end of the nineteenth century and is inspired by the old factory assembly line (Dicerbo, 2016). Controversy over educational theory and practice is an ongoing presence in the educational sector (Ball, 2017). Many researchers believe a strategic implementation of personalized learning, primarily through technological empowerment and motivation of students, is the key to improving the quality of education at large, and it could significantly increase positive learning outcomes (Dicerbo, 2016; Mesecar, 2016; Moeller & Reitzes, 2011). Concurrently, this quantitative study was designed to discover beliefs of educators in a secondary environment toward several key aspects of personalized learning. The key aspects include attitudes regarding the use of technology

for personalized learning, beliefs regarding professional development experiences in utilizing instructional technology for the provision of personalized learning, and perceptions of barriers faced when trying to facilitate a personalized learning environment for students.

Chapter Two contains a review of the current literature surrounding several aspects of personalized learning for secondary students. Personalized learning, using technology as a teaching tool, is explored throughout the review of literature. Furthermore, in Chapter Two, topics of discussion include teacher professional development utilizing technology-based personalized learning and current research involving barriers to the implementation of personalized learning.

Chapter Two: Review of the Literature

Traditionally, teachers have tried to meet the needs of students by utilizing a curriculum-based model or teacher-centered model of instruction (DeMink-Carthew, Olofson, LeGeros, Netcoh, & Hennessey, 2017; Kurshan, 2016). However, the advent and integration of technology into the classroom has forced schools to move beyond the traditional one-size-fits-all educational model to a model yielding autonomy, personalization, equity, and excellence for every child (Ferlazzo, 2017; Friend, Patrick, Schneider, Vander Ark, 2017; Hanover Research, 2012; National Center for Learning Disabilities, 2018). The adoption and utilization of technology within the expansive education system focus on instructional technology, which allows customized learning to meet individual student needs (Herold, 2017b; United States Department of Education, 2018; Waldrip et al., 2015).

Technology supports personalized learning in three distinct ways (Hanover Research, 2012; Waldrip et al., 2015). First, technology allows students to utilize interactive, innovative teaching software to learn at their own pace (Hanover Research, 2012). Secondly, technology enables assessment and monitoring of student progress in real-time (Hanover Research, 2012; Waldrip et al., 2015). Finally, technology gives students the opportunity to increase engagement with class materials and enables learning to take place at any time, from anywhere. (Hanover Research, 2012).

Technology associated with personalized learning is readily used as a teaching tool to increase student motivation and achievement (Brookfield, 2017). Evidence-based research involving the professional development of teachers and the use of technology-

based personalized learning demonstrates a relative increase in the motivation and achievement of secondary students (Hanover Research, 2012). Key barriers to the integration and use of personalized learning in classrooms have also been noted in current research as schools shift from teacher-centered learning to an education system focused on student-centered learning (Herold, 2017a).

In general, the importance of technology and personalized learning seems to lie in the ability of technology to support multiple learning styles, enable self-paced learning, and adjust the content of teaching to specific student weaknesses (Adams, Rodriguez, Estrada, & Davis, 2016). These three areas are recurrent themes in the literature on instructional technology (Andrade, 2013; Carr, Zube, Dickens, Hayter, & Barterian, 2013; de Freitas, Morgan, & Gibson, 2015; De los Arcos, Farrow, Pitt, Weller, & McAndrew, 2016; Ho & Kuo, 2010; Kuo, Walker, Schroder, & Belland, 2014; Lee, 2010; Prunuske, Batzli, Howell, & Miller, 2012; Rumble, 2012; Xu & Jaggars, 2013). Furthermore, the main gap identified in this literature review was the absence of empirical studies containing teachers' beliefs on the technology-personalized learning link (Lee, 2015). The purpose of the literature review was to discuss, analyze, and critically synthesize both theories and empirical findings relevant to the three research questions of the study.

Conceptual Framework

A work completed by the Hanover Research Group (2012) served as the conceptual framework for this research study. The conceptual framework of personalized learning supports student-centeredness and is applicable to both teaching and learning in the 21st century (Garrison, 2017). The Hanover Research Group (2012) concluded,

"overall student achievement is likely to increase when students are able to learn at their own pace with a variety of teaching styles and formats available to them" (p. 4). Personalized learning eliminates the utilization of a standard curriculum and instead focuses on creating a unique learning experience in alignment with individual student needs (Hanover Research, 2012). Furthermore, "given the ability to self-direct their learning, students will make greater gains in achievement due to increased interest and customization" (Hanover Research, 2012, p. 7).

Personalized learning is focused on placing student needs first, thereby enabling students to direct their own learning (Suskie, 2018). The Hanover Research Group (2012) claimed the intent of personalized learning is to meet the students where they are, to help them meet their "potential," and to "educate the whole child" (p. 4). Different learning environments are encouraged, as personalized learning takes place both within and outside of the classroom (Hanover Research Group, 2012) . The Hanover Research Group (2012) placed a strong emphasis on parental involvement, meaningful student-teacher-parent relationships, and the utilization of technology to enhance the learning opportunities.

Although organizations define personalized education differently, educators agree, "education should be learner-centered, not curriculum-centered" (Hanover Research, 2012, p. 8). The International Society for Technology in Education concluded personalized learning tailors instruction, learning, and assessments to student preferences and individual needs (Howton, 2017). As part of the Race to the Top competition, the United States Department of Education placed a strong emphasis on student-centered

personalized learning (Hanover Research, 2012). The United States Department of Education gave clear direction concerning personalized learning:

> Create student centered learning environment(s) that are designed to: significantly improving teaching and learning through the personalization of strategies, tools, and supports for teachers and students that are aligned with college- and career-ready standards; increase the effectiveness of educators, and expand student access to the most effective educators in order to raise student achievement; decrease the achievement gap across student groups; and increase the rates at which students graduate from high school prepared for college and careers. (Hanover Research Group, 2012, pp. 4-5)

The fundamentals of personalized learning are focused on the significance of putting all students first and customizing learning to meet individual needs (Hanover Research, 2012). Personalized learning, as a conceptual framework, enables students to reach their true potential by fostering, developing, and maintaining relationships between students, the community, parents, school, and teachers (Hanover Research, 2012). Personalized learning is achieved by supporting and challenging each student at his or her own level as students assume more ownership of the learning (Bishop, Downes, & Nagle, 2017; National Conference of State Legislatures, 2018; U.S. News & World Report, 2017). Learning processes involving personalized learning allow teachers to optimize classroom instruction and increase student preparedness for becoming life-long learners (Hanover Research, 2012; Office of Educational Technology, 2018; Patrick, Worthen, Frost, & Gentz, 2016).

According to the Personalized Learning Foundation, the personalized learning model identified fundamental attributes and characteristics correlated with a personalized learning initiative (Hanover Research, 2012). Such characteristics include access to technology, development of programs for parents and teachers, and increased one-on-one interaction between students and teachers (Hanover Research, 2012). Strong emphasis was placed on parental involvement, smaller classroom sizes, varied learning environments, and the ability to have choices within curriculum programs (Hanover Research, 2012).

Personalized learning integrates the utilization of modern technologies and smart e-learning systems to aid in tracking and managing the needs of students (Hanover Research, 2012). Personalized learning enhances the provision of engagement in learning content while providing the opportunities and resources not available to students within a traditional classroom setting (Hanover Research, 2012). The use of technology as an enabler of learning outside the classroom is a recurring theme in literature (Andrade, 2013).

In the classroom, the teacher's time is committed to increasing performance and comprehension of the broad mass of students, not students at the extremes of performance (Muijs & Reynolds, 2017). Some researchers believe students with learning disabilities (Prevatt, Welles, Li, & Proctor, 2010) and students who are gifted (Grantham & Biddle, 2014) have more personalized needs than students who are close to the mean of intelligence. Therefore, technology is particularly valuable to deliver extra personalized instruction for students with learning-disabilities who struggle in the

classroom while affording gifted students the opportunity to explore topics in greater depth (Bennett, Agostinho, & Lockyer, 2015; Freitas et al., 2015).

Additionally, teachers have reported the ability to address multiple learning styles as a benefit of technology for personalized learning (Gardner, 2011). Some students are verbal and textual learners, who do well in traditional classroom environments, whereas other students are more effective learners when interacting with rich media, simulations, and the kinds of experiences instructional technology is particularly well-suited to provide (Bennett et al., 2015; Freitas et al., 2015). Students who are in the average mean of intelligence have much to gain from the personalized approach made possible through technology (Bierly, Doyle, & Smith, 2016).

Beliefs of Teachers on Integrating Technology into Secondary Classrooms

Research in education and human development refers to how perceptions of technology integration among preservice teaching candidates lack sufficient attention (Boyle, 2015; Strieker, Adams, Cone, Hubbard, & Lim, 2016). Perceptions of technology integration allow administrators to determine which improvements to instructional curricula will enhance learning outcomes of secondary students (Kalota, 2015). As Kalota (2015) suggested, research in big data and analytics applies to secondary education as much as it currently has a near-ubiquitous presence within the college and university classroom. Along those lines, perceptions of secondary teachers toward technology integration in the classroom depend on how school administrators identify which professional development strategies will have the most positive, long-term effects (Broadbent & Poon, 2015; Schmidt, Tschida, & Hodge, 2016). The research discussed in this next section suggests both educators of secondary students and administrators of

secondary schools likely have widely divergent opinions on how technology use in the classroom influences learning outcomes (Herold, 2016).

Although educators and administrators may express concerns about how secondary students use technology toward constructive educational purposes, literature in computer information systems and industrial management outlines key benefits of online platforms applied to implementing a student-centered curriculum (Roth, 2015). Ideally, the integration of technological tools to enhance learning outcomes of secondary students promotes self-efficacy in both secondary students and less professionally experienced educators (Franklin & Smith, 2015; Kent & Giles, 2017; Nguyen et al., 2016). However, effective integration of innovative technological tools in secondary classrooms requires more research (Blackley & Walker, 2015; Luetkemeyer & Mardis, 2016; Nguyen et al., 2016; Roth, 2015). Educational research on various theorethical frameworks which contain prescribed standards of criteria for enhancing student learning outcomes would benefit educators by providing empirical and longitudinal data (Blackley & Walker, 2015; Luetkemeyer & Mardis, 2016; Nguyen et al., 2016; Roth, 2015). As literature suggests, the perceptions of educators of secondary students who are integrating technology into classrooms affect self-efficacy cultivation based on the identification of specific learning needs (Shifflet & Weilbacher, 2015).

Educators of secondary students who encourage the use of mobile devices for learning purposes may believe all individuals should learn “on the go” and have access to adequate “e-content” capable of enhancing learning outcomes along empirical and longitudinal lines (Franklin & Smith, 2015; Gokcearslan, 2017). Secondary students who have access to adequate e-content will, in turn, improve perceptions of their ability to

succeed (Kent & Giles, 2017; Nguyen et al., 2016). Kent & Giles (2017) suggested negative teacher perceptions about how secondary students use technology outside of the classroom is an underlying cause of the under-utilization of technology in the curriculum.

Negative perceptions about the utility of innovative technology in the classroom may nevertheless involve issues related to geographical location and personal obligations (Lewthwaite, Knight, & Lenoy, 2015). Unfortunately, negative perceptions secondary educators may have toward the integration of technology into curricular instruction produces negative empirical and longitudinal effects on student learning outcomes (Palaigeorgiou & Grammatikopoulou, 2016). Negative perceptions toward the integration of technology into the secondary education classroom, moreover, have a poor influence on the instructional practices of educators (Willis, Steel, & Seriki, 2015). Some experts in educational research suggest when educators of secondary students have negative perceptions toward integrating technology into the classroom, the barriers to success become more pronounced as student learning outcomes do not indicate any effective empirical or longitudinal shifts (Nguyen et al., 2016). Overall, the literature suggests negative perceptions toward integrating technology into secondary classrooms require ongoing assessment of variables considered influential on the design and implementation of personalized learning curricula (Moeller & Reitzes, 2011).

Researchers have provided evidence to suggest a connection between the quality of instructional curricula and personalized learning through technology integration (Sidik, 2016). An emphasis on student-centered learning and technology integration has been shown to improve student learning outcomes (Martin & Ndoye, 2016; Twyman &

Redding, 2015). Student-centered learning and the utilization of technology are helping secondary students to cultivate perceptions of self-efficacy (Twyman & Redding, 2015).

Accordingly, researchers (Martin & Ndoye, 2016) of student-centered learning and personalized learning must consider developing answers to questions such as:

1. To what extent do secondary students who use technology in the classroom apply learning tools toward enhancing learning outcomes? (p. 1)
2. How does personalized learning meet the individual learning needs of secondary students? (p. 1)
3. Which specific learning competencies does technology enhance among a small cohort of secondary students? (p. 8)
4. How exactly do secondary students take responsibility for their individual learning needs? (p. 16)
5. How do the enhancements of learning outcomes among secondary students affect the ability of educators to cultivate self-efficacy through the development of effective instructional curricula? (p. 18)

While more professional development opportunities may have positive implications for how educators of secondary students improve learning outcomes, there are still challenges for these educators and students (Nurain, Mohd & Shahbodin, 2015). Different levels of engagement from students concerning educational technology may have an impact on learning outcomes (Nurain et al., 2015). The levels of engagement regarding the learning outcomes from students will also have implications for how researchers assess the value of personalized learning (Nurain et al., 2015). Accordingly, Nurain et al. (2015) suggested the integration of personalized learning tools into

instructional content will enhance learning outcomes among secondary students and should highlight technology tool features such as online dictionaries, video conferencing, and discussion tools.

Adminstrators have considerable influence of the distriubtion of resources and the presentation of professional development used to further personalized learning and technology intergration, while educators hold to policies and instructional practices, designed by administrators to enhance learning outcomes. (Franklin & Smith, 2015; Luetkemeyer & Mardis, 2016). Ultimately, superintendents create policies to support the mission of the school district, and the building administrators communicate goals and prioritize instructional practices they believe will impact student growth and adhere to the superintendent's educational values (Mirzajani, Mahmud, Ayub, & Wong, 2015). The policy directives set by district-level superintendents pose challenges to educators who have positive, negative, or even ambivalent perceptions toward identifying technology as a core element of long-term academic success among secondary students (Franklin & Smith, 2015; Luetkemeyer & Mardis, 2016; Mirzajani et al., 2016).

Researchers who reviewed the policy literature identified an “overarching desire to understand the relationship between national digital learning priorities, the shift to digital resources, and changes in learning and teaching…” (Luetkemeyer & Mardis, 2016, p. 2). The specific relationship identified by researchers draws from at least three interrelated assumptions about personalized teaching and learning (Hodas, 2016). First, the need for educators of secondary students to instruct differently requires more than a minimal administrative presence in the classroom (Hodas, 2016).

Secondly, administrators at the building level and superintendents at the district-level must actively demonstrate support for educators of secondary students to develop alternative instructional curricula that may effectively transform a national educational landscape (Hodas, 2016). Finally, the stakeholders responsible for the development of effective educational technology must identify key educational trends, proven effective for enhancing student learning outcomes (Hodas, 2016). Stakeholders must also build relationships with information technology professionals who design more effective tools (Hodas, 2016). Perceptions of educators of secondary students toward integrating technology into classroom environments have further implications for professional development, particularly among individual veteran teachers (Boyle, 2015; Strieker et al., 2016). In turn, knowledge gained by educators of secondary students, through participation in professional development and teacher preparation programs influence the extent of technology integration in the classroom (Good, 2017).

Professional Development, Instructional Technology, and Personalized Learning

Professional development provides opportunities for teachers to obtain greater theoretical and practical knowledge of instructional technology, while it, in turn, can be utilized to improve personalized learningare aligned with college-and career-ready (Adams & Vescio, 2015). Therefore, it is important to ask what role professional development might play in the application of instructional technology and personalized learning (Bennett et al., 2015; Freitas et al., 2015). The main insight emerging from the literature on professional development and personalized learning (Johnston & Cornish, 2016; Popp & Goldman, 2016) was professional development communities equip teachers with the knowledge, rationales, and techniques necessary to implement

instructional technology for specific purposes. Professional development communities provide opportunities for teachers to share knowledge about technology (Johnston & Cornish, 2016; Popp & Goldman, 2016), thus building pro-technology attitudes among novice teachers and teachers who have limited exposure to technology.

One of the points made by technology integration theorists Tondeur, van Braak, Ertmer, and Ottenbreit-Leftwich (2017), whose work is discussed later in the literature review, was teachers need to have some kind of motivation to explore and experiment with technology. In this regard, the main insight of technology acceptance theory (Venkatesh, Morris, Davis, & Davis, 2003) is teachers will be more likely to explore and experiment with technology if they have reasons to believe technology will be helpful and easy to use. Teachers can be persuaded to utilize instructional learning technology as it has been documented in the literature, to the extent adminstrators design professional development regarding the usefulness of instructional technology (Johnston & Cornish, 2016; Popp & Goldman, 2016).

Professional development entails the supervision of educators by administrators and associated faculty during their first five years of employment after graduation from a university (Striker et al., 2016). Secondly, professional development provides opportunities for faculty and administrators to build relationships while engaging in large scale paradigm shifts (Richardson, Sales & Sentočnik, 2015). As suggested by researchers of information science, professional development programs, which include administrative and faculty support for integrating technology into instructional curricula, encourage self-directed learning for academic purposes (Rieh, Collins-Thompson, Hansen, & Lee, 2016).

Professional development programs provide opportunities for teachers to acquire new intructional tools, but a lack of administrative and faculty support for integrating technology into classroom environments has a negative influence on this important growth process (Franklin & Smith, 2015; Kalota, 2015; Lewthwaite et al., 2015; Nguyen et al., 2016). Teaching and learning skills prioritized by district-level administrators impact the way educators view this paradigm shift within a given learning community (Lewthwaite et al., 2015; Mirzajani et al., 2016). Moreover, the perception of educators concerning the ability to produce new ideas using instructional technology reflects personal beliefs toward student-centered learning (Lewthwaite et al., 2015; Mirzajani et al., 2016; Nurain et al., 2015).

Educators who practice teacher-centered learning may decide to integrate technology in an effort to promote empirical and longitudinal enhancements in student learning outcomes (Mohd & Shahbodin, 2015). Although there are still hurdles for the classroom educator, innovative technological developments provide teachers of secondary students with numerous opportunities to enhance learning outcomes through self-directed learning (Blackley & Walker, 2015). Educators who participate actively in professional development may not necessarily acquire the knowledge needed to incorporate more personalized frameworks into student-centered pedagogical practice (Blackley & Walker, 2015; Roth, 2015). Teacher-centered learning does not encourage educators of secondary students to address individual learning needs nor does the pedagogical practice provide space for performing a needs assessment at school and district-levels (Lewthwaite et al., 2015; Luetkemeyer & Mardis, 2016; Mirzajani et al., 2016).

Although educators of secondary students may receive more than sufficient information about professional development skills necessary to effectively integrate innovative learning tools into classroom environments, a lack of confidence in administrators and faculty who oversee professional development programs can cause a lack of professional growth in an educator (Luetkemeyer & Mardis, 2016). However, some research implicitly suggests professional development programs among educators of secondary students should involve assessments of cognitive skills and review of portfolio samples (Willis et al., 2015). Literature suggests professional development programs for educators of secondary students lack the theoretical frameworks necessary to encourage an application of a more student-centered paradigm shift (Lewthwaite et al., 2015; Luetkemeyer & Mardis, 2016; Mirzajani et al., 2016).

Professional development programs for educators of secondary students with little to no emphasis on personalized learning create institutional barriers between educators, administrators, and superintendents at the district-level, as well as between educators and students at the school and classroom level (Strieker et al., 2016). Boyle (2015) noted the overarching goals of most professional development involving the integration of technology into instructional curricula, is to cultivate self-efficacy through digital literacy. Accordingly, professional development programs designed to promote digital literacy among educators of secondary students, facilitate a type of "communal communication" involving greater levels of support from school administrators and district-level superintendents (Richardson et al., 2015, p. 20).

Administrators and superintendents must provide a sufficient amount of financial resources for professional development programs to see potential growth in student

learning outcomes (Franklin & Smith, 2015; Nguyen et al., 2016). Important questions about the competency levels and the minimum level of experience necessary to enhance learning outcomes over time continued to be raised (Nguyen et al., 2016). The support for integrating technology into classroom environments depends largely on how policy frameworks are implemented by administrators and superintendents (Luetkemeyer & Mardis, 2016; Martin & Ndoye, 2016).

Some authors of research literature refer to a gap between the traditional and innovative procurement models concerning the integration of technology into classroom environments (United States Department of Education, 2017a). These models may have negative implications for how educators of secondary students acquire knowledge from participating in professional development programs and maintain their utility irrespective of competency levels or experience (United States Department of Education, 2017a). Traditional models involve official district policy mandates, which require compliance (Hodas, 2016; Luetkemeyer & Mardis, 2016). Educators of secondary students who prefer the traditional procurement model may also define some of the best available information technology practices as applicable to all schools within the United States (United States Department of Education, 2017b).

Innovative procurement models provide rewarding experiences through skills development and relationship building (Hodas, 2016; Luetkemeyer & Mardis, 2016). This model allows teachers to provide personalized learning opportunities for students who have specific learning needs (Hodas, 2016; Luetkemeyer & Mardis, 2016). Educators redefine the instructional curricula through technology to provide meaningful learning experiences (Hodas, 2015; Mohd & Shahbodin, 2015; Twyman & Redding,

2015). As described further in this review of the literature, the gap between traditional and innovative procurement models creates barriers to facilitating a personalized learning experience as educators of secondary students utilize technology to enhance learning outcomes (Hodas, 2016; United States Department of Education, 2017a).

Palaigeorgiou and Grammatikopoulou (2016) suggested participation in professional development programs enables educators of secondary students to cultivate self-efficacy through personal ownership. Professional development programs constitute a learning community in which educators of secondary students discuss possible strategies for improvement and collaboration in reshaping policy environments at school and district-levels (Luetkemeyer & Mardis, 2016; Martin & Ndoye, 2016; Palaigeorgiou & Grammatikopoulou, 2016). Professional development programs designed by administrators to encourage educators to cultivate self-efficacy have proven effective in improving learning outcomes (Franklin & Smith, 2015; Kent & Giles, 2017). Nguyen et al. (2016) observed the implementation of professional development programs, which focus on technology to enhance learning outcomes, establish a much-needed environment for inclusion through personalization.

Professional development programs concerning instructional technology encourage educators to promote critical self-reflection in secondary students through technology (Nguyen et al., 2016). Conversely, barriers to personalized learning significantly affect factors associated with developing and implementing effective instructional curricula and determine how adequately students improve learning outcomes for extended periods of time (Turkcapar, 2015). Teachers are often required to use a particular form of learning technology to support a predefined goal, such as

improvement in school-wide standardized scores (Johnston & Cornish, 2016; Popp & Goldman, 2016). Researchers have explored this topic, but teachers' perceptions of professional development in relation to the use of instructional technology for personalized learning have not been explored (Sorbie, 2015).

Barriers to Deploying Personalized Learning

As defined in the available research, personalized learning refers to a varying process by which educators consider the "time, place, and pace of learning" for each student in secondary grades (Twyman & Redding, 2015, p. 3). Personalized learning encourages secondary students to actively participate in the development and implementation of effective instructional curricula by using innovative technological tools to enhance learning outcomes (Twyman & Redding, 2015). However, school administrators and faculty who do not value technology may likely prove counterproductive despite all efforts at developing and implementing best practices (Turkcapar, 2015).

Personalized learning enables secondary students to adopt a learning process, improving academic achievement over time (Mcknight et al., 2016). Despite evidence of how technology can improve learning outcomes of secondary students, existing limitations of professional developments continue to reflect a gap in traditional and innovative procurement models (Hodas, 2016; Richardson et al., 2015). As such, barriers to personalized learning depend on how likely educators of secondary students comply with policy frameworks mandated by administrators and faculty at the school level, as well as by superintendents at the district-level (Vasquez et al., 2015).

Negative attitudes toward individuals with physical and intellectual disabilities create barriers to integrating personalized learning techniques into the design of instructional curricula for secondary students (Silva, White, & Toch, 2015; Vasquez et al., 2015). Vasquez et al. (2015) found most current studies in education assess effects of technology integration among students in middle grades. While secondary students with physical disabilities may have the cognitive capacity to make critical links between technology and improvements in learning outcomes, those with intellectual disabilities may lack the resources necessary to express a sincere interest in personalized learning (Willis et al., 2015).

For example, secondary students diagnosed on the autism spectrum may not necessarily lack the cognitive capacity to recognize empirical and longitudinal effects of technology on enhancements in learning outcomes, but may be overlooked by educators who employ traditional models for integrating technology into the design of instructional curricula (Hodas, 2016; Thoma, Cain, Wojcik, Best, & Scott, 2017). District-level superintendents may identify challenges associated with adaptability to real-world situations in regard to implemenation of professional development concerning personalized learning and individuals with disablities (Brown, Hales, Kuehn, & Steffensen, 2017).

Irvine and Kevan (2017) found the delivery of personalized instruction through technology provided detailed analytical information about empirical and longitudinal enhancements in learning outcomes at all grade levels. In this context, personalized instruction provides all stakeholders involved in the education of secondary students with the tools for promoting digital literacy (Boyle, 2015; Hodas, 2016; Rieh et al., 2016;

Schmidt et al., 2016). Despite barriers to personalized learning, some hope remains concerning the development of remedial instructional curricula (Schwartz, 2017).

Secondary students have a diverse range of learning needs, often creating barriers to personalized learning (Luetkemeyer & Mardis, 2016; Silva et al., 2015). Although some teachers are eager to implement technology to improve learning outcomes, their concerns regarding workload and difficulty of the task halt progress in the classroom (Broadbent & Poon, 2015). Furthermore, developmental trends in education indicate quantitative changes are occurring related to how educators of secondary students choose to emphasize personalized learning experiences among those with intellectual and physical disabilities (Borba et al., 2016; Vasquez et al., 2015).

Negative perceptions about mobile devices and other forms of technology create barriers to the implementation of personalized learning (Borba et al., 2016). Similarly, barriers to personal development may reflect negative perceptions among educators regarding the ability of secondary students to use instructional technology for learning purposes and nothing else (Mirzajani et al., 2016; Rieh et al., 2016). Researchers suggest personalized learning ideally establishes conditions for proactive, self-directed guidance, while negative perceptions of technology by administrators, faculty, and superintendents hinder the education of students with diverse intellectual needs (Grant, 2014).

Gokcearslan (2017) observed students at all grade levels, even those with mild intellectual disabilities, are effectively utilizing technology to enhance learning outcomes which remain constant over time. Personalized learning through technology encourages the development of improved cognitive functions, including memory and time management (Twyman & Redding, 2015). The lack of support from administrators,

faculty, and superintendents obstructs the improvement process in cognitive functions, even when professional development programs encourage educators to integrate technology into the design frameworks of instructional curricula (Sidik, 2016). Beyond potential improvements to cognitive functions, barriers to facilitating personalized learning have significant implications for the economic future of secondary students who transition into a college or university setting and eventually receive a degree (Kalota, 2015).

The presence of technology in the instructional environment of college and university campuses throughout the United States indicates a need for administrators, faculty, and superintendents of secondary schools to consider the links between technology integration and the potential improvements in learning outcomes for secondary students with unique needs (Kalota, 2015). While personalized learning may emerge as a byproduct of integrating technology at the classroom level, stakeholders such as administrators, faculty, and superintendents, may still maintain the conviction traditional procurement models will have more aggregate empirical and longitudinal effects on improvement in the learning outcomes of secondary students (Hodas, 2016).

Researchers in educational technology have highlighted how educators of secondary students might alter the classroom environment by integrating instructional technologies in alignment with learning needs identified through formal assessments of learning outcomes on standardized tests (Broadbent & Poon, 2015; Karal, Kokoc, Colak, & Yalcin, 2015). Yet, researchers in education have observed teachers' backgrounds, professional development, and personal teaching experiences impact how personalized learning in secondary grades is implemented and the extent technology is utilized in the

process (Borba et al., 2016; Gokcearslan, 2017; Lewthwaite et al., 2015; Silva et al., 2015; Vasquez et al., 2015; Willis et al., 2015).

Participation in professional development may encourage educators of secondary students to consider how personalized learning may have a positive influence on learning outcomes (Neve, Devos, Tuytens, 2015). Hodas (2016) hypothesized administrators, faculty, and superintendents would then promote the integration of these models into instructional curricula. However, aggregate student learning outcomes on standardized tests in mathematics and English language arts may result in limited flexibility for administrators, faculty, and superintendents in allowing educators to facilitate personalized learning (Blackley & Walker, 2015; Borba et al., 2016; Boyle, 2016; Hodas, 2016; Karal et al., 2015). Furthermore, aggregate student learning outcomes on standardized tests require educators of secondary students to reflect on the skills acquired from participating in professional development and preparation programs (Borba et al., 2016; Hodas, 2016).

In sum, educators of secondary students may overcome limitations in professional development and work toward generating improvements in learning outcomes on standardized tests along empirical and longitudinal lines (Hodas, 2016). Educators who have the least experience with integrating technology into instructional curricula, typically use the traditional procurement model more than other educational models (Hodas, 2016). Furthermore, researchers claim educators who were found to use the traditional procurement model face the most significant barriers to creating personalized learning experiences for their students (Hodas, 2016). Some researchers may legitimately argue there is too much emphasis on personalized learning (Luetkemeyer & Mardis,

2016). Additionally, these researchers believe a focus on personalized learning cannot effectively satisfy the policy mandates established by administrators, faculty, and superintendents who operate at both the school and district-levels (Luetkemeyer & Mardis, 2016).

Technology integration. Personalized learning can be rendered difficult by technology integration (Tondeur et al., 2017). Technology integration emphasizes teachers, schools, and the educational infrastructure as the main drivers of personalized learning (Tondeur et al., 2017). Gaps in technology integration can prevent teachers from creating environments in which personalized learning is augmented through the appropriate use of technology (Bennett et al., 2015; Freitas et al., 2015).

Kotrlik and Redmann (2005) proposed the following model of technology integration:

> (a) Exploration: Thinking about using technology. Teachers seek to learn about technology and how to use it. (b) Experimentation: Beginning to use technology. Physical changes start to occur in classrooms and laboratories. Instructors focus more on using technology in instruction by presenting information using presentation software and doing a few instructional exercises using spreadsheets, databases, word processors, games, simulations, the Internet, and other computer tools. (c) Adoption: Physical changes are very evident in the classroom and laboratory with the computers becoming a focal point in the classroom and laboratory organization. Instructors employ presentation software and technology-based instructional exercises using games, simulations, spreadsheets, databases, word processors, the Internet, or other technology tools as a regular and normal

> feature of instructional activities. Students shared responsibility for learning emerges as a major instructional theme. (d) Advanced Integration: Using technology innovatively. Instructors pursue innovative ways to use technology to improve learning. Students take on new challenges beyond traditional assignments and activities. Learners use technology to collaborate with others from various disciplines to gather and analyze information for student learning projects. The integration of technology into the teaching-learning process has led to a higher level of learning. (p. 208)

Kotrlik and Redmann (2005) proposed the mere presence of classroom technology is not sufficient to support learning. The authors argued technology must be closely integrated into classrooms to have a positive effect on learning (Kotrlik and Redmann, 2005). Kotrlik and Redmann (2005) identified four sequential steps of integration: exploration, experimentation, adoption, and advanced integration.

According to the literature on technology integration, teachers, even those within the same school, employ substantially different levels of technology integration (Tondeur et al., 2017). One of the points of consensus among researchers is personalized education through the use of educational technology exists in many American schools (Tondeur et al., 2017). Whether or not this technology is appropriately integrated depends on factors such as teachers' levels of technological readiness and technological attitudes, school priorities, and other non-technological factors (Tondeur et al., 2017).

Assuming schools are supportive of the use of technology, both for personalized learning and other purposes, technology integration can remain an important barrier to providing personalized learning experiences as it relies on software and other classroom

technologies (Tondeur et al., 2017). This barrier can be overcome if teachers make a conscious effort to explore, experiment with, adopt, and otherwise integrate technology (Hodas, 2016). Yet, given limited time and professional development opportunities, it appears teachers' prior attitudes towards, and experiences with, technology are highly predictive of their technology integration skill (Tondeur et al., 2017). Thus, for teachers who have limited exposure to technology, instituting a personalized learning environment, enabled by technology, may be more difficult (Tondeur et al., 2017).

The impact of standardized testing. Personalized learning is rendered difficult by the efficiency-oriented, educational system of the United States, particularly in the wake of the No Child Left Behind Act and similar accountability-based legislation (Addison & McGee, 2015; Benjamin & Pashler, 2015; Dogan, Ogut, & Kim, 2015). The current educational environment of the United States typically matches school funding to measures of student progress, resulting in the prioritization of standardized testing and non-personalized pedagogical and curricular approaches (Addison & McGee, 2015; Benjamin & Pashler, 2015; Dogan et al., 2015). Non-individuated teaching becomes the norm as teachers and administration feel pressure to raise test scores and remain accountable to parents and the community (Dogan et al., 2015). This theme, like the first theme of technology integration, suggests teachers, schools, policy-makers, and the educational apparatus in general, are responsible for reducing student exposure to personalized learning (Addison & McGee, 2015; Dogan et al., 2015).

According to Weiland and Yoshikawa (2013), the best window for personalized learning might be in the earlier grades, when (a) testing pressures are nonexistent or reduced, (b) school children's minds are more plastic, and (c) a strong academic self-

concept can be an attitude in students. In the later grades, when standardized testing becomes an ongoing concern, schools are under considerable pressure to teach in a standardized, efficient, and largely impersonal manner which can result in aggregate improvements in standardized tests (Addison & McGee, 2015; Benjamin & Pashler, 2015; Dogan et al., 2015). To obtain funding and credentialing by meeting performance requirements of standardized tests, schools place considerable emphasis on teaching to the test, rather than creating personalized learning environments (Addison & McGee, 2015; Benjamin & Pashler, 2015; Dogan et al., 2015).

Student engagement and related factors. Personalized learning can be difficult to implement because of low levels of student engagement (Sun, 2014). Students with low academic engagement are less likely to demonstrate work ethic, creativity, and initiative than students who are highly engaged, resulting in less profitable personalized learning experiences (Rodriguez & Elbaum, 2014). The blame for student disengagement cannot be placed solely on the educational infrastructure (Sun, 2014). The responsibility for reducing apathy and academic disengagement must also be placed on students, families, and the larger community (Sun, 2014).

Personalized learning requires willing personalized learners (Sun, 2014). Students who are not willing or able to take on the added work and responsibility required for personalized learning can, therefore, prevent personalized learning from being efficiently implemented (Rodriguez & Elbaum, 2014). Digital divide theory suggests, when technology is involved, some students are innately underprivileged because of a lack of experience with certain kinds of technology (van Deursen & van Dijk, 2014). Thus, researchers must address student attitudes and ability when examining ways students'

orientations and experiences might present a barrier to personalized learning, especially when personalized learning is reliant on some form of classroom technology (Rodriguez & Elbaum, 2014).

Barriers to Technology Use and Integration

The De los Arcos et al. (2016) study questioned teachers directly about barriers to technology use and integration. The teachers identified 15 distinct barriers to the use of technology and integration (De los Arcos et al., 2016). However, these barriers were not specifically identified as barriers to the facilitation of personalized learning (De los Arcos et al., 2016). Nonetheless, these findings are worth reporting as one of the few comprehensive, documentary measures of what teachers themselves find to be barriers to technology adoption (De los Arcos et al., 2016). In order of importance, teachers ranked the barriers as follows:

1. Finding resources of sufficiently high quality;
2. finding suitable resources in a subject area;
3. not having enough time to look for suitable resources;
4. knowing where to find resources;
5. overcoming technology problems when downloading resources;
6. finding resources relevant to a local context;
7. not having sufficient time or opportunity to experiment;
8. finding up-to-date resources;
9. not knowing whether there is permission to use or change a resource;
10. not having connections with technology-using peers;
11. getting work colleagues/managers to accept the use of technology;

12. not being skilled enough to edit resources;
13. resources not being aligned with professional standards;
14. lacking institutional support for technology use; and
15. not knowing how to use the resources in the classroom. (De los Arcos et al., 2016, p. 34)

The list provided by De los Arcos et al. (2016) applies to other information presented in the literature review. Researchers identified time and resource limitations as strong barriers to the implementation of technology into content (De los Arcos et al., 2016). Teachers in De los Arcos et al.'s (2026) study appear not to have identified the right technology to explore. Furthermore, teachers' concerns related to quality and suitability suggest they have pedagogical and curricular standards for technological media and content (Foulger, Graziano, Schmidt-Crawford & Slykhuis, 2017).

Relevant Technology Adoption Theories

As discussed in earlier sections of the literature review, technology is instrumental in allowing teachers to support personalized learning in classrooms (Mohd & Shahbodin, 2015). The purpose of this section of the literature review is to identify and discuss theories relevant to the utilization, or lack of utilization of technology in the implementation of personalized learning in classrooms (Addison & McGee, 2015; Benjamin & Pashler, 2015; Venkatesh et al., 2003). Two relevant theories are the educational efficiency theory and the technology adoption theory (Addison & McGee, 2015; Benjamin & Pashler, 2015; Venkatesh et al., 2003).

Educational efficiency theory approaches the mission, rationale, and strategy of education from the perspective of optimization (Addison & McGee, 2015; Benjamin &

Pashler, 2015). Specifically, educational efficiency theory maximizes measurable performance while minimizing the use of resources, including teachers' time, classroom materials, and other resources (Addison & McGee, 2015; Benjamin & Pashler, 2015). The philosophy of educational efficiency is driven by the year-to-year, measurable results mandated by the United State Department of Education (2017a). Therefore, educational efficiency theory deemphasizes the kinds of alternative teaching and assessment associated with personalized learning resulting in longer-term educational gains, albeit more difficult to measure (Williams, 2014).

According to Henderikus (2010), a theory "is normally aimed at providing explanatory leverage on a problem, describing innovative features of a phenomenon or providing predictive utility" (p. 1498). The theory of educational efficiency explains the problem of low levels of personalized learning and describes personalized learning in terms of a challenge to the efficiency-oriented system of American learning (Henderikus (2010). Furthermore, researchers of the educational efficiency theory predict barriers to personalized learning will remain until or unless personalized learning can be reconciled with the goals associated with standardized test performance (Addison & McGee, 2015). Thus, the theory of educational efficiency is particularly relevant to the paradigm of personalized learning (Addison & McGee, 2015; Benjamin & Pashler, 2015; Venkatesh et al., 2003).

Technology adoption theory suggests technology adoption results from a mix of factors (Venkatesh et al., 2003; Zuiderwijk, Janssen, & Dwivedi, 2015). The technology adoption model proposed by Venkatesh et al. (2003), contains four main factors:

> a) Performance expectancy: How well a technology user judges a technology to perform for its intended purpose. b) Effort expectancy: How much work a technology user anticipates devoting to technology. c) Social influence: How much pressure to adopt a technology emanates from individuals and groups in positions of influence. d) Facilitating conditions: What kinds of environmental factors might simplify or complicate the adoption of technology. (pp. 428-430)

These four factors are relevant to the discussion of personalized learning offered in this literature review (Venkatesh et al., 2003). For example, considerable social influence pressures teachers to utilize technologies closely related to the goal of improving standardized test performance (Addison & McGee, 2015; Benjamin & Pashler, 2015). This pressure might overcome teachers' perceptions of the value of technology, especially in the context of personalized learning (Benjamin & Pashler, 2015).

Similarly, Venkatesh et al.'s (2003) technology adoption theory overlaps with Kotrlik and Redmann's (2005) concept of technology integration. Kotrlik and Redmann (2005) argued teachers need to explore and experiment with technology before moving to the adoption and advanced integration stages. The stages of exploration and experimentation are likely to offer teachers more insight into what Venkatesh et al. (2003) described as the performance expectancy and effort expectancy components of technology adoption. In other words, acts of technology exploration and experimentation appear to provide a basis for technology adoption by informing the future adopter about how well the technology works and how difficult the technology is to utilize (Kotrlik & Redmann, 2005). Therefore, technology adoption theory complements the concept of technology integration (Zuiderwijk et al., 2015).

Gaps in the Literature

Gaps in the literature regarding teachers' perspectives on instructional technology and personalized learning have been identified (Horvath, Lodge, & Hattie, 2016). Some studies have examined instructional technology (Bennett et al., 2015; Freitas et al., 2015) and personalized learning as facilitated by instructional technology (Tondeur et al., 2017). However, there appear to be few, if any, studies on teachers' perceptions of how technology impacts personalized learning (Research and Development Corporation [RAND], 2014). It is important to identify teacher perceptions concerning personalized learning and the utilization of technology for educational leaders to understand their role in mediating the student-technology relationship (Lanier, 2017; Shifflet & Weilbacher, 2015; Williams, 2014). It is crucial to examine teacher perceptions because they alone create the environment where students encounter and benefit from technology (Hwang, Lai, & Wang, 2015).

Summary

The purpose of this literature review was to discuss, analyze, and critically synthesize both theories and empirical findings relevant to the research questions of the study. Educational efficiency theory and technology acceptance theory (Venkatesh et al., 2003) were applied to an analysis of teacher perceptions of technology usage for personalized learning, professional development-related issues, and barriers to implementing personalized learning (Addison & McGee, 2015; Benjamin & Pashler, 2015; Dogan et al., 2015). Numerous pressures complicate attempts at implementing personalized learning; however, evidence shows technology integration will facilitate the development of individualized learning plans (Hodas, 2016; Tondeur et al., 2017).

The methodology for this research study is provided in Chapter Three. The chapter contains an overview of the problem and purpose, the rationale for the method of research, and a restatement of the three research questions. Presented is information about the research population and sample and a detailed description of the survey instrument. Finally, Chapter Three includes ethical considerations for this study, along with an explanation of data collection and analysis used to answer the research questions.

Chapter Three: Methodology

In a report funded by the Nellie Mae Education Foundation, Moeller and Reitzes (2011) proposed "technology can equip students to organize their learning process independently. Instead of being passive recipients of information, students using technology become active users" (p. 6). Schools have turned to technology to improve student engagement and performance, along with an improved focus on instruction in the classroom (Skinner, 2016). Technology integration has been shown to facilitate the implementation of personalized learning (Hodas, 2016; Tondeur et al., 2017). There is growing agreement among educators that equipping students with skills to advance in education and careers in the twenty-first century, will require changes to how secondary education is organized (Moeller & Reitzes, 2011; Oakes, 2017).

Problem and Purpose Overview

This study examined the approach to personalized learning from the perspective of secondary classroom teachers. The purpose of this quantitative study was to identify perceptions of secondary educators on different aspects of personalized learning for students. Areas covered in this study included teacher professional development on the personalized learning process, the amount and quality of teacher support for the implementation of personalized learning, the impact of technology on personalized learning with classroom instruction, and inhibiting roadblocks to the learning process.

Research questions. The following research questions directed this study:

1. What are the beliefs of secondary teachers concerning personalized learning with the use of instructional technology in their classrooms?

2. What are the beliefs of teachers concerning their professional development experiences designed to assist in utilizing instructional technology to provide personalized learning for their students?
3. What are the beliefs of teachers concerning the barriers they experience in facilitating a personalized learning environment for students through instructional technology?

Rationale for Quantitative Research

Quantitative research collects mathematical data to explain a particular occurrence (Creswell, 2017). According to Picciano, "Quantitative descriptive studies use numerical data to describe and interpret events, conditions, or situations" (as cited in Dziuban et al., 2016, p. 18). A quantitative descriptive design was utilized in this study to provide educational leaders with a deeper understanding of teachers' perceptions of personalized learning in their classrooms. Insight to this research may enable educators to analyze practices in the areas of technology usage, teacher preparedness, and barriers in facilitating personalized learning (Shifflet & Weilbacher, 2015).

Population and Sample

The setting of this research study included six secondary schools in southwest Missouri that emphasize technology as an everyday tool in the classroom. Fowler (2014) suggested, "How well a sample represents a population depends on the sample frame, sample size, and the specific design of selection procedures" (p. 27). The sample frame includes a description of individuals in the population who were surveyed, and an explanation of how the targeted population meets the requirements of the survey (Fowler, 2014).

Through the use of a simple web search of schools utilizing a one to one technology model, the researcher identified secondary schools to be surveyed in southwest Missouri and conducted follow-up communication with their district superintendents to determine interest in participation within this research study. Participants included educators from six high schools in southwest Missouri. The researcher obtained school demographic information through the Department of Elementary and Secondary Education. The targeted secondary school sizes ranged from 707 students to 1,746 students in grades nine to 12. School A is a rural school district with a high school student population of 707 students and 69 certified staff members. School B is a rural school district with a high school student population of 1,324 students and 106 staff members. School C is in an urban school district with a high school student population of 1,624 students and 106 staff members. School D is a rural school district with a high school student population of 1,632 students and 120 staff members. School E is in an urban school district with a high school student population of 1,467 students and 93 staff members. School F is a rural school district with a high school student population of 491 students and 52 staff members.

In quantitative research, the sample size needs to be established to make predictions about the population with a certain level of confidence (Montgomery, 2017). The researcher used purposive sampling in this study. The method of purposive sampling is commonly referred to as judgment sampling (Dudovskiy, 2016). The primary purpose of this sampling technique is to enable the researcher to rely on his or her judgment when selecting the strata of the total population (Dudovskiy, 2016).

Out of the potential sample size of 546 teachers, a sufficient number of respondents was expected. According to Bluman (2015), a minimum sample size of 30 is needed to guarantee a normal distribution of the sample. In the study, 49 secondary teachers chose to participate in this personalized learning survey.

Instrumentation

The Hanover Research Group (2014) initially administered a Personalized Learning Instructional Staff Survey to 23 personalized learning schools in the spring of 2014. This survey was developed by the RAND Corporation at the request of the Bill and Melinda Gates Foundation (RAND, 2014). The RAND Corporation survey was developed for the Interim Research on Personalized Learning in November of 2014 (RAND, 2014). The RAND Corporation (2014) researchers obtained and analyzed both subjective and quantitative data from every school in the survey to develop an expansive overview of the schools' endeavors to implement customized learning and to understand the results of the adoption of these new instruction and learning practices. The personalized learning survey for this study was modeled after the 2014 RAND Corporation Personalized Learning survey. In this personalized learning survey, the researcher used questions one and two, and five to 11 with permission from the RAND Corporation (see Appendix A).

Gray (2014) advised testing a sample survey in a small group setting. Survey questions were approved by the dissertation chairman, and a test survey was administered to educators fitting the description of the targeted survey respondents but who were not in the actual target group. Participants in the personalized learning test survey provided

feedback concerning the clarity of each survey question. The feedback was used to develop a final revision of the survey and then sent the survey to the target sample group.

The first two questions in the survey asked participants to provide demographic information. Question One required participants to select the subject area they taught or supervised in the 2016-17 school year. Question Two required participants to select how many years they have been in education.

Survey Question Three was designed to ascertain educator perceptions concerning the importance of personalized learning within their building. The researcher selected each school in the study because they were considered a technology-rich school. It was assumed instructional technology tools were made available to students because the school district wanted to have a personalized experience for each student. Survey responses ranged from a *Supplement, but not needed* and *Necessary to implement all aspects/practices and scale for all learners*. The researcher converted survey responses to a percentage from a five-point Likert-type scale.

Question Four was designed to measure the prevalence of personalized learning in each participating school district. Although participating schools emphasized the use of technology, it cannot be assumed all teachers used this opportunity for personalized learning (Kim, 2016). The individual teacher should decide if a constraint is real or if it is necessary to modify learning for his or her students (Kim, 2016). Survey responses ranged from *Non-existent* to *Extremely prevalent* on a five-point Likert-type scale.

Question Five sought information from the participants about the duration of time students were engaged using technology for the use of personalized learning. This question helped the researcher gauge the effect of the eleven instructional activities to

impact students the most in the personalized learning environment. According to Hanover Research (2012):

> Technology supports personalized learning in some ways. First, students can utilize interactive, innovative teaching interfaces via software and applications to learn traditional materials at their own pace. Second, technology also facilitates assessment and monitoring of student progress in real-time. Finally, technology serves to increase student engagement with course material and enables learning to take place at any time, from anywhere. (p. 6)

Survey responses from Question Five ranged from *Never* to *Always.* The researcher converted survey responses to percentages of the five-point Likert-type scale.

Question Six was developed to reveal what teachers believe are strengths in developing personalized learning experiences through the use of technology. This question was essential to understanding the educators' personal beliefs regarding personalized learning in the classroom. This open-response survey question allowed the researcher to gain an in-depth view of the participants' responses and to validate the data gained from the survey (Sutton & Austin, 2015).

Question Seven was created to determine what types of professional development educators had experienced and their beliefs about their professional development experiences during a given timeframe. Mattero (2016) suggested a majority of teachers do not believe professional development will help them prepare for the changing nature of their jobs, including using instructional technology tools. Survey responses ranged from *Strongly disagree* to *Strongly agree.* Once again, the researcher converted survey

responses to numerical form in which each response corresponded to a percentage on a five-point Likert-type scale.

Question Eight was developed to gather types of support the classroom educator received from the school district, the supervisor, an instructional coach, or the administrative level in regard to integration of this blended learning between instructional technology and personalization for students. Schools need to continue to provide professional development to help prepare teachers to incorporate new blended learning environments into the classroom (Mattero, 2016). Survey responses ranged from *I did not receive this support* to *Support was very helpful*. For this question, the researcher also converted survey responses to numerical form in which each response corresponded to a percentage on a three-point Likert-type scale.

Question Nine provided a view into what each of the participating high school's teachers perceived as important professional development to each school site. The teachers were asked if their school focuses *Support and professional development on the mechanics, How to integrate technology,* or *Utilizing technology to personalize learning for the student*.

Participants were asked to respond to question 10 if they would prefer *Support and professional development on the mechanics, How to integrate technology,* or *Utilizing technology to personalize learning for the student.* These questions explored what type of professional development opportunities were being provided to teachers and what type of professional development would be needed to train teachers to be better educators in the classroom (Mattero, 2016).

Finally, in the last survey question, educators were asked to share their perceptions of obstacles that hinder their ability to promote personalized learning in the classroom. These 12 potential obstacles were presented in the survey and could have been the determining factor in the success or failure of personalized learning in the classroom (Hanover Research Group, 2014). Survey responses ranged from *No obstacles* to *Major obstacles.* Once again, the researcher converted survey responses to numerical form in which each response corresponded to a percentage on a four-point Likert-type Scale.

Ethical Considerations

The researcher established safeguards throughout the data collection and analysis phase. The safeguards included, yet were not limited to the following:

To assure confidentiality. Participants were informed that all documents, including reports, will be stored on a password protected electronic device and will be destroyed three years from completion of the project.

To assure anonymity. The data requested from participants are non-identifiable. The researcher did not collect participant names, IP addresses from computers, or school district locations, thus assuring respondent anonymity. An online survey tool was used to protect the anonymity of the respondents (Lowry, D'Arcy, Hammer, & Moody, 2016).

Overall. Each participating school received an email describing in detail the purpose of the research, any risks, and the opportunity to opt out of the study. The same email was then sent to the teachers throughout each building to remain consistent throughout the study.

Data Collection

After approval from the Institutional Review Board of Lindenwood University (see Appendix B) was received, the researcher sent an email (see Appendix C) to school superintendents of districts who were identified as meeting the criteria for participation in the study. The email sent to superintendents introduced the researcher, researcher's organization, the purpose of the study, and asked for permission to survey teachers via email in their school districts. Reminders were sent to targeted superintendents up to two times if the invitation to participate was not answered.

After permission was received by the school superintendent, the survey for this research project was attached to an email and sent to the building administrator. The building administrator of the selected schools was asked to forward the email of introduction to the teachers within the building. This e-mail letter included the official informed consent for participation in the research study. Teachers who participated in this study were presented with a personalized learning survey (see Appendix D) via email in March 2017.

The researcher utilized Qualtrics, an online research platform, to create the survey instrument and to record responses from the target group. The researcher developed the survey using current research and literature surrounding educator professional development, student technology usage, and implementation obstacles to the personalized learning initiative. A follow-up email was sent to each building administrator after the second week asking them to resend the survey. This request was made in hopes to gather more survey results for the study.

Data Analysis

The researcher used descriptive statistics in the analysis of survey responses for each of the three research questions. Descriptive statistics are a set of brief descriptive quantities, to summarize a set of data responses to the extent it represents the entire population or a sample (Mertler & Reinhart, 2017). In this study, the researcher used measures of frequency to show how often responses were given from each respondent (Leavy, 2017). These survey results allowed the researcher to examine how educators perceive their readiness and ability to implement personalized learning in the classroom. Teachers' attitudes and skill with technology have been associated with key indicators of using technology in the classroom (Englund, Olofsson, & Price, 2016; Instefjord & Munthe, 2017; Moeller & Reitzes, 2011). The results of participant responses for each survey question were presented in a table or graph with the frequency of responses provided in percentages. The results were representative of how often a particular response was chosen (Leavy, 2017). This was done to validate findings in the data analysis (Leavy, 2017). The analysis included recommendations to address any problems found and suggestions for further research.

One open-ended survey question was included in the analysis for Research Question One. Teacher respondents were given the opportunity to express, in their own words, the strengths they saw in developing a personalized learning experience through the utilization of technology with their students (Sutton & Austin, 2015). This free-response survey question allowed the researcher to gain an in-depth view of the participants and to validate the data gained from the survey (Sutton & Austin, 2015).

Summary

The goal of this quantitative study was to discover perceptions of secondary educators toward several key aspects of personalized learning for students. The researcher selected a quantitative descriptive approach, through surveys, because the descriptive design helped facilitate greater depth of response from participants (Creswell, 2017; Dziuban et al., 2016). The sample size of the study included six secondary schools in southwest Missouri, each of which placed value on the every-day use of technology in the classroom.

The survey itself was composed of beginning demographic questions, followed by teacher experience and expertise questions (RAND, 2014). The researcher utilized a Likert-type scale for participant responses to questions within the survey. Questions included rating the importance of technology to personalized learning, the prevalence of personalized learning in the respondent's school, the level of agreement with professional development experience through the lense of personalized learning, the level of support received to facilitate personalized learning to the classroom, perceptions of school foci related to personalized learning, and the relative utility of personalized learning versus technology integration or mechanics.

In Chapter Four, results of the statistical analysis for each of the methods used in the study are presented. First, beliefs of secondary teachers concerning personalized learning within instructional technology in their classrooms are reviewed and analyzed. Next, beliefs of teachers concerning their professional development experiences are evaluated and discussed. Finally, the last section of Chapter Four is a complete analysis

of the barriers secondary teachers identified in facilitating a personalized learning environment for students.

Chapter Four: Analysis of Data

Review of Study

As technology becomes more ubiquitous in the world and a more common component of student's daily lives, educators continue to explore the possibilities educational technology can offer (Fenwick & Edwards, 2015). Multiple studies have indicated one of the best ways to educate students is in a one-on-one setting, however, for most districts, the cost of implementing personalized learning is prohibitive (Escueta, Quan, Nickow, & Oreopoulos, 2017; Maher & Prescott, 2017 VanderVeen, 2014). Many schools have pursued 1:1 technology programs, where every student has access to some technology device, such as a cell phone, tablet, or computer (Cavanaugh, 2014).

While technology does not provide one-on-one education, the advances in computing science, especially in the areas of personalized learning, offer teachers the opportunity to create highly personalized educational experiences, geared to the personal needs, interests, and aptitudes of the student (Bennett et al., 2015; Schmidt et al., 2016). Although there are many proponents of using educational technology to improve learning outcomes, others are critical of such endeavors, pointing to a lack of substantive evidence to support such costly investments (Herold, 2016). Therefore, it is important to justify such investments to make sure they are effective and are being delivered appropriately (Brookfield, 2017).

This quantitative study was designed to explore the perceptions of those who are on the front line of education, namely, teachers. This study explored experiences of educators to find out how students were utilizing personalized learning tools, what their experience was in receiving professional development, and what, if any, obstacles they faced in implementing personalized learning in their classrooms. Teachers in this study

were asked for feedback about their experiences during the 2016-2017 school year. A survey was used to collect data from educators, and the results were analyzed for statistical frequency. An open-ended question was asked to elicit in-depth insight from educators regarding the students' use of technology, as well as the educators' views toward the use of instructional technology in the classroom. The comments provided by teachers were examined and grouped into common themes, which were then analyzed for frequency to provide additional understanding of the teachers' experiences (Hancock & Algozzine, 2017).

Demographics of the Study

The research sample was selected from six high schools in southern Missouri and was made up of secondary school teachers in classes with a 1:1 technology implementation model. Out of the approximately 546 educators in the six high schools surveyed, 49 educators elected to participate in the survey.

The first two survey questions were designed to gather demographic information about the subjects taking the survey. Teachers responded to the first question of what subject area they taught for the 2016-2017 school year. Table 1 shows the subject areas taught by those who participated in the survey. In Table 1, core classroom teachers in this study made up 53.7% of the participants and 46.3% of the participants were non-core classroom teachers.

Table 1

Subject Areas Taught for the 2016-17 School Year

Subject	*n*	Percent of Sample
Mathematics	11	20.37%
Science	4	7.41%
Social Studies	6	11.11%
English Language Arts	8	14.81%
Career/Technical Education	7	12.96%
Visual or Performing Arts	7	12.96%
Physical Education/Health Education	0	0.00%
Foreign Language	1	1.85%
Other	10	18.52%

Note. n = the number of respondents.

Table 2 indicates how many years participants have taught in the education field. As shown, 36.17% of the respondents were teachers with 10 or fewer years in education, and 63.83% had taught for 11 or more years.

Table 2

How Many Total Years in Education

Years	*n*	Percent of Sample
1-5 Years	6	12.77%
6-10 Years	11	23.40%
11-15 Years	8	17.02%
16-20 Years	7	14.89%
21-25 Years	6	12.77%
26 + Years	9	19.15%

Note. n = the number of respondents.

Data Analysis

The next nine survey questions addressed the three research questions proposed in this research. Teachers were asked in survey questions three through six about their beliefs concerning personalized learning through the use of instructional technology in their classrooms. Survey questions seven through 10 related to the beliefs of teachers concerning their professional development experiences involving the use of instructional technology and personalized learning. Finally, survey question 11 elicited the beliefs of teachers concerning the barriers they experience in facilitating a personalized learning environment for students through instructional technology.

Beliefs of secondary teachers concerning personalized learning with the use of instructional technology in their classrooms. Teachers responded to the question of how important they felt technology is to personalized learning. Table 3 shows teachers value technology as an important factor in the role of personalized learning. Together, 63.83% of the respondents to the survey felt technology is *Needed, but not necessary to*

implement all aspects/practices and scale for all learners or *Necessary to implement all aspects/practices and scale for all learners*.

Table 3

How Important Is Technology to Personalized Learning

Answer	*n*	Percent of Sample
A supplement, but not needed.	2	4.26%
A supplement	14	29.79%
Neutral	1	2.13%
Needed, but not necessary to implement all aspects/practices and scale for all learners.	22	46.81%
Necessary to implement all aspects/practices and scale for all learners	8	17.02%

Note. n = the number of respondents.

Teachers answered the question of how prevalent is personalized learning in their school. As illustrated in Table 4, 72.34% of teacher respondents answered this survey question either *Prevalent* or *Extremely Prevalent* to whether personalized learning is present in their building. Responses also showed 27.66% of respondents felt personalized learning was either *Non-existent* or *Rarely* practiced within their building.

Table 4

How Prevalent Is Personalized Learning in Your School

Answer	*n*	Percent of Sample
Non-Existent	0	0.00%
Rarely	13	27.66%
Prevalent	28	59.57%
Extremely Prevalent	6	12.77%

Note. n = the number of respondents.

For survey question five, illustrated in Tables 5 through 13, teacher respondents delved into what activities the students were engaged in when they were participating in personalized learning activities in the classroom, utilizing either computers, tablets, or smartphones. As illustrated in Table 5, 91.04% of teachers indicated their use of personalized learning was intended to gain immediate feedback either *Sometimes*, *Most of the time*, or *Always*.

Table 5

Receiving Immediate Feedback

Answer	*n*	Percent of Sample
Never	3	6.52%
Seldom	1	2.10%
Sometimes	19	41.30%
Most of the time	17	36.95%
Always	6	13.04%

Note. n = the number of respondents.

In response to survey question five, teachers spoke to the frequency of students utilizing personal learning tools in class for reading during the 1:1 technology intervention. According to the analysis in Table 6, just 36.88% of teacher respondents answered students use personalized learning tools for reading *Most of the time* or *Always* and over 45.65% reported at least *Sometimes* teachers felt students use the personalized learning tools for reading.

Table 6

Reading

Answer	*n*	Percent of Sample
Never	2	4.34%
Seldom	6	13.04%
Sometimes	21	45.65%
Most of the time	16	34.78%
Always	1	2.10%

Note. n = the number of respondents.

Teachers responded to the question of how frequently during the 1:1 technology intervention students were using personalized learning tools to solve problems for which there were clear solutions. According to the analysis presented in Table 7, over 82.21% of teacher respondents reported students use personalized technology in the classroom either *Sometimes* or *Most of the time*. Similar to the previous questions, the response of *Seldom* or *Never* received 17.77% of the responses, indicating a smaller group does not utilize the technology for this purpose.

Table 7

Solving Problems With Clear Solutions

Answer	*n*	Percent of Sample
Never	3	6.66%
Seldom	5	11.11%
Sometimes	25	55.55%
Most of the time	10	22.22%
Always	2	4.44%

Note. n = the number of respondents.

The teacher respondents were asked how frequently students use personalized learning tools in the classroom to take assessments during the 1:1 technology intervention. According to the analysis presented in Table 8, over 88.68% responded students use personalized learning tools in this way either *Sometimes, Most of the time,* or *Always.* It should be noted, this is likely not a student-driven number but is driven by teachers who have decided to utilize the instructional learning tools for assessment purposes.

Table 8

Taking Assessments

Answer	*n*	Percent of Sample
Never	2	4.34%
Seldom	4	8.69%
Sometimes	23	51.11%
Most of the time	13	28.88%
Always	4	8.69%

Note: n = the number of respondents.

Teachers responded regarding how often during the 1:1 technology intervention students use personalized learning tools in the classroom to perform more complicated learning tasks. These challenges include solving multi-step and open-ended problems and conducting investigations. According to the analysis presented in Table 9, 67.31% reported the use of personalized learning tools to perform more complicated challenges was either *Sometimes, Most of the time* or *Always*. Responses of *Never* or *Seldom* were lower for this question, 32.6% of the respondents indicated students were not utilizing personalized technology for this type of task.

Table 9

Solving Multi-Step, Open-Ended Problems or Conducting Investigations

Answer	*n*	Percent of Sample
Never	3	6.52%
Seldom	12	26.08%
Sometimes	18	39.13%
Most of the time	12	26.08%
Always	1	2.10%

Note. n = the number of respondents.

The teacher respondents were asked how frequently students were using personalized learning tools to watch videos, animations, or simulations during the 1:1 technology intervention. According to the analysis presented in Table 10, 78.25% of teachers responded students were using personalized technology to watch videos, animations, or simulations either *Sometimes*, *Most of the time* or *Always.* A small group of respondents, 21.72% indicated personalized instructional technology is used either *Seldom* or *Never* for this purpose.

Table 10

Watching Videos, Animations, or Simulations

Answer	*n*	Percent of Sample
Never	5	10.86%
Seldom	5	10.86%
Sometimes	23	50.00%
Most of the time	8	17.39%
Always	5	10.86%

Note. n = the number of respondents.

Teacher respondents were asked how frequently during the 1:1 technology intervention their students were using personalized learning tools to obtain feedback from the automated system on their strengths and weaknesses. According to the analysis presented in Table 11, 24.44% of teacher respondents indicated students *Never* use the personalized learning tools for this purpose. The largest response group, 39.13% answered students *Sometimes* utilize personalized learning tools for this purpose. An additional 26.08% reported they observed this use of the tools *Most of the time,* and an equal group of teachers at 26.08% answered their students use the tools *Seldom* for this purpose.

Table 11

Receiving Feedback About Strengths and Weaknesses of an Automated System

Answer	*n*	Percent of Sample
Never	11	24.44%
Seldom	9	26.08%
Sometimes	14	39.13%
Most of the time	9	26.08%
Always	2	2.10%

Note. n = the number of respondents.

The teacher respondents were then asked how frequently during the 1:1 technology intervention their students were observed receiving problem-solving help from the automated tutoring system in the personalized learning tools. According to the analysis in Table 12, the largest group, 35.55% reported their students *Never* utilize the personalized learning tools for this purpose. Additionally, 24.44% answered students *Seldom* receive feedback about strengths and weaknesses from an automated system, and 31.11% reported technology is *Sometimes* used for this purpose.

Table 12

Receiving Problem-Solving Help From an Automated Tutoring System

Answer	*n*	Percent of Sample
Never	16	35.55%
Seldom	11	24.44%
Sometimes	14	31.11%
Most of the time	4	8.88%
Always	0	0.00%

Note. n = the number of respondents.

Teacher respondents were asked how frequently during the 1:1 technology intervention their students were using personalized learning to engage in discussions or problem-solving with other students in the school. According to the analysis presented in Table 13, almost half, 39.12%, of teacher respondents indicated students *Never* or *Seldom* use the personalized learning tools for this purpose. A small group of teachers, 17.31%, reported their students use the tools *Most of the time* or *Always* for this purpose. According to the largest group of analysis, 43.47% answered they observed this use of the tool *Sometimes* to engage in discussion for the purpose of problem solving with other students.

Table 13

Engaging in Discussions or Problem Solving With Other Students in the School

Answer	*n*	Percent of Sample
Never	11	23.91%
Seldom	7	15.21%
Sometimes	20	43.47%
Most of the time	7	15.21%
Always	1	2.10%

Note. n = the number of respondents.

The teacher respondents were asked how frequently students were using personalized learning tools to search for relevant information on the web during the 1:1 technology intervention. According to the analysis presented in Table 14, 56.51% of teachers reported students use personalized instructional technology *Most of the time* or *Always* for this purpose. The largest percentage of responses, 39.13% indicated students *Sometimes* utilize personalized learning tools to search for relevant information on the web.

Table 14

Searching for Relevant Materials on the Web

Answer	*n*	Percent of Sample
Never	1	2.10%
Seldom	1	2.10%
Sometimes	18	39.13%
Most of the time	16	34.78%
Always	10	21.73%

Note. n = the number of respondents.

Teacher respondents were asked how frequently during the 1:1 technology intervention their students were using personalized learning tools to engage in discussion or collaboration with students, not from the same school. According to the analysis presented in Table 15, a high percentage of teacher respondents, 56.52%, indicated students *Never* use the personalized learning tools for this purpose. Over 30.42% of teachers observed students utilizing personalized learning tools *Sometimes, Most of the time* or *Always* to engage in discussion or collaborative problem solving with other students who were not from the same school.

Table 15

Engaging in Discussions Problem Solving With Other Students Not From the Same School

Answer	*n*	Percent of Sample
Never	26	56.52%
Seldom	6	13.04%
Sometimes	9	19.56%
Most of the time	3	6.52%
Always	2	4.34%

Note. n = the number of respondents.

Survey question number six was an open-ended research question. Thirty-five teacher respondents provided additional open-ended responses which were used to compare to the survey responses involving their experiences in developing personalized learning. Initially, the researcher listed all of the responses to the question, but common trends were noted in the responses and were coded with an individual theme. The number of trends was then coded under a respective theme.

For this question teachers were given the opportunity to express, in their own words, strengths they saw in developing a personalized learning experience using technology with their students. The first major theme to emerge was the ability of technology to allow anywhere/anytime access for students. Eleven of the teacher respondents' answers matched this theme. This included the ability for homebound students to keep up with their peers and get faster responses. Furthermore, students were able to work at their own pace and were provided easier access to course work, even when not in class.

The second major theme identified by teacher respondents was students use technology to receive feedback. Eight of the participants provided valuable information in their open-ended response. Teachers responses included immediate feedback for students, flexible learning, personalized feedback, and immediate reinforcement.

The third and final major theme identified by the survey was incorporating technology into the curriculum. Five respondents' answers matched this theme. Although other themes were noted in the responses, the researcher only mentioned the top three themes from this research question.

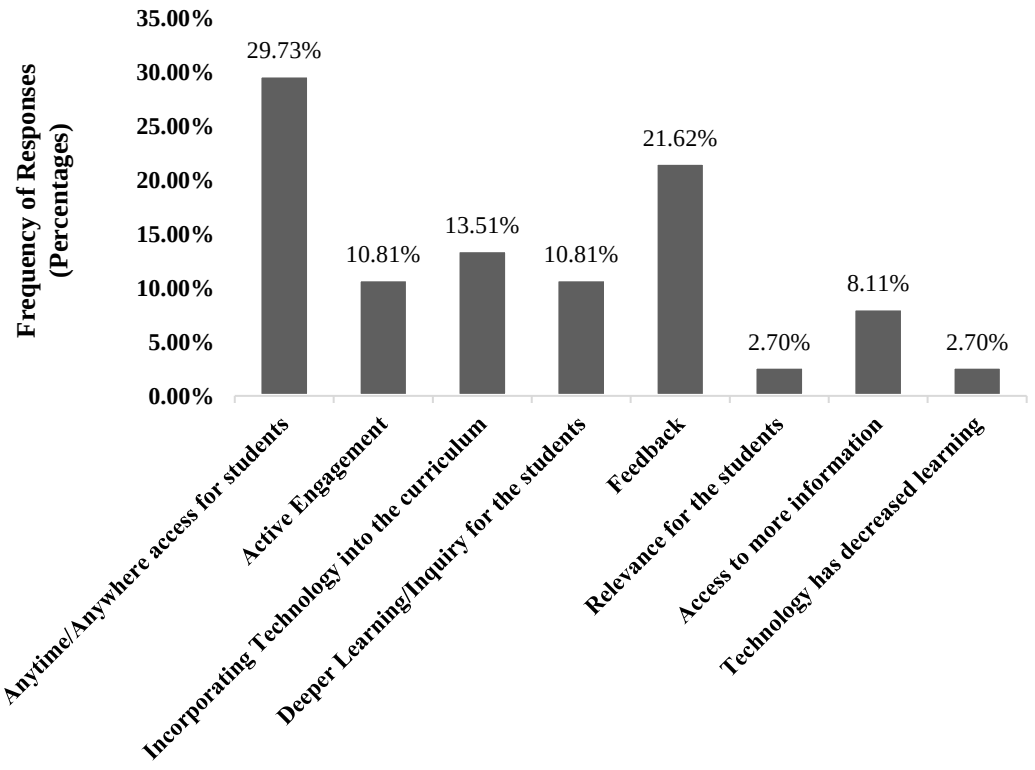


Figure 1. Open-ended responses on strengths in developing personalized learning experiences.

Beliefs of teachers concerning their professional development experiences designed to assist in utilizing instructional technology. In this section of questions, the teacher respondents reflected upon their own experiences in professional development during the 1:1 technology intervention. All measurements were taken on a five-point Likert-type scale and then converted to a percentage for statistical analysis. In the first question, teacher respondents were asked how professional development encouraged them to reflect on their instructional practices (see Table 16).. The vast majority, 71.73%, responded they were *Strongly in agreement* or *Somewhat agreed* professional development experiences were helpful to them in reflecting upon their instructional practice.

Table 16

Encouraged Me to Reflect on My Instructional Practices

Answer	*n*	Percent of Sample
Strongly disagree	3	6.52%
Somewhat disagree	5	10.86%
Neither agree or disagree	5	10.86%
Somewhat agree	15	32.60%
Strongly agree	18	39.13%

Note. n = the number of respondents.

In survey question number seven, teacher respondents were asked for their strength of agreement as to whether professional development given as a part of the 1:1 technology effort is useful for improving instruction on personalized learning in the classroom. These questions were rated on a five-point Likert-type scale with answers

ranging from *Strongly disagree* to *Strongly agree* and then converted to a percentage for statistical analysis. Table 17 shows the largest group of teacher respondents, 62.32%, indicated they *Somewhat agreed* or *Strongly agreed* professional development aided them in improving their instruction on personalized learning in the classroom. A smaller number of respondents, 23.19%, were strongly in agreement with the statement.

Table 17

Useful for Improving My Instruction on Personalized Learning in the Classroom

Answer	*n*	Percent of Sample
Strongly disagree	3	6.52%
Somewhat disagree	7	15.21%
Neither agree or disagree	7	15.21%
Somewhat agree	18	39.13%
Strongly agree	11	23.19%

Note. n = the number of respondents.

Teacher respondents answered a question about the 1:1 technology intervention regarding their agreement with the statement professional development is helpful when implementing the technology for the use of personalized learning in the classroom. The answers to these questions were measured on a five-point Likert-type scale and were converted to a percentage for statistical analysis. Data were analyzed and presented in Table 18. The highest percentage of teacher respondents, 77.19%, indicated they *Somewhat agreed* or *Strongly agreed* professional development is helpful for implementing technology for the use of personalized learning in the classroom. In the

next group, 19.55% responded they either *Strongly disagreed* or *Somewhat disagreed* with the statement.

Table 18

Helped Teachers Implement Technology for the Use of Personalized Learning

Answer	*n*	Percent of Sample
Strongly disagree	5	10.86%
Somewhat disagree	3	6.52%
Neither agrees nor disagrees	3	6.52%
Somewhat agree	23	51.11%
Strongly agree	12	26.08%

Note. n = the number of respondents.

The next question asked for agreement among teacher respondents in their opinion about whether professional development familiarized teachers with a variety of instructional approaches to personalized learning during the 1:1 technology intervention. The answers to this question were given on a five-point Likert-type scale ranging from *Strongly disagree to Strongly agree*, with the points being converted into a percentage for statistical analysis. In the analysis, presented in Table 19, the largest group of teacher respondents, 65.21% *Somewhat agreed* or *Strongly agreed* the professional development familiarized them with a variety of instructional approaches to personalized learning. In smaller-sized groups, 30.42% responded they either *Somewhat disagreed, Neither agreed* or *disagreed* the professional development familiarized them with a variety of instructional approaches to personalized learning.

Table 19

Familiarized Teachers With a Variety of Instructional Approaches

Answer	*n*	Percent of Sample
Strongly disagree	2	4.34%
Somewhat disagree	7	15.21%
Neither agree or disagree	7	15.21%
Somewhat agree	19	41.30%
Strongly agree	11	23.91%

Note. n = the number of respondents.

For this question, teachers were asked if they believed professional development provided during the 1:1 technology intervention helped them to determine how to personalize goals for the students. The answers were presented on a five-point Likert-type scale, ranging from *Strongly disagree* to *Strongly agree*. The data points were converted to a percentage for statistical analysis. In the analysis presented in Table 20, the largest group of teacher respondents, 52.17% reported they *Somewhat agreed* or *Strongly agreed* the professional development aided them in understanding how to personalize goals for their students. 30.42% *Strongly disagreed* or *Somewhat disagreed* with the statement professional development provided them aide in understanding how to personalize goals for their students.

Table 20

Helped Teachers Understand How to Personalize Goals for Students

Answer	*n*	Percent of Sample
Strongly disagree	4	8.69%
Somewhat disagree	10	21.73%
Neither agree or disagree	8	17.39%
Somewhat agree	18	39.13%
Strongly agree	6	13.04%

Note. n = the number of respondents.

Teachers were asked to respond to the topic of whether or not the professional development provided helped teachers to understand how to offer personalized instruction to address individual student needs. The answers were presented on a five-point Likert-type scale ranging from *Strongly disagree to Strongly agree*. The answers were converted into a percentage for statistical analysis. In the analysis, illustrated in Table 21, the largest percentage of teacher respondents, at 41.30% stated they *Somewhat agreed* the professional development aided them in understanding how to offer personalized instruction to meet individual student needs. The next two groups, both measuring 39.12% *Somewhat disagreed* and *Neither disagree or agree*. Both of these groups indicated there was not a strong feeling professional development aided them to understand how to offer personalized instruction to meet individual student needs.

Table 21

Helped Teachers Understand How to Offer Personalized Instruction That Addresses Individual Students' Needs

Answer	*n*	Percent of Sample
Strongly disagree	3	6.52%
Somewhat disagree	12	26.08%
Neither agree or disagree	6	13.04%
Somewhat agree	19	41.30%
Strongly agree	6	13.04%

Note. n = the number of respondents.

Teacher respondents were asked to reflect on the value received by the training in comparison with the time invested in the effort. Teacher respondents were asked to state their agreement or disagreement with the statement the professional development received had taken more time on personalized learning than it was worth. The analysis, presented in Table 22, indicated the largest groups, 29.54% either *Somewhat agreed* the professional development took more time on personalized learning than it was worth, and a similarly-sized group *Neither agreed or disagreed*. A smaller group of teacher respondents, 11.36%, *Strongly disagreed* with the assessment more time was taken on personalized learning professional development than it was worth.

Table 22

Taken More Time on Personalized Learning Professional Development Than They Were Worth

Answer	*n*	Percent of Sample
Strongly disagree	5	11.36%
Somewhat disagree	9	20.45%
Neither agree or disagree	13	29.54%
Somewhat agree	13	29.54%
Strongly agree	4	9.09%

Note. n = the number of respondents.

The next response addressed the topic of whether the professional development tried to cover too many personalized learning topics. The answers were presented in a range from *Strongly disagree to Strongly agree* on a five-point Likert-type scale. The answers were converted into a percentage for statistical analysis. Based on the analysis presented in Table 23, the largest group of teacher respondents, 34.09% reported they *Neither agreed or disagreed* the personal development in personalized learning tried to cover too many personalized learning topics. In the next grouping, 34.08% *Strongly agreed* and were *Somewhat in agreement* with the assessment the professional development tried to cover too many personalized learning topics.

Table 23

Cover Too Many Personalized Learning Topics

Answer	*n*	Percent of Sample
Strongly disagree	4	9.09%
Somewhat disagree	10	22.72%
Neither agree or disagree	15	34.09%
Somewhat agree	14	31.81%
Strongly agree	1	2.27%

Note. n = the number of respondents.

Survey question eight pertained to support received by the teachers during the 2016-17 school year and how beneficial the teachers felt such support was in improving their ability to provide personalized learning instruction. The answers were presented on a four-point Likert-type scale with the options including *I did not receive this support, Support was somewhat helpful, Support was very helpful,* or *Not applicable.* The answers were converted into a percentage for statistical analysis. In the responses to this question analyzed in Table 24, the largest number of teacher respondents, 39.13% reported they did not receive observation and feedback on their lessons from other teachers. The second largest group, 30.43% indicated they had received such support and found it to be very helpful.

Table 24

Observation of and Feedback on Your Lessons by Other Teachers

Answer	*n*	Percent of Sample
I did not receive this support	18	39.13%
Support was somewhat helpful	9	19.56%
Support was very helpful	14	30.43%
Not Applicable	5	10.86%

Note. n = the number of respondents.

Teacher respondents asked if they had received release time to observe other teachers during the past school year, and if they had, what were the benefits. The responses were *I did not receive this support, Support was somewhat helpful, Support was very helpful,* or *Not applicable* presented on a four-point Likert-type scale. The answers were converted into a percentage for statistical analysis. In the analysis presented in Table 25, the vast majority, 51.11% indicated they had not received release time to observe other teachers during the past school year. Two equal groups of 13.04% of the teacher respondents stated they were able to obtain release time to observe other teachers in the past school year to be either *Support was somewhat helpful* or *Support was very helpful.*

Table 25

Release Time to Observe Other Teachers

Answer	*n*	Percent of Sample
I did not receive this support	23	51.11%
Support was somewhat helpful	6	13.04%
Support was very helpful	6	13.04%
Not Applicable	11	23.91%

Note. n = the number of respondents.

Teachers provided information regarding support they received from an informal mentor during the past school year. The answer options were *I did not receive this support, Support was somewhat helpful, Support was very helpful,* or *Not applicable.* The answers were presented on a four-point Likert-type scale. The responses were converted into a percentage for statistical analysis. In the analysis presented in Table 26, the largest group, 34.78% reported they *did not receive this support* during the past school year. The second largest group of teacher respondents, 26.08% believe *Support was very helpful* they received from an informal mentor the past school year. The smallest group, 15.21%, felt having an informal mentor was *Not applicable* to their situation.

Table 26

Informal Mentor

Answer	*n*	Percent of Sample
I did not receive this support	16	34.78%
Support was somewhat helpful	11	23.91%
Support was very helpful	12	26.08%
Not Applicable	7	15.21%

Note. n = the number of respondents.

This survey question asked about teacher respondent's ability to access professional learning communities where they could discuss their concerns during the past school year. The answers were presented on a four-point Likert-type scale. The answers were converted into a percentage to facilitate statistical analysis. According to the analysis presented in Table 27, the largest two groups of teacher respondents, 69.55% indicated they found the ability to access professional learning communities where they could discuss concerns was *Support was somewhat helpful* and *Support was very helpful.* The next group, 23.91% reported they were not provided access to professional learning communities where they could discuss concerns.

Table 27

Access to Professional Learning Communities Where You Can Discuss Concerns

Answer	*n*	Percent of Sample
I did not receive this support	11	23.91%
Support was somewhat helpful	15	32.60%
Support was very helpful	17	36.95%
Not Applicable	3	6.52%

Note. n = the number of respondents.

Teacher respondents were asked whether they received the opportunity to engage in instructional planning with other teachers in the past school year. The choices were offered on a four-point Likert-type scale. The answers were converted into a percentage to enable statistical analysis of the results. According to the analysis, the largest group, 45.65% have the opportunity to engage in instructional planning with other teachers during the previous school year but found it only to be *somewhat helpful.* The next largest group of teacher respondents, 34.78% reported they had received such support and found the *Support was very helpful*. The next group, 13.04% indicated they *had not received* time to engage in instructional planning with other teachers in the previous school year.

Table 28

Engage in Instructional Planning With Other Teachers

Answer	*n*	Percent of Sample
I did not receive this support	6	13.04%
Support was somewhat helpful	21	45.65%
Support was very helpful	16	34.78%
Not Applicable	3	6.52%

Note. n = the number of respondents.

Teacher respondents were asked if they had received common planning time with other teachers during the previous school year. Choices were presented on a four-point Likert-type scale. The responses were converted into a percentage to allow for statistical analysis. Based on the analysis presented in Table 29, the largest group, 40.00% reported they *had not received* common planning time with other teachers in the prior school year. The next largest group, 25.66% answered they had received common planning time with other teachers and they found such time to be very helpful.

Table 29

Common Planning Time With Other Teachers

Answer	*n*	Percent of Sample
I did not receive this support	18	40.00%
Support was somewhat helpful	8	17.77%
Support was very helpful	12	25.66%
Not Applicable	7	15.55%

Note. n = the number of respondents.

The next question asked the teacher respondents if they had received support in the form of observation and feedback on lessons by administrators of the personalized learning technology system. The answers were presented on a four-point Likert-type scale. The responses were converted into a percentage for statistical analysis. According to the statistical analysis presented in Table 30, the largest response group, 51.11% indicated they had received observation and feedback on their lessons by administrators, but felt the feedback was only *somewhat helpful*. The next largest group, 34.78% reported they had received observation and feedback from administrators and they found the assistance to be *very helpful.*

Table 30

Observation of and Feedback on Your Lessons by Administrators

Answer	*n*	Percent of Sample
I did not receive this support	5	10.86%
Support was somewhat helpful	23	51.11%
Support was very helpful	16	34.78%
Not Applicable	2	4.34%

Note. n = the number of respondents.

For survey question nine, teacher respondents were asked what they believed to be the school districts focus on professional development. In contrast, they were also asked what they wish would have been the focus in district-provided professional development. The three options provided to respondents included; a focus on the *Mechanics of using technology*, *Integrating technology into the curriculum*, or *Utilizing the technology to personalize learning for the students*. In the analysis presented in *Figure 2*, the vast majority of teachers, 65.91% felt schools focused primarily on *Integrating technology into the curriculum*.

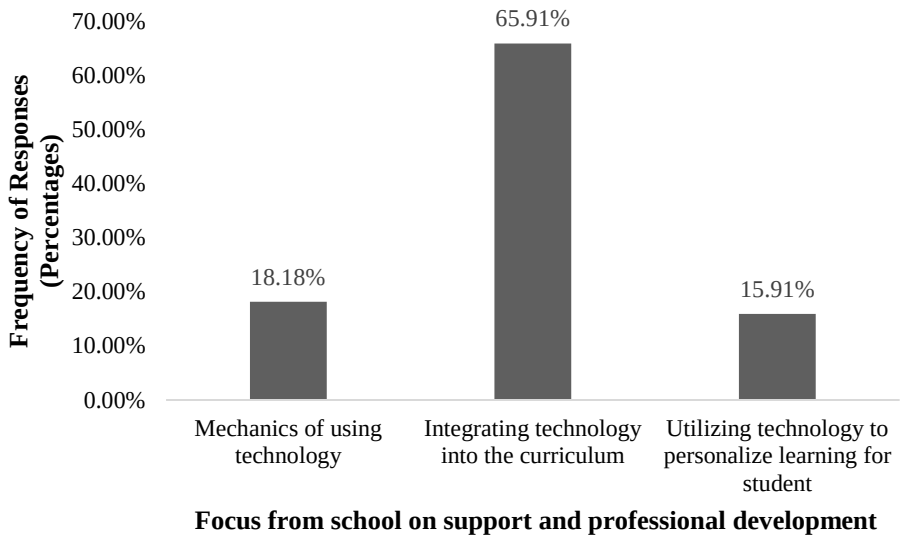


Figure 2. Frequency of responses of mechanics, focusing on how to integrate technology and focusing on utilizing technology to personalize learning.

Question 10 focused on what the teachers perceived would be most beneficial for successful use of the technology. This indicates what teachers hoped would be covered by professional development. According to the analysis presented in Figure 3, the largest number of teacher respondents, 58.70% indicated they had hoped the school focused their support and professional development on *Utilizing the technology to personalize learning for the students.* This was in contrast to the smallest teacher response group, 15.22%, who were hopeful the focus would be on the *Mechanics of using the technology*.

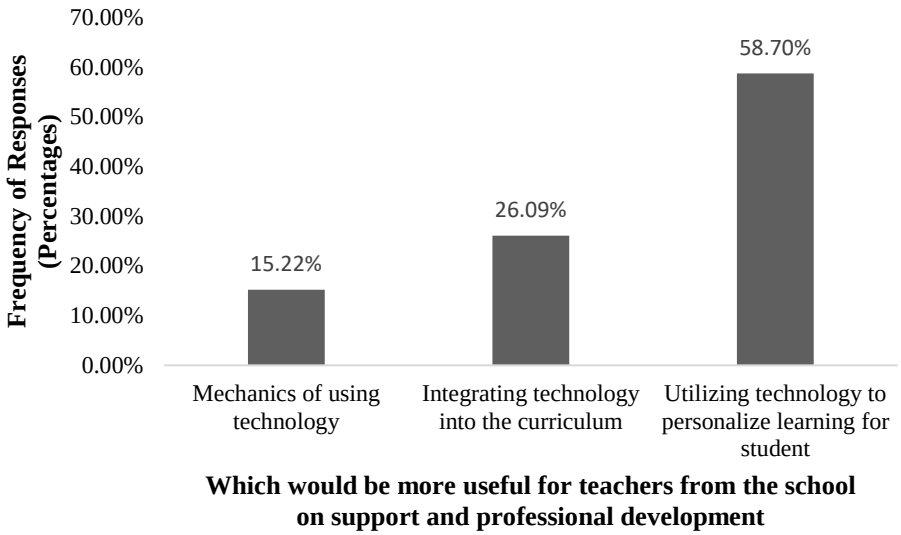


Figure 3. Frequency of responses of mechanics, focusing on how to integrate technology, and focusing on utilizing technology to personalize learning.

Beliefs of teachers concerning the barriers they experience in facilitating a personalized learning environment for students. This section of questions concentrated on research question three, which focused on barriers teachers perceived toward their efforts in promoting student personalized learning using technology. Teachers were asked to respond if observation of and feedback on lessons by an administrator were seen as an obstacle or not. Choices were presented on a four-point Likert-type scale. According to the analysis presented in Table 31, the largest group of teacher respondents, 84.43%, reported observation of and feedback on lessons by administrators presented *Minor obstacles* or *No Obstacles*. A small group, 11.11%, indicated the observation of and feedback on their lessons by administrators presented *Major obstacles.*

Table 31

Observation of and Feedback on Your Lessons by Administrators

Answer	*n*	Percent of Sample
No Obstacles	12	26.66%
Minor Obstacles	26	57.77%
Major Obstacles	5	11.11%
Not Applicable	2	4.44%

Note. n = the number of respondents.

Teachers were asked to respond if they were given sufficient opportunities to provide input on how technology was used and any impediments during the professional development process. Options were presented on a four-point Likert-type scale. According to the analysis presented in Table 32, the largest group of teacher respondents, 77.77% indicated opportunities for teachers to provide input on how technology is used presented *Minor obstacles* or *No Obstacles*.

Table 32

Inadequate Opportunities for Teachers to Provide Input on How Technology Is Used

Answer	*n*	Percent of Sample
No Obstacles	15	33.33%
Minor Obstacles	20	44.44%
Major Obstacles	6	13.13%
Not Applicable	4	8.88%

Note. n = the number of respondents.

Teachers were asked to respond if the opportunities to participate in professional development were inadequate. The choices were presented on a four-point Likert-type scale. According to the analysis presented in Table 33, the largest group of teachers, 77.77% found inadequate professional development opportunities related to technology use only presented *Minor obstacles* or *No Obstacles.* The next group, 13.13%, indicated they felt by having inadequate opportunities to participate in professional development related to technology use presented *Major obstacles* to their adoption of such technology during the 1:1 technology intervention.

Table 33

Inadequate Opportunities to Participate in Professional Development Related to Technology Use

Answer	*n*	Percent of Sample
No Obstacles	20	33.33%
Minor Obstacles	18	44.44%
Major Obstacles	4	13.13%
Not Applicable	3	8.88%

Note. n = the number of respondents.

Teacher respondents were asked if they perceived excessive amounts of time needed to develop content for technology-based instruction as an obstacle to their adopting the technology as part of their pedagogy during the 1:1 technology intervention. The choices were presented on a four-point Likert-type scale. According to the analysis presented in Table 34, the largest percentage, 46.66% found the excessive amounts of time needed to spend developing content for technology-based instruction to be a *Major Obstacle.* The next largest group, 40.00% found it to be a *Minor Obstacle.* The response groups for *No Obstacles and Not Applicable* were even at 6.66% each.

Table 34

Excessive Amounts of Time I Need to Spend Developing Content for Technology-Based Instruction

Answer	*n*	Percent of Sample
No Obstacles	3	6.66%
Minor Obstacles	18	40.00%
Major Obstacles	21	46.66%
Not Applicable	3	6.66%

Note. n = the number of respondents.

Teacher respondents were asked regarding their feelings about an inadequate number of computers or devices to accommodate all students being an obstacle to executing the personal learning initiative. The choices were presented on a four-point Likert-type scale. According to the analysis provided in Table 35, the vast majority, 93.32% reported an inadequate number of computers or devices to accommodate all students presented *Minor Obstacles* or *No Obstacles.*

Table 35

An Inadequate Number of Computers or Devices to Accommodate All Students

Answer	*n*	Percent of Sample
No Obstacles	35	77.77%
Minor Obstacles	7	15.55%
Major Obstacles	1	2.22%
Not Applicable	2	4.44%

Note. n = the number of respondents.

Survey question 11 addressed whether a lack of high-quality content for technology-based instruction was seen to be an obstacle to enabling personalized learning during the 1:1 technology intervention. The choices were presented on a four-point Likert-type scale. According to the analysis presented in Table 36, the majority of teacher respondents, 42.22% saw *No Obstacles* to high-quality content for technology-based instruction as being a major impediment to enabling personalized learning during the intervention. The next group, 37.77% believe a lack of high-quality content to be a *Minor Obstacle* to the program goals. The next smaller group, at 15.55%, reported a lack of high-quality content for technology-based instruction as a *Major Obstacle* to achieving the program objectives.

Table 36

Lack of High-Quality Content for Technology-Based Instruction

Answer	*n*	Percent of Sample
No Obstacles	19	42.22%
Minor Obstacles	17	37.77%
Major Obstacles	7	15.55%
Not Applicable	2	4.44%

Note. n = the number of respondents.

Teachers were asked if a lack of support from technology specialists or other staff who could provide technical support, was seen to be an obstacle to enabling personalized learning during the 1:1 technology intervention. The choices were presented on a four-point Likert-type scale. According to the analysis presented in Table 37, a majority of teachers, 62.22%, indicated they did not see a lack of support from technology specialists

or other staff providing technical support as an obstacle to a successful 1:1 technology intervention.

Table 37

Lack of Support From Technology Specialists Who Can Provide Technical Support

Answer	*n*	Percent of Sample
No Obstacles	28	62.22%
Minor Obstacles	16	35.55%
Major Obstacles	0	0.00%
Not Applicable	1	2.22%

Note. n = the number of respondents.

Participants were asked whether a lack of alignment between learned content and taught was seen to be an obstacle to enabling personalized learning during the 1:1 technology intervention. The choices were presented on a four-point Likert-type scale. In the analysis presented in Table 38, the largest group, 82.22% reported they saw a misalignment between the content students were learning online and what the teacher was trying to teach as a *Minor obstacle* and *No Obstacles* to the successful implementation of the program.

Table 38

Lack of Alignment Between the Content Students Learn Online and the Content That the Teacher Is Trying to Teach

Answer	*n*	Percent of Sample
No Obstacles	18	40.00%
Minor Obstacles	19	42.22%
Major Obstacles	5	11.11%
Not Applicable	3	6.66%

Note. n = the number of respondents.

Teacher respondents were asked if a slow internet connection or low bandwidth presented an obstacle to successfully enabling personalized learning. The possible options were presented on a four-point Likert-type scale. According to the analysis presented in Table 39, the largest group of teacher respondents, 44.44% did not see slow internet connection or bandwidth issues to be obstacles to the successful execution of the program. The next group, 40.00% saw these as potentially *Minor obstacles* to conducting the intervention.

Table 39

Slow Internet Connection or Inadequate Bandwidth

Answer	*n*	Percent of Sample
No Obstacles	20	44.44%
Minor Obstacles	18	40.00%
Major Obstacles	6	13.13%
Not Applicable	1	2.22%

Note. n = the number of respondents.

Survey question 11 addressed the flexibility of the system in deciding how the teacher could utilize the technology as a part of their instruction method. The potential answers were presented on a four-point Likert-type scale. According to the analysis presented in Table 40, the largest percentage of teacher respondents, 60.00% did not find inflexibility in the system design to be an obstacle to successfully implementing the instructional intervention.

Table 40

Lack of Flexibility in Deciding How a Teacher Can Use Technology in Their Instruction

Answer	*n*	Percent of Sample
No Obstacles	27	60.00%
Minor Obstacles	10	22.22%
Major Obstacles	5	11.11%
Not Applicable	3	6.66%

Note. n = the number of respondents.

Respondents were asked whether or not hardware problems, such as insufficient computing power or incompatible software, presented obstacles to successful implementation of the 1:1 technology intervention. The options were offered on a four-point Likert-type scale. According to the analysis presented in Table 41, an equal number, 44.44% felt problems with hardware such as insufficient computing power or software incompatibilities, presented either *No obstacles or Minor obstacles* to their successful implementation of the intervention.

Table 41

Problems With Hardware, Such As Insufficient Computing Power or Lack of Compatibility With Software

Answer	*n*	Percent of Sample
No Obstacles	20	44.44%
Minor Obstacles	20	44.44%
Major Obstacles	3	6.66%
Not Applicable	2	4.44%

Note. n = the number of respondents.

The final survey question addressed whether teacher respondents felt their technology limitations presented an obstacle to successfully conducting the 1:1 technology intervention. The options were offered on a four-point Likert-type scale. According to the analysis provided in Table 42, the largest group of teacher respondents, 53.33% indicated their limitations with technology presented *Minor obstacles.* The next largest group of teacher respondents, 24.22% reported such limitations provided *No obstacles*.

Table 42

My Limited Technology Skills

Answer	*n*	Percent of Sample
No Obstacles	19	24.22%
Minor Obstacles	24	53.33%
Major Obstacles	1	2.22%
Not Applicable	1	2.22%

Note. n = the number of respondents.

Summary

Teachers from six high schools in southwest Missouri were given the *Personalized Learning through the use of Instructional Technology Survey* in the spring of 2017. This survey targeted secondary school teachers in high schools with a 1:1 technology implementation model. Schools for this study were selected based on their use of instructional technology in the 1:1 classroom. Data were collected through a quantitative data-gathering tool using a survey. The results of the open-ended questions were coded and grouped into meaningful categories to provide a deeper understanding of the responses to the question being asked.

Chapter Five includes a summary of the data presented in Chapter Four. The findings from this chapter highlight teachers' beliefs on personalized learning through the utilization of instructional technology, professional development experiences, and any barriers experienced while implementing personalized learning experiences. The final chapter includes a presentation and conclusions of the research findings, implications for practice, recommendations for future research, and a final summary of the study.

Chapter Five: Summary and Conclusions

Children in schools of today are comfortable using technology as part of their daily living (Darling-Hammond, 2015). It stands to reason educators must recognize this evolution in technology and find ways to integrate this teaching tool in the classroom (Darling-Hammond, 2015). Technology comes, however, with a significant expense (Clark & Mayer, 2016). Investments in physical infrastructures, such as servers and software, as well as funds being spent on professional development must be set aside by districts in order to train teachers to integrate these tools into their pedagogy (Andrade, 2013; Ertmer et al., 2012; Mirzajani et al., 2016; Richardson et al., 2015; van Deursen & van Dijk, 2014; Watson, 2014).

In addition, as computing power continues to increase, and programming in areas such as artificial intelligence continues to grow, there are opportunities for educational technology to generate instruction and feedback tailored to the individual student which could lead to improving learning outcomes (Boardman, 2012; Hwang et al., 2015; Turkcapar, 2015; Vasquez et al., 2015). For teachers to fully benefit from innovative technologies, they must receive professional development in generating instructional content, software and web-based products, and the implementation of personalized learning plans (Ko, 2017).

In the past, it was sufficient for a teacher to come to class with a lesson plan, class handouts, and perhaps a videotape or DVD, or, more recently, a PowerPoint presentation, to support lesson delivery (Nurain, Mohd, & Shahbodin, 2015). With current personalized learning systems, a teacher must now take on more roles, including video producer, program designer, rich media developer, and in-class tech support (Broadbent

& Poon, 2015; Nurain et al., 2015; Tondeur, Kershaw, Vanderlinde, & van Braak, 2013). In the meantime, school boards are questioning the justification to support such large outlays of resources (Richardson et al., 2015; Strieker et al., 2016).

When the concept of personalized learning started emerging on the scene, the RAND Corporation (2014) commissioned several early studies on the effectiveness of personalized learning in the classroom. Several years have passed since those studies were conducted and the results of the studies were released (Hunter, 2015). Teachers have gained knowledege and experience utilizing technology in the classroom through adequate professional development (Hunter, 2015). As advances in software have continued, current and relevant training has enabled teachers to elicit the full value of such tools with their students (Hunter, 2015).

Findings

This study was conducted to identify beliefs of secondary educators regarding different aspects of personalized learning for students. One purpose of this study was to provide educators information about teacher professional development on the personalized learning process, the amount and quality of support teachers receive for the implementation of personalized learning, the impact of technology on personalized learning with classroom instruction, and inhibiting barriers to the learning process. The following findings are an indication of teachers' beliefs from the surveyed population of 1:1 classrooms at the secondary level.

Beliefs for secondary teachers regarding personalized learning as a part of instructional technology in their classrooms. Teachers were asked to respond to how important the use of technology was to the personalized learning experience. The largest

group of respondents, 63.83% indicated they felt such technology was either *Needed but not necessary* for all aspects of personalized learning, or necessary for all aspects of personalized learning. However, 29.79% believed technology was merely a supplement to personalized learning and *Not needed* or *Necessary* to successfully provide a personalized learning experience. This finding echoes Palaigeorgiou and Grammatikopoulou (2016) who reported opinions of pioneering Greek teachers who concluded new technologies coming online are powerful, but not necessarily a solution or cure-all for every classroom ill. Teachers in the current study conceded students' interest was initially captivated by using new technologies. Teachers reported the need for educators to take care in selecting materials and making lesson plans capable of holding students'attention and aligning with their interests.

Teacher respondents expressed the prevalence of personalized learning in their schools. They indicated some form of personalized learning was either *Prevalent* or *Extremely prevalent* 72.34% in their school. Scott (2015) contended the trend toward personalized learning is unstoppable and at some point soon, "customized learning opportunities and methods will be the norm" (p. 5). Theories in pedagogy increasingly recognize students do not all learn the same way and a highly successful approach for one type of learner may be ineffective with another who has a radically different style of learning (Parra, 2016).

Teacher respondents were also surveyed on 11 activities in the classroom where teachers observed students utilizing personalized learning technology. Almost half of the teacher participants, 49.99%, noted students accessed personalized learning most frequently using technology either *Most of the time* or *Always* to obtain immediate

feedback. This finding is consistent with conclusions by Reigeluth (2016) who found students could utilize such feedback systems through formative assessment. Feedback helps students to learn from their mistakes by providing hints and guidance on performance or summative assessment and allows the student to know when they have reached the standard required for attainment. This coincides with the student use of personalized learning tools, taking assessments. According to 37.57% of teacher respondents, students took assessments in the personalized learning systems either *Most of the time* or *Always*.

The next most common utilization of personalized learning tools through technology observed by 36.88% of teachers, reported students use the tools for reading either *Most of the time* or *Always*. Using personalized learning tools to seek out information or search for relevant materials on the web was done *Most of the time* or *Always* in 34.78% of teacher respondents' observations. The latter was not unexpected because, as Parra (2016) proposed, students tend to utilize web searching as a key method to gather information.

Despite the value of formative assessments and using automated tutoring software as discussed earlier by Reigeluth (2016), 59.99% of teachers noted students *Seldom* or *Never* utilize assistance problem-solving from automated tutoring services. Almost half of the teacher respondents, 44.44% reported their students *Seldom* or *Never* use personalized learning systems to elicit feedback about strengths and weaknesses of the automated tutoring systems. Regarding solving multi-step, open-ended problems, or conducting investigations, 32.60% of respondents reported students use personalized learning systems either *Seldom* or *Never* for this purpose. De Freitas et al. (2015) found

utilizing online courses particularly effective in personalized instruction because of the ability to use auto-grading and tutorial assistance, as well as automated assessment tools. In a related area, 55.55% of teachers observed their students utilizing personalized learning tools to solve problems with clear solutions, such as math problems or vocabulary drills, *Sometimes*, while only 26.66% of respondents reported students doing so *Most of the time* or *Always*.

Another area where teacher respondents provided feedback was on the collaborative use of personalized learning technology tools. In the first question, 39.12% of teachers indicated students *Seldom* or *Never* engaged in discussions or collaborative problem solving with other students within the same school. In response to the same question, 43.47% of teachers indicated students *Sometimes* used personalized learning tools. In a similar question, 59.99% of teachers responded students *Seldom* or *Never* utilized the personalized learning tools for discussions or collaborative problem solving with students who were not attending the same school.

Borba et al. (2016) proposed automated systems could facilitate collaborative experiences through shared online virtual spaces. Parra (2016) suggested a teacher who avoids such opportunities, may be missing out on active, dynamic, collaborative learning practices enabled by such technology. This could mean students are missing one of the major benefits such technology can provide to develop a richer, more reflective understanding of course materials (De los Arcos et al., 2016). Mirzajani et al. (2016) suggested teachers may not feel comfortable in promoting uses of personalized education technology when they do not feel competent or knowledgeable enough to support and direct the utilization of technology.

Some teachers, 29.73%, indicated a benefit of personalized learning as part of instructional technology is accessibility to the systems anywhere and anytime. These technological capabilities allow students to learn at their own pace and enable faster feedback. Likewise, Scott (2015) indicated one of the benefits of technology application in the classroom is the customization of lessons for students who were previously excluded from the use instructional technology.

Another thematic area to emerge in this study revolved around technological abilities for feedback. A small group of teachers, 21.62%, indicated students valued the availability of flexible learning, personalized feedback, and immediate reinforcement. Areas in which technology was useful to individualized learning include the ability for active engagement, deeper learning potential, and inquiry opportunities. However, a small number of teachers reported students actually utilized technology for the purpose of collaborating with peers, problem solving, and higher level thinking. There appears to be a conflict between what teachers feel the strengths of learning technology are as compared to the actual way teachers perceive learning technology strengths are being applied in working practice in the classroom.

Beliefs of secondary teachers regarding their professional development experiences connected to personalized learning and instructional technology.

Teacher respondents were asked to reflect on the value obtained through professional development offered to them through the school, as well as the support they received. The survey included eight questions on professional development experiences during the 2016-17 school year. The highest percentage, 77.19% of teachers, indicated they either *Somewhat agreed* or *Strongly agreed* the professional development aided

them in implementing technology for personalized learning in the classroom. The next largest response group, 71.73%, indicated professional development encouraged them to reflect on personal instructional practices to provide personalized learning to students. This finding is consistent with the research conducted by Kent and Giles (2017) and Nguyen et al. (2016). These researchers found school districts and teacher preparation programs increasingly more equipped to provide the teacher with the application tools for new technology modalities (Kent and Giles, 2017; Nguyen et al., 2016).

Survey questions seven and eight addressed how professional development has helped teachers with instructional approaches related to personalized learning. According to responses, 65.21% of teachers either *Somewhat agreed* or *Strongly agreed* the professional development experience exposed them to a variety of instructional approaches to personalized learning. A group of 63.04% of teachers indicated professional development was useful in improving instruction regarding personalized learning. This is important because, as Mirzajani et al. (2016) argued, if teachers do not have a high sense of self-efficacy regarding their ability to integrate information and communication technology in the classroom, they will be reluctant to integrate it into their daily teaching. Palaigeorgiou and Grammatikopoulou (2016) also found knowledge and skills to be a potential barrier to teacher use of personalized learning in the classroom.

In survey question seven, it is of interest to note, 41.30% of teachers only *Somewhat agreed* with the statement regarding the impact of professional development on pedagogical practices, methods of personalized instruction. For this question, 32.60% of teachers responded they *Strongly disagreed* or *Somewhat disagreed*, the professional

development they received on technology and its application, adequately prepared them to provide personalized learning opprotunities for students. This presumption is supported by the response to the question on how professional development has helped teachers to understand how to personalize goals for students, with 39.13% indicating they *Somewhat agree*, but 30.42% either *Strongly or Somewhat disagree*. This is particularly challenging because the goal of personalizing learning requires the ability to find content and customize it to students' needs (De los Arcos et al., 2016). Educators agree there is a need for customized learning, but teachers in this response group indicated they still feel inadequately equipped to do what is at the heart of personalized learning, customizing content to meet student needs (De los Arcos et al., 2016).

Teacher respondents shared some negative feedback regarding two areas of survey question seven. When asked whether professional development took more time than it was worth, the responses were across the board, with 31.81% stating they *Strongly* or *Somewhat disagreed*, 29.54% neither *Agreeing* or *Disagreeing*, and 38.63% either *Somewhat* or *Strongly disagreeing*. Part of the reason for this response about professional development may be linked to the next question which asked teachers to agree to the statement about how professional development tried to cover too many personalized learning topics. For this question, 31.81% either *Strongly* or *Somewhat disagreed*, 34.09% neither *Agreed* or *disagreed*, and 34.08% either *Somewhat* or *Strongly agreed*. This negative feedback is consistent with findings demonstrating while teachers believe in information and communication technology and are willing to use it, in actual practice, the amount of change is slight (Albion, Tondeur, Forkosh-Baruch, & Peeraer, 2015). Holm and Kajander (2015) argued for actual changes to happen in the classroom, a

professional development program has to address not only knowledge but also beliefs. It appears through the survey results; teachers would prefer to reduce the number of personalized learning methods taught in professional development and focus more on the application.

The next survey questions related to the support teachers received as part of their professional development experience. Starting with survey question eight, 51.11% of teacher respondents agreed administrative observation and feedback regarding their lessons was *Somewhat helpful* and 34.78% found the support to be *Very helpful*. In the second question, 45.65% of teachers indicated engaging in instructional planning with other teachers was *Somewhat helpful*, while 34.78% felt the assistance was *Very helpful*. Both of these statements are well in line with Bandura's (1997) social cognitive theory, to the extent Bandura proposed much of the knowledge acquired occurs in relationship to observing others in social interactions and experiences. By experiencing the support of administrators who were knowledgeable about instructional technology, learning goals of professional development were reinforced. This also is supported by recent research regarding the strong influence exerted by feedback and working with one's peers (Baydas, Kucuk, Yilmaz, Aydemir, & Goktas, 2015; Tondeur et al., 2017).

In the next question, 36.95% of respondents found the ability to access professional learning communities where they could discuss their concerns was very helpful, while 32.60% found it only to be *Somewhat helpful*. It is important to note 23.91% of respondents indicated they *Did not receive this support*. Teachers' valuation of professional learning communities is consistent with the research of Popp and Goldman

(2016), indicating the value of professional learning communities for building new knowledge.

Some teachers suggested a lack of support from administration and their peers hindered their professional development. For example, 40.00% of teachers indicated they did not receive common planning time with other teachers and 39.13% of teachers were not provided observation and feedback on their lessons from other teachers. Moreover, 36.95% indicated they did not have a formally assigned mentor or coach. The largest response of teachers, 51.11%, reported they had not received release time to observe other teachers. The lack of support in these areas denies teachers valuable knowledge and experience they could use to improve their craft (Bandura, 1997).

The value of this interaction and training, when provided, is found in the responses of teachers who did receive such support. For example, when observation and feedback from other teachers were provided, 30.43% indicated they felt it was *Very helpful*, and only 19.56% indicated it was *Somewhat helpful*. Respondents expressed when common planning time with other teachers was offered, 25.66% explained it was *Very helpful* and 17.77% indicated it was only *Somewhat helpful*.

When an informal mentor was made available, 26.08% found it to be *Very helpful*, 23.91% found it to be *Somewhat helpful*, yet 34.78% *Did not receive access* to such services. Professional development and teacher preparation programs which exclude the component of teacher interaction, drastically limit opportunities for teacher growth, ultimately impacting student learning outcomes (Boei, Dengerink, Geursen, Kools, Koster, Lunenberg & Willemse, 2015; Patton, Parker, & Tannehill, 2015; Tondeur et al., 2017; Vanassche & Kelchtermans, 2016).

Beliefs of secondary teachers regarding obstacles to their implementation of personalized learning as a part of instructional technology in their classes. The final set of questions had to do with items teachers viewed as obstacles to implementing personalized learning through instructional technology. Survey question 11 asked teacher respondents to record their answers as *No obstacles*, *Minor obstacles*, or *Major obstacles*. Almost half of the teacher respondents, 46.66%, indicated they felt the *Major obstacle* to implementing personalized learning was the excessive time needed to develop content for technology-based instruction. Of the other responses to this question, 40.00% viewed it as a *Minor obstacle*, and only 6.66% did not see it as an obstacle.

While Mandernach and Holbeck (2016) indicated college faculty who teach online generally spend about 10% of their time developing content for the class, it should be noted in many cases such professors teach the same class over and over again. Indeed, authors argued for novice teachers, the time needed to generate content would be much higher in the initial content production (Mandernach & Holbeck, 2016). Peña, Shih, and Rosson (2014) observed, while there is substantial attention to student learning in flipped classrooms, or those utilizing classroom technology, there is a scant discussion of the socio-technical aspects of creating such courses and course material. The authors in the 2012 Hanover Research Study, found teachers must frequently deal with multiple systems and not all of them are particularly compatible or well-designed (Hanover Research, 2012). This frequently leads to frustration as teachers find the content they developed in one place and will not work in another, thus creating a large demand on their time for creating content (Hanover Research, 2012).

No other *Major obstacles* received more than 15% of the responses. Among *Minor obstacles* noted, 57.77% of teachers indicated sometimes the students have inadequate technology skills, and 53.33% of teachers indicated sometimes the teachers do as well. Given teachers must support students in the class, it would seem teachers should have more focused skills to enable them to provide support in the classroom setting. Other areas quantified as obstacles including insufficient opportunities for teachers to provide input on how technology is used (44.44%), hardware problems such as insufficient computing power or software incompatibility (44.44%), slow internet connectivity or bandwidth (40.00%), and insufficient opportunities to participate in professional development (40.00%). All of these issues echo concerns raised in the literature regarding insufficient technical skills being an obstacle for students and teachers, as well as problems with the technology in general (Aidinopoulou & Sampson 2017; Alabdulaziz & Higgins, 2016; Kiili, Kauppinen, Coiro, & Utriainen, 2016).

Conclusions

The gap in the literature identified in the literature review was apparent even though some researchers have explored educational technology and the success of personalized learning (Ferlazzo, 2017; Friend, Patrick, Schneider, Vander Ark, 2017; Hanover Research, 2012**)**. Most importantly, there is a lack of research from one important perspective, the teacher's view (Hanover Research, 2014). This study explored the question of 1:1 technology interventions with a focus on personalized learning from the perspective of the teacher (Bennett et al., 2015; Freitas et al., 2015; Tondeur et al., 2017).

What are the beliefs of secondary teachers concerning personalized learning with the use of instructional technology in their classrooms? According to the findings, students are using technology they have access to in the most simple ways; such as reading, getting feedback, taking tests, viewing videos and other content, and performing web research. The results of this study showed immediate feedback was often provided through instructional technology. This result mirrored the findings by Reigeluth (2016), who found students could utilize such feedback systems through the use of formative assessment.

According to teachers who participated in this study, there is also a lack of activity in personalized learning by students at the critical thinking level. The absence of activities at a higher level of thinking includes discussion and collaboration with other students, figuring out complex problems with multiple parts, and utilizing automated tutoring systems to get feedback on strengths and weaknesses. Based on research concerning personalized learning, these are exactly the areas students must engage in to gain the full benefit of such personalized learning platforms (Rahimi, van den Berg, & Veen, 2015; Reigeluth, 2016; Scott, 2015).

Parra (2016) suggested by ignoring such teaching and learning moments in the context of personalized learning, teachers may be missing out on learning opportunities supported by technology. If students can take advantage of this technology integration in instruction, they will have a deeper and more reflective understanding of course materials (De los Arcos et al., 2016). Since teachers are now setting the tone and pace of the personalized learning experience, they must have the skills needed to direct such activities (Freitas et al., 2015; Tondeur et al., 2017).

What are the beliefs of teachers concerning their professional development experiences designed to assist in utilizing instructional technology to provide personalized learning for their students? A high percentage of teachers indicated they agreed professional development aided them in implementing technology for personalized learning in the classroom. Mirzajani et al. (2016) confirmed if teachers do not have a feeling of success in instruction regarding their ability to integrate information and communication technology in the classroom, they will be reluctant to use technology in their classrooms and integrate it into their daily teaching. Teachers in this study expressed there is not enough time to implement these best practices in the classroom. This negative feedback is consistent with findings indicating while teachers believe in information and communication technology and are willing to use it, in actual practice, the amount of change is slight (Albion et al., 2015).

A professional development program must address not only knowledge but also beliefs for actual changes to happen in the classroom (Holm and Kajander, 2015). According to the results of this survey, one of the weakest areas for teachers is knowing how to set up personalized learning to address individual student needs and how to set learning goals for students. Parra (2016) argued to be successful in building a personalized learning environment, the content needs to be organized and planned around learners' unique learning strategies and styles. This study and literature confirmed there is a clear disconnect between the concepts teachers thought their professional development was enabling them to understand and do to enable personalized learning, although their later statements demonstrate they do not.

What are the beliefs of teachers concerning the barriers they experience in facilitating a personalized learning environment for students through instructional technology? Another area of concern from feedback provided by teachers is many of them are not receiving support. Many teachers reported they are not provided the support of mentors or coaches, either formally or informally. Many teachers also identified a lack of time as an obstacle to their success, as it takes too long to create online teaching materials, and there is not an available supply of high-quality online educational materials. As stated previously in the literature, educators expressed the need for teachers to have time to generate content for instructional purposes (Mandernach & Holbeck, 2016). In this study, teacher respondents indicated they felt the time needed to develop content for technology-based instruction was excessive and was a major obstacle to implementing technology-based instruction. Teachers became more frustrated because the instructional content they developed on one platform may not work on another, and reconstructing the content on additional platforms required a large demand on their time (Hanover Research Group, 2012).

According to the Hanover Research Group (2012) teachers must frequently deal with multiple systems, and not all of them are particularly compatible or well-designed. It appears training for these teachers did not include instruction regarding open educational resources, accessible and usable for learning through technology (Borba et al. 2016; de Freitas et al., 2015; De los Arcos et al., 2016). These and other issues stated in literature were barriers experienced in facilitating a personalized learning environment and echoed concerns regarding insufficient technical skills being an obstacle for students

and teachers, as well as problems with technology in general (Aidinopoulou & Sampson 2017; Alabdulaziz & Higgins, 2016; Kiili, et al., 2016).

Implications for Practice

There are several major implications for practice emerging from the findings of this study. First, it is clear teachers are not receiving sufficient support through peer interaction, mentoring, and coaching. While teachers are still being required to carry on other duties, they are expected to create learning materials for entire classes and to have different versions of those materials to provide a customized experience for every student. According to Vanassche and Kelchtermans (2016), teacher professional development requires changes in professional practice, including training in delivering personalized learning. However, it also requires changes in practitioners' thinking about their practice, especially how and why something is done. If all professional training is demonstrating how to use a group of new tools, but the reason for implementing the tools is lacking, the way to leverage the tools to elicit desired personal learning outcomes will not be forthcoming.

One of the areas noted in the research is teachers' resistance to certain aspects of professional development, perhaps due to not understanding the how and why of what must be done (Wyatt, 2015). In this study, teachers complained there were too many topics, and much of the time in the professional development was wasted. Vanassche and Kelchtermans (2016) stressed the importance and quality of collaborative learning, and how relationships make collaboration work. Another point to note is teachers are having a hard time grasping the value of all they are being required to do because they have not been included in decision-making regarding what to implement and how.

While it is not feasible to include every teacher at every step of the development and decision-making process, Woo (2016) suggested by deploying information and communications technology champions in schools, these champions can support instructional change as well as the implementation of new skills. Woo (2016) observed that there are many kinds of barriers to pedagogical innovation for teachers, one of the major ones is teachers' fundamental beliefs, which are considered to be a second-order barrier to change. If teachers are unhappy about a change they feel is being forced upon them, or they feel misunderstood, they may resist making changes, and resist training because they have already decided it is a waste of time (Woo, 2016). By using information and communications technology champions, this model of professional development utilizing a socio-cultural approach would potentially break down barriers these teachers are experiencing in adopting and fully benefitting from the advances in personalized learning (OECD, 2016).

Teachers not being involved in decision-making regarding how technology is to be utilized in their classrooms is a legitimate concern (De los Arcos et al., 2016). School leadership needs to demonstrate sensitivity to teacher feelings and find ways to communicate research findings to their instructional staff so the development and application of new structures, such as personalized learning environments, is not such a formidable hurdle (Hord, 2016). By developing a sense of shared responsibility for students, school leadership can work with teachers to help them secure the content they need to make personalized learning successful in the school (Sheninger, 2014).

Critics of personalized education contend millions of dollars are being spent on personalized education with a paucity of evidence to support its efficacy (Herold, 2016).

If the sample population considered in this dissertation is reflective of the feelings of educators across the country, before personalized education can be successfully implemented, there are issues to be addressed. Hopefully, educators can accept the challenge and rise to the occasion, so a potentially beneficial tool for students nationwide does not become another educational idea discarded due to poor implementation.

Recommendations for Future Research

As mentioned in the limitations section, this study covered a small population of self-selecting teachers in southwest Missouri, and the results and responses should only be taken as being generalizable to the population. A larger study, with randomly-selected participants from a wider area of the country, would be needed to derive findings that are generalizable outside of the limited population (Fowler, 2014).

It is noted this study was limited to the secondary education population. This study could be extended by including the insights and experiences of primary school teachers. In addition, some of the survey questions need to be reconsidered. For example, in the section regarding how teachers benefitted from their professional development experiences, the choices were either there was no support provided, the support helped some, or the support helped much. A larger Likert-type scale used for this question would allow a better understanding than the two choices this survey offered (Patten, 2014). Further exploration using a mixed methods approach should also be considered (Cresswell, 2013). While using Likert-type scale indicators for set questions provides some value, if teachers had an option to provide narrative responses, more in-depth descriptions of the lived experiences of teachers regarding their professional development in connection with personalized learning could be collected (Crist & Tanner, 2003).

Summary

The world children are growing up in has changed dramatically in the past 150 years (Newcomb, 2015). Digital technologies have become a ubiquitous part of their lives, with children accessing them from toddlerhood on through adulthood (Freitas et al., 2015). However, a closer look at the current state of education reveals the education system has changed very little despite major changes in the technological world. (Ronan, 2017). Ample research has been discussed in this study indicating how one-to-one tutoring is one of the most effective ways to educate children (VanderVeen, 2014). The expense of implementing this type of instruction on a nationwide scale is prohibitive (Samuels, 2012; Reigeluth, et al., 2015). Advances in educational technology have started to demonstrate ways the rapidly advancing state of computing may provide a solution in the form of personalized education (Hanover Research Group, 2014).

Personalized education allows computer programs with analytic algorithms to create a responsive and adaptive situation which modifies itself to the learner's unique needs and style of learning (Earley & Greany, 2017). Properly applied, personalized learning can be utilized to create a customized learning plan for each student, enabling them to achieve their full academic potential (Basye, 2016; Wolf, 2010). Programmed and real-time systems can provide immediate feedback as well as hints to the student so they can adaptively learn (Good, 2017). The systems also provide assessment and monitoring of student progress in real time for student and teacher (Hanover Research Group, 2012).

Successful implementation of personalized learning requires teachers to be sufficiently trained and equipped through professional development to implement

effective personal learning programs through instructional technology (Bennett et al., 2015; Freitas et al., 2015). While there is ample research on efforts being made to improve personalized education, and ways technology can be more effective in achieving the goals established, there is a lack of evidence regarding the teacher's perspective in this area (Good, 2017).

The purpose of this study was to examine, through responses and lived experiences of a group of teachers in southern Missouri, perspectives on the value of how personalized learning is being used in their classrooms. Teachers' perspectives of the level, amount, and type of professional development they have received to support the transition to personalized learning were explored. Finally, this study elucidated the barriers teachers perceive they are experiencing in successfully delivering a personalized learning experience to their students.

Through the results of this study, it has been established while professional development has been delivered to the teachers, it has not always been done in the best manner. There are clear conflicts between the evidence-based literature on professional development best practices where a high value is placed on teachers working in groups and actual practice; too many teachers are deprived of these professional development opportunities. Some teachers expressed concerns they were being left out of the planning process. Because of their perceptions and beliefs, teachers resisted aspects of training, feeling the professional development was trying to cover too many topics, and much of it was a waste of time.

A consideration of literature on these topics revealed there is an opportunity to approach teachers differently so they can learn not only the technology they need but also

how and when to effectively employ it. One of the most disconcerting findings from the study was teachers surveyed had students who were performing low-level functions using technology such as reading, viewing videos, researching, taking tests, and receiving feedback. However, when it came to performing higher-level functions such as collaboration, working complex problems, and utilizing the systems to gain automated tutoring as needed, students were not likely to employ technology.

Teachers reported they are weak in knowledge regarding how to customize the educational environment for their students, and they are unclear on how to use systems to set personalized goals. Perhaps this research study will provide food for thought for administrators who are responsible for managing personalized education transition programs. With this insight, administrators can avoid pitfalls and mistakes identified in this report in their educational interventions for 1:1 technology and personalized learning.

Appendix A

April 24, 2017

Chris Ford, [redacted]

Dear Mr. Ford:

RAND gives you permission to use questions from the following report.
Steiner, Elizabeth D., Laura S. Hamilton, Evan Peet and John F. Pane. *Continued Progress: Promising Evidence on Personalized Learning: Survey Results Addendum*. Santa Monica, CA: RAND Corporation,
2015. http://www.rand.org/pubs/research_reports/RR1365z2.html.

That version of the report explicitly grants permission to use and adapt with appropriate credit through a Creative Commons Attribution 4.0 International License (https://creativecommons.org/licenses/by/4.0/).

Sincerely,

Heather Schwartz, PhD
Associate Director, RAND Education
650 Poydras St, Suite 1400
New Orleans, LA 70130
e: hschwart@rand.org
t: 504-299-3404

Appendix B

LINDENWOOD

LINDENWOOD UNIVERSITY ST. CHARLES, MISSOURI

DATE:	May 4, 2017
TO:	Christopher Ford, ED
FROM:	Lindenwood University Institutional Review Board
STUDY TITLE:	[1059484-1] Beliefs of Secondary Teachers Concerning Personalized Learning through the use of Instructional Technology
IRB REFERENCE #:	
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	May 4, 2017
REVIEW CATEGORY:	Exemption category # 1

Thank you for your submission of New Project materials for this research study. Lindenwood University Institutional Review Board has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office.

If you have any questions, please send them to IRB@lindenwood.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Lindenwood University Institutional Review Board's records.

Appendix C

Greetings,

My name is Chris Ford. I am a doctoral student in the Educational Administration program through Lindenwood University. I would like to request permission to conduct research as partial fulfillment to meet requirements set forth by Lindenwood University for my degree. Your participation is important to my study as it includes teachers from school districts in Southwest Missouri.

Please read through the following informed consent. There is a link to the survey at the bottom. By clicking the link, you agree to the informed consent. Thank you so much for your time, as I know it is extremely valuable.

The purpose of the Study:

The purpose of this quantitative study is to identify the perceptions of secondary educators on the different aspects of personalized learning for students. The areas covered in this study include teacher professional development on the personalized learning process, the amount or quality of teacher support for the implementation of personalized learning, the impact of technology on personalized learning with classroom instruction and any roadblocks that might inhibit the learning process.

Completion of the Survey:

You will complete a survey, which will take approximately **15** minutes to complete. The survey includes questions about your perceptions of classroom management and preparedness. Survey questions will address your perceptions about personalized learning through the use of instructional technology.

Benefits of this Study:

You will be contributing to knowledge of personalized learning through the use of instructional technology.

Risks or Discomforts:

No risks or discomforts are anticipated from taking part in this study. If you feel uncomfortable with a question, you can skip that question or withdraw from the study altogether. You are free to quit at any time before you have finished the survey.

Confidentiality:

Your responses will be kept completely confidential. I will NOT know your name from the survey. No part of the survey will be shared with any organization internally or externally to the Lindenwood program. Only the researcher will see your individual survey responses and the results of our content analysis from the survey. If I use quotations from your responses, I will NOT include any names or nicknames you use, nor will I include identifying names along with the quotations.

Participation in the survey:

Your participation is voluntary; you are free to withdraw your participation from this study at any time. If you do not want to continue, you can simply not respond to the survey. You also may choose to skip any questions you do not wish to answer.

How the findings will be used:

The results of the study will be used for scholarly purposes only. The results of the study will be presented as a dissertation paper and will be available to all participants upon request by email at chrisford[redacted].

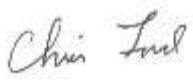
Contact information:

If you have any questions about the study, you may contact my advisor Dr. Brad Hanson, Lindenwood University, by email at [redacted].

By beginning the survey, you acknowledge you have read this information and agree to participate in this survey, with the knowledge you are free to withdraw your participation at any time without penalty.

Thank you again for completing this survey.

Sincerely,



Chris Ford

Appendix D

Personalized Learning through the use of Instructional Technology Survey

The definition of personalized learning (The Glossary of Education Reform, 2015) states that it is a variety of educational structures, student learning experiences, instructional focuses, and response to interventions that address the learning needs, interest, goals of each student.

1. What subject area(s) are you teaching (or supervising) this year (2016-2017)? Multiple selections are allowed.

A. Mathematics
B. Science
C. Social Studies
D. English Language Arts
E. Career/Technical Education
F. Visual or Performing Arts
G. Physical Education/Health Education
H. Foreign Language
I. Other

2. Including this school year (2016-2017), how many total years have you been in education, regardless of location?

A. 1-5 years
B. 6-10 years
C. 11-15 years
D. 16-20 years
E. 21-25 years
F. 26-30 years
G. More than 31 years

3. How important is technology to personalized learning?

A supplement, but not needed.	A supplement	Neutral	Needed, but not necessary to implement all aspects/practices and scale for all learners.	Necessary to implement all aspects/practices and scale for all learners
☐	☐	☐	☐	☐

4. How prevalent is personalized learning in your school.?

Non-Existent	Rarely	Prevalent	Extremely Prevalent
☐	☐	☐	☐

5. Throughout the school year, during the times when students use technology for personalized learning, how often are the students engaged in the following activities? For this question, please consider only the time students spend using technology to personalize learning in the classroom such as a computer, smartphone, or tablet throughout the school year.

	Never	Seldom	Sometimes	Most of the time	Always
Receiving immediate feedback	☐	☐	☐	☐	☐
Reading	☐	☐	☐	☐	☐
(Solving problems with clear solutions (e.g., multiple-choice math problems or vocabulary drills)	☐	☐	☐	☐	☐

Taking assessments	☐	☐	☐	☐	☐
Solving multi-step, open-ended problems or conducting investigations	☐	☐	☐	☐	☐
Watching videos, animations, or simulations	☐	☐	☐	☐	☐
Receiving feedback about strengths and weaknesses from an automated system	☐	☐	☐	☐	☐
Receiving problem solving help from an automated tutoring system	☐	☐	☐	☐	☐
Engaging in discussions or collaborative problem solving with other students in the school	☐	☐	☐	☐	☐
Searching for relevant materials on the web	☐	☐	☐	☐	☐
Engaging in discussions or collaborative problem solving with other students, not from the same school	☐	☐	☐	☐	☐

6. What do you believe has been a strength in developing personalized learning experiences through the use of technology with students in your classroom?

7. Please indicate your level of agreement with each of the following statements about all of your instructional technology professional development experiences during the current school year (2016-2017, including summer 2017).

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Have encouraged me to reflect on my own instructional practices	☐	☐	☐	☐	☐
Have been useful for improving my instruction on personalized learning in the classroom	☐	☐	☐	☐	☐
Have helped me implement technology for the use of personalized learning in the classroom	☐	☐	☐	☐	☐
Have familiarized me with a variety of instructional approaches to personalized learning	☐	☐	☐	☐	☐
Have helped me understand how to personalize goals for students	☐	☐	☐	☐	☐
Have helped me understand how to offer personalized instruction that addresses individual students' needs	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Have taken more time on personalized learning professional development than they were worth	☐	☐	☐	☐	☐
Have tried to cover too many personalized learning topics	☐	☐	☐	☐	☐

8. Please indicate whether, in the past year school year, you received each of the following kinds of supports and the extent to which you found it helpful for improving your personalized learning instruction.

	I did not receive this support	Support was somewhat helpful	Support was very helpful	N/A
Observation of and feedback on your lessons by other teachers	☐	☐	☐	☐
Release time to observe other teachers	☐	☐	☐	☐
Informal mentor	☐	☐	☐	☐
Formally assigned mentor or coach	☐	☐	☐	☐

Access to professional learning communities where you can discuss concerns	☐	☐	☐	☐
Engage in instructional planning with other teachers	☐	☐	☐	☐
Common planning time (formally scheduled) with other teachers	☐	☐	☐	☐
Observation of and feedback on your lessons by administrators	☐	☐	☐	☐

9. Does your school focus support and professional development more on the mechanics, focusing on how to integrate technology, or focusing on utilizing technology to personalize learning for students?

A. Mechanics of using technology
B. Integrating technology into the curriculum
C. Utilizing technology to personalize learning for students

10. Which would be more useful to you: focusing on the mechanics, focusing on how to integrate technology, or focusing on utilizing technology to personalize learning for students?

A. Mechanics of using technology
B. Integrating technology into the curriculum
C. Utilizing technology to personalize learning for students

11. Please indicate the extent to which each of the following conditions is an obstacle to your efforts to promote student personalized learning using technology such as computers, smartphones, or tablets. If the condition does not exist in your school, please mark "Not applicable."

	No Obstacles	Minor Obstacles	Major Obstacles	N/A
Inadequate technology skills among students	☐	☐	☐	☐
Inadequate opportunities for teachers to provide input on how technology is used	☐	☐	☐	☐
Inadequate opportunities to participate in professional development related to technology use	☐	☐	☐	☐
Excessive amounts of time I need to spend developing content for technology-based instruction	☐	☐	☐	☐
An inadequate number of computers or devices to accommodate all students	☐	☐	☐	☐
Lack of high-quality content for technology-based instruction	☐	☐	☐	☐
Lack of support from technology specialists or other staff who can provide technical support	☐	☐	☐	☐

Lack of alignment between the content students learn online and the content that I am trying to teach	☐	☐	☐	☐
Slow Internet connection or inadequate bandwidth	☐	☐	☐	☐
Lack of flexibility in deciding how I can use technology in my instruction	☐	☐	☐	☐
Problems with hardware, such as insufficient computing power or lack of compatibility with software	☐	☐	☐	☐
My own limited technology skills	☐	☐	☐	☐

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Vita

Christopher (Chris) Jay Ford graduated from Kickapoo High School in Springfield, Missouri in 1988. After high school, Chris attended Missouri State University in Springfield, Missouri, where he completed his Bachelor of Science Degree in Instrumental Music Education in 1993. In August of 1993, Chris started his first education job with the Walnut Grove School District in Walnut Grove, Missouri, as a Vocal and Instrumental teacher. In 1994, Chris transitioned to a new position as the Assistant Director of Bands in the Republic R-5 School District in Republic, Missouri. The next year, Chris moved to Monett, Missouri, as the Director of Bands for the Monett R-1 School District. In 1998, Chris assumed the position as Director of Bands at Glendale High School in Springfield, Missouri. While working in the Springfield R-12 School District, Chris completed his Master's Degree in Educational Administration from Missouri State University in Springfield, Missouri. In 2002, Chris received his first administrative position with the Weaubleau R-3 School District in Weaubleau, Missouri. In 2006, Chris became the high school principal at Hollister R-5 School District in Hollister, Missouri, and became the assistant superintendent of operations of the school in 2012. Chris completed his Educational Specialist's Degree, with an emphasis in Educational Administration, from Missouri State University in Springfield, Missouri, in 2009. In 2014, Chris moved to the Fordland R-3 School District in Fordland, Missouri, as the Superintendent of Schools.