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The Role of Technology in Personalized Learning and the Effect on Student Achievement

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by

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Declaration of Originality

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

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Abstract

Personalized learning is not a new concept and can be traced back to the 1700s, but it has become increasingly popular in today's schools (Bray & McClaskey, 2015). With the high rate of technology introduction into classrooms, the implementation of personalized learning has become easier as instruction shifts from teacher-led to student-centered (Grant & Bayse, 2014). The purpose of this study was to identify the role of technology in personalized learning and to determine if the implementation of the pedagogy had an effect on student achievement scores. Elementary classroom teachers and elementary principals served as the participants for this study, which was conducted in a southwest Missouri school district. Teachers rated their personal level of personalized learning implementation on a survey. The rating was compared to mean student scale score gains in reading and mathematics, as measured on the i-Ready Diagnostic Assessment. Teachers and administrators also identified how technology impacted personalized learning in their classrooms or buildings. After an analysis of the data, it was determined there was no statistically significant correlation between the degree of implementation of personalized learning and student achievement. According to survey responses, 89% of educators agreed technology eased the implementation of personalized learning, and the teachers and administrators indicated using technology for research and accessing resources outside of the classroom as the most frequent use for devices.

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Chapter One: Introduction

Although personalized learning is currently a high-profile topic in K-12 education, it is not a new concept (Bray & McClaskey, 2015). Furthermore, the implementation of standardized tests is not required to discover not all students meet grade-level standards (Ventura, 2014). The United States education system is in the midst of an attempted transformation from the industrial age model, in which most current teachers were educated, to a learner-centered framework that allows students to control their educational experiences (Brichacek, 2014). In order to move from the traditional classroom to a personalized learning environment, a paradigm shift is required and can be difficult to implement in environments that are "perpetually short on funding and pressed for time" (Brichacek, 2014, para. 2).

The personalized learning movement has been further advanced through the integration of technology in classrooms and schools (Grant & Basye, 2014):

> Technology adds choices as to how, when, and where students access learning opportunities, thus reducing many barriers. Learning becomes a personal experience, combining personal interactions with media supports and online learning and communication activities (Smith, 1997). Students remain connected to peers, experts, information, and experiences through threaded conference discussions, video records, and real-world data simulations in an anywhere, anytime frame of access. (p. 21)

Additional barriers to personalized learning are discussed in Chapter Two. In this chapter, the background of the study, theoretical framework, statement of the problem,

purpose of the study, and key terms are defined in order to provide context around the role of technology in personalized learning.

Background of the Study

Brief history of personalized learning. Components of personalized learning can be traced back to Jean-Jacques Rousseau, who during the 1700s opposed the implementation of a singular curriculum for students and postulated schools built on "individual capacities and choices" would create greater motivation to learn for students (Yonezawa, McClure, & Jones, 2012, p. 4). Authors of the *National Education Technology Plan* synthesized the works of Dewey, Keller, and Sizer into a document, intended to be used by educators, that contains the current model of personalized learning (Ilg, 2014; United States Department of Education [USDOE], 2010; Ventura, 2014; Yonezawa et al., 2012). A more complete historical timeline of the evolution of personalized learning is presented in the review of literature.

Multiple models exist to characterize personalized learning. The following information is an overview aimed at providing additional background knowledge for this study. While not all models of personalized learning are included, these models are often referenced by researchers focused on this topic.

Four "deeps" and nine "gateways" of personalized learning. In 2006, Dr. David H. Hargreaves produced a series of documents and conferences titled, *A New Shape for Schooling*, which outlined nine gateway elements of personalized learning clustered into four deep categories. The clusters include the following: 1) Deep learning that occurs through assessment for learning, student voice, and learning to learn; 2) Deep support that occurs through mentoring and coaching, as well as advice and guidance; 3)

Deep experience that occurs through new technologies and curriculum; and 4) Deep leadership that occurs through design and organization, as well as workforce reform (Hargreaves, 2006). Bray and McClaskey (2015) noted in their reference to this model that Dr. Hargreaves referred to this work as steps to "personalizing learning" rather than "personalized learning" to stress this is a "process, not a product" (p. 22).

Performance orientation classroom (PoC) vs. learning orientation classroom (LoC). Chris Watkins authored an article in 2010 for *INSI Research Matters* regarding the correlation between learning and performance in schools. He cited evidence in the article that classroom culture typically consists of "teaching is telling, learning is listening, knowledge of the subject matter taught by teachers and found in books" rather than equipping learners with knowledge of how they learn (Watkins, 2010, p. 1). Watkins (2010) outlined the differences between a learning orientation classroom (LoC) and a performance orientation classroom (PoC), with traditional classrooms fitting into the performance orientated category. He stated there is a "concern for improving one's competence" in a LoC, while the PoC focuses on "a concern for proving one's competence" (Watkins, 2010, p. 3). In order to move from a PoC to a LoC, teachers must facilitate "learning about learning" with students (Watkins, 2010, p. 7).

Personalization vs. differentiation vs. individualization (PDI). The 2010 *National Education Technology Plan* contained definitions of the terms personalization, differentiation, and individualization, but the definitions were related to instruction rather than student learning (Bray & McClaskey, 2015). Bray and McClaskey (2015) created a chart to compare the three terms to their relationship with student learning and have since iterated the chart to its third version. These terms are often confused or used

interchangeably, but the authors focused on the learner in personalization, whereas the definitions of differentiation and individualization are focused on the actions of the teacher (Bray & McClaskey, 2015).

Stages of personalized learning environments. Bray and McClaskey (2015) recognized moving to a personalized learning environment from a traditional learning environment is likely to occur in stages, or small shifts. The stages, outlined below, provide a brief overview of criteria for each level of personalized learning:

- Traditional: Teacher-centered with explicit or direct instruction
- Stage One: Teacher-centered with learner voice and choice
- Stage Two: Learner-centered with teacher and learner as co-designers
- Stage Three: Learner-driven with teacher as facilitator and partner in learning. (Bray & McClaskey, 2015, p. 73)

The stages of personalized learning are analyzed and compared to student achievement results in Chapter Four.

Personalized learning elements. The Institute for Personalized Learning (2014), a division of the Cooperative Educational Service Agency (CESA) in Wisconsin, utilized research on personalized learning to develop a honeycomb model of the personalized learning elements. At the core of the model are three core components of personalized learning which are "comprehensive, data-rich learner profiles, customized learning paths, and proficiency-based progress" (Bray & McClaskey, 2015, p. 119). The remaining elements were categorized by "learning and teaching," "relationships and roles," and "structures and policies" (The Institute for Personalized Learning, 2014, para. 4). The agency then created a continuum for each element from traditional practice to

personalized learning practice (The Institute for Personalized Learning, 2014). This continuum served as the foundational document for the survey instrument in this study.

Theoretical Framework

The term *personalization* is often interchanged with other terms or instructional strategies, which leads to educators believing they are personalizing learning for students when that might not be the case (Bray & McClaskey, 2015; USDOE, 2010). The primary source utilized for the theoretical framework of this study was the Personalized Learning Theory of Bray andMcClaskey (2015). The author duo synthesized the works of many reformists to define what personalized learning is and what it is not (Bray & McClaskey, 2015).

In 2010, the terms personalization, differentiation, and individualization were compared regarding how they relate to teaching or instruction (USDOE, 2010). Bray and McClaskey (2015) expanded on the definitions of these terms by relating them to students and student learning. In the *National Education Technology Plan*, personalization was defined as instruction where learning is personalized for the learner by teachers or the curriculum; if learners want to learn something, it usually represents something personal to them (USDOE, 2010). If a teacher determines what a learner is supposed to learn solely based on the curriculum, it may not feel personal to the learner (Bray & McClaskey, 2015).

In this study, the following personalized learning elements were examined: learner profiles, personal learning goals, learner voice and choice, multiple instructional methods or modes, cultural responsiveness, rapid cycle feedback, customized responsive instruction, progressions toward deeper learning, learner independence, family and

community engagement, co-designers of learning, learning-aligned technology, flexible learning spaces, flexible time and pace, and learning-aligned grouping options (The Institute for Personalized Learning, 2014). The survey perceptions based on the previously mentioned personalized learning elements were used to determine the extent learner-centered, student-driven personalized learning occurred in the sample classrooms. Some elements outlined in the continuum produced by The Institute for Personalized Learning (2014) were not directly listed in the survey due to the length of the survey and how closely some of the elements related to each other.

Bray and McClaskey (2015) also debunked the automatic inclusion of popular instructional strategies and models as personalized learning in their theory. Some researchers and educators believe adaptive learning systems, blended learning, differentiated instruction, flipped classroom, 1:1 programs, project-based learning, and Individualized Education Plans (IEPs) equate to personalized learning, but key components within these models must be present, in addition to other personalized learning elements, to fit the Bray and McClaskey (2015) definition of personalized learning. While these instructional strategies and models could contribute to a personalized learning environment, other elements must also be incorporated (Bray & McClaskey, 2015).

Statement of the Problem

Personalized learning is a trending phrase spoken in many schools across the nation (Cavanagh, 2014). Educators are working to personalize learning in an accountability system that standardizes learning for students, yet "as it stands, districts see the potential in personalized learning to meet the demands of a diverse student

population" (Cavanagh, 2014, para. 4). Furthermore, educators are confusing personalization with differentiation and individualization, so it is difficult to know if true personalized learning impacts student achievement (Bray & McClaskey, 2015). While it has been stated technology can make the incorporation of personalized learning more achievable, a comprehensive list of ways technology can support a personal approach for students has yet to be compiled (Grant & Basye, 2014).

Purpose of the Study

The findings of this study will allow educators to determine if authentic personalized learning experiences are occurring for students, to determine the role of technology in personalized learning, and to determine if there is a connection between the degree of implementation of personalized learning and student achievement. By reviewing the outcomes of this study, educators could use the survey instrument to determine the degree of implementation of personalized learning within their buildings or districts, to determine elements of personalized learning on which to focus, or to identify new roles for technology within a personalized learning system.

Research questions and hypotheses. The following research questions guided the study:

1. How do the perceptions of classroom teachers and building administrators within a building compare regarding the degree of implementation of personalized learning?
2. What role does technology play in personalizing learning within a building?

3. Is there a difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of overall personalized learning implementation within a building?

$H3_0$: There is no difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building.

$H3_a$: There is a difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building.

4. Is there a difference in mean scale score gain on a diagnostic math assessment based on the modal rating of overall personalized learning implementation within a building?

$H4_0$: There is no difference in mean scale score gain on a diagnostic math assessment based on the modal rating of personalized learning implementation within a building.

$H4_a$: There is a difference in mean scale score gain on a diagnostic math assessment based on the modal rating of personalized learning implementation within a building.

5. Is there a difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology?

$H5_0$: There is no difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology.

$H5_a$: There is a difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology.

Definition of Key Terms

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

Adaptive learning software. Adaptive learning software is a computer-based learning tool that assesses a student's current level of learning and modifies instructional materials to meet the learning needs of that student (Cavanagh, 2014). As student performance changes in the program, the software continues to provide instruction based on learner successes and gaps (Cavanagh, 2014).

Blended learning. Blended learning combines face-to-face, classroom instruction with an online learning environment allowing students, in part, to control time, pace, and place of their learning (Tucker, 2013).

Differentiated instruction. Differentiated instruction is tailoring instruction to meet small groups of learners' needs through differentiated content, processes, products, or the learning environment (Gregory & Chapman, 2013). Small groups are identified based on "challenges in a specific content area and/or skill levels" (Bray & McClaskey, 2015, p. 11).

Flipped classroom. In a flipped classroom, the lecture and homework elements of a class are reversed (Educause, 2012). Short lectures are converted into video format

to be viewed by students prior to the class session (Educause, 2012). Class time is then utilized for student collaboration, independent practice, or in-depth projects (Educause, 2012).

Individualized learning. The teacher identifies learners' needs through evaluations based on student challenges or disabilities and then provides instruction to an individual learner (Bray & McClaskey, 2015). Within an individualized learning structure, "learning goals are the same for all students" (USDOE, 2010, p. 12).

One-to-one technology implementation. Within a one-to-one environment, a device is provided for each individual student (Bray & McClaskey, 2015).

Personalized learning environment. When students are "in a personalized learning environment, learning starts with the learner. Learners understand how they learn best so they can become active participants in designing their learning goals along with the teacher" (Bray & McClaskey, 2015, p. 11).

Project-based learning. According to Hallermann, Larmer, and Mergendoller (2011), "Project based learning is a systematic teaching method that engages students in learning knowledge and 21st-century skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and learning tasks" (p. 5).

Limitations and Assumptions

The following limitations were identified in this study:

Sample demographics. The study was focused on one public school district in southwest Missouri; therefore, the sample was a limitation, and the results of the analysis should not be considered absolute.

Instrument. The survey instrument was adapted from the Honeycomb Alignment with Continuum of Legacy to Personalized Learning Practices, created by the Institute for Personalized Learning (2014) and converted into a Google Form. The survey was piloted with teachers and administrators outside of the study population to obtain feedback for clarity and validation.

The following assumptions were accepted:

1. The responses of the participants were offered honestly and without bias.
2. The responses of the participants were representative of their own classrooms or school environments.

Summary

While the concept of personalized learning is not new, it is a current trend sometimes confused with other teaching pedagogies (Bray & McClaskey, 2015). The background information presented in this chapter was provided to clarify the meaning of a personalized learning environment to ensure the outcomes presented in Chapter Four align with the intended definition of the term. In Chapter One, the statement of the problem, purpose of the study, and research questions were identified to lay necessary groundwork for the remainder of the study.

Chapter Two includes a review of literature related to personalized learning, as well as the role of technology in the instructional concept. The design of the research and methodology are described in Chapter Three. Chapter Four includes an analysis of data from the survey, as well as secondary student achievement data. The findings of the study are revealed in Chapter Five.

Chapter Two: Review of Literature

The literature reviewed was utilized to define personalized learning to ensure the language in survey instrument questions reflected the intended definition, as well as captured all of the elements, of personalized learning. The historical timeline of the approach, as well as the role of technology in personalized learning, are examined in this chapter. Barriers to the concept, but also the importance of personalized learning, are identified to justify conducting the study.

Evolution of Personalized Learning

A historical timeline of education in the United States depicts a largely unchanged system that mirrors a factory model, producing batches of students equipped to work in a factory or industrial job (Horn & Evans, 2013). Yet the workforce has changed; for example, "in 1900, only 17% of all jobs required so-called knowledge workers, whereas over 60% do today" (Horn & Evans, 2013, para. 3). While the factory model has been the prevailing archetype since publicly-funded education was instituted in the United States, elements of personalized learning, which contradicts the factory model, have been documented dating back to the 1700s (Zmuda, Curtis, & Ullman, 2015).

During the 1700s, Jean-Jacques Rousseau encouraged schools to be "built on individual capacities and choices to capitalize on inherent motivations," while he also opposed the implementation of a singular curriculum for students (Yonezawa et al., 2012, p. 4). In 1915, John Dewey cited Rousseau's principle that "education takes place most successfully" when the learning is a necessity to children and not when it is "an adornment, a superfluity, and even an unwelcome imposition" (Dewey & Dewey, 1915, p. 3). Dewey additionally advocated for personalized learning principles in 1916,

through his work *Democracy and Education* (Ventura, 2014), in which he advocated for educators to identify and "build on students' interests and incorporate outside experiences into [learning] in order to meet students' individual needs" (Yonezawa et al., 2012, p. 4). Dewey believed teachers could not simply give knowledge to a student, but that learning occurred through experience and engagement (Ventura, 2014).

During the era of school reform in the 1950s and 1960s, Dinkmeyer noted concepts such as "open education, new math, individualized instruction, and other reforms dominated" the educational conversation and "discussions centered on instructional practices" (as cited in Yonezawa et al., 2012, p. 4). Students in Brazil were learning using Personal Systems of Instruction (PSI), introduced by Fred Keller in 1968, to work through short units at their own pace, take assessments at the conclusion of the units, and either move forward into the next unit or return to their previous coursework until the content was mastered (Ventura, 2014). Soon after in the 1970s, debates over how much student choice versus government agenda should influence curricula were prolific (Yonezawa et al., 2012).

The current personalization movement is said to have been initiated by the work of Theodore Sizer and colleagues at the Coalition of Essential Schools, by pushing for "tighter connections between adults and youth and more academic focus as a way out of our educational quagmire" (Yonezawa et al., 2012, p. 4). This widespread, student-centered movement of the 1990s is credited with transforming junior high schools into middle schools – "a friendlier and more developmentally appropriate model that fostered stronger teacher-student connections" (Yonezawa et al., 2012, p. 5). Sizer denounced traditional lecture and advocated teachers coach through "give-and-take dialogue" (Ilg,

2014, para. 4). According to Yonezawa et al. (2012), the reforms of the coalition "marked significant investments of money, time, and energy by educators who were intent on trying to restructure schools in ways that enabled teachers to spend more time with individual students and develop closer, more productive relationships" (p. 5). Sizer and colleagues also promoted extended class periods where deeper learning and in-depth projects, driven by student interest, could occur, rather than a superficial understanding of topics dictated by educators (Ilg, 2014).

In 2010, the *National Education Technology Plan* was published, in which the terms "individualization, differentiation, and personalization" were defined (USDOE, 2010, p. 12). The USDOE (2010) defined the terms as follows:

> Individualization refers to instruction that is paced to the learning needs of different learners. Learning goals are the same for all students, but students can progress through the material at different speeds according to their learning needs. For example, students might take longer to progress through a given topic, skip topics that cover information they already know, or repeat topics they need more help on.
>
> Differentiation refers to instruction that is tailored to the learning preferences of different learners. Learning goals are the same for all students, but the method or approach of instruction varies according to the preferences of each student or what research has found works best for students like them.
>
> Personalization refers to instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interests of different learners. In an environment that is fully personalized, the learning objectives and content as

> well as the method and pace may all vary (so personalization encompasses differentiation and individualization). (p. 12)

In the *National Education Technology Plan*, all terms were focused on instruction or teacher behaviors and were interchangeable, so Bray and McClaskey (2013) developed the Personalization vs. Differentiation vs. Individualization (PDI) Chart in 2012 (see Figure 1).

Personalization	Differentiation	Individualization
The Learner…	The Teacher…	The Teacher…
Drives their learning.	Provides instruction to groups of learners.	Provides instruction to an individual learner.
Connects learning with interests, talents, passions, and aspirations.	Adjusts learning needs for groups of learners.	Accommodates learning needs for the individual learner.
Actively participates in the design of their learning.	Designs instruction based on the learning needs of different groups of learners.	Customizes instruction based on the learning needs of the individual learner.
Owns and is responsible for their learning that includes their voice and choice on how and what they learn.	Is responsible for a variety of instruction for different groups of learners.	Is responsible for modifying instruction based on the needs of the individual learner.
Identifies goals for their learning plan and benchmarks as they progress along their learning path with guidance from teacher.	Identifies the same objectives for different groups of learners as they do for the whole class.	Identifies the same objectives for all learners with specific objectives for individuals who receive one-on-one support.
Acquires the skills to select and use the appropriate technology and resources to support and enhance their learning.	Selects technology and resources to support the learning needs of different groups of learners.	Selects technology and resources to support the learning needs of the individual learner.
Builds a network of peers, experts, and teachers to guide and support their learning.	Supports groups of learners who are reliant on them for their learning.	Understands the individual learner is dependent on them to support their learning.
Demonstrates mastery of content in a competency-based system.	Monitors learning based on Carnegie unit (seat time) and grade level.	Monitors learning based on Carnegie unit (seat time) and grade level.
Becomes a self-directed, expert learner who monitors progress and reflects on learning based on mastery of content and skills.	Uses data and assessments to modify instruction for groups of learners and provides feedback to individual learners to advance learning.	Uses data and assessments to measure progress of what the individual learner learned and did not learn to decide next steps in their learning.
Assessment AS and FOR Learning with minimal OF Learning	Assessment OF and FOR Learning	Assessment OF Learning

Figure 1. Personalization v. differentiation v. individualization chart (v3). Adapted from *Make Learning Personal,* by B. Bray and K. McClaskey, 2015, p. 9. Copyright 2015 by Corwin.

Although many educators have contributed to the notion of personalized learning, the definition synthesized by Bray and McClaskey (2015), as depicted in Figure 1, was utilized to guide the work in this study and to distinguish among differentiation, individualization, and personalization.

Theoretical Framework

Personalized learning is used by many people, but it does not always mean the same to everyone (Bray & McClaskey, 2015). In its current form, personalized learning is a "culture shift and transformational revolution shaking up teaching and learning" (Bray & McClaskey, 2015, p. 7). After the release of the 2010 *National Education Technology Plan*, Bray and McClaskey (2015) were the first to define personalization in education with how it related to the learner, rather than how the teacher tailored instruction, and developed the PDI chart. This study was viewed through the lens of how personalized learning relates to the learner.

Barriers to Personalized Learning

School structure. Theodore Sizer (1999), a leading activist for personalized learning, outlined the current rigid organizational system found in most schools in America, which keep personalized learning out of the classrooms:

- Students are grouped in classes by age.
- Assessments are administered by grade level rather than by student readiness, and students are marked as successful or unsuccessful according to their test score on one day.

- Students are promoted through "social promotion," a practice where students are promoted to the next grade level whether or not they master minimum grade level standards or expectations.
- Teachers deliver content confined within a subject matter and subjects are taught in isolation from one another.
- Courses and content are taught in a sequential, lock step manner according to grade level rather than student readiness or interest. (paras. 4-10)

The current high school model is "something for everybody," but options within that model are different from personalization (Sizer, 1999, para. 13).

Standardized testing. The era of standardized testing produced a host of barriers to creating personalized learning environments (Amrein & Berliner, 2003; Bray & McClaskey, 2015). These assessments, which are often tied to financial support for schools, decrease student motivation to learn (Amrein & Berliner, 2003). According to Amrein and Berliner (2003):

> High-stakes testing assumes that rewards and consequences attached to rigorous tests will "motivate the unmotivated" to learn. Yet researchers have found that when rewards and sanctions are attached to performance on tests, students become *less* intrinsically motivated to learn and less likely to engage in critical thinking. (p. 32)

Standardized testing also causes teachers to control student learning experiences to a greater degree, thus decreasing opportunities for students to steer their own learning (Amrein & Berliner, 2003). According to Amrein and Berliner (2003), "When the stakes

get high, teachers no longer encourage students to explore the concepts and subjects that interest them" (p. 32).

Some schools have resorted to reducing or eliminating courses or activities outside of the tested subjects during this high-stakes testing era (Amrein & Berliner, 2003). When schools need to increase test scores on state assessments, often "art, music, creative writing, physical education, recess, ROTC, and so forth are all reduced in time or dropped from the curriculum" (Amrein & Berliner, 2003, p. 34). This can be detrimental for some students who thrive in the co-curricular content areas (Dwyer, 2011). Finally, by focusing on standardized assessments, teachers and students have to cover a very broad curriculum with few opportunities to gain a deeper understanding of content (Amrein & Berliner, 2003).

Control of the learning experience. Aside from the rigid organization of schools, the personalized learning movement itself presents the issue of control, on which leading experts cannot even agree (Zmuda et al., 2015). Zmuda et al. (2015) offered a simple continuum to depict control over the learning experience from "teacher-driven learning experience" to "student-driven learning experience" (p. 12). Richardson, an advocate for change in schools and classrooms that align with the diverse new learning opportunities the internet and other technologies now offer, insisted, "Students now have the ability to create a personal curriculum around the things they truly care about learning out of the abundance of information, people, and tools they now have access to" (2014, para. 6). On the other hand, Meyer (2006), an advocate for better math instruction, spoke to the power of teacher-led instruction to deliver and assess content. He theorized giving students control to "determine path and pace…will lead to 'large knowledge deficits' in

many students, especially those at risk" (as cited in Zmuda et al., 2015, p. 13). Zmuda et al. (2015) advocated for "a balanced approach through which the teacher and student collaborate in the design of the learning experience" (p. 13).

Wide-ranging definitions of personalized learning. A barrier to true personalized learning is the misconception some trendy initiatives equal personalized learning, when often the teacher is still controlling the learning rather than partnering with the students (Bray & McClaskey, 2015). A few of the programs confusing the term include the following: Adaptive Learning Systems, Blended Learning, Differentiated Instruction, The Flipped Classroom, 1:1 Programs, Project-Based Learning, and Individualized Education Plans (IEPs) (Bray & McClaskey, 2015, pp. 24-25). While these programs could enhance or factor into personalized learning, if the teacher continues to "direct what and when each learner learns," personalized learning is not occurring (Bray & McClaskey, 2015, p. 33). To fully implement the personalized learning approach, it is imperative educators "build a common language around personalized learning so everyone…has a shared meaning and understanding…around a similar vision, goals, and activities" (Bray & McClaskey, 2015, p. 34).

In order to overcome barriers to personalized learning, educators must focus on changing instruction and mindsets rather than "school structures (for example, block scheduling, competency-based systems, 1:1 technology)" (Zmuda et al., 2015, p. 18). According to Frontier and Rickabaugh (2013), "Education is littered with well-intended transformational changes in practice. Too often, the surface-level changes that were implemented resulted in neither improved organizational capacity nor improved student

learning" (p. 17). In order for personalized learning to become a deeper change, Zmuda et al. (2015) offered the following advice:

> The evolution to personalized learning is an adaptive change; it's hard, it's disruptive, and it creates uncertainty. These deep and transformational changes require leaders, teachers, and students to examine and oftentimes abandon deeply held beliefs in order to reframe the role of the teacher and the student, the nature of what is to be learned, and the way in which it is learned. (p. 147)

Moving toward a personalized learning approach does not eliminate or even diminish the need for the classroom teacher; it merely shifts the role of the teacher from the lead resource and deliverer of information to a "curriculum planner, classroom facilitator and coach, assessor, advisor, communicator, and connector" to form a learning partnership between the teacher and the student (Zmuda et al., 2015, p. 20).

Personalized Learning Elements

The Institute for Personalized Learning (2014) developed a "change strategy" for schools and districts to reference as they shift to a personalized learning system (para. 4). A honeycomb model was initially created, focusing on personalized learning elements categorized as foundational, learning and teaching, relationships and roles, and structures and policies components (The Institute for Personalized Learning, 2014). A continuum from legacy to personalized learning practices was developed for each of the personalized learning elements to assist educators in knowing the criteria necessary to grow toward personalized learning (The Institute for Personalized Learning, 2014). The continuum served as the foundational resource for the survey administered in this study.

Learner profiles. In a personalized learning classroom, "comprehensive, data-rich learner profiles convey a deep understanding of the learner and are used to plan a customized learning environment and instructional strategies. They are "dynamic, real-time and learner-owned and managed" (The Institute for Personalized Learning, 2014, p. 1). A Personal Learner Profile (PLP), a title coined by Bray and McClaskey (2015), is student-created, and once completed, provides information to the teacher about each student's "strengths, challenges, interests, aspirations, talents, and passions" (p. 57).

By understanding students and how they learn, teachers can use data to ensure learning success by "diagnosing student needs and plan[ning] effective supports" (McCarthy, 2014, para. 3). McCarthy (2014) stated, "When using learning profiles, one guarantee is that all learners fall somewhere on the learning styles range. [Educators should] design versions of an activity or product that incorporates different aspects of a learning profile" (para. 12). The PLP can serve as a conversation starter between learners and educators, as well as aid in learners designing their individual learning goals (Bray & McClaskey, 2015).

Personal learning goals. After students have completed a learner profile, the "learner and educator co-develop purposeful personalized goals to provide benchmarks and add focus, clarity and commitment to learning" (The Institute for Personalized Learning, 2014, p. 1). By setting academic, character, and other goals, students will develop a growth mindset and gradually increase their ability to take on challenges (Elias, 2014). The skill of setting personal goals will take students time to develop, but with practice, feedback, and coaching from a teacher, students' motivation to learn will increase (Center on Education Policy, 2012; Elias, 2014).

Consider the following motivation theory and how it relates to personal goal setting:

> Each of the four main dimensions of motivation−competence, control/autonomy, value/interest, and relatedness−can play a crucial role in goal-setting. To feel competent, students need to see their goals as realistic and achievable, which may require altering the goals or altering students' perceptions of their own abilities. To feel in control, students must be able to see a clear path to achieving the goal, through means they can control rather than through luck or chance. Control is also maximized when students set goals themselves, or at least agree with and internalize goals set for them by someone else. Student support for the goal will also foster interest and value. Lastly, relatedness can be affected by what students perceive is expected of them by society, how they will be judged by people of social importance, or what goals other members of their own social group or another desirable social group are pursuing. (Center on Education Policy, 2012, p. 2)

Goals must meet a common set of standards in order to increase student motivation (Center on Education Policy, 2012). The goals must be realistic, attainable yet challenging, timely, desirable, and personal (Center on Education Policy, 2012). The Center on Education Policy (2012) also stated, "Goals can actually undermine motivation if they are too difficult, or if students feel a goal has been imposed on them or that failing to meet it would have dire consequences" (p. 16).

Learner voice- and choice-infused. Within a personalized learning environment, "learners have significant and meaningful input into and choice about their learning

experience" (The Institute for Personalized Learning, 2014, p. 1). The most common application of infusing student voice and choice is when teachers allow learners to choose how to present learning or projects, but there should be more evidence of this practice in personalized learning (Miller, 2016). While teachers are still charged with determining how much learner voice and choice should occur within a lesson, providing students with the opportunity to incorporate their personal ideas, beliefs, and choices into learning allows learners to feel autonomous and contributes to intrinsic motivation (Brophy, 2013; Larmer, Mergendoller, & Boss, 2015). According to Larmer et al. (2015), "The degree of voice and choice must be made with an eye to what students are ready to handle, and what scaffolds and coaching will be available" (p. 42). The goal for the infusion of student voice and choice is to allow learners to build confidence in making logical decisions in life (Larmer et al., 2015).

Multiple instructional methods and modes. In a personalized learning environment, "instruction is offered using a variety of methods (e.g. demonstration, discussion, simulation, small group) and modes (e.g. face-to-face, blended, virtual) in response to learner readiness, strengths, needs and interests" (The Institute for Personalized Learning, 2014, p. 2). Educators are faced with the challenge of determining the most effective methods of organizing and delivering content to diverse student populations (Voltz, Sims, & Nelson, 2010). It is important for teachers to learn about their students and how their students learn through the use of learner profiles (Bray & McClaskey, 2015). Educators should use the information they have collected to plan lessons, offering a variety of methods and modes to match learners' needs (Bray & McClaskey, 2015). By interacting with content through a variety of modes (online, face-

to-face, blended), learners have the opportunity to explore content at a deeper level (Horn & Staker, 2015).

Cultural responsiveness. In order for learning to feel personal to students, they must be "provided opportunities to engage with content through various cultural lenses and perspectives and draw from their cultural background to build their learning" (The Institute for Personalized Learning, 2014, p. 2). Culturally responsive education "is an approach that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills and attitudes" (Ladson-Billings, 1994, p. 18). In a personalized learning classroom, students' individual cultures should be recognized while also learning about others' (The Education Alliance at Brown University, 2008). Educators must practice cultural sensitivity by learning about the various cultures represented within the class, adjusting the curriculum to respond to the background of students, and being mindful of social situations and learning tasks that occur in the classroom to ensure they are appropriate based on represented cultures (The Education Alliance at Brown University, 2008).

Rapid cycle feedback. The researchers at The Institute for Personalized Learning (2014) stated, "Feedback is frequent, timely and continuous" in a personalized learning classroom, and "the feedback allows the learner to continue to learn and grow" (p. 2). Collecting data and providing students with effective feedback is linked to improved student learning (Dwyer & Wiliam, 2016). Teachers can use evidence from daily classroom activities and/or formative assessments to provide feedback to students so students understand what they have learned, as well as areas for improvement (Dwyer & Wiliam, 2016). Feedback, however, is only impactful if adjustments are made based

on the data collected and presented (Dwyer & Wiliam, 2016). Additionally, "the shorter the amount of time between assessment and adjustment, the more powerful its effect on learning" (Dwyer & Wiliam, 2016, para. 5).

Customized responsive instruction. The Institute for Personalized Learning (2014) described customized responsive instruction as "instruction and pacing…driven by individual learner needs and growing capacity for independent learning" (p. 2). Bray and McClaskey (2015) referred to this concept as Response to Learning (RTL) in the personalized learning environment. Traditionally, educators have incorporated Response to Intervention (RTI) in their classrooms to support the needs of struggling learners, but RTL is a system that provides supports for all learners (Bray & McClaskey, 2015). The cycle includes the teacher understanding each student's "strengths, challenges, interests, and passions" through the implementation of Personal Learner Profiles (PLPs); facilitating the development of learning goals; and finally co-developing a plan with the student to achieve the learning goals (Bray & McClaskey, 2015, p. 182). Once learning goals are mastered, the cycle repeats so the student is constantly learning and the teacher is constantly adjusting instruction to meet learners' needs (Bray & McClaskey, 2015).

Progressions toward deeper learning. In a personalized learning classroom, "movement [occurs] over time toward more expert understanding and sophisticated ways of thinking about a concept or idea" (The Institute for Personalized Learning, 2014, p. 3). The Hewlett Foundation outlined six competencies of deeper learning students must master in order to be successful beyond high school (Ark & Schneider, 2014). Those competencies include the following:

> (1) *Master core academic content*. Students develop and draw from a baseline understanding of knowledge in an academic discipline and are able to transfer knowledge to other situations. (2) *Think critically and solve complex problems*. Students apply tools and techniques gleaned from core subjects to formulate and solve problems. These tools include data analysis, statistical reasoning, and scientific inquiry as well as creative problem solving, nonlinear thinking and persistence. (3) *Work collaboratively*. Students cooperate to identify and create solutions to academic, social, vocational and personal challenges. (4) *Communicate effectively*. Students clearly organize their data, findings and thoughts in both written and oral communication. (5) *Learn how to learn*. Students monitor and direct their own learning. (6) *Develop academic mindsets*. Students develop positive attitudes and beliefs about themselves as learners that increase their academic perseverance and prompt them to engage in productive academic behaviors. Students are committed to seeing work through to completion, meeting their goals and doing quality work, and thus search for solutions to overcome obstacles. (Ark & Schneider, 2014, p. 4)

As mentioned in the section regarding barriers to personalized learning, school structure and standardized testing have led to curriculum that is a "mile wide and inch deep" (Amrein & Berliner, 2003; Ark & Schneider, 2014, p. 10; Sizer, 1999). Operational and cultural school shifts are necessary to involve students in deeper learning (Ark & Schneider, 2014).

When Vander Ark and Schneider (2014) analyzed 20 schools across America where deeper learning was occurring, they proposed the following steps to incorporate deeper learning practices:

> (1) Pick compelling subjects and help students frame big but specific questions. (2) Set rigorous goals. Outline high quality products that will be produced and judged with standards-based rubrics. (3) Make the projects long enough to go in depth and build in milestones to keep teams on track. (4) Ask students to publish their work and create venues for presentations of learning to the school community. (5) Create regular time for teachers to plan and collaborate. (p. 13)

Deeper learning cannot happen for students without the other personalized learning elements, especially competency-based learning (Ark & Schneider, 2014). If teachers and building leaders commit to a culture of deeper learning and remove barriers, this practice is possible for every learner (Ark & Schneider, 2014).

Learner independence. When learners are autonomous, they "have the capacity to learn and work independently, without heavy dependence on external structures and supports" (The Institute for Personalized Learning, 2014, p. 3). This step is not automatic and requires scaffolding and support (Bray & McClaskey, 2015). Students must understand how they learn best, be able to monitor their own progress, and be able to reflect on their learning to make adjustments to their PLPs (Bray & McClaskey, 2015). This level of learning is equivalent to Bray and McClaskey's (2015) "Stage Three Personal Learning Environment (PLE): Learner-Driven with Teacher as a Partner in Learning" (p. 102). The authors stated in a Stage Three PLE, learners "design challenging learning experiences;" "self-direct how they access information, engage with

content, and express what they know based on learning goals;" and "learn at their own pace and move on by demonstrating mastery of competencies," among other indicators (Bray & McClaskey, 2015, p. 102).

Family and community engagement. Family and community engagement must go beyond a level of awareness to where learners, schools, the family, and the community work together to fully leverage resources and expertise to maximize the learning experience (The Institute for Personalized Learning, 2014). Traditionally, parent involvement in student learning has been restricted to knowledge of progress through standard curriculum, reception of the student grade card, occasional parent-teacher conferences, and attendance at school events (The Institute for Personalized Learning, 2014). Community involvement has often been limited to fundraising or sponsorship opportunities, "superficial career exploration," and one-day field trip or guest speaker experiences (The Institute for Personalized Learning, 2014, p. 2).

In a personalized learning system, families and community members or agencies have the chance to make a much more meaningful impact on learners (The Institute for Personalized Learning, 2014). The family perspective is collected through the PLP process and serves as a valuable source of data in supporting individual learners (Bray & McClaskey, 2015; The Institute for Personalized Learning, 2014). Community partners, similarly, work with teachers or administrators in a personalized learning environment to form planned partnerships that maximize student learning by providing authentic and engaging resources, field experts, and experiences (The Institute for Personalized Learning, 2014).

Co-designers of learning. When students and teachers co-design learning, "learners and educators work together to design learning experiences and determine how proficiency is demonstrated" (The Institute for Personalized Learning, 2014, p. 4). The level of personalization of content can range from "personalized *to* the learner" to "personalized *with* the learner" to "personalized *by* the learner" (Rickabaugh, 2016a, paras. 4, 7, & 10). In the initial phase, "personalized *to* the learner," the teacher tailors the content and path to individual learner preferences and readiness levels (Rickabaugh, 2016a, para. 4). When content is "personalized *with* the learner," standards to be achieved are the focal point, and teachers and students collaborate on the learning path (Rickabaugh, 2016a, para. 7).

Finally, when learning is "personalized *by* the learner," teachers take on more of a guide or facilitator role and relinquish control to the students (Rickabaugh, 2016a, para. 10). Learning is still standards-based, but "learners...take the lead in defining learning outcomes and constructing the path while relying on the experience, expertise and coaching of educators to support what the learner has committed to achieve" (Rickabaugh, 2016a, para. 12). In a personalized learning classroom, there will be an ebb and flow of personalizing *to, with,* and *by* the learner, depending on the learners and the task at hand (Rickabaugh, 2016a).

Learning-aligned technology. When learning is personalized, "technology is used as a tool to modify or redesign learning tasks. It enhances, deepens or accelerates understanding and mastery of content" (The Institute for Personalized Learning, 2014, p. 4). The expectation of students has risen above mastery of the core curriculum; learners must also demonstrate skills with the "four C's: critical thinking, creativity,

communication, and collaboration," as well as technology skills to be college- and/or workforce-ready (Blair, 2012, p. 10). In order for students to accomplish this, they must have access to technology, use it in an authentic manner, and be trusted "with more progressive technology use" (Blair, 2012, p. 10). The teacher's role in tech integration has shifted from teaching *with* technology to teaching *through* technology, allowing the learner to become the "focal point of the classroom, acting as explorer" (Blair, 2012, p. 10). Tasks have shifted from teacher-created multimedia presentations to student-created presentations of learning, thus giving more ownership of learning to the student (Blair, 2012).

Flexible learning spaces. When students are working in personalized learning classrooms, "comfortable physical spaces are conducive to collaborative learning, responsive to the needs of learners, and support individual, small-group and large-group instruction" (The Institute for Personalized Learning, 2014, p. 5). Many educators today are challenging the traditional rows of seats and desks that allow for no student voice and choice and instead promote teacher authority and control (Bray & McClaskey, 2015). Technology and collaborative spaces are quickly replacing archaic seating arrangements (Bray & McClaskey, 2015). Learners are choosing where they fit in the space to "learn, collaborate, create, and design" by transitioning to different spaces based on the task at hand (Bray & McClaskey, 2015, p. 184).

Flexible time and pace. At the heart of personalized learning is flexible time and pace, where "learners have the flexibility to progress at their own pace to adjust time allocations based on their learning objectives. Learning is the constant; time is the variable" (The Institute for Personalized Learning, 2014, p. 5). Students contained within

the same grade level always have different knowledge backgrounds and learn at various rates, but are traditionally taught at the same pace through lecture and whole-class assignments (Grant & Basye, 2014). When teachers support students as individuals, "they are more likely to succeed academically, emotionally, and behaviorally (Grant & Basye, 2014, p. 3). When educators embrace learner differences and provide asynchronous pacing through the curriculum, multiple benefits occur: "learners advance upon mastery, learners provide evidence of learning, learners receive just-in-time support based on their individual learning needs," learners are able to move beyond knowledge acquisition into application and creation phases of learning, and "learning takes place anytime, anywhere" (Bray & McClaskey, 2015, p. 177).

Learning-aligned grouping options. Students' learning can be personalized when "learners are grouped flexibly based on readiness, needs and interests" (The Institute for Personalized Learning, 2014, p. 5). The term personalized learning might lead some to believe students work independently of each other, at their own personal pace (Rickabaugh, 2016b). This might be true in some situations, but knowing students must obtain collaboration skills to be career- and college-ready, learners must learn or work in groups, at times, to accomplish tasks (Rickabaugh, 2016b). Collaboration "plays a key role in supporting learning" by providing opportunities for students to model for one another (Rickabaugh, 2016b, p. 71). When students are grouped, Rickabaugh (2016b) advocated putting students in groups according to their readiness levels:

> For example, educators might cluster a small group of learners who are ready to address a particular concept and provide them with brief, strategic, and specific

> instruction. Students who are working on common content or skills might also be clustered together to support each other's learning. (p. 53)

The purpose or desired outcome of the learning task should dictate whether students work independently, in small groups, in a whole class setting, or if the student gets choice in the grouping structure (Rickabaugh, 2016b).

The Role of Technology in Personalized Learning

The traditional classroom structure, with all students learning in the same place and at the same pace, is no longer feasible for today's educators (Grant & Basye, 2014). According to researchers and educators with the USDOE (2010), "[Technology] frees learning from a rigid information-transfer model (from book or educator to students)" (p. 52). The use of technology creates opportunities for teachers to release control of learning and experiences to students and produces opportunities for them to choose how, when, and where learning occurs, which reduces barriers (Grant & Basye, 2014). According to Zmuda et al. (2015):

> Personalized learning requires not only a shift in the design of schooling but also a leveraging of modern technologies. Personalization cannot take place at scale without technology. Personalized learning is enabled by smart e-learning systems, which help dynamically track and manage the learning needs of all students, and provides a platform to access myriad engaging learning content, resources and learning opportunities needed to meet each student's needs everywhere at any time, but which are not all available within the four walls of the traditional classroom. (p. 8)

The integration of technology, referred to as a "revolutionary opportunity for change" in the *National Education Technology Plan* (USDOE, 2010, p. 52), has allowed students and teachers to transform the educational experience (Grant & Basye, 2014; USDOE, 2010). Technology should not be used to digitize a traditional system, but should improve learning for all students by allowing student control over pace and place of learning, increased opportunities for collaboration within and beyond the classroom walls, and immediate access to information (Grant & Basye, 2014; Zmuda et al., 2015).

Impact of technology on learner profiles. Educators collected learner profile data long before classrooms were filled with technology, but prior to refined tech tools, student record management was insufficient to meet the needs of teachers (Bailey, Carter, Schneider, & Ark, 2015). In the past, teachers had limited visibility into previous learner profiles, requiring each educator to collect his or her own learner data (Bailey et al., 2015). Current software, web tools, and learning management systems (LMSs) allow students and teachers to construct digital portfolios that contain a lot of background information about each child to assist with personalizing learning for each student (Bailey et al., 2015). By having the data travel with the student, educators can begin personalizing learning on day one (Bailey et al., 2015).

Impact of technology on learner voice and choice. Technology has impacted learner voice and choice in slightly different ways. DeWitt (2015) stated, "Without student voice, technology just fosters another type of compliance. [Therefore, it] will be just as boring for students as the chalkboard and lecture methods" (DeWitt, 2015, p. 1). A variety of web tools have been incorporated into classrooms to allow student voice to be collected in an efficient and useful manner (Ledesma, 2011). Students can provide

feedback and opinions through survey tools such as Google Forms, blog about topics or issues that are important to them, or create their own videos to share ideas that pertain to a particular topic (DeWitt, 2015).

Educators can allow for student choice in a variety of ways as well. Interactive choice boards allow students to select how they will learn about the topic being studied, or students can have choice in how they present or deliver content they learned through technology (Ronan, 2015). For example, students might all have to research a topic but could have the choice to create an animation, slideshow, or interactive mind map depicting their findings (Ledesma, 2011). When students have choice in their learning, problem solving and authentic learning are incorporated into the experience, thus making the learning more meaningful (Ledesma, 2011).

Impact of technology on multiple instructional methods and modes. Prior to the technology era in schools, multiple instructional methods were used, but shifting to blended and online learning has radically developed as internet access becomes faster and more reliable, devices become more affordable, and online content becomes more engaging (Horn & Staker, 2015). As knowledge acquisition for students has moved more online, more class time is available for collaborative projects, Socratic discussions, labs, etc. (Horn & Staker, 2015). Improved technology and software has also allowed classrooms to have more experts than just the teacher, as adaptive software and research databases can help students learn individually while the teacher works with a different small group of students on a face-to-face lesson (Horn & Staker, 2015). Teachers have gained freedom and students have gained a personalized education through the use of technology (Horn & Staker, 2015).

Impact of technology on rapid cycle feedback. Teachers and students today have access to technology tools that personalize instruction and provide feedback in the form of real-time data, so interventions and redirections occur immediately to support the pace of individual learners (Abel, 2016). Many curricular software programs now include features that allow students to complete homework online and then receive immediate feedback based on their answers, allowing students to make an adjustment in how they approach a problem (Sun, 2012). Similarly, students working in adaptive software programs not only receive immediate feedback based on answers, but the learner's pathway within the program is customized based on how a student answers each problem (DreamBox Learning, 2016). There is a long list of various tech tools teachers can use to provide feedback to students including the comment feature within Google Docs, recording video comments within a learning management system, commenting on student blogs, and allowing students to provide peer feedback using the previously mentioned tools and more (Hertz, 2012).

Impact of technology on progressions toward deeper learning. Deeper learning is possible for today's learners through enhanced access to "expanded options and extended reach" (Ark & Schneider, 2014, p. 27). Enhanced access includes access to high quality teachers and content through always-available online resources; quick, sometimes immediate, feedback that allows for acceleration; and multiple pathways to master content that was previously unavailable (Ark & Schneider, 2014). Technology advancements have also improved collaboration and communication tools, which positively impact two of the deeper learning competencies (Ark & Schneider, 2014). Today's learners can now collaborate with virtual teams, create collaborative projects,

and have the ability to produce high quality communicative documents and work products (Ark & Schneider, 2014).

Impact of technology on learner independence. With the advancement in technology, students adapted quickly to independently learning outside of school. The following statistics were provided in the Speak Up 2011 report produced by Project Tomorrow (2012):

- 1 in 10 students in grades 6-12 have sent out a Tweet about an academic topic that interests them;
- 15% have informally tutored other students online or found an expert to help them with their own questions;
- 18% have taken an online assessment to evaluate their own self-knowledge;
- One-fifth have used a mobile app to organize their school work;
- 1 in 4 have used a video that they found online to help with homework;
- 30% of middle school students and 46% of high school students have used Facebook as an impromptu collaboration tool for classroom projects;
- Almost half of the high school students have sought out information online to help them better understand a topic that is being studied in class. (p. 5)

The inclusion of technology during the school day also fosters independence by allowing students to research from numerous resources, review content in a variety of ways (e.g., video lessons, text), access online curriculum, set and receive reminders and alerts to manage learning, and collaborate and communicate with peers and resources in and beyond the school building (Project Tomorrow, 2012).

Impact of technology on co-designing learning. Adaptive learning systems have become an effective tool to assist teachers in personalizing content *to* students (Bray & McClaskey, 2015; Rickabaugh, 2016a). Khan Academy (2016) staff advertise their site as "a personalized learning resource for all ages: Khan Academy offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom" (para. 1). Some adaptive software programs allow content to be personalized *by* the student, although the content is typically limited by what the student is ready to learn (DreamBox Learning, 2016). In DreamBox, students are able to select lessons that are available based on the students' knowledge level (DreamBox Learning, 2016).

Impact of technology on flexible learning spaces. Prior to devices becoming smaller and more portable and the infrastructure becoming wireless and faster, students reported to a computer lab to access technology (Bray & McClaskey, 2015). Students had limited access to labs due to scheduling issues or lack of supervision (Bray & McClaskey, 2015). With easier access to technology due to lower cost, more options, and high demand, devices are infiltrating classrooms at a rapid pace (Bray & McClaskey, 2015). Most devices included in a 1:1 initiative are portable, wireless devices, which allow students to move freely through the flexible learning space without having to worry about being tethered or connected to a wall (Bray & McClaskey, 2015).

Impact of technology on flexible time and pace. Various advances in technology have allowed students to work at a pace appropriate for their ability level (Grant & Basye, 2014). Students can read the same information at varying reading levels and might also have access to text-to-speech or other assistive technology features, which

ensure learners with varying levels of ability can access text (Grant & Basye, 2014). The progression of technology has also brought about concepts like the flipped classroom, which enables students to watch videos or lectures outside of the classroom related to topics studied in class (Bray & McClaskey, 2015). By viewing the recorded material on one's own time, the learner can review the content at an individualized pace and as often as needed (Bray & McClaskey, 2015). Furthermore, one in four students has accessed an online video, without being directed by a teacher, to assist with a homework assignment or project (Project Tomorrow, 2012).

Finally, students can learn at an individualized pace using one of the many adaptive software programs available (Bray & McClaskey, 2015). One example, Khan Academy, allows learners to watch instructional videos, practice skills, and obtain feedback so they can study at a pace that is comfortable (Khan Academy, 2016). While incorporating multi-level texts, a flipped classroom, or adaptive software does not ensure a personalized learning environment, the technology-based concepts allow students more control over the pace of their learning, which is an element of personalized learning (Bray & McClaskey, 2015).

Summary

The literature review consisted of a historical timeline of personalized learning, which highlighted that the concept of personalized learning has existed for over 300 years (Yonezawa et al., 2012) and provided the basis for a definition of personalized learning. The barriers educators and students are facing as more classrooms are transitioning to a personalized approach was expanded upon to depict the lingering impact of the industrial age on the schools. Finally, literature on the role of technology in personalized learning

offered insight into how devices and networking can make the implementation of this methodology easier for teachers and students. Chapter Three contains detail of the methodology utilized for this study. The data analysis from the surveys will be revealed in Chapter Four, while the conclusions and findings of the study will be presented in Chapter Five.

Chapter Three: Methodology

The personalized learning pedagogy allows educators to better meet the vast and unique needs of learners (Bray & McClaskey, 2015; Grant & Basye, 2014). However, the current reality of education systems in Missouri still requires students to perform adequately on high-stakes assessments for accreditation, funding, and other purposes (Missouri Department of Elementary and Secondary Education [MODESE], 2015a). Data obtained in this study could allow educators to determine if there is a relationship between the degree of implementation of personalized learning and student achievement results. The role of technology in the implementation of personalized learning was also examined. In Chapter Three, the overview of the study is defined, the research design is established, ethical considerations are discussed, and components of the study are outlined including population and sample, instrumentation, data collection, and data analysis.

Problem and Purpose Overview

The purpose of this study was to determine the degree of implementation of personalized learning, according to elementary classroom teachers and administrators. Educators are working to personalize learning in an accountability system that standardizes learning for students, yet "as it stands, districts see the potential in personalized learning to meet the demands of a diverse student population" (Cavanagh, 2014, para. 4). The role of technology in personalizing learning for students was identified, as well as the correlation between the implementation of personalized learning elements and student achievement since performance on high-stakes assessments is still used to award or deny school district accreditation in Missouri.

Research questions and hypotheses. The following research questions guided the study:

1. How do the perceptions of classroom teachers and building administrators within a building compare regarding the degree of implementation of personalized learning?

2. What role does technology play in personalizing learning within a building?

3. Is there a difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of overall personalized learning implementation within a building?

$H3_0$: There is no difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building.

$H3_a$: There is a difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building.

4. Is there a difference in mean scale score gain on a diagnostic math assessment based on the modal rating of overall personalized learning implementation within a building?

$H4_0$: There is no difference in mean scale score gain on a diagnostic math assessment based on the modal rating of personalized learning implementation within a building.

$H4_a$: There is a difference in mean scale score gain on a diagnostic math assessment based on the modal rating of personalized learning implementation within a building.

5. Is there a difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology?

$H5_0$: There is no difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology.

$H5_a$: There is a difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology.

Research Design

A mixed methods research approach was utilized in this study, integrating qualitative and quantitative data (Creswell, 2014). According to Creswell (2014), "The core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone" (p. 4). Within the mixed methods research approach, a "statistical and text analysis" was conducted to answer the five guiding research questions (Creswell, 2014, p. 4).

In this study, a survey was administered to the sample group of educators, and the results were analyzed to determine the degree of implementation of personalized learning. In order to answer the research questions, several comparative analyses took

place. Administrator responses were compared to teacher responses from several survey components to determine if the perceptions were similar within the same building, or if there was a perceptual disconnect between responses. Finally, the educator perceptions from the survey were compared to student achievement results from the same buildings to determine if there was a correlation between the degree of implementation of personalized learning and test scores.

Ethical Considerations

The following paragraph contains safeguards with regard to confidentiality and anonymity. No identifiable information regarding teachers, administrators, students, or school buildings was collected or appeared on within the study; therefore, anonymity was ensured. In order to assure confidentiality, each participant received information which informed him or her in detail the purpose of the research, any possible risks, and the opportunity to opt out of the study any time without negative effects. Due to a possible conflict of interest between the researcher and participants, a third-party distributed and collected data and expunged identifying data prior to providing data to the researcher. Data codes were used to lessen the possibility of identifying participants. Approximations or slight modifications were utilized to assure anonymity within discussions that included identifiable statistics, such as student enrollment, free and reduced price meals percentages, or the percentage of specific subgroups of individuals. All electronic files were saved using a protected password on a personal computer and secured site. Additionally, all documents and files will be destroyed three years from completion of the research project.

Population and Sample

The population for this study included all elementary classroom teachers and building administrators working in a southwest Missouri school district. Of the 36 elementary buildings within the studied district, three buildings house students in grades kindergarten through fourth grade (K-4), and the remaining 33 buildings house students in grades kindergarten through fifth grade (K-5). Only the 480 classroom teachers and 33 lead administrators in the K-5 buildings were included in the population of this study to eliminate additional factors impacting the results. Given the population size of approximately 500, a sample size of 81 was necessary to ensure a 95% confidence level with a 10% margin of error (SurveyMonkey, 2016). The convenience sample, a sampling technique using subjects who are convenient to the researcher, included the population who completed a survey (Bluman, 2012).

Secondary student achievement data were also collected and analyzed in this study. The student population consisted of 10,624 students in grades kindergarten through five attending one of the 33 K-5 buildings (MODESE, 2015b). Of the 10,624 students, 2.5% were Asian/Pacific Islander, 7.3% were Black, 6.9% were Hispanic/Latino, 6.7% were multiracial, 0.5% were Native American, and 76.2% were White (MODESE, 2015b). The percentage of students who qualified for free or reduced meal prices was 65.2%, while the 33 buildings had a collective mobility rate of 65.8% (MODESE, 2015b). Student achievement data from the entire population of students were included in the data analysis.

Instrumentation

With permission (see Appendix A), the survey instruments used for this study were adapted from Honeycomb Alignment with Continuum of Legacy to Personalized Learning Practices, created by educators at The Institute for Personalized Learning (2014), a division of Cooperative Education Service Agencies #1. The teacher survey (see Appendix B) was created by incorporating 15 of the 27 personalized learning elements from the continuum, which included descriptors for "traditional teaching practices" and "personalized learning practices" (The Institute for Personalized Learning, 2014, p. 1). The researcher created a middle descriptor for "transitional teaching practices." The researcher then added six additional questions to the survey to gain insight on the overall implementation of personalized learning as well as the role of technology. Once the teacher survey was completed, the administrator survey (see Appendix C) was created using the same questions, but the wording was adapted to focus on the principals' perceptions of the implementation of personalized learning throughout the buildings.

Both surveys were administered to a trial group of teachers and administrators not included in the population for the study. The trial group was asked to provide feedback on the length of the survey as well as the wording in the questions to ensure the questions were easy to understand and would not confuse participants. The trial survey also gave the researcher an opportunity to check the data collection process and make adjustments when necessary. This process led to adjusting the length of the survey, altering the wording of some questions, and slightly changing the organization of the survey to make it more user-friendly.

Data Collection

Permission to collect data for this study was requested from the Institutional Review Board (IRB) at Lindenwood University (see Appendix E), as well as from the southwest Missouri school district (see Appendix F). Once permission was granted, the Director of Analytics, Accountability, and Assessment (AAA) assigned each building an arbitrary code ranging from A-GG that was unknown to the researcher. The Director of AAA then sent survey links to all building administrators and classroom teachers, with each principal and set of teachers by site receiving a unique link (e.g., principal at School A received the administrative survey for School A, and the teachers at the same building received the teacher survey link for School A). The Informed Consent Letter (see Appendix D) for survey participants was included with the survey.

Once the survey was completed by educators, the Director of AAA provided the results, identified only by arbitrary codes, to the researcher. The director also provided reading and math scores from the district's diagnostic assessment administered to all students in kindergarten through eighth grades. The assessment data were disaggregated by school, but again, only identifiable to the researcher by the arbitrary codes assigned by the Director of AAA. The codes assigned coincided to the codes assigned by site to the survey data.

The Director of AAA handled the survey distribution and data collection with such confidentiality from the researcher, because the researcher is an administrator within the district studied for this project. The process reduced bias from the researcher and reduced perceived coercion for the participants. To ensure confidentiality and anonymity, all administrator, teacher, and student achievement data were kept

confidential and only reported holistically. All documents will be destroyed three years after completion of the study.

Data Analysis

In order to answer the five research questions guiding the study, a variety of statistical tests were conducted on the data sets. Measures of central tendency were reported on classroom teacher and building administrator perceptions for each personalized learning element, overall implementation of personalized learning, and opinions about the role of technology in personalized learning. Measures of central tendency include mean, median, mode, and midrange (Bluman, 2012). The one-way analysis of variance (ANOVA) test was conducted on multiple data sets to determine if there was a statistically significant difference in mean scale score gain based on the modal response of teachers to the survey statement, "Rate your overall implementation of personalized learning on a scale from one to seven with one indicating no implementation and seven indicating full implementation."

A one-way ANOVA test "is used to determine whether there are any significant differences between the means of two or more independent (unrelated) groups" (Lund Research, 2013, para 1). The one-way ANOVA test was used to determine if there was a significant difference in scale score gains based on personalized learning implementation for the following data sets: 1) The degree of implementation of personalized learning and student achievement on a diagnostic reading assessment; 2) The degree of implementation of personalized learning and student achievement on a diagnostic math assessment; 3) The degree of implementation of personalized learning and student achievement in buildings with one-to-one technology; and 4) The degree of

implementation of personalized learning and student achievement in buildings without one-to-one technology.

Summary

A survey, administered by a third party, was provided to all classroom teachers and administrators employed in 33 K-5 buildings. The results of the surveys were analyzed to determine the degree of implementation of personalized learning. The survey results were also compared to student achievement results from within the same buildings to determine if there is a correlation between the data sets. These results can be found in Chapter Four. The findings based on the results are presented in Chapter Five, along with conclusions and recommendations for future research.

Chapter Four: Analysis of Data

Introduction

This study was conducted to discover the degree to which personalized learning was implemented in elementary classrooms, according to classroom teachers and administrators. Additionally, the impact of technology on the implementation of personalized learning was identified, according to the same survey respondents. Finally, student achievement data were collected and compared to the degree of personalized learning implementation to determine if incorporating personalized learning elements could have a positive impact on student performance.

Since personalized learning is a trending term in the nation's schools (Cavanagh, 2014), it is important to identify if implementation of the pedagogy has a positive influence on student achievement. The outcomes of this study could allow educators to identify the most impactful uses for technology in a personalized learning environment. Furthermore, the survey instrument utilized in this study could be used by teachers or administrators to determine the degree of implementation of personalized learning within their buildings. The use of the survey tool would allow educators to understand the elements of true personalized learning rather than elements of differentiation or individualization.

Data Collection

The Honeycomb Alignment with Continuum of Legacy to Personalized Learning Practices was created by the staff at The Institute for Personalized Learning (2014) and served as the foundational resource for the survey instrument used in this study. While the Honeycomb Alignment document contains 27 personalized learning elements, the

survey focused on only 15 of those elements, because the 27-element survey was too lengthy and there was overlap among some of the elements, eliminating the need to survey respondents about all practices. For each of the elements included on the survey, educators were asked to rate their practice by selecting (1) Traditional Practice, (2) Transitional Practice, or (3) Personalized Learning Practice, with each phase described for each element. Following the educators' rating of each personalized learning element, they were then asked to rate their overall implementation of personalized learning on a scale from one to seven, with one representing no implementation and seven representing full implementation. The majority of the survey focused on the personalized learning elements, but additional questions were added to capture the perceptions of each teacher and administrator's level of personalized learning implementation.

Educators were also asked to identify all ways, based on their perceptions, technology has impacted personalized learning. Teachers who took the survey were asked to reflect on their own classroom practices, while administrators were asked to answer the questions based on the practices of the majority of teachers in their buildings. The teacher survey and administrator survey were administered electronically through Google Forms.

The student achievement data utilized for this study were collected by the district as a component of the district assessment plan. The assessment, i-Ready, was administered three times per year to all kindergarten through eighth-grade students, in reading as well as mathematics. According to Curriculum Associates (n.d.):

> The i-Ready Diagnostic is a computer-delivered, adaptive assessment...developed to ...accurately and efficiently assess student knowledge by adapting to each

> student's ability for the content strands within each subject…[and] provide valid and reliable information on skills students are likely to have mastered and the recommended next steps for instruction. (p. 15)

Student scores are reported in i-Ready as scale scores, which place students on one "continuum so that educators can compare [scores] across grade levels...and provides a metric, which indicates that a student has mastered skills up to a certain point and still needs to work on skills that come after that point" (Curriculum Associates, n.d., p. 8). The beginning-of-year (BOY) scale scores were compared to the end-of-year (EOY) scale scores to determine the rate of increase. Those rates were then compared to various analyses of the survey data.

Organization of the Chapter

This chapter contains a summary of the data collected to answer the research questions. First, demographic information regarding the respondents of the survey is highlighted. Then, data from the administrator survey, teacher survey, and math and reading student achievement data are presented by research question. A summary of the findings, by research question, are presented in each section, as well as support for the hypothesis or null hypothesis, when appropriate. Finally, a summary of the chapter is provided.

Demographics of Survey Respondents

Administrator survey demographics. Thirty-three principals of elementary buildings, housing kindergarten through fifth-grade students, were invited to participate in the survey. Of the 33 principals, 19 administrators participated for a 57.6% response rate. With 19 buildings represented in the administrator survey, eight of those sites are

considered Title I schools, meaning "schools in which children from low-income families make up at least 40 percent of enrollment are eligible to use Title I [federal] funds for school wide programs that serve all children in the school" (USDOE, 2015, para. 2). The remaining 11 schools represented by administrators taking the survey do not receive Title I funding. When asked how many years the respondents have been administrators in their current buildings, 63.2% (12) indicated they had served their building for five or fewer years, 26.3% (5) indicated they had served their building for six to 10 years, leaving one administrator who had served his or her building for 16 to 20 years and another who had served his or her building for more than 30 years.

Teacher survey demographics. Eighty-one classroom teachers responded to the teacher survey for this study, representing 16.9% of the 480 teachers invited to participate. Of the 81 respondents, 45.7% (37) taught in a Title I building, which indicated 54.3% (44) taught in a non-Title I site. The breakdown of teachers who responded by grade level is as follows: 13.6% (11) taught kindergarten, 21.0% (17) taught first grade, 18.5% (15) taught second grade, 18.5% (15) taught third grade, 13.6% (11) taught fourth grade, 13.6% (11) taught fifth grade, and 1.2% (1) indicated he or she taught a classroom of 3rd and 4th grade students. Teachers who participated in the survey represented a wide range of tenure, as follows: 21% (17) taught five or fewer years, 25.9% (21) taught six to 10 years, 23.5% (19) taught 11 to 15 years, 18.5% (15) taught 16 to 20 years, 6.2% (5) taught 21 to 25 years, 2.5% (2) taught 26 to 30 years, and 2.5% (2) taught more than 30 years.

Teacher vs. Administrator Perceptions of Personalized Learning Implementation

In order to determine how the perceptions of classroom teachers and building administrators within a building compare regarding the degree of implementation of personalized learning, the administrator and at least one teacher from the same building had to participate in the survey. Seventeen buildings were represented by at least one administrator and one teacher in the data collection. A comparison of their responses is depicted below for each of the personalized learning elements, as well as collective administrator and teacher ratings of the overall implementation of personalized learning.

Personalized learning element 1: Learner profiles. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Little is known about or applied to leverage each student's strengths, readiness, and learning modalities; (2) Transitional Practice − Learner profiles are created, but not used to create a customized learning path OR Data for learner profiles are collected, but are managed by the teacher rather than by the learner; or (3) Personalized Learning Practice − Comprehensive, data-rich learner profiles convey a deep understanding of the learner and are used to plan a customized learning environment and instructional strategies. Personalized learner profiles are dynamic real-time and learner-owned and managed.

The mode, or number that occurs most often in the data set (Bluman, 2012), was 2.0 for administrators as well as for teachers. While the mode was the same for both groups, the percentage of responses for traditional, transitional, and personalized learning practice phases represented in Figure 2 indicates administrators feel more traditional

practices are occurring in their buildings than teachers indicated for the implementation of learner profiles.

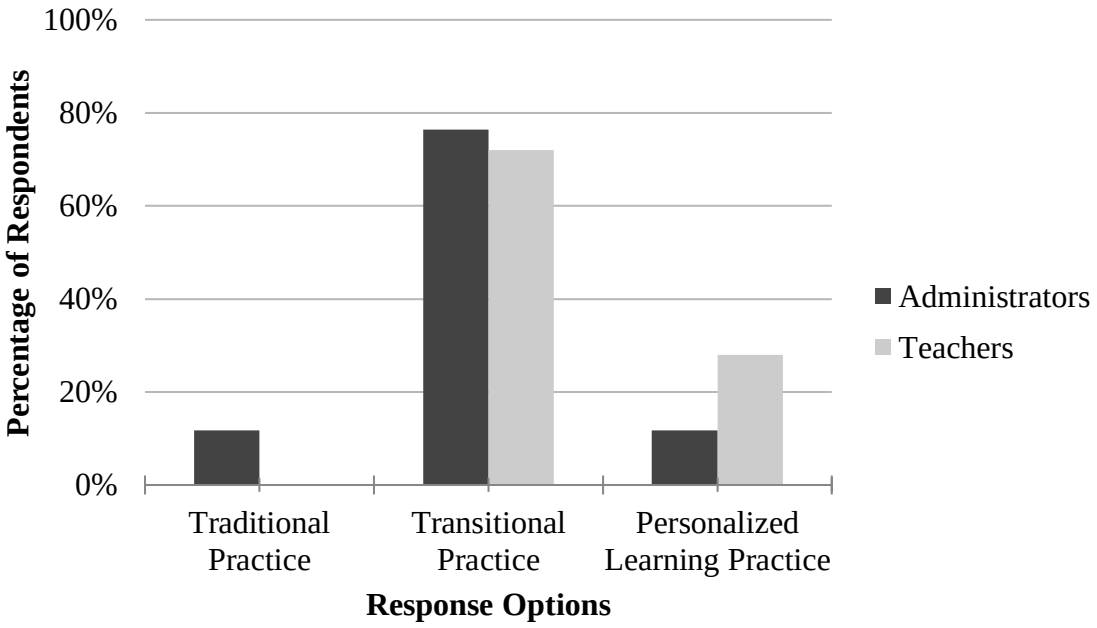

Figure 2. Administrator and teacher survey results regarding learner profiles.

Personalized learning element 2: Personal learning goals. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Whole-class, teacher identified expectations of what students should be able to know and do; (2) Transitional Practice − After gathering student input, teacher identifies expectations for students OR Learner and educator co-develop personalized goals in some content areas, but not all; or (3) Personalized Learning Practice − Learner and educator co-develop purposeful personalized goals to provide benchmarks and add focus, clarity, and commitment to learning.

The mode for teachers and administrators was 2.0. While the modes of the perceptions among administrators and teachers were identical and aligned with the transitional practice phase, the percentage of each answer selected by each category of educator varied, with administrators selecting traditional or personalized learning practices at a higher rate than teachers (see Figure 3).

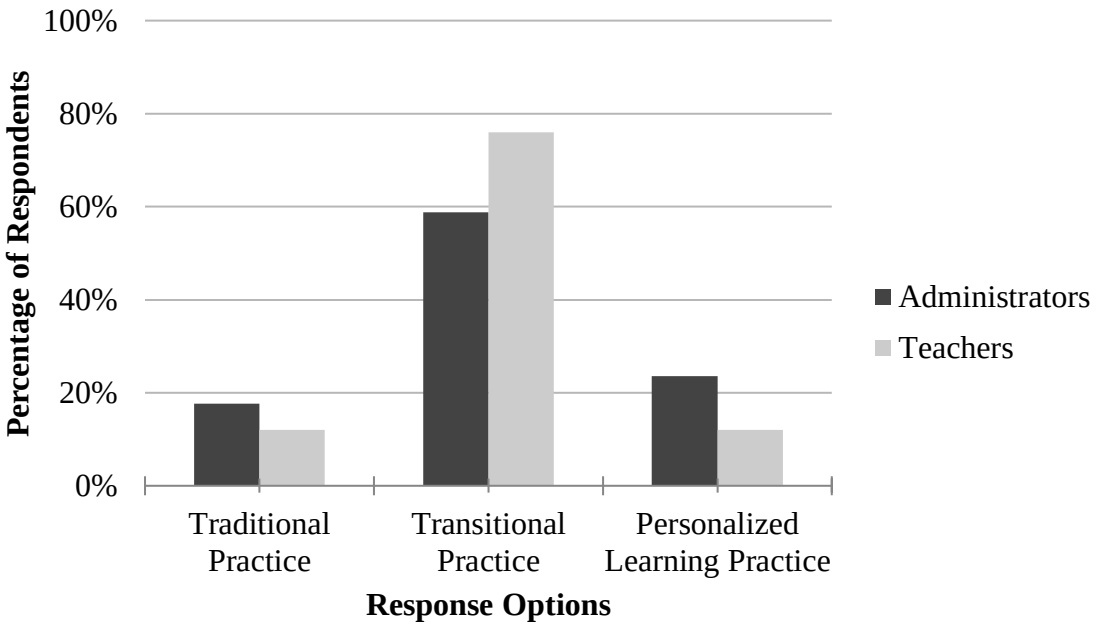

Figure 3. Administrator and teacher survey results regarding personal learning goals.

Personalized learning element 3: Learner voice- and choice-infused. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Students have limited input into or choice about their educational experience; (2) Transitional Practice − Students have some input into or choice about their educational experience; or (3) Personalized Learning Practice −

Learners have significant and meaningful input into and choice about their learning experience.

The mode was 2.0 for both administrators and teachers, yet when analyzing the percentage of each response by group, teachers reported a higher rate of transitional and personalized learning practices than their administrators reported from the same buildings with regard to the implementation of student voice and choice (see Figure 4).

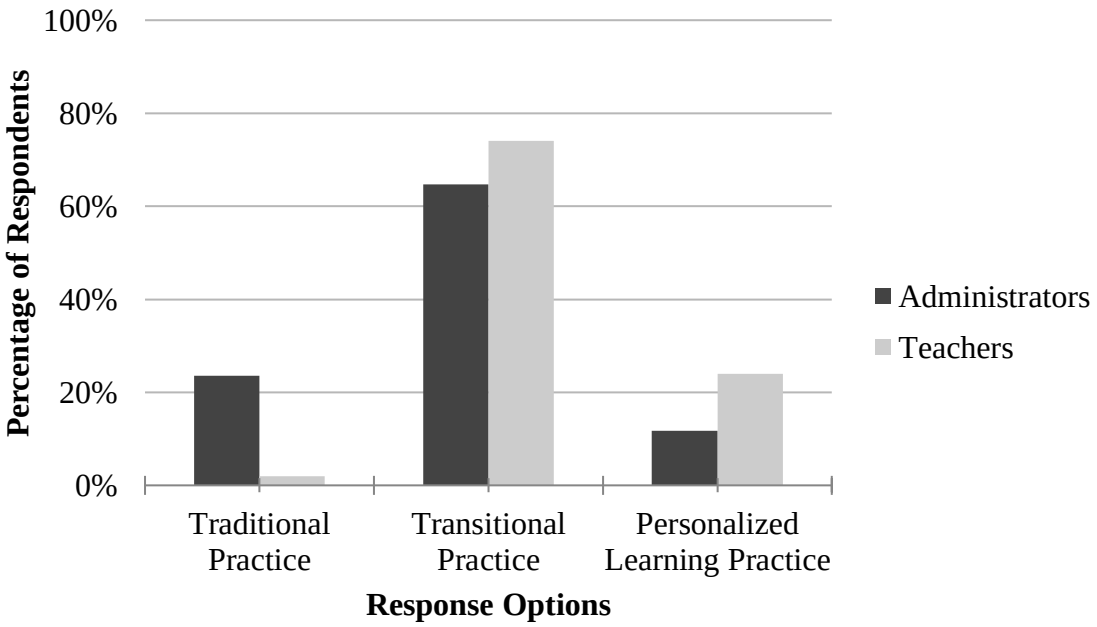

Figure 4. Administrator and teacher survey results regarding student voice and choice.

Personalized learning element 4: Multiple instructional methods/modes. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Instruction is largely face-to-face and conducted in large groups regardless of varying readiness, strengths, needs, and interests; (2) Transitional Practice − Instruction is offered using a variety of methods (e.g.,

demonstration, discussion, simulation) OR modes (e.g., face-to-face, blended, virtual) in response to learner readiness, strengths, needs, and interests; or (3) Personalized Learning Practice − Instruction is offered using a variety of methods (e.g., demonstration, discussion, simulation, small group) AND modes (e.g., face-to-face, blended, virtual) in response to learner readiness, strengths, needs, and interests.

For administrators and teachers, the mode was 2.0, but similar to the reporting of previous elements, the percentage of responses indicates teachers felt they were implementing multiple instructional methods and modes at a personalized learning level at a higher rate than administrators (see Figure 5).

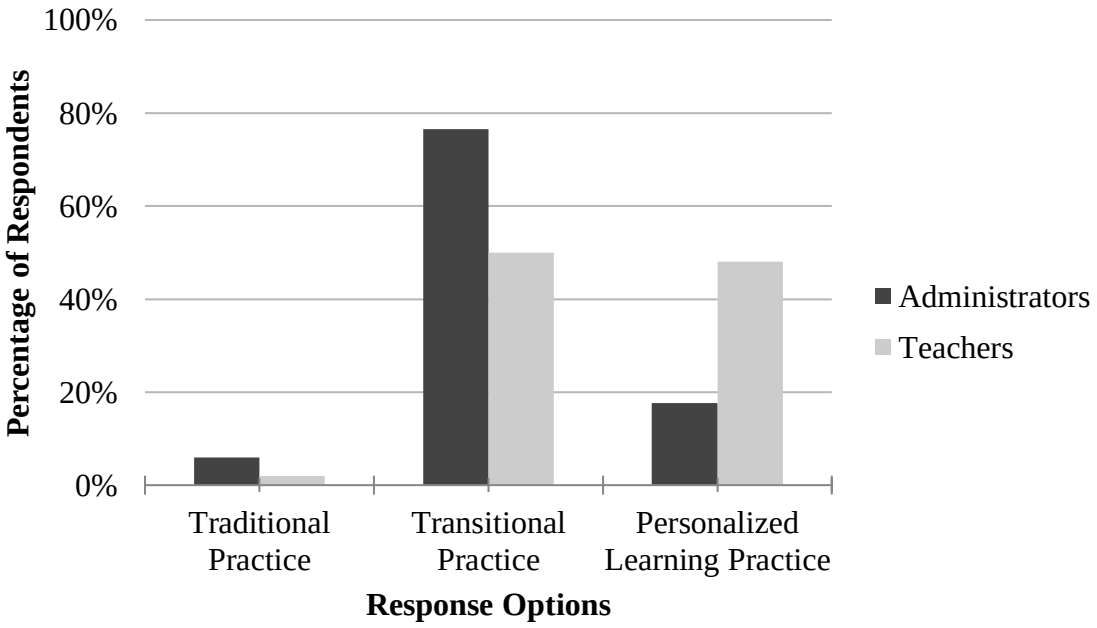

Figure 5. Administrator and teacher survey results regarding multiple instructional methods/modes.

Personalized learning element 5: Cultural responsiveness. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Content is typically presented with a narrow, predefined cultural context; (2) Transitional Practice − Some learning opportunities to engage with content through various cultural lenses and perspectives; or (3) Personalized Learning Practice − Learners are provided opportunities to engage with content through various cultural lenses and perspectives and draw from their cultural background to build their learning.

The mode was 2.0 for administrators as well as teachers. According to the mode and the percentages for each response depicted in Figure 5, there was little variance between administrator and teacher perceptions of cultural responsiveness implementation.

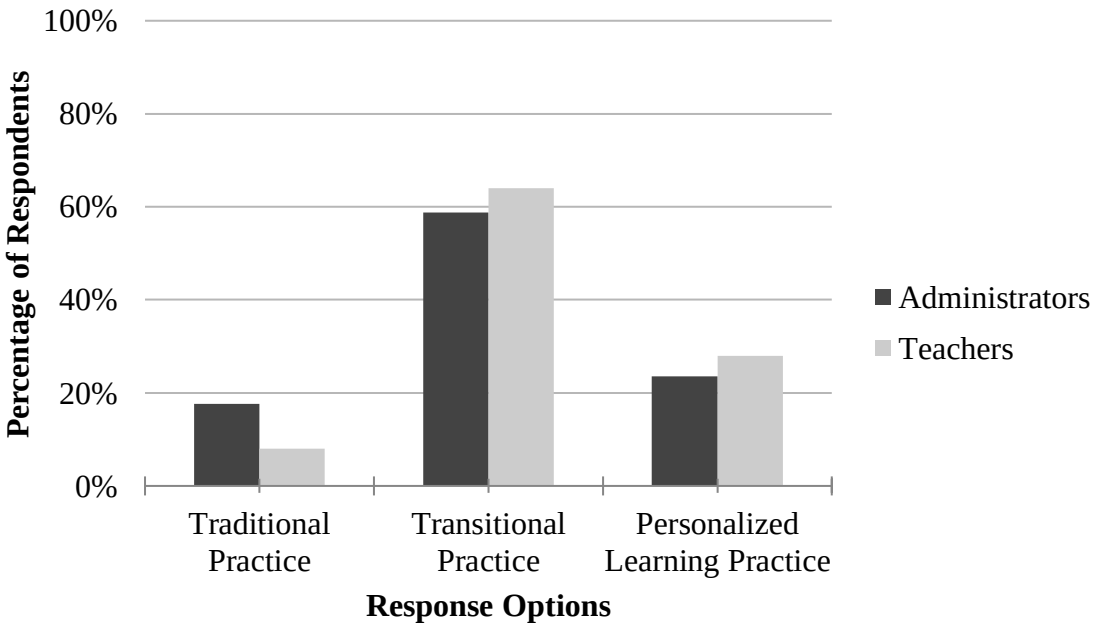

Figure 6. Administrator and teacher survey results regarding cultural responsiveness.

Personalized learning element 6: Rapid cycle feedback. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Feedback is infrequent, delayed, and static; (2) Transitional Practice − Feedback is frequent, timely, or continuous OR Feedback is provided, but is not used by the student to learn and grow; or (3) Personalized Learning Practice − Feedback is frequent, timely, and continuous. The feedback allows the learner to continue to learn and grow.

The mode for both teachers and administrators was 3.0; therefore, both groups have a higher number of respondents perceiving rapid cycle feedback was occurring at a personalized learning level than the previous five elements (see Figure 7).

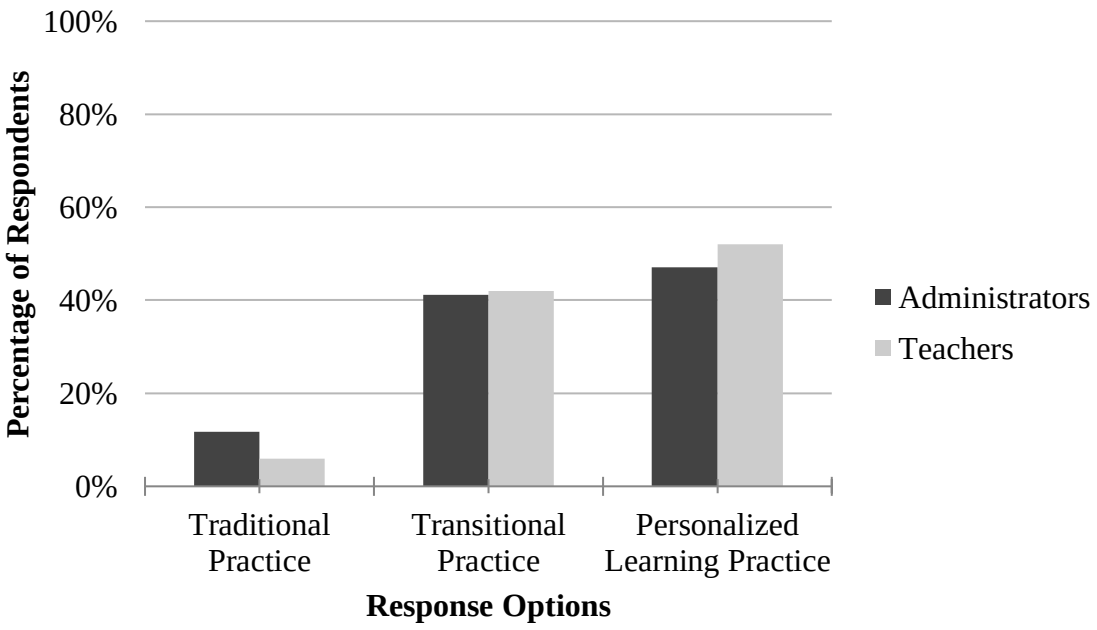

Figure 7. Administrator and teacher survey results regarding rapid cycle feedback.

Personalized learning element 7: Customized responsive instruction. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Instruction and pacing are standardized and predetermined. Differentiation occurs primarily at the lower and upper margins of performance; (2) Transitional Practice − Some instruction and pacing are determined by learner needs; or (3) Personalized Learning Practice − Instruction and pacing are driven by individual learner needs and growing capacity for independent learning.

The mode was 2.0 for administrators, while the teacher mode was 3.0, indicating most administrators observe customized responsive instruction at the transitional level while most teachers feel this element is implemented at the personalized learning level (see Figure 8).

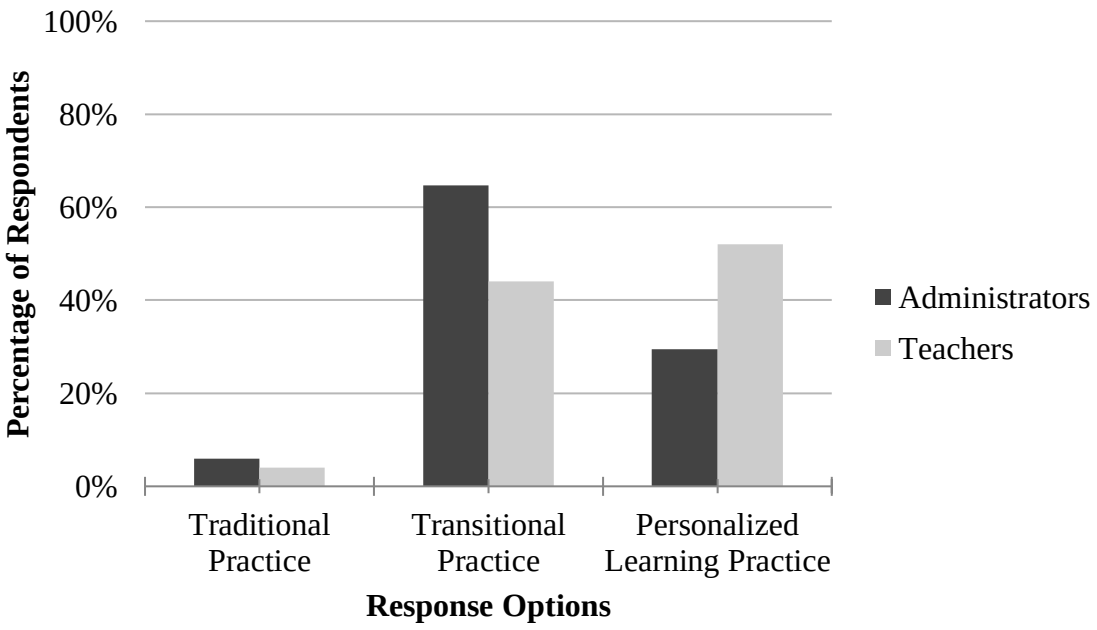

Figure 8. Administrator and teacher survey results regarding customized responsive instruction.

Personalized learning element 8: Progression toward deeper learning.

Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Learning is driven by the scope and sequence of curriculum; (2) Transitional Practice − Some opportunities for movement toward more expert understanding are available, but typically outside of the dedicated learning time (e.g., after school or during work time); or (3) Personalized Learning Practice − Movement over time toward more expert understanding and sophisticated ways of thinking about a concept or idea.

The mode was 2.0 for administrators and teachers; therefore, most educators felt this element was implemented at the transitional practice, but the figure below depicts how teachers had a higher percentage of responses in the personalized learning practice column than administrators (see Figure 9).

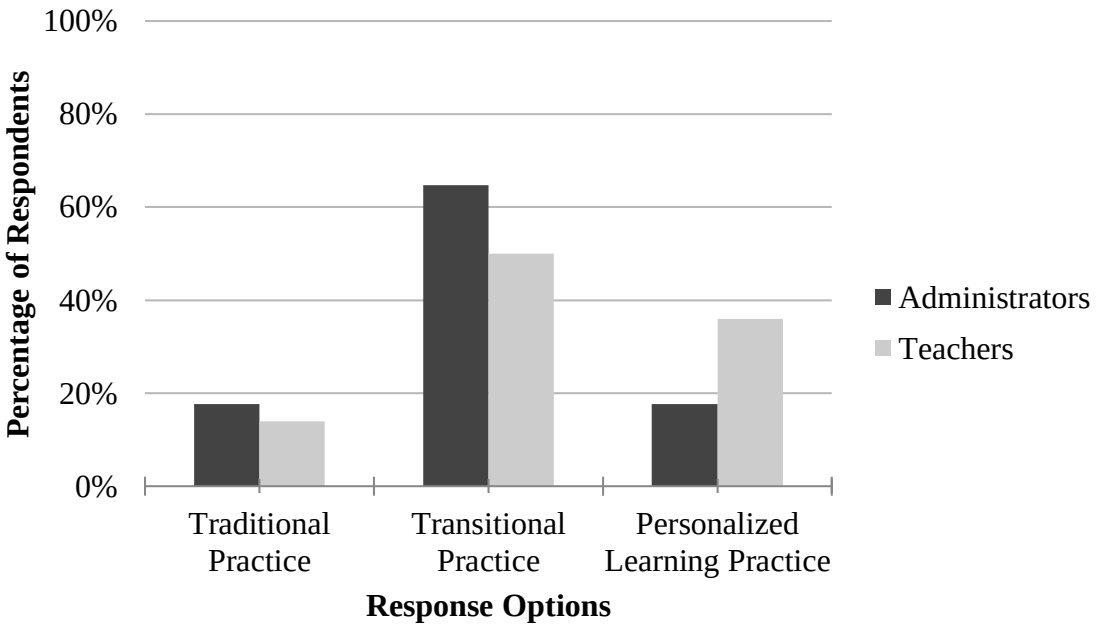

Figure 9. Administrator and teacher survey results regarding progressions toward deeper learning.

Personalized learning element 9: Learner independence. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Students depend on the teacher to tell them what to do, and when and how to do it; (2) Transitional Practice − Students have the capacity to learn and work independently, but still rely on the teacher for guidance on what, when, and how to complete activities; or (3) Personalized Learning Practice − Learners have the capacity to learn and work independently, without heavy dependence on external structures and supports.

The mode for the administrator and teacher responses was 2.0. As depicted in Figure 9, the percentage of administrators and teachers reporting learner independence at the transitional level was nearly identical. Administrators indicated the majority of

teachers in their buildings implemented this element at the traditional level at a higher rate than at the personalized learning level. The opposite was true for teachers (see Figure 10).

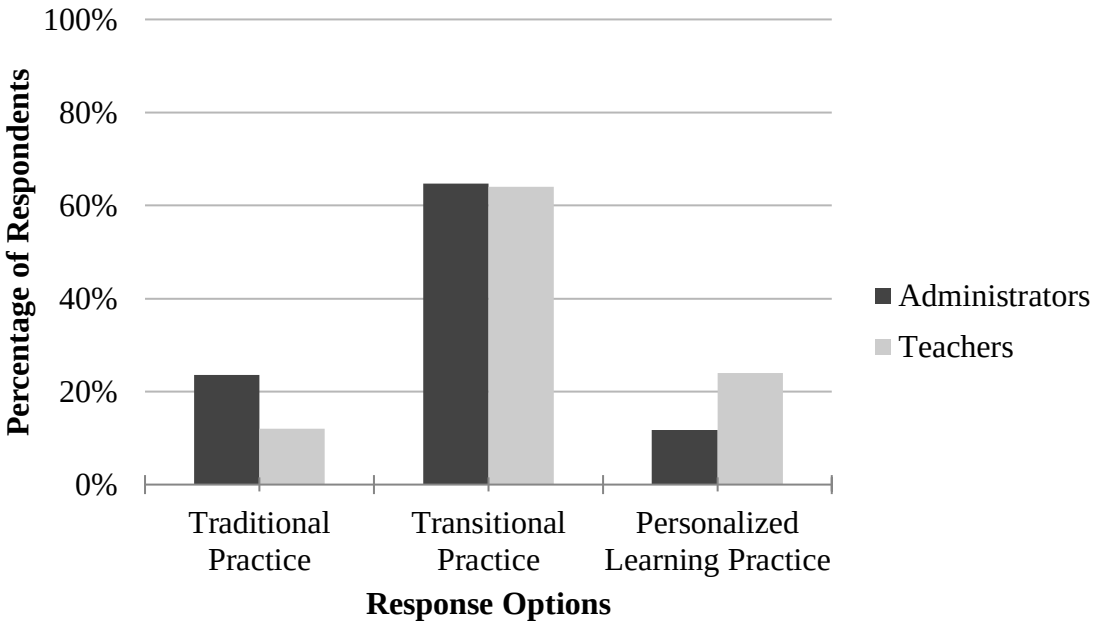

Figure 10. Administrator and teacher survey results regarding learner independence.

Personalized learning element 10: Family and community engagement.

Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Involvement by families or community members within a classroom is limited with few connections between concepts learned in the classroom and life outside of school; (2) Transitional Practice − Families or community members are engaged with the classrooms based on units implemented in the classroom; or (3) Personalized Learning Practice − Learners work together with families

and/or community members to fully leverage resources and expertise to maximize the learning experience.

The mode for administrators was 1.0, while the mode of teacher responses was 2.0. By analyzing the percentage of responses for each level of practice, very few educators indicated family and community engagement was implemented at a personalized learning level (see Figure 11).

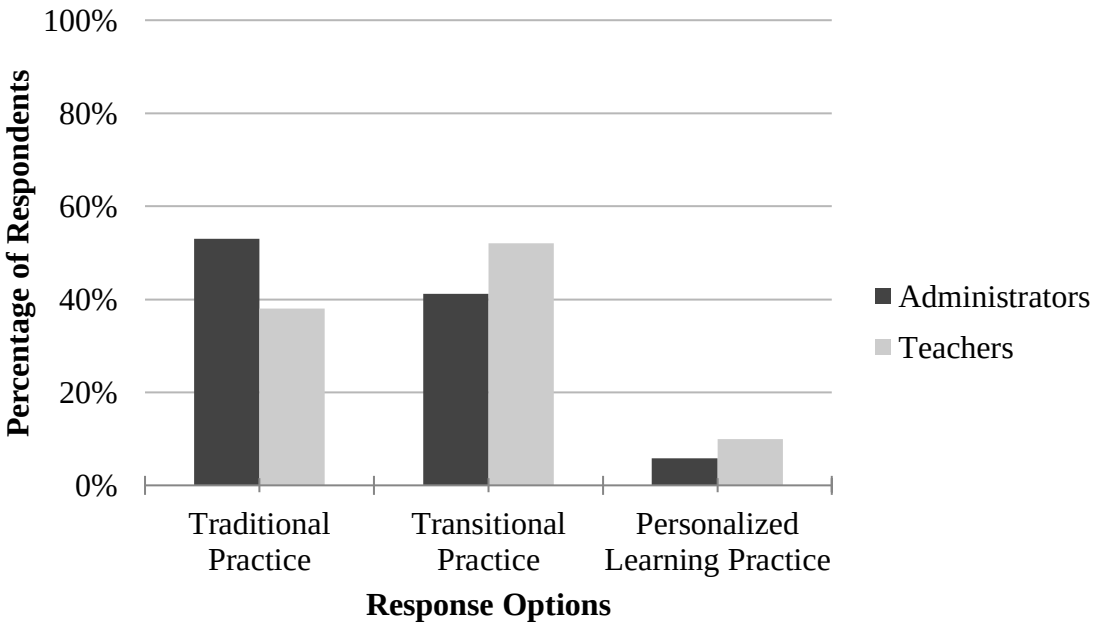

Figure 11. Administrator and teacher survey results regarding family and community engagement.

Personalized learning element 11: Co-designers of learning. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Teachers are responsible for managing all aspects of their students' learning experience; (2) Transitional Practice − Teachers and

students work together to design some learning experiences OR Teachers and students work together to determine how proficiency is demonstrated, regardless if they co-design learning experiences; or (3) Personalized Learning Practice − Learners and educators work together to design learning experiences and determine how proficiency is demonstrated.

With identical modes of 2.0, administrators and teachers indicated the co-design of learning takes place most often at the transitional phase. The second highest practice selected was traditional, as indicated in Figure 12.

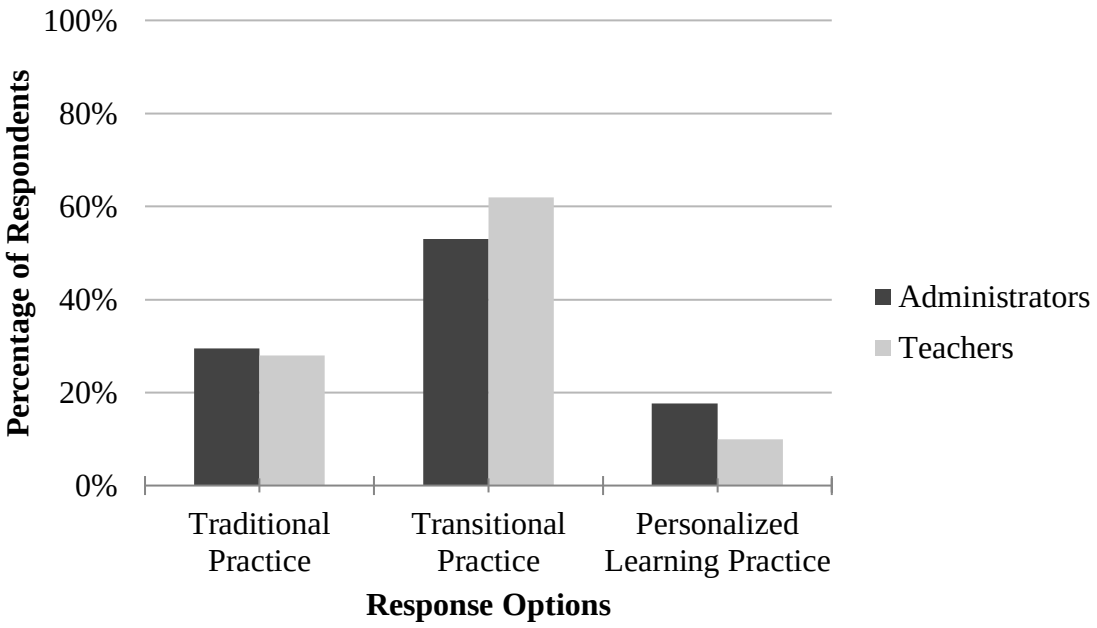

Figure 12. Administrator and teacher survey results regarding co-designers of learning.

Personalized learning element 12: Learner-aligned technology. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Technology is used primarily as a substitute

for existing tasks (e.g., taking notes on a device rather than on paper); (2) Transitional Practice − Technology is used to augment existing tasks (substitute with some functional improvement); or (3) Personalized Learning Practice − Technology is used as a tool to modify or redesign learning tasks. It enhances, deepens, or accelerates understanding and mastery of content.

The mode of the teacher responses, 3.0, was higher than that of administrators, 2.0, indicating more teachers reported they were implementing learner-aligned technology at the personalized learning level than administrators observed and reported (see Figure 13).

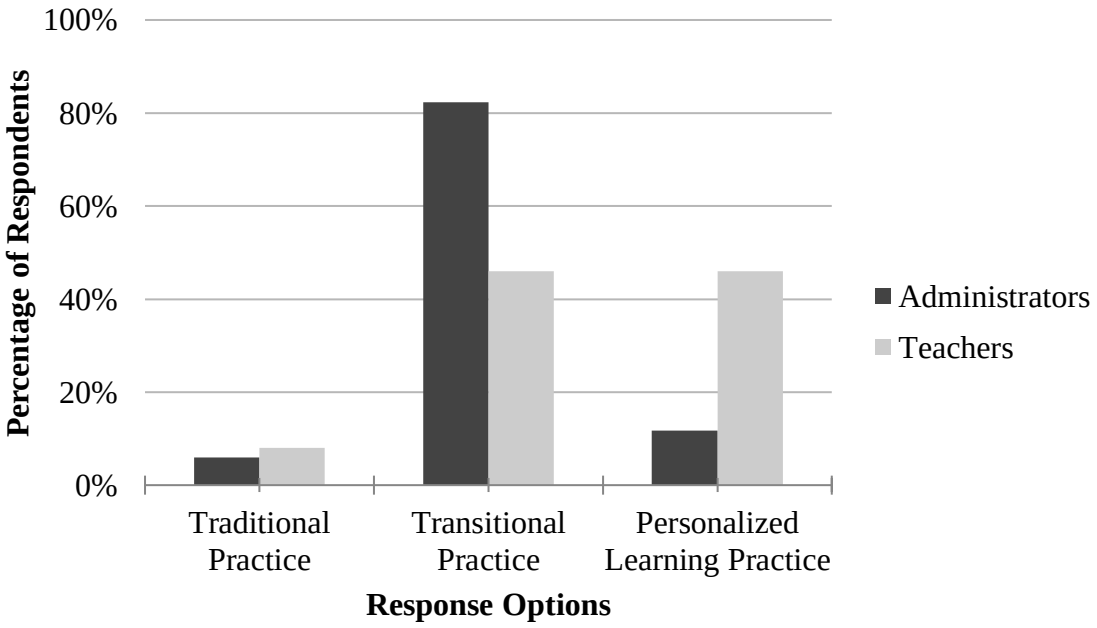

Figure 13. Administrator and teacher survey results regarding learner-aligned technology.

Personalized learning element 13: Flexible learning spaces. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Traditional classrooms and furniture limit flexible grouping and inhibit interaction; (2) Transitional Practice − Flexible grouping and collaboration occur, but the physical classroom and/or furniture limit the possibilities; or (3) Personalized Learning Practice − Comfortable physical spaces are conducive to collaborative learning, responsive to the needs of learners, and support individual, small-group, and large-group instruction.

The mode of the teacher and administrator responses was 2.0, yet teachers reported they were implementing flexible learning spaces at the personalized learning level at a higher frequency than administrators witnessed in their buildings (see Figure 14).

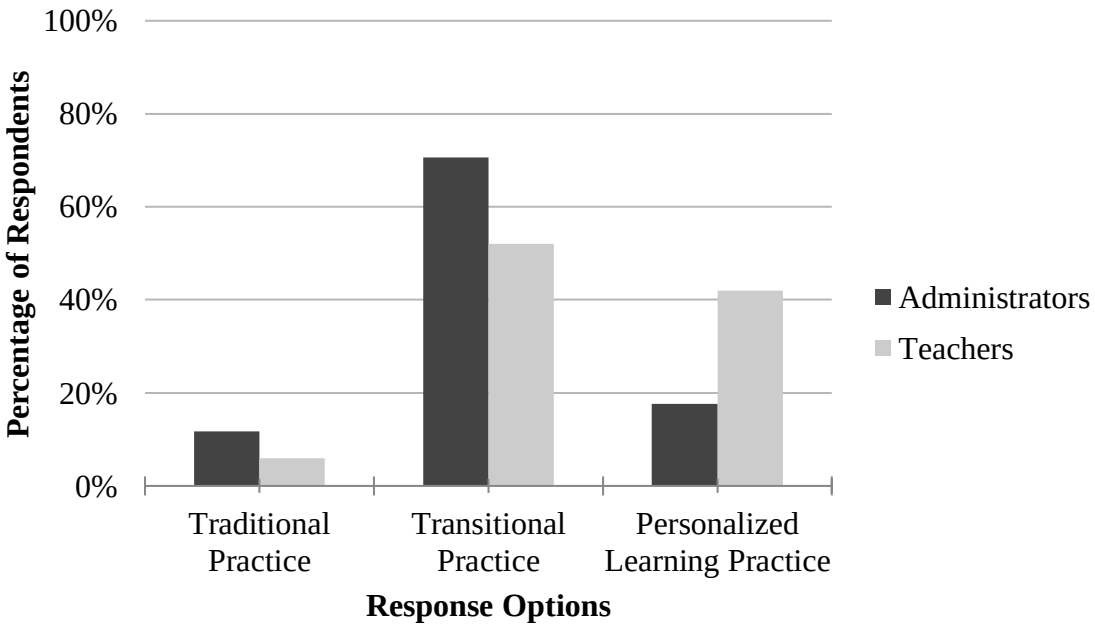

Figure 14. Administrator and teacher survey results regarding flexible learning spaces.

Personalized learning element 14: Flexible time and pace. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Students are expected to progress at the same rate within a prescribed amount of time (time is the constant, learning is the variable); (2) Transitional Practice − There is some flexibility of time and pace; or (3) Personalized Learning Practice − Learners have the flexibility to progress at their own pace and to adjust time allocations based on their learning objectives (learning is the constant, time is the variable).

The mode of administrator and teacher responses was 2.0, which aligned with the transitional practice (see Figure 15).

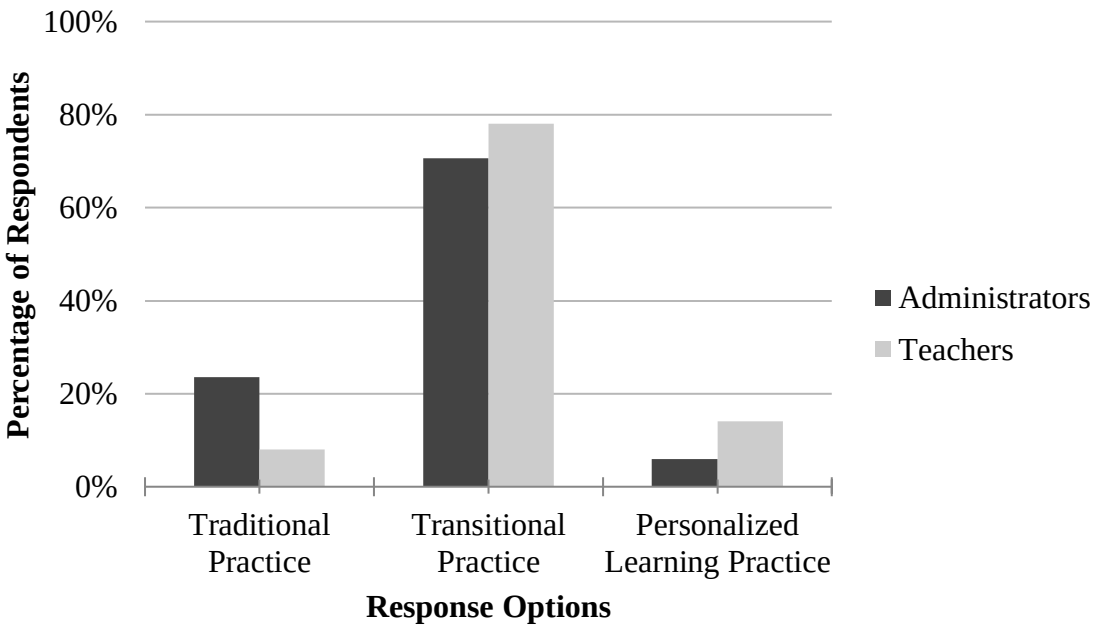

Figure 15. Administrator and teacher survey results regarding flexible time and pace.

Personalized learning element 15: Learner aligned grouping options. Survey respondents were asked to select which practice they best identify with from the following choices: (1) Traditional Practice − Students are arranged into static groups based on characteristics such as age, gender, or perceived ability or disability; (2) Transitional Practice − Students are sometimes grouped flexibility based on common characteristics; or (3) Personalized Learning Practice − Learners are grouped flexibly based on readiness, needs, and interests.

The mode of administrator responses, 2.0, aligned with the transitional practice. In review of the teacher mode, 3.0, the sample aligned with the personalized learning practice for grouping students (see Figure 16).

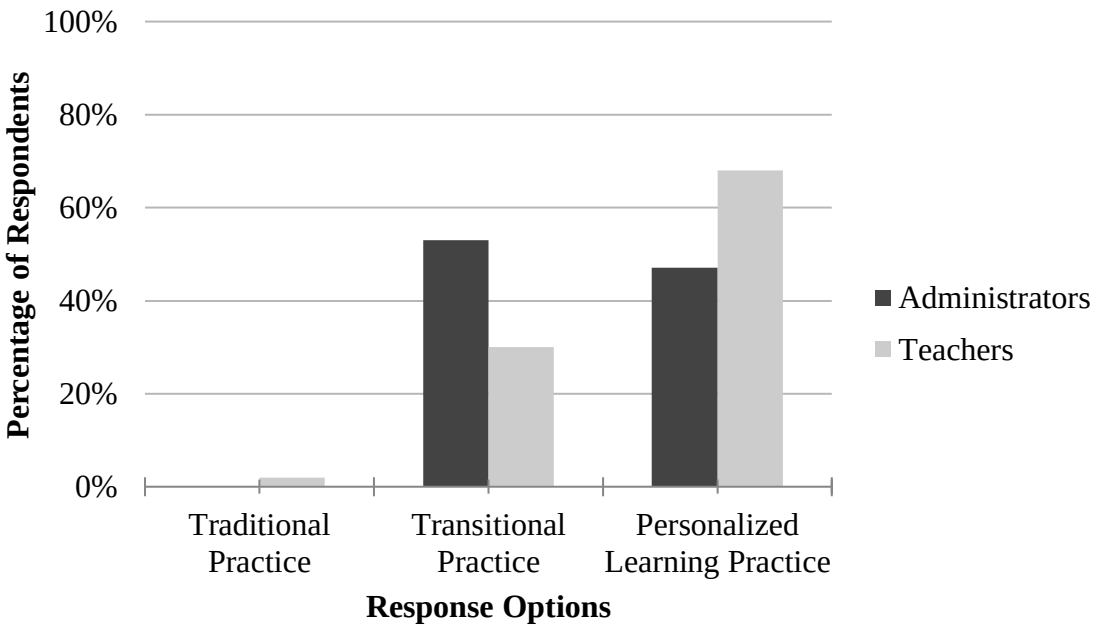

Figure 16. Administrator and teacher survey results regarding learner-aligned grouping options.

Teachers and administrators were asked to rate the overall implementation of personalized learning practices in their classrooms or buildings on the survey on a scale from one to seven, and the measures of central tendency were calculated for each group. Teacher responses had a mean of 4.75, a median of 5.0, and a mode of 5.0. On the other hand, the measures of central tendency for administrators included a mean of 3.94, a median of 4.0, and a mode of 3.0. The statistics gathered for this research question were analyzed, and the findings are presented in Chapter Five.

Role of Technology in Personalized Learning

The second research question, to determine the roles technology plays in personalizing learning within a building, was addressed by asking educators the following survey questions:

- What resources might assist in the implementation of personalized learning?
- Rate your level of agreement with the statements below:
    - Technology eases the implementation of personalized learning components.
    - The teachers in my building are/I am confident in their/my ability to utilize technology devices with students in the classroom.
- In what ways has technology enhanced personalized learning in your building/classroom?

Listed below are the summarized educator replies to the questions above, as well as a response to the research question.

The survey question, “What resources might assist in the implementation of personalized learning?” was open-ended, meaning respondents could have answered with

any resources they felt could benefit teachers in implementing personalized learning, or they could have left the question blank. When administrators responded to this question, 14 of the 19 provided an answer, and six (42.9%) of those responses specifically listed technology as a resource needed to implement personalized learning. Other popular responses cited were time for teachers to collaborate (35.7%) and professional development on what personalized learning should look like in the elementary classroom (28.5%). Of the 81 teacher participants in the study, 46 responded to this open-ended question, but only nine (19.6%) listed technology as a needed resource. The majority of the responses focused on professional learning opportunities (39.1% of replies), but themes of time to plan (10.9%) and funds for flexible seating options (13.0%) also emerged. Therefore, administrators indicated technology was a needed resource most often, while teachers indicated professional learning opportunities were the biggest need.

Educators were then asked on the survey to rate their level of agreement with the following statements:

- Technology eases the implementation of personalized learning components.
- The teachers in my building are/I am confident in their/my ability to utilize technology devices with students in the classroom.

Figures 17 and 18 depict the response rates to the statements above by administrators and teachers. Educators were asked to rate their perceptions on a Likert scale by selecting Strongly Agree, Agree, Neutral, Disagree, or Strongly Disagree. Teacher and administrator responses were consistent with one another, with approximately 89% of respondents agreeing or strongly agreeing technology eases the implementation of personalized learning (see Figure 17) and approximately 74-77% agreeing or strongly

agreeing they have confidence in themselves or their teachers to use technology devices with students in the classroom (see Figure 18).

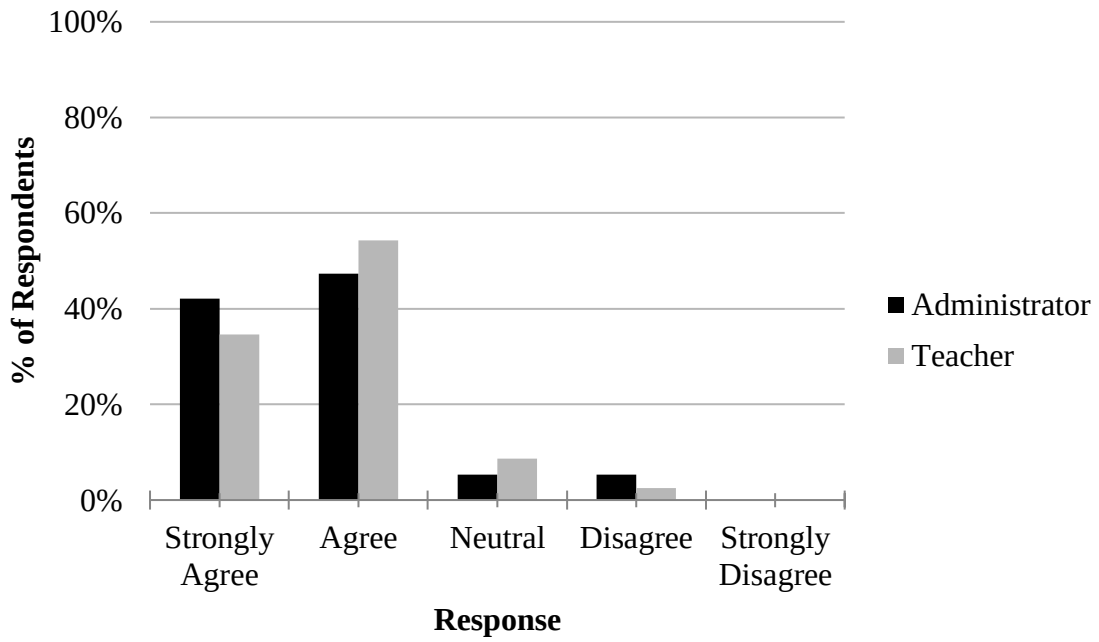

Figure 17. Administrator and teacher survey results regarding response to "Technology eases the implementation of personalized learning components."

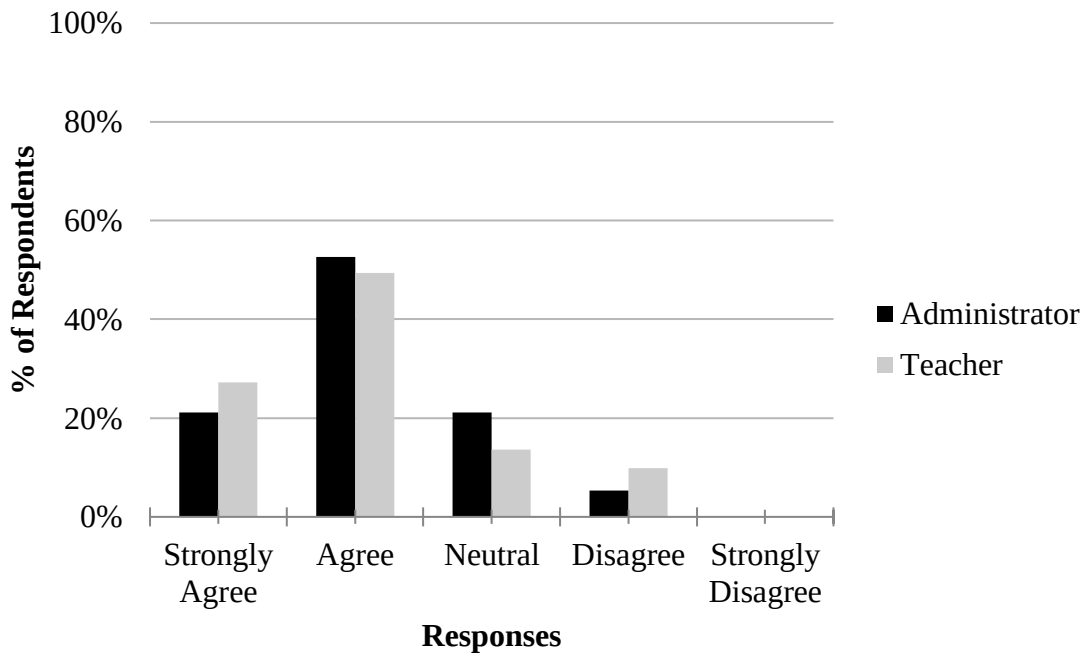

Figure 18. Administrator and teacher survey results regarding response to "The teachers in my building are/I am confident in their/my ability to utilize technology devices with students in the classroom."

Educators were asked on the survey, "In what ways has technology enhanced personalized learning in your building/classroom?" A checklist of possible ways was provided, as well as an option to list other ways technology has enhanced personalized learning. The statements and percentage of administrators and teachers selecting each option are contained in Table 1.

Table 1

Educator Responses to Statements Regarding the Role of Technology in Personalized Learning

Statement	Administrator Response Rate	Teacher Response Rate
Technology has not enhanced personalized learning in my building/classroom.	0.0%	1.2%
Students connect and collaborate with peers.	63.2%	63.0%
Students connect with experts in the field.	42.1%	21.0%
Students have access to a wide variety of resources and information for meaningful research.	89.5%	76.5%
Students are able to participate in virtual field trips and/or other real-world experiences such as simulations.	47.4%	48.2%
The use of technology increases student engagement.	84.2%	87.7%
Technology allows multiple assessment options.	73.7%	72.8%
Adaptive programs allow for customized learning paths.	79.0%	65.4%
Programs assist students with organization.	47.4%	34.6%
Technology provides access to resources outside of the classroom.	84.2%	74.1%
Other	5.3%	3.7%

When educators reflected on the practices in their classrooms or buildings, the top three impacts of technology included allowing students to research, increasing student engagement, and accessing resources outside of the classroom. Other impacts noted by teachers and administrators included providing immediate feedback from the teacher to the students and using word translation programs for English Language Learners (ELLs).

Difference in Reading Assessment Scores Based on Personalized Learning Implementation

A data analysis was conducted in order to determine if there was a difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of overall personalized learning implementation within a building. Teachers rated their overall implementation of personalized learning on a scale of one to seven, with one indicating no implementation and seven indicating full implementation. The modal responses of teachers, by building, to this statement on the survey were categorized by rating of three, four, five, or six. There were no modes of one or seven reported. Next, the mean student scale score gain was found by subtracting the BOY scale score from the EOY scale score and averaging the gains. To be included in the data set, students had to have a BOY and EOY scale score. A one-way ANOVA test was then conducted to compare the mean scale score gain of the corresponding buildings to determine if there was a difference in mean scale score gains between the differing ratings of personalized learning implementation. Results of the one-way ANOVA test are depicted in Table 2.

Table 2

Summary of One-Way ANOVA Data – Reading Scale Scores

Group	Count	*M*	Variance
3	2	68	0.00
4	7	252	18.67
5	16	580	14.20
6	6	221	58.97

ANOVA

Source of Variation	*SS*	*df*	*M*	*F*	*P*	*F crit*
Between Groups	12.36	3	4.12	0.179	0.909	2.960
Within Groups	619.83	27	22.96			
Total	632.19	30				

Note. $N = 31$, *M* = mean score, *df* = degrees of freedom, *p* = significance value, *F* = F statistic, *F crit* = F critical value.

In order to determine statistical significance, the *P*-value was compared to the significance level. The *P*-value for this data set (0.909) is greater than the significance level of 0.05; therefore, statistically significant differences between the means of each group were not noted (Lund Research, 2013). The null hypothesis ($H3_0$) for this research question, "There is no difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building" was not rejected because the means for each group were close to equal and not statistically significant (Lund Research, 2013).

Difference in Mathematics Assessment Scores Based on Personalized Learning Implementation

Next, a data analysis was conducted in order to determine if there is a difference in mean scale score gain on a diagnostic math assessment based on the modal rating of

overall personalized learning implementation within a building. The overall implementation of personalized learning was rated on a scale of one to seven, with one indicating no implementation and seven indicating full implementation, by teachers. By building, the modal responses of teachers to this statement on the survey were categorized by rating of three, four, five, or six, as no modes of one or seven were reported. The mean student scale score gain was then found by subtracting the BOY scale score from the EOY scale score and averaging the gains. Students had to have a BOY and EOY scale score in the data set to be included. A one-way ANOVA test was then conducted to compare the mean scale score gain of the corresponding buildings to determine if there was a difference in mean scale score gains between the differing ratings of personalized learning implementation. Results of the one-way ANOVA test are depicted in Table 3.

Table 3

Summary of One-Way ANOVA Data – Math Scale Scores

Group	Count	*M*	Variance
3	2	50	2.00
4	7	186	14.95
5	16	448	8.80
6	6	157	25.77

ANOVA

Source of Variation	*SS*	*df*	*M*	*F*	*P*	*F crit*
Between Groups	28.94	3	9.65	0.739	0.538	2.960
Within Groups	352.55	27	13.06			
Total	381.48	30				

Note. $N = 31$, M = mean score, df = degrees of freedom, p = significance value, F = F statistic, $F\ crit$ = F critical value.

In order to determine statistical significance, the *P*-value was compared to the significance level. For this data set, the *P*-value (0.538) is greater than the significance level of 0.05; therefore, there were no statistically significant differences between the means of each group (Lund Research, 2013). The null hypothesis ($H4_0$) for this research question, *There is no difference in mean scale score gain on a diagnostic math assessment based on the modal rating of personalized learning implementation within a building,* was not rejected because the means for each group were close to equal and not statistically significant (Lund Research, 2013).

Difference in Reading and Mathematics Assessment Scores Based on Personalized Learning Implementation within Buildings With and Without One-to-One Technology

Supported by the survey findings, as well as related literature, the use of technology creates opportunities for teachers to release control of learning and experiences to students and produces opportunities for learners to choose how, when, and where learning occurs, which reduces barriers (Grant & Basye, 2014). The final research question was designed to identify if increased access to technology increased the implementation of personalized learning and if there was a difference in assessment scores depending on technology availability. Approximately one-third of the schools where staff was surveyed have access to one-to-one technology.

To begin, a comparison of the modes of the responses for teachers regarding the practice they implemented in their classroom, from traditional (1) to transitional (2) to personalized learning practice (3), was made between teachers employed in buildings with and without one-to-one technology. The results are summarized in Table 4.

Table 4

Modal Values of Teacher Selections for Each Personalized Learning Element in Buildings With and Without One-to-One Technology

Personalized Learning Element	Modal Teacher Response – With 1-to-1 Technology	Modal Teacher Response − Without 1-to-1 Technology
Learner Profiles	3	2
Personal Learning Goals	2	2
Learner Voice and Choice Infused	3	2
Multiple Instructional Methods/Modes	3	2
Cultural Responsiveness	3	2
Rapid Cycle Feedback	3	3
Customized Responsive Instruction	3	2
Progressions Toward Deeper Learning	3	2
Learner Independence	3	2
Family and Community Engagement	2	2
Co-designers of Learning	2	2
Learning Aligned Technology	3	2
Flexible Learning Spaces	3	2
Flexible Time and Pace	2	2
Learning Aligned Group Options	3	3
Overall Implementation (1-7 Scale)	5	4

Teachers with one-to-one technology responded most often with a rating of three, the personalized learning practice, on 11 of the 15 personalized learning elements, while teachers without one-to-one technology had a mode of three on only two of the elements. Additionally, teachers with one-to-one technology responded most often with a full point higher on a one to seven scale when asked to rate their overall implementation of personalized learning than their colleagues without devices for all students.

Next, a one-way ANOVA test was conducted to compare the mean scale score gain of the corresponding buildings to determine if there was a difference between the various ratings of personalized learning implementation on a scale of one to seven. The test was administered four times to analyze reading scores in buildings with one-to-one technology, reading scores in buildings without one-to-one technology, math scores in buildings with one-to-one technology, and math scores in buildings without one-to-one technology. The mode of these responses for overall implementation of personalized learning was found, by building, while the mean student scale score gain was found by subtracting the BOY scale score from the EOY scale score and averaging the gains. Students had to have a BOY and EOY scale score to be included in the data set. The results of each one-way ANOVA test are depicted in Table 5 (reading within buildings with one-to-one technology), Table 6 (reading within buildings without one-to-one technology, Table 7 (math within buildings with one-to-one technology, and Table 8 (math within buildings without one-to-one technology).

Table 5

Summary of One-Way ANOVA Data – Reading Scale Scores in Buildings With 1-to-1 Technology

Group	Count	*M*	Variance
4	1	34	N/A
5	4	139	14.92
6	5	177	58.30

ANOVA

Source of Variation	*SS*	*df*	*M*	*F*	*P*	*F crit*
Between Groups	2.05	2	1.03	0.026	0.975	4.737
Within Groups	277.95	7	39.71			
Total	280.00	9				

Note. $N = 10$, *M* = mean score, *df* = degrees of freedom, *p* = significance value, *F* = F statistic, *F crit* = F critical value.

Table 6

Summary of One-Way ANOVA Data – Reading Scale Scores in Buildings Without 1-to-1 Technology

Group	Count	*M*	Variance
3	2	68	0
4	6	218	21.47
5	12	441	14.20
6	1	44	N/A

ANOVA

Source of Variation	*SS*	*df*	*M*	*F*	*P*	*F crit*
Between Groups	68.70	3	22.90	1.477	0.256	3.197
Within Groups	263.58	17	15.50			
Total	332.29	20				

Note. $N = 21$, *M* = mean score, *df* = degrees of freedom, *p* = significance value, *F* = F statistic, *F crit* = F critical value.

Table 7

Summary of One-Way ANOVA Data – Math Scale Scores in Buildings With 1-to-1 Technology

Group	Count	*M*	Variance
4	1	29	N/A
5	4	110	4.33
6	5	125	22.00

ANOVA

Source of Variation	*SS*	*df*	*M*	*F*	*P*	*F crit*
Between Groups	21.40	2	10.70	0.742	0.510	4.737
Within Groups	101.00	7	14.43			
Total	122.40	9				

Note. $N = 10$, *M* = mean score, *df* = degrees of freedom, *p* = significance value, *F* = F statistic, *F crit* = F critical value.

Table 8

Summary of One-Way ANOVA Data – Math Scale Scores in Buildings Without 1-to-1 Technology

Group	Count	*M*	Variance
3	2	50	2
4	6	157	16.57
5	12	338	10.70
6	1	32	N/A

ANOVA

Source of Variation	*SS*	*df*	*M*	*F*	*P*	*F crit*
Between Groups	48.74	3	16.25	1.364	0.287	3.197
Within Groups	202.50	17	11.91			
Total	251.24	20				

Note. $N = 21$, *M* = mean score, *df* = degrees of freedom, *p* = significance value, *F* = F statistic, *F crit* = F critical value.

The null hypothesis ($H5_0$) for this research question was, *There is no difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology*. To determine statistical significance, the *P*-value for each data set was compared to the significance level of 0.05. The *P*-values for each set were summarized in Table 9.

Table 9

Summary of P-values for One-way ANOVA Tests

Data Set	*P*-value
Reading Scale Score Gains, With 1-to-1 Technology	$P = 0.975$
Reading Scale Score Gains, Without 1-to-1 Technology	$P = 0.256$
Math Scale Score Gains, With 1-to-1 Technology	$P = 0.510$
Math Scale Score Gains, Without 1-to-1 Technology	$P = 0.287$

To determine if the differences were statistically significant, the *P*-value was compared to the significance level of 0.05. In all four tests, the *P*-values were greater than the significance level; therefore, the differences between the means in all data sets were not significant (Lund Research, 2013). Therefore, the null hypothesis was not rejected and the alternative hypothesis was not supported. There was no difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rate of personalized learning implementation within buildings with and without one-to-one technology.

Summary

A mixed methods research approach was utilized in this study, integrating qualitative and quantitative data to answer the guiding research questions. Teachers and administrators from elementary buildings serving students in grades kindergarten through five were invited to participate in a survey regarding implementation of personalized learning elements, and to share opinions regarding the role of technology in personalized learning environments. Nineteen administrators and 81 teachers responded to the survey. Student achievement data were gathered for math and reading to determine if there was a difference in average mean scale score gains based on how teachers rated the overall level of personalized learning implementation by building. In Chapter Five, conclusions, discussions, and suggestions for further research are discussed.

Chapter Five: Summary and Conclusions

This study was designed to determine the degree of implementation of personalized learning by elementary classroom teachers, to identify the role of technology in personalized learning, and to determine if the degree of implementation of personalized learning impacts student achievement in math or reading. Bray and McClaskey's (2015) model of personalized learning was used to focus the study and to avoid misunderstanding with commonly confused terms such as differentiation or individualization. Bray and McClaskey's (2015) model revolved around the concept of learning as it relates to students, how they learn, and student ownership of learning. Educators could use the survey instrument developed for this study to determine the degree of implementation of true student-directed, personalized learning in classrooms, buildings, or districts. Additional roles for technology in a personalized learning environment could be identified as a result of this study. Within this final chapter, the research questions are reviewed, the findings are summarized by research question, conclusions are drawn, and finally, suggestions for further research are proposed.

Findings

Statistical analyses were conducted and presented in Chapter Four. The findings, identified below, are organized by research question. A narrative response to each question and each hypothesis are provided.

Teacher vs. administrator perceptions of personalized learning implementation. To determine how the perceptions of classroom teachers and building administrators within a building parallel regarding the degree of implementation of personalized learning, the responses of teachers and administrators regarding their

implementation of each of the 15 personalized learning elements were compared. Educators rated implementation of each element on a one to three scale, with one representing traditional practices, two representing transitional practices, and three representing personalized learning practices. While the mode of the responses for both groups was the same for most elements, a side-by-side comparison of the percentage of responses for each phase typically resulted in a larger percentage of teachers rating themselves higher on the continuum from traditional to personalized learning practice than administrators reported observing in the same buildings.

Additionally, both groups of educators were asked to rate the overall implementation of personalized learning on a scale from one to seven, with teachers rating their personal implementation and administrators rating the implementation level of the majority of teachers in their buildings. According to the overall rating over personalized learning implementation, teachers consistently rated their implementation of personalized learning practices a full point higher than administrators reported they observed those same practices within their buildings. Therefore, when analyzing both data sets, teachers indicated they implement personalized learning at a higher rate than principals observed the practices in their buildings.

Role of technology in personalized learning. As stated in Chapter Two, technology should not be used to digitize a traditional system, but should improve learning for all students through allowing student control over pace and place of learning, increased opportunities for collaboration within and beyond the classroom walls, and immediate access to information (Grant & Basye, 2014; Zmuda et al., 2015). The following findings address the second research question, “What is the role of technology

in personalized learning?" Through the analysis of the survey responses, educators agreed at a high rate technology eases the implementation of personalized learning elements, and they had confidence in implementing technology-based instruction. Only one of 100 educators who participated in the survey indicated technology did not aid in personalizing learning for students.

When provided with a checklist on the survey, teachers selected all ways they have used technology to personalize learning in their classrooms, and administrators indicated what they observed in their buildings. Per the sample population, the top three roles of technology in personalized learning were as follows:

- Students have access to a wide variety of resources and information for meaningful research.
- The use of technology increases student engagement.
- Technology provides access to resources outside of the classroom.

From these responses it is clear educators saw the highest utilization of technology for accessing resources beyond the classroom walls. These roles align most with traditional curriculum practices and are likely an entryway in using technology when first gaining access to devices (Grant & Basye, 2014). The three least likely roles for technology were as follows:

- Students connect with experts in the field.
- Programs assist students with organization.
- Students are able to participate in virtual field trips and/or other real-world experiences such as simulations.

These practices for technology implementation are likely new experiences for teachers, as well as students, which might result in slower implementation. These opportunities redefine the classroom experience; therefore, curriculum writing to realign and incorporate these resources and opportunities may be needed (Grant & Basye, 2014).

Difference in reading assessment scores based on personalized learning implementation. A purpose for this study was to determine if the implementation of personalized learning practices impacted student achievement. The research question, "Is there a difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of overall personalized learning implementation within a building?" was aimed at identifying the impact. The null hypothesis was there is no difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building. The results of the one-way ANOVA test revealed there was no statistically significant difference in student achievement based on whether teachers at that building had a mode rating of three, four, five, or six for the overall implementation of personalized learning on a one to seven scale. Therefore, the alternative hypothesis was not supported, and the null hypothesis was not rejected, meaning there was little to no difference in reading scale score gain based on response.

Difference in mathematics assessment scores based on personalized learning implementation. As stated previously, one purpose for this study was to determine if the implementation of personalized learning practices had an impact on student achievement in math. The question, "Is there a difference in mean scale score gain on a diagnostic math assessment based on the modal rating of overall personalized learning

implementation within a building?" was asked to frame the data collection for the purpose. The null hypothesis was there is no difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building. Mean scale score gains on the i-Ready math assessment were compared based on teachers' rating of their implementation of personalized learning. The *P*-value from the one-way ANOVA test resulted in a number higher than the significance level of 0.05, indicating there is no statistical significance between the response groups. Therefore, the alternative hypothesis was not supported, and the null hypothesis was not rejected, meaning there was no difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of personalized learning implementation within a building based on this sample.

Difference in reading and mathematics assessment scores based on personalized learning implementation within buildings with and without one-to-one technology. In order to determine the difference in scale score gains based on teachers' rating of personalized learning implementation within buildings with and without one-to-one technology, multiple data sets were analyzed. The null hypothesis ($H5_0$) for this research question indicated there is no difference in mean scale score gain on a diagnostic reading or math assessment based on the modal rating of personalized learning implementation within buildings with and without one-to-one technology.

First, the modal responses from teachers with and without one-to-one technology were compared for each of the 15 personalized learning elements, as well as on the overall implementation scale. Teachers with one-to-one technology aligned more often with "personalized learning practices" for 11 of the 15 elements and had a mode of five

on the overall implementation scale. On the other hand, teachers without one-to-one technology only had a mode that aligned with "personalized learning practices" and had a mode of four on the overall implementation scale. Whether it is due to increased number of devices in the room, teachers with one-to-one technology reported higher implementation of personalized learning than their colleagues without one-to-one devices.

The mean scale score gains from the beginning of the year to the end of the year in reading, as well as math, were compared. The gains were grouped by the modal response to the overall personalized learning implementation statement on the teacher survey; teachers could rate themselves on a scale from one to seven. This analysis was grouped by schools with one-to-one technology and without one-to-one technology. The *P*-values were reported, by data set, for comparison against the significance level of 0.05 in the one-way ANOVA test analysis. The results were summarized in Table 9. If the *P*-value is greater than the significance level, the differences are not statistically significant. This was the case for all four data sets; all *P*-values were greater than 0.05, and therefore, not significant. Even though personalized learning took place more frequently at schools with one-to-one technology, the implementation of the practices did not result in statistically significant gains in student achievement. The null hypothesis was not rejected for this question, and the alternative hypothesis was not supported.

Conclusions

As previously discussed, the purpose of the study was to determine if there was a connection between the implementation of personalized learning, at varying degrees, and student achievement gains. Additionally, the role of technology in personalized learning

was to be identified. The conclusions surrounding each of the research questions, based on data and the review of literature, are described in the next section.

Conclusion of teacher vs. administrator perceptions. The information gleaned to answer the first research question indicated administrators reported observing personalized learning practices at a lower rate than teachers reported. This finding could have resulted from a variety of factors. First, administrators were asked to report what they found in the majority of the classrooms they observe, while teachers were only asked to reflect on their own practices. When administrators envisioned the classrooms in their buildings, the teachers who made up the majority of those buildings may or may not have been the educators who responded to the survey. Secondly, teachers might have reflected on practices that occur in their classrooms, but administrators do not observe on a regular basis. Principals typically have a busy schedule and are not always able to be in the classroom to observe practices. Thirdly, although it is assumed survey respondents were honest, teachers might have rated themselves higher than what administrators observed. Teachers might have considered when they implemented certain elements once or twice, while administrators might have considered the bigger picture of implementation since they were reflecting on the implementation of the entire building. All possibilities considered, teachers reported implementing personalized learning practices at a higher rate than administrators. After participating in the survey, administrators could use the data as a baseline for their buildings and could use the definitions within the continuum to assist teachers in increasing capacity within an element.

Conclusion for role of technology in personalized learning. The conclusion for the second research question was determined through the review of literature in Chapter Two, as well as through the survey responses. Technology has played an important role in the personalization of learning for students (Grant & Basye, 2014; Zmuda et al., 2015). The introduction of technology into the classroom has essentially created an additional teacher for students, thus providing freedom over time, pace, place, and content of learning (Grant & Basye, 2014; Zmuda et al., 2015). While an outline of the impact of technology for many of the personalized learning elements was provided in Chapter Two, conclusions were drawn between the research and the responses of the survey participants.

As indicated in Chapter Four, only six administrators and nine teachers listed additional technology as a needed resource to implement personalized learning practices, while a higher percentage of responses focused on the need for professional learning opportunities and time to learn and plan. Reasons for technology not being listed as a need by more educators could include the following: 1) one-third of the schools who participated in the survey had just received devices at a one-to-one ratio, indicating technology is sufficient; or 2) personalized learning is a newer concept or practice, so educators must first learn about it before they know what they need to implement it.

When asked to rate their level of agreement about whether technology eased the implementation of personalized learning components, overwhelmingly, 89% of educators who took the survey agreed it did. The majority of educators (74% of administrators and 77% of teachers) agreed they had confidence in themselves or their teachers to use devices with students, but the responses indicated about 25% lack confidence. This

figure could have impacted responses to several of the other questions regarding the role of technology in personalized learning. Only 1.2% of teachers indicated "Technology has not enhanced personalized learning in my building/classroom." This further indicates technology is vital to the implementation of personalized learning.

Besides selecting "Technology has not enhanced personalized learning in my building/classroom," educators had the option to indicate other ways technology might have been used in classrooms to personalize learning. Devices are used most often to access resources and information outside of the classroom walls. Only about two-thirds of educators reported students use technology to connect with peers, and even fewer, about one-fifth, use devices to connect with experts regarding certain topics. In Chapter Two, it was stated students are using devices outside of school to collaborate with one another via Facebook or to seek an online tutor or expert to get help answering questions (Project Tomorrow, 2012). Teachers might not be comfortable allowing or seeking online collaborations with peers or experts. This rationale might also be the reason such few respondents selected "Students are able to participate in virtual field trips and/or other real-world experiences such as simulations" and "Programs assist students with organization." Teachers likely need professional learning opportunities and time to learn how to incorporate these uses for technology into their curriculum. In conclusion, technology has had a positive impact on the implementation of personalized learning, but not all teachers have used technology to redefine the classroom and allow more student ownership.

Conclusion for the difference in reading assessment scores based on personalized learning implementation. To determine if there is a difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of overall personalized learning implementation within a building, teacher responses, by building, were compared to the average reading scale score gain for students within the same building. There was no statistical difference in scale score gain found between the various implementation levels of personalized learning. There are a few possible explanations for this finding. First, since the teachers were unidentifiable, it was not possible to correlate a specific class of students to an individual teacher. The results might have differed if a set of student scores had been directly correlated with the classroom teacher response. Second, the modal teacher response for overall implementation was five, indicating most were not fully implementing personalized learning. With this response, it seems unlikely the implementation or lack of implementation would impact student scores. To conclude, the difference in scale scores based on implementation of personalized learning would need to be reexamined after teachers have had sufficient training on personalized learning and have had time to implement the concept fully in their classrooms.

Conclusion for the difference in mathematics assessment scores based on personalized learning implementation. Determination of the relationship of the difference in mean scale score gain on a diagnostic reading assessment based on the modal rating of overall personalized learning implementation within a building yielded similar findings to those regarding reading. There was no statistically significant difference in mean scale score gain between the teacher responses when asked to rate

overall implementation of personalized learning. In addition to the reasons for no correlation listed for reading, one additional explanation could exist for math. According to Burns (2015), "Elementary school teachers are typically more comfortable teaching reading" than math (para. 1). Some teachers even are intimidated or fear teaching mathematics (Burns, 2015). With this lack of confidence, teachers might be reluctant to allow students to control their own journey through math curriculum out of fear of not understanding the pathway. Some teachers might also worry students will surpass teachers' mathematical understanding if allowed to move at a more rapid pace. Nevertheless, a significant difference in scale score gains, based the degree of implementation of personalized learning, was not observed in this study.

Conclusion for difference in reading and mathematics assessment scores based on personalized learning implementation within buildings with and without one-to-one technology. To draw conclusions for the final research question, multiple data sets were compared and analyzed. Teachers with technology in their classrooms had a modal response aligned with personalized learning practices for 10 of the 15 elements, while teachers without one-to-one technology indicated they used a transitional practice for the same elements most often. The elements that had a difference in responses included learner profiles, learner voice-and choice-infused, multiple instructional methods/modes, cultural responsiveness, rapid cycle feedback, customized responsive instruction, progressions toward deeper learning, learner independence, learning-aligned technology, and flexible learning spaces. Seven of these elements were described in Chapter Two as being directly impacted by the introduction of technology into classrooms. One conclusion that can be drawn is that teachers with one-to-one

technology implement personalized learning at a higher degree than teachers without one-to-one technology.

While teachers with one-to-one technology implement personalized learning at a higher degree than their colleagues without one-to-one technology, no statistically significant difference was observed, in math or reading, in buildings with or without devices. The *P*-values for all four one-way ANOVA test were summarized in Table 9. While not statistically significant, the *P*-values closest to the significance level of 0.05 occurred in classrooms with one-to-one technology with math and reading scores. While additional questioning would be necessary to make a definitive conclusion, it is possible teachers in classrooms with technology need to better equip students with strategies for personalizing their own paths with technology. There are many online games and adaptive software programs, but students must interact regularly with manipulatives and other hands-on learning methods in order to move from concrete to representational to abstract concepts (Amegatcher, 2015). If students are learning mostly through technology, there might be a missing link crucial for a strong mathematical and reading foundation, and teachers must work with students to find a balance between learning using technology and hands-on learning in the elementary classroom.

There is no statistically significant difference in scale score gains between any of the personalized learning implementation levels. One possible explanation for the indifference could include the inability to compare individual teacher responses to the student scores from the same classroom. Additionally, other factors such as readiness level, effectiveness of the teacher, and required curriculum could have impacted the reading and math scores more than the implementation of personalized learning. Further

research is needed to determine the root cause of scale score growth for students in reading and math.

Implications for Practice

While there were no statistically significant differences found in this study, there are multiple opportunities to change educational practices based on the findings. Despite the lack of correlation to student achievement data, personalized learning is important for this generation of students, because today's students are very connected and want to be in control of their own learning (Bray & McClaskey, 2015). Many of the findings are a direct result of the open-ended responses from the survey, as they represent teachers' reactions to the personalized learning elements and strategies for implementing this style of learning in elementary classrooms.

Assess baseline data. There are many elements in personalized learning, so many that it might be overwhelming for teachers to implement all elements at the same time. Administrators could use the survey tool with teachers to allow personal reflection and assessment of their current levels of personalized learning implementation. Administrators and teachers could partner to develop a growth plan, with a goal of implementing two to three elements over the course of the school year. The survey provides explicit descriptions of each level of practice from traditional to transitional to full personalized learning for each element. The descriptions would provide teachers with concrete ways to alter instructional strategies to provide more student-centered structures. Teachers could work in collaborative groups to pick focus elements, or they could work individually toward goals. The same survey can be used to continue to reflect on teaching practices and determine if growth has been made towards the educators'

goals identified. Ideas for educators to familiarize themselves with personalized learning, as well as resources to help them achieve goals, are outlined in the next implication for practice.

Provide professional learning opportunities. On the survey, teachers were asked to answer the open-ended question, "What resources might assist in the implementation of personalized learning?" The majority of teachers replied to this question by listing either the need for professional learning around the implementation of personalized learning or time to collaborate with colleagues to plan the implementation of the learning practice. Since personalized learning is an instructional strategy most teachers did not likely experience when they were students, it will take time to learn about best practices and strategize implementation.

Multiple resources utilized for this study could serve as foundational tools in researching about personalized learning. Teachers could conduct a collaborative book study using Bray and McClaskey's (2015) book, *Make Learning Personal: The What, Who, Wow, Where, and Why*. This resource provides a short historical overview, research support for the practice, and practical examples and tools for teachers to try (Bray & McClaskey, 2015). The book also provides examples and tools for teachers for each grade level, K-12, because the authors recognize student needs differ at every grade level (Bray & McClaskey, 2015).

Another resource is the Cooperative Educational Service Agency (CESA) #1, or The Institute for Personalized Learning (2014) website. This site provides opportunities for networking opportunities for educators to connect with one another while implementing personalized learning, provides documents and tools educators can use to

implement this practice, and highlights multiple examples of personalized learning practices occurring in classrooms in videos or through blogs so that other educators can see what these elements could look like in action (The Institute for Personalized Learning, 2014). The website also tailors content to teachers with various roles besides that of classroom teachers, such as special education and English Language Learner educators (The Institute for Personalized Learning, 2014).

Once educators have selected resources from which they can learn about personalized learning, administrators must provide time for teachers. Time should be spent researching the various subtopics, collaborating to construct an implementation plan, practicing implementation, and reflecting and participating in follow-up discussions with colleagues to adjust the strategies. Time was the response that occurred most often in the open-ended question, highlighting how important it is for teachers to have time for the implementation of personalized learning to be successful in classrooms and schools.

Release ownership of learning to students. The most challenging task of implementing personalized learning could be relinquishing control of learning to the students, but it is also the most important component (Bray & McClaskey, 2015). When students are able to have more control of their education, the feeling of autonomy contributes to their intrinsic motivation (Brophy, 2013; Larmer et al., 2015). While the degree of implementation of personalized learning did not have a strong correlation with student achievement in math or reading, a possible reason was that teachers are not fully implementing the instructional strategies. Teachers must balance guiding students through curriculum and learning goals with students having the ability to provide their own voice and choice to co-design the learning path.

Teachers can create student-centered classrooms by researching the implementation of several personalized learning practices. By implementing learner profiles, students can identify their learning strengths and opportunities for improvement so they can interact with new content in a way that sets them up for success (Bray & McClaskey, 2015). Allowing students to set personal learning goals aids in developing a growth mindset for students and increases their ability to take on challenges they might face (Elias, 2014). By infusing learner voice and choice into lessons, students build confidence and are able to make decisions about their educational path (Larmer et al., 2015).

Teachers can provide more ownership for students by creating opportunities for progressions toward deeper learning (Ark & Schneider, 2014). Incorporating the competencies for deeper learning, including (1) master core academic content, (2) think critically about complex problems, (3) work collaboratively, (4) communicate effectively, (5) learn how to learn, and (6) develop academic mindsets, allows students to explore content or concepts they might not have taken the time to investigate in a traditional classroom (Ark & Schneider, 2014). The concept of learner independence is an important element to explore for teachers wanting to implement personalized learning (Bray & McClaskey, 2015).

Bray and McClaskey (2015) offered a three-stage model for implementation that would allow a slow relinquishing of control of learning from the teacher to the students. In the final stage, learners "design challenging learning experiences," "self-direct how they access information, engage with content, and express what they know based on learning goals," and "learn at their own pace and move on by demonstrating mastery of

competencies," among other indicators (Bray & McClaskey, 2015, p. 102). Finally, the implementation of the element co-designers of learning would allow teachers and students to truly tailor learning paths toward what the teacher knows the students need to learn, and also align learning with student goals and interests (Rickabaugh, 2016a). By encouraging teachers to focus on the research and implementation of one or more of these elements, the classroom environment will begin to transform to a personalized learning environment.

Recommendations for Future Research

Other topics that pertain to personalized learning could be explored, especially since few studies on the impact of personalized learning existed prior to this study. With the concept of personalized learning becoming more popular in schools, further research would allow educators to measure the benefits in classrooms. The following recommendations could be investigated by future researchers wanting to uncover additional information regarding this concept.

Overcoming barriers to personalized learning. As stated in Chapter Two, multiple barriers to personalized learning exist. A recommendation would be to study how schools and teachers have overcome these barriers. This study might be a qualitative study, consisting of case studies with interviews. Identifying concrete strategies others have implemented to provide students with ownership over their learning would be of great benefit to educators and students.

Student perceptions of personalized learning. This study focused primarily on adult perceptions of personalized learning implementation. A second recommendation would be to identify schools or classroom teachers who are implementing elements of

personalized learning and obtain the students' perceptions of the pedagogy. Since the student is owner of the learning, it is important to identify if he or she feels empowered, frustrated, or benefitted by the relinquishing of control from the teacher. The study could be conducted in a similar manner to this study, where perceptions are compared to student achievement scores, or long-term student success measures such as dropout rate or college readiness could be analyzed.

Correlate teacher data to student data in same class. If this study were to be repeated, ideally the student achievement data would be correlated to the teachers' responses for the same class. By keeping the data sets contained within classrooms, a determination might be made if personalized learning truly impacted the data or not. Correlations between student achievement data and each element could also take place, so it could be determined if a particular element has a great impact on student learning.

Summary

The concept of personalized learning has existed since at least the 1700s, when Jean-Jacques Rousseau advocated for schools to focus on an individual's capacity to learn and have choice in curriculum (Yonezawa et al., 2012). The personalized learning movement has gained momentum as the low cost and availability of technology has made the concept easier to implement in today's classrooms (Grant & Basye, 2014). It was discussed in Chapter One that multiple researchers and authors have developed various models of personalized learning, but the framework utilized for this study was the Personalized Learning Theory created by Barbara Bray and Kathleen McClaskey (2015). In this context, a personalized learning environment consists of learners understanding "how they learn best so they can become active participants in designing their learning

goals along with the teacher," rather than a focus on the actions of the teacher (Bray & McClaskey, 2015, p. 11).

In Chapter Two, multiple barriers that make the implementation of personalized learning more challenging, such as current school structure, the requirement of standardized testing, the uncomfortable feeling of teaching in a student-centered environment, and the wide range of definitions of personalized learning, were outlined. Despite the barriers, there are opportunities to implement personalized learning by addressing individual elements in the classroom until full student-driven learning is achieved. These elements, which were addressed on the survey for this study, were identified by The Institute for Personalized Learning (2014) and were depicted in a honeycomb model for organization and clarity. The inclusion of technology in the classroom has impacted most of the personalized learning elements in a way that makes it easier for teachers to implement.

Chapter Three contained an overview of the methodology of this study. It was conducted to determine the degree of implementation of personalized learning, how the pedagogy effects student achievement, and the role of technology in the teaching strategy. A mixed methods approach was used to understand the perceptions of educators related to personalized learning implementation and how it might correlate to student achievement data. A survey was offered to the population for this study, which included 480 elementary classroom teachers and 33 building administrators in a southwest Missouri school district.

The findings, highlighted in Chapter Four, resulted in teachers reporting a higher rate of implementation of personalized learning elements than administrators reported

observing. Nearly all participants in the survey indicated technology played a role in the application of the instructional pedagogy, citing multiple ways technology has eased the implementation. No statistically significant difference was found in mean scale score gain on reading or math diagnostic assessments between groups of educators reporting various degrees of personalized learning, even when disaggregated by schools with and without one-to-one technology implementation.

There are multiple possibilities for the lack of correlation, including the inability to correlate scores from a specific class of students to an individual teacher's responses and teachers not yet fully implementing personalized learning; therefore, it is difficult to know the level of impact on student test scores. The findings in this study could be used to assess baseline data for teachers' implementation of personalized learning; to identify possible avenues for educators to research the elements described in the study for further growth; and to allow teachers to learn to release ownership of learning to the students, creating a student-centered classroom.

Appendix A

Permission to Reference Honeycomb Alignment with Continuum of Legacy to Personalized Learning Practices

From: Carolyn Reeves
To: Pilley, Allison
Subject: Re: Thanks for Downloading the Institute's Personalized Learning Honeycomb
Date: Monday, March 09, 2015 3:48:32 PM

Hi Allison,
Yes, you can absolutely use the continuum to help construct a survey as long as you attribute us. We would also love to see what you come up with and/or any findings you discover from the survey.

Best,
Carolyn

On Mon, Mar 9, 2015 at 10:21 AM, Pilley, Allison [redacted]> wrote:

I'm exploring personalized learning for my dissertation, as well as the role curriculum plays in personalization for my school district I serve. I came across your "Honeycomb Alignment with Continuum of Legacy to Personalized Learning Practices" and am hoping to turn it into a survey, with your permission of course, for students, teachers, and administrators across Missouri.

Allison Pilley
Director of Curriculum, Instruction, and Assessment
[redacted]

[redacted]
Includer/Developer/Belief/Analytical/Futuristic

Confidentiality Notice: This email message and any accompanying attachments contain information from [redacted], which is confidential and privileged. The email transmission and any attached documents are intended to be for the review and use solely of the individual(s) or entity(ies) named and listed on the email transmission message.

Appendix B

Personalized Learning Survey – Teacher

Personalized Learning Survey – Teacher
Survey Adapted From: The Institute @ CESA #1 Personalized Learning and Continuum

Section 1: Demographic Information

Which grade level do you currently teach?

- Kindergarten
- 1st Grade
- 2nd Grade
- 3rd Grade
- 4th Grade
- 5th Grade
- K-5 Specialty Teacher
- K-5 SPED, Title I, or ELL Teacher
- Other:

How many years have you taught?
Include the current school year in your total number of years.

- 0-5 Years
- 6-10 Years
- 11-15 Years
- 16-20 Years
- 21-25 Years
- 26-30 Years
- More than 30 Years

Section 2: Personalized Learning Elements
Select the practice that your teaching style most closely aligns with for each element.

Element	1: Traditional Practice	2: Transitional Practice	3: Personalized Learning Practice
Learner Profiles	Little is known about or applied to leverage each student's strengths, readiness, and learning modalities.	Learner profiles are created, but not used to create a customized learning path. OR Data for learner profiles are collected, but are managed by the teacher rather than by the learner.	Comprehensive, data-rich learner profiles convey a deep understanding of the learner and are used to plan a customized learning environment and instructional strategies. They are dynamic, real-

			time and learner-owned and managed.
Personal Learning Goals	Whole-class, teacher-identified expectations of what students should be able to know and do.	After gathering student input, teacher identifies expectations for students. OR Learner and educator co-develop personalized goals in some content areas, but not all.	Learner and educator co-develop purposeful personalized goals to provide benchmarks and add focus, clarity, and commitment to learning.
Learner Voice- and Choice-Infused	Students have limited input into or choice about their educational experience.	Students have some input into or choice about their educational experience.	Learners have significant and meaningful input into and choice about their learning experience.
Multiple Instructional Methods/Modes	Instruction is largely face-to-face and conducted in large groups regardless of varying readiness, strengths, needs, and interests.	Instruction is offered using a variety of methods (e.g., demonstration, discussion, simulation) OR modes (e.g., face-to-face, blended, virtual) in response to learner readiness, strengths, needs, and interests.	Instruction is offered using a variety of methods (e.g., demonstration, discussion, simulation, small group) AND modes (e.g., face-to-face, blended, virtual) in response to learner readiness, strengths, needs, and interests.
Cultural Responsiveness	Content is typically presented with a narrow, predefined cultural context.	Some learning opportunities to engage with content through various cultural lenses and perspectives.	Learners are provided opportunities to engage with content through various cultural lenses and perspectives and draw from their cultural backgrounds to

			build their learning.
Rapid Cycle Feedback	Feedback is infrequent, delayed, and static.	Feedback is frequent, timely, or continuous. OR Feedback is provided, but is not used by the student to learn and grow.	Feedback is frequent, timely, and continuous. The feedback allows the learner to continue to learn and grow.
Customized Responsive Instruction	Instruction and pacing are standardized and predetermined. Differentiation occurs primarily at the lower and upper margins of performance.	Some instruction and pacing are determined by learner needs.	Instruction and pacing are driven by individual learner needs and growing capacity for independent learning.
Progressions Toward Deeper Learning	Learning is driven by the scope and sequence of curriculum.	Some opportunities for movement toward more expert understanding are available, but typically outside of the dedicated learning time (e.g., after school or during work time).	Movement over time toward more expert understanding and sophisticated ways of thinking about a concept or idea.
Learner Independence	Students depend on the teacher to tell them what to do and when and how to do it.	Students have the capacity to learn and work independently, but still rely on the teacher for guidance on what, when, and how to complete activities.	Learners have the capacity to learn and work independently, without heavy dependence on external structures and supports.
Family and Community Engagement	Involvement by the family or community in the education system is limited with few connections between concepts learned in the classroom and life	The family or community is engaged with the schools based on units implemented in the classroom.	Learners, schools, and the family/community work together to fully leverage resources and expertise to maximize the learning

	outside of school.		experience.
Co-designers of Learning	Teachers are responsible for managing all aspects of their students' learning experience.	Teachers and students work together to design some learning experiences. OR Teachers and students work together to determine how proficiency is demonstrated, regardless if they co-design learning experiences.	Learners and educators work together to design learning experiences and determine how proficiency is demonstrated.
Learning-Aligned Technology	Technology is used primarily as a substitute for existing tasks (i.e., taking notes on a device rather than on paper).	Technology is used to augment existing tasks (substitute with some functional improvement).	Technology is used as a tool to modify or redesign learning tasks. It enhances, deepens, or accelerates understanding and mastery of content.
Flexible Time and Pace	Students are expected to progress at the same rate within a prescribed amount of time. (Time is the constant; learning is the variable.)	There is some flexibility of time and pace.	Learners have the flexibility to progress at their own pace and to adjust time allocations based on their learning objectives. (Learning is the constant; time is the variable.)
Learning-Aligned Grouping Options	Students are arranged into static groups based on characteristics such as age, gender, or perceived ability or disability.	Students are sometimes grouped flexibly based on common characteristics.	Learners are grouped flexibly based on readiness, needs, and interests.

Section 3: Overall Implementation of Personalized Learning

Rate your overall implementation of personalized learning on a scale of 1-7 with 1 indicating no implementation and 7 indicating full implementation.

No Implementation of Personalized Learning	1 2 3 4 5 6 7	Full Implementation of Personalized Learning

Rate your level of agreement with the statements below.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have the skills to implement personalized learning with my students.	○	○	○	○	○
Adequate training opportunities are available to assist me with the implementation of personalized learning.	○	○	○	○	○
I have the resources in my building/ classroom to implement personalized learning.	○	○	○	○	○

What resources might assist in the implementation of personalized learning?

_____

_____

Section 4: Use of Technology for Personalized Learning

Rate your level of agreement with the statements below.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Technology eases the implementation of personalized learning components.	○	○	○	○	○
I am confident in my ability to utilize technology devices with students in my classroom.	○	○	○	○	○

In what ways has technology enhanced personalized learning in your classroom?
Check all that apply

- o Technology has not enhanced personalized learning in my classroom.
- o Students connect and collaborate with peers.
- o Students connect with experts in the field.
- o Students have access to a wide variety of resources and information for meaningful research.
- o Students are able to participate in virtual field trips and/or other real-world experiences such as simulations.
- o The use of technology increases student engagement.
- o Technology allows multiple assessment options.
- o Adaptive programs allow for customized learning paths.
- o Programs assist students with organization.
- o Technology provides access to resources outside of the classroom.
- o Other:

Appendix C

Personalized Learning Survey – Administrator

Personalized Learning Survey – Administrator
Survey Adapted from: The Institute @ CESA #1 Personalized Learning and Continuum

Section 1: Demographic Information

How many years have you been an administrator in your current building?
Include the current school year in your total number of years.

- 0-5 Years
- 6-10 Years
- 11-15 Years
- 16-20 Years
- 21-25 Years
- 26-30 Years
- More than 30 Years

Section 2: Personalized Learning Elements
Select the practice that the majority of teachers in your building align with for each element of personalized learning.

In the building that I lead, the majority of teachers align closest with:

Element	1: Traditional Practice	2: Transitional Practice	3: Personalized Learning Practice
Learner Profiles	Little is known about or applied to leverage each student's strengths, readiness, and learning modalities.	Learner profiles are created, but not used to create a customized learning path. OR Data for learner profiles are collected, but are managed by the teacher rather than by the learner.	Comprehensive, data-rich learner profiles convey a deep understanding of the learner and are used to plan a customized learning environment and instructional strategies. They are dynamic, real-time and learner-owned and managed.
Personal Learning Goals	Whole-class, teacher-identified expectations of what students	After gathering student input, teacher identifies expectations for	Learner and educator co-develop purposeful personalized goals

	should be able to know and do.	students. OR Learner and educator co-develop personalized goals in some content areas, but not all.	to provide benchmarks and add focus, clarity, and commitment to learning.
Learner Voice- and Choice-Infused	Students have limited input into or choice about their educational experience.	Students have some input into or choice about their educational experience.	Learners have significant and meaningful input into and choice about their learning experience.
Multiple Instructional Methods/Modes	Instruction is largely face-to-face and conducted in large groups regardless of varying readiness, strengths, needs, and interests.	Instruction is offered using a variety of methods (e.g., demonstration, discussion, simulation) OR modes (e.g., face-to-face, blended, virtual) in response to learner readiness, strengths, needs, and interests.	Instruction is offered using a variety of methods (e.g., demonstration, discussion, simulation, small group) AND modes (e.g., face-to-face, blended, virtual) in response to learner readiness, strengths, needs, and interests.
Cultural Responsiveness	Content is typically presented with a narrow, predefined cultural context.	Some learning opportunities to engage with content through various cultural lenses and perspectives.	Learners are provided opportunities to engage with content through various cultural lenses and perspectives and draw from their cultural backgrounds to build their learning.
Rapid Cycle Feedback	Feedback is infrequent, delayed, and static.	Feedback is frequent, timely, or continuous. OR Feedback is provided, but is not	Feedback is frequent, timely, and continuous. The feedback allows the learner

		used by the student to learn and grow.	to continue to learn and grow.
Customized Responsive Instruction	Instruction and pacing are standardized and predetermined. Differentiation occurs primarily at the lower and upper margins of performance.	Some instruction and pacing are determined by learner needs.	Instruction and pacing are driven by individual learner needs and growing capacity for independent learning.
Progressions Toward Deeper Learning	Learning is driven by the scope and sequence of curriculum.	Some opportunities for movement toward more expert understanding are available, but typically outside of the dedicated learning time (e.g., after school or during work time).	Movement over time toward more expert understanding and sophisticated ways of thinking about a concept or idea.
Learner Independence	Students depend on the teacher to tell them what to do and when and how to do it.	Students have the capacity to learn and work independently, but still rely on the teacher for guidance on what, when, and how to complete activities.	Learners have the capacity to learn and work independently, without heavy dependence on external structures and supports.
Family and Community Engagement	Involvement by the family or community in the education system is limited with few connections between concepts learned in the classroom and life outside of school.	The family or community is engaged with the schools based on units implemented in the classroom.	Learners, schools, and the family/community work together to fully leverage resources and expertise to maximize the learning experience.
Co-designers of Learning	Teachers are responsible for managing all aspects of their students' learning experience.	Teachers and students work together to design some learning experiences. OR Teachers and	Learners and educators work together to design learning experiences and determine how

		students work together to determine how proficiency is demonstrated, regardless if they co-design learning experiences.	proficiency is demonstrated.
Learning-Aligned Technology	Technology is used primarily as a substitute for existing tasks (i.e., taking notes on a device rather than on paper).	Technology is used to augment existing tasks (substitute with some functional improvement).	Technology is used as a tool to modify or redesign learning tasks. It enhances, deepens, or accelerates understanding and mastery of content.
Flexible Time and Pace	Students are expected to progress at the same rate within a prescribed amount of time. (Time is the constant; learning is the variable.)	There is some flexibility of time and pace.	Learners have the flexibility to progress at their own pace and to adjust time allocations based on their learning objectives. (Learning is the constant; time is the variable.)
Learning-Aligned Grouping Options	Students are arranged into static groups based on characteristics such as age, gender, or perceived ability or disability.	Students are sometimes grouped flexibly based on common characteristics.	Learners are grouped flexibly based on readiness, needs, and interests.

Section 3: Overall Implementation of Personalized Learning

Rate the overall implementation of personalized learning in your building on a scale of 1-7 with 1 indicating no implementation and 7 indicating full implementation.

No Implementation of Personalized Learning	1 2 3 4 5 6 7	Full Implementation of Personalized Learning

Rate your level of agreement with the statements below.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The majority of the teachers in my building have the skills to implement personalized learning with my students.	○	○	○	○	○
Adequate training opportunities area available to assist teachers in my building with the implementation of personalized learning.	○	○	○	○	○
Teachers in my building have the resources to implement personalized learning.	○	○	○	○	○

What resources might assist in the implementation of personalized learning?

_____

_____

Section 4: Use of Technology for Personalized Learning

Rate your level of agreement with the statements below.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Technology eases the implementation of personalized learning components.	○	○	○	○	○
Teachers in my building are confident in their ability to utilize technology devices with students in the classroom.	○	○	○	○	○

In what ways has technology enhanced personalized learning in your classroom?
Check all that apply

- o Technology has not enhanced personalized learning in my building.
- o Students connect and collaborate with peers.
- o Students connect with experts in the field.
- o Students have access to a wide variety of resources and information for meaningful research.
- o Students are able to participate in virtual field trips and/or other real-world experiences such as simulations.
- o The use of technology increases student engagement.
- o Technology allows multiple assessment options.
- o Adaptive programs allow for customized learning paths.
- o Programs assist students with organization.
- o Technology provides access to resources outside of the classroom.
- o Other:

Appendix D

Lindenwood University
School of Education
209 S. Kingshighway
St. Charles, Missouri 63301

Informed Consent for Participation in Research Activities
"The Role of Technology in Personalized Learning"

Date: February 29, 2016

Primary Investigator: Allison Pilley

Telephone: [redacted] E-mail: [redacted]

You are invited to participate in a research study conducted by Allison Pilley under the guidance of Dr. Grover. The purpose of the research study is to allow educators to determine if authentic personalized learning experiences are occurring for students, determine the role of technology in personalizing learning, and determine if there is a correlation between the degree of implementation of personalized learning and student achievement.

1. This **survey** will include the following:
   a. Your participation will involve completion of a brief survey regarding implementation of personalized learning in your classroom. The survey will be conducted online through Google Forms, and the information you provide will remain confidential and anonymous.
   b. The amount of time involved in your participation will be approximately 20 minutes. You have the option of taking the survey 24 hours a day, 7 days a week so as not to intrude on instructional time.
2. There are no anticipated risks associated with this research study.
3. There are no direct benefits for you participating in this study. However, your participation will contribute to the development of professional learning opportunities for the implementation of personalized learning.
4. Your participation is voluntary and you may choose not to participate in this research study or to withdraw your consent at any time. You may decide not to answer any questions. You will NOT be penalized in any way should you choose not to participate or to withdraw.
5. Every effort will be made to protect your privacy. As part of this effort, your identity will not be revealed in any publication or presentation that may result from this research study and the information collected will remain in the possession of the Primary Investigator in a safe location.
6. If you have any questions or concerns regarding this research study, or if any problems arise, you may contact the Primary Investigator, Allison Pilley, [redacted]. You may also contact the dissertation adviser for this

research study, Dr. Grover at [redacted] or KGrover@lindenwood.edu. You may also ask questions of/or state concerns regarding your participation to the Lindenwood Institutional Review Board (IRB) through contacting Dr. Marilyn Abbott, Provost at mabbott@lindenwood.edu or 636-949-4912.

I have read this consent form and have been given the opportunity to ask questions. I may retain a copy of the Consent Form for future reference.

By completing this survey, I consent to participate in this research study.

Appendix E

From: Megan Woods
To: Kathy Grover; Pilley, Allison
Subject: IRBNet Board Action
Date: Friday, March 18, 2016 2:55:37 PM

Please note that Lindenwood University Institutional Review Board has taken the following action on IRBNet:

Project Title: [816515-1] The Role of Technology in Personalized Learning
Principal Investigator: Allison Pilley

Submission Type: New Project
Date Submitted: February 29, 2016

Action: APPROVED
Effective Date: March 18, 2016
Review Type: Expedited Review

Should you have any questions you may contact Megan Woods at mwoods1@lindenwood.edu.

Thank you,
The IRBNet Support Team

www.irbnet.org

Appendix F

[redacted] ***Public Schools Exists For the Academic Excellence of All Students***

To: Allison Pilley

From: Jill Palmer

Date: February 29, 2016

Subject: Request to Conduct Research

Your request to conduct research proposal titled, Role of Technology in Personalized Learning, submitted for consideration has been approved.

Feel free to contact Jill Palmer at [redacted] if you have questions or need additional information.

Jill Palmer
Coordinator of Accountability
[redacted]

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Vita

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Aside from Allison's passion for teaching and learning, she is always busy having fun with her family. The Pilleys and Allison's parents are usually at the ball field, the basketball court, swimming in the pool, or outside catching fireflies. Residing in Springfield, Missouri, Allison's very supportive family includes her husband, Nathan; children, Mikayla and Nolan; stepdaughter, Brea; and parents, Peggy and David Riggs.