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Flexibility Matters: A Qualitative Look at Four Middle Grade Teachers' Implementation of Personalized Learning

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DEDICATION

I would like to dedicate my work in memory of my late husband, Ricky Heath whose love and support allowed me to start this path down this educational journey. I will earn the title he always wanted. To my late father, William Evans who raised me to be independent and allowed me to make decisions which led me on my life journey. They both help me to persevere and be committed to my goal.

To my son, Austin Miller for your understanding of me not always being present during this last fourteen years with me being in school.

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ABSTRACT

Personalized learning (PL) has emerged as a trend in K-12 teaching and learning (Netcoh, 2017). This instructional strategy provides a customized learning experience, allowing students to work on their own path and at their own pace while learning and instruction is developed to students' ability levels, interests, and learning modalities. While some scholars and many educational organizations have published definitions of PL, these definitions are often vague and sometimes conflicting. Furthermore, there is limited in-depth research presently available regarding the implementation of personalized learning in K-12 classrooms. Due to the lack of clear definitions and descriptions of PL, educators struggle to conceptualize and implement PL. To bridge this gap, this case study will examine how four exemplary middle school teachers implement PL in a Title 1 middle school in a large urban K-12 school district in the Southeast. The study will also describe these teachers' perceptions of PL.

Keywords: personalized learning, technology, 1:1 computing, professional development, transformation, middle school

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Chapter One: Introduction

As students graduate from high school and college, they enter a workforce that continues to rapidly advance in the areas of technology and innovation. While the workforce has transformed, education still uses the traditional, industrial age model of "sit and get," creating a disparity between education and the workforce (Zmuda, Curtis, & Ullman, 2015). There must be a shift in the paradigm of teaching for a new approach in learning that fosters the same elements needed in today's workforce: creativity, innovation, agency, collaboration, and goal setting (Pane, Steiner, Baird, & Hamilton, 2015). Two of the most notable names in technology today, Bill Gates and Mark Zuckerberg, created a 12-million-dollar foundation to support new ways of tailoring classroom instruction to individual students. Previously, the Gates Foundation provided more than 300 million dollars in funding to support research and development on personalized learning (Herold, 2017). Foundations such as Next Generation Learning Challenge and Digital Promise offer grants to assist schools and districts in their efforts to implement personalized learning and support districts in developing funding strategies for the instructional model.

Personalized learning (PL) creates environments for student instruction developed for students' individual abilities, modalities, path, and pace. The implementation of personalized learning is on the rise in K-12 schools looking to improve student achievement and enhance learning. Due to the lack of in-depth research regarding personalized learning, there is confusion about its definition and how the model should be implemented. Agencies like the Future Ready Schools, the Gates Foundation, the International Society for Technology in Education (ISTE), the National Center for Learning Disabilities (NCLD), and the United States Department of Education Technology (US OET) are just a few of the organizations that have published definitions of personalized learning.

Despite the promise of PL, practitioners will likely find it difficult to implement. There is little research on the implementation of PL, and the definitions are vague and conflicting (Jenkins et al., 2016; Pasatta, Hamilton, & DeDoes, 2017; Patrick, Kennedy, & Powell, 2013). Personalized learning environments are defined and implemented in various iterations. Some iterations of PL integrate project-based learning, design thinking, and competency-based education (Pasatta et al., 2017). In most instances, personalized learning models include some or all the following items: student agency and choice, student self-paced learning, mastery or competency-based, and technology-enhanced environments. Research reveals insight into the concepts of personalized learning including engagement (Ferlazzo, 2017), motivation (Kim, 2002), freedom, (Vatterott, 1995, Netcoh, 2017), design (Basham, 2016) and role of technology (Altuna & Lareki, 2015; O'Donnell, Lawless, Sharp, & Wade, 2015). However, recent research does not describe concrete models of implementation of personalized learning. As educators and districts work to implement this instructional model in classrooms, the lack of clarity in what is personalized learning contributes to misperception in how this approach is implemented in classrooms. Questions remain regarding the definition and implementation of PL.

The researcher developed a clear understanding of the definition of personalized learning and how it is enacted in a middle school classroom in a large urban school district. To develop this understanding, the researcher engaged teachers who have implemented PL in their classrooms and provided descriptive insight of their daily enactment of the model. The purpose of the study was to explore personalized learning through the beliefs, perceptions, and practices of a group of teachers within this community. The researcher aimed to discover teachers' perceptions, experiences, motivations, and factors that influence their implementation of PL in the classroom. The implications of this research could provide an initial understanding from a

small sample of teachers of a model of PL implementation. Through this research, the experiences and voice of teachers who have implemented PL could provide guide for others in their own PL implementation.

The researcher used a qualitative multi-case study research design to conduct this study. The researcher conducted observations, interviews, and archival review to examine the various factors that impede and enable the implementation of PL in an urban middle school. The research questions examined the definition of PL, characteristics of implementation, the role of technology, and factors that influence the implementation of PL. Observations focused on how PL is enacted in classrooms, including tools and strategies to provide a model of implementation. Further examination occurred to determine how teacher perceptions of PL influence the implementation PL. This examination included teachers' comfort in developing PL environments, administrative support, and the role of professional development in teachers' ability to enact PL in their classrooms. The following research questions guided this qualitive inquiry:

RQ1: How do four teachers at one middle school define and enact PL?

RQ2: What role does technology play in their implementation of PL?

RQ3: What factors enable and impede these teachers' implementation of PL

RQ4: How do these teachers perceive the effects of PL environments on student learning?

This document is organized in the following manner: Chapter Two provides a conceptual framework, including the literature and theory that guided this study. In Chapter Three, the researcher details the methodology which was used to investigate the topic. In Chapter Four, the researcher provides a description of the research findings, including participants' direct words. In

Chapter Five, the researcher presents the findings of the study, including implications and recommendations for future research and practices.

Chapter Two: Literature Review

Definition of Personalized Learning

Many school districts strive to provide personalized learning (PL); however, determining a clear definition of the term and how to implement it in classrooms is problematic. The practical and academic literature in education provides several definitions of PL. Twelve are from government agencies or educational organizations, three appear in publications by educational professionals, and two appear in peer reviewed academic journals (see Table 1). There are common elements within these definitions, but there is also a great deal of variation. No unified consensus of what constitutes PL in K-12 schools exists.

Table 1

Definitions of Personalized Learning

Publication	Definition
International Society of Technology Educators (ISTE)	"[Personalized] learning that is tailored to the preferences and interests of various learners, as well as instruction that is paced to a student's unique needs" (Basye, 2018, p. 12).
United States Office of Education Technology (USOET)	"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 (personalization encompasses differentiation and individualization)." (U.S. Office of Education Technology, 2018, para. 5)
Personalized Learning Foundation (PLF)	PL includes "strong emphasis on parental involvement, smaller class sizes, more one on one teacher and student interaction, attention to difference in learning styles, student driven participation in developing the learning process, technology access, varied learning environments, teacher and parent development programs, and choices in curriculum programs." (PLF, 2012, para.1)

Table 1 Continued

Future Ready Schools	"Personalized learning as a student-centered approach designed to help students develop deeper learning competencies, including thinking critically, using knowledge and information to solve problems, working collaboratively, communicating effectively, learning how to learn, and developing academic mindsets" (Future Ready Schools, 2017, p. 40).
Association of Personalized Learning and Services (APLS)	"PL is putting the needs of students first; tailoring learning plans to individual students; supporting students in reaching their potential; providing flexibility in how, what, when, and where students learn; supporting parent involvement in student learning" (APLS, 2012, para. 1).
The National Center for Learning Disabilities (NCLD)	"Personalized learning allows all children to receive a customized learning experience. Students learn at their own pace with structure and support in challenging areas. Learning aligns with interests, needs and skills, and takes place in an engaging environment where students gain a better understanding of their strengths." (NCLD, 2018, p. 4)
Association for Supervision of Curriculum and Development (ASCD)	PL has five key elements: flexible anytime/everywhere learning, redefined teacher role/expand teacher, project-based authentic learning, student-driven learning path, and mastery/competency-based progression /pace" (Hanover Research, 2012, p. 8).
Gates Foundation	"Personalized learning seeks to accelerate student learning by tailoring the instructional environment - what, when, how and where students learn - to address the individual needs, skills and interests of each student. Students can take ownership of their own learning, while also developing deep, personal connections with each other, their teachers and other adults." (Gates Foundation, 2014, p. 6)
iNacol	"Personalized learning is tailoring learning for each student's strengths, needs, and interests - including enabling student voice and choice in what, how, when, and where they learn - to provide flexibility and supports to ensure mastery of the highest standards possible" (Patrick, Kennedy, & Powell, 2013, p. 3).

Table 1 Continued

Bingham and Dimandja	PL is a "strategy in which teachers used digital resources to adjust instruction according to students' learning needs and interests to promote mastery of skills and content" (Bingham & Dimandja, 2017, p. 76).
Powell and Kusuma-Powell	"Personalized learning is about making the curriculum as attractive and relevant as possible to the widest possible audience" (Powell & Kusuma-Powell, 2011, p. 7).
Lokey-Vega and Stephens	"Personalized learning is an educational paradigm shift that values learner differences and harnesses technology to allow educator and learner to co-plan an individualized educational experience" (Lokey-Vega & Stephens, 2018, p. 7).
Zmuda, Curtis, and Ullman	"Personalized Learning is a progressively student driven model in which students deeply engage in a meaningful, authentic, and rigorous challenges to demonstrate desired outcomes" (Zmuda, Curtis, & Ullman, 2015, p. 7).
Bray and McClaskey	In a personalized learning environment, learners actively participate in their learning. They have a voice in what they are learning based upon how they learn best. Learners have a choice in how they demonstrate what they know and provide evidence of their learning. The teacher is their guide on their personal journey" (Bray & McClaskey, 2017, p. 7).
The Council of Chief State School Officers (CCSSO) and Jobs for the Future	"As much as possible, instruction is customized students' individual developmental needs, skills, and interests. In a personalized experience, students develop connections to each other, their teachers, and other adults that support their learning. Ways to build toward personalized learning include co-designing an individual learning plan and scaffolding supports and interventions for each learner" (CCSSO &Jobs for the Future, 2017, p. 47).

Accommodating Student Differences

Nearly all definitions of PL address the need to accommodate students' individual differences in the classroom. Lokey-Vega and Stephens (2018) addressed the concept in broad terms of *learner difference*; other definitions include more specific terms. For example, many definitions involve tailoring instructions to *student needs* (Bingham & Dimandja, 2017; Gates Foundation, 2014; CCSSO & Jobs for the Future, 2017; Patrick et al., 2013; ISTE, 2018; NCLD, 2018; U.S. Office of Education [US-ED], 2015). All except APLS (2012) refer to *student interest* as a factor of PL. According to the Gates Foundation (2014) and the U.S. OET (2018), *student needs* depend on learning levels, abilities, and skill levels. CCSSO &Jobs for the Future, (2017) use the term developmental regarding student's needs. Bingham and Dimandja (2017) extended this definition of student needs to include skills that students need to acquire, and the way students learn. Patrick et al. (2013) concurred that student needs are individual gaps in skill levels that impede learning. Meeting student needs means meeting students at their ability- and skill-levels when designing curriculum to increase achievement. Not all sources define *student needs* as their skills. NCLD (2018) identified student needs as accommodations that support individual student's disabilities, while CCSSO & Jobs for the Future (2017) identify skills as knowledge.

Most definitions of PL relate *student interest* to passions. The Gates Foundation (2014) and U.S. ED (2015) defined student interest as talents and passions, personalities, experiences, and how the world informs ideal learning design. According to Bingham and Dimandja (2017), CCSSO & Jobs for the Future (2017), and NCLD (2018), interests include students' passions, which can provide motivation if learning aligns with these interests. *Student interests* motivate students to learn beyond the classroom. Interests could be athletic or musical passions or talents.

Student interests could bring pre-existing interest in material they already know or develop interest in knowledge they gain for outside passions or future career goals.

Other terms that are similar to needs and interest include *preferences* (ISTE, 2018; U.S. -ED (2015), *skills* (Bingham & Dimandja, 2017; Gates Foundation, 2014), and *strengths* (Patrick et al., 2013). Preferences, skills, and strengths have various connotations but often appear interchangeably in the literature regarding learner differences. The U.S.-ED (2015) noted that student *preferences* are topics that interest students or help students reach goals or aspirations. Student *preference* is similar to *student interests*. Student *preferences* could also be the way they prefer to gain knowledge. Student *skills* are ideas or abilities that a student acquired or needs to acquire (Bingham & Dimandja, 2017; Gates Foundation, 2014). *Strengths* are skills that students acquired or mastered or students' interests or aspirations. NCLD (2018) defined skills as abilities that allow students to mitigate challenges. Student strengths and skills can also refer to a student's readiness level. What are the skills students possess and what skills will they need to acquire? Strengths can be skills they acquired or areas in which students have abilities.

The PLF (2012) and Bray and McClaskey (2017) defined student differences in terms of learning styles. The PLF (2012) defined learning styles as students' use of gifts, skills, and passions to address challenges or obstacles to their academic and personal growth. The PLF (2012) focused on interest and skill as ways to improve student growth. Bray and McClaskey (2017) provided a deeper understanding of learning styles. They explained that learning styles develop through a combination of teacher perspectives and student reflections on their strengths, challenges, preferences, needs, and how students personally engage in learning depending on their talents, aspirations, and interests.

Definitions from CCSSO and Jobs for the Future (2017), Future Ready Schools (2017), ASCD (2012), Powell and Kusuma-Powell (2011), and Zmuda, Curtis, and Ullman (2015) did not address learner difference at all. Future Ready Schools (2017) used the Universal Design for Learning (UDL) framework to address learner differences. With this framework, students connect to learning by using their strengths (i.e., interests and aspirations) to address their needs and improve their individual levels of mastery. Powell and Kusuma-Powell (2011) and ASCD (2012) concurred with the implementation of the UDL framework. Powell and Kusuma-Powell (2011) did not address interests and preferences in their definition of PL, but their work provided additional understanding of these terms. They noted that interests are pre-existing or potential curiosities; preferences include intelligence, different modalities of receiving information, and production styles of expressing knowledge (Powell & Kusuma-Powell, 2011). Zmuda et al. (2015) agreed that interest, needs, and skills are important for accommodating learner differences. However, the concept of mindsets influenced their understanding of PL. Relevance, growth mindset, self-efficacy, and sense of belonging are pivotal to student learning (Zmuda et al., 2015). Not all definitions directly address accommodating learner differences, but past researchers have addressed the ways that students engage in their learning. Many of the terms in definitions of PL are similar but the meanings of these terms vary and overlap, like definitions of PL itself.

Student-Centered Learning

Student-centered learning is another common aspect of definitions of PL. In PL, students are the focal points of learning and instruction. However, the extent to which students control the development of their learning process varies across the definitions. Future Ready Schools (2017) defined the PL model as *student-centered*; however, this ignores the role that students play.

Many definitions include the role of students in the development of their learning (APLS, 2012; Bingham & Dimandja, 2017; CCSSO & Jobs for the Future (2017); ISTE, 2018; NCLD, 2018; Powell & Kusuma-Powell, 2011; US-ED 2015).

Some definitions include the role of students in the development of the learning process; a few describe students as *drivers* of learning (ASCD, 2012; PLF, 2012; Zmuda et al., 2015). As *drivers* of their learning, student control their learning to varying extents. The Gates Foundation (2014) incorporated students as *co-owners* of their learning in its definition of PL. As *co-owners*, students determine content, the way they learn, the path and pace of learning, the environment in which they learn, and monitor their progress. Bray and McClaskey (2017) used the term *co-designers* and Lokey-Vega and Stephens (2018) applied the term *co-planners*. Students, rather than teachers, control what, how, and when they learn and how they show evidence of their learning.

Bray and McClaskey (2017) included students as *co-designers* of learning and included *voice* and *choice* in their definition of PL. Students have a *voice* and *choice* in the what they learn, how they learn, and how they demonstrate mastery. Having a voice builds student agency; students become independent and self-motivated in their learning (Bray & McClaskey, 2017). CCSSO & Jobs for the Future (2017) noted students are *co-designers* of their learning. Patrick et al.'s (2013) definition of PL described *agency*/*voice* and *choice* but did not include students as owners, designers, or planners of their learning. In some conceptions of PL, student agency or voice and choice are limited and only include making decisions regarding teacher-designed instruction and assessment. However, in most conceptions of *student agency*/*voice* and *choice,* students have some influence on the type of instruction and their assessments of mastery (Bray & McClaskey, 2017; Lokey-Vega & Stephens, 2018; Patrick et al., 2013). Some definitions of PL

fully support an instructional model with a student focus (APLS, 2012); however, most do not include the role of students in the learning design (Bingham & Dimandja, 2017; ISTE, 2018; NCLD, 2018; US-ED, 2015; Powell & Kusuma-Powell, 2011).

Varied Learning Environments

Another common topic in many definitions of PL is varied learning environments. However, descriptions of the learning environments differ across sources (APLUS; ASCD, 2012; Gates Foundation, 2014; NCLD, 2018; Patrick et al., 2013; PLF, 2012; US-ED, 2015). The PLF (2012) uses the broad term *varied learning environment*. Other definitions of PL include the following terms to describe learning environments: *flexible* (APLUS; ASCD, 2012; Patrick et al., 2013), *pace* (ASCD,2012; NCLD, 2018; US-ED, 2015), *anytime/everywhere* (ASCD, 2012), and *how, when, and where* (APLUS, 2012; Gates Foundation, 2014; Patrick et al., 2013). *Flexibility* in learning environments may imply differences in the physical location of learning, delivery of instruction, or the pace of student learning. The terms *varied* and *flexible* can have similar connotations or be different. Schools and teachers create many delivery methods and locations for instruction and learning to occur and may be flexible in that not all students receive instruction in the same manner (e.g., different location, time, or content). Learning environments in a PL model can vary in classroom layout, where students learn, use of technology, inclusion of hands-on learning, and offering of student services. Students work at their own *pace* as they develop mastery of concepts and skills (ASCD, 2012; ISTE, 2018; NCLD, 2018; US-ED, 2015). The terms *anytime/anywhere* and *how, when, and where* are synonymous. Researchers and educators use these terms to refer to different models of learning. The integration of technology allows teachers to change the physical location of the delivery of instruction. Learning environments can be *blended*, mixing teacher and computer-based instruction through use of

computer labs or online tutoring (APLUS; ASCD, 2012; Patrick et al., 2013; US-ED, 2015). Varied learning environments allow student learning to take place through multiple delivery methods. Many definitions of PL do not directly address learning environments (Bingham & Dimandja, 2017; Bray & McClaskey, 2017; CCSSO & Jobs for the Future, 2017; Future Ready Schools, 2017; Lokey-Vega & Stephens, 2018; Powell & Kusuma-Powell, 2011; Zmuda et al., 2015). However, researchers concur that varied or flexible learning environments are essential to PL. *Flexibility* in learning environments could allow students to move at their own *pace* to increase mastery of learning. Some researchers view traditional models with fixed grade levels or time students spend in school as less effective (Bray & McClaskey, 2015; Future Ready Schools, 2017; Lokey-Vega & Stephens, 2018; Powell & Kusuma-Powell, 2011). Varied learning environments could be as simple as smaller class sizes, differences in the physical layout of classrooms or locations, or new forms of student/teacher interaction. Varied learning environments require significant changes to school structure, including staff, space, and time (Gates Foundation, 2014; Zmuda et al., 2015).

Student Mastery of Learning

Another element of PL is student mastery of learning. However, few definitions of PL refer to mastery of learning. Some definitions refer to mastery as *mastery of highest standards possible*, *mastery of skills and content,* and *mastery/competency-based progression/pace*. Patrick et al. (2013) provided an ambiguous statement, referring to the *mastery of highest standards possible* in their definition of PL. Student progress requires demonstrated mastery of clearly defined standards. Bingham and Dimandja (2017) referred to the concept of mastery in their definition of PL as *mastery of skills and content*; instruction should reflect student interests and needs to promote student mastery of specific skills and content. ASCD (2012) specifically

included the element of *mastery/competency-based progression and pace* in PL. Students' progress through content at their own pace and move forward as they show mastery or competency of concepts and skills. The pace and progression of learning has no time constraints, grade levels, or certain teachers or schools. Other researchers did not directly mention mastery in definitions of PL but related *mastery /competency-based* learning to students working at their own pace (APLUS, 2012; Bray & McClaskey, 2017; Gates Foundation, 2014; Lokey-Vega & Stephens, 2018; NCLD, 2018; US-ED, 2015). A few definitions do not include mastery as part of PL (CCSSO & Jobs for the Future, 2017; Future Ready Schools, 2017; ISTE, 2018; PLF, 2012; Powell & Kusuma- Powell, 2011; Zmuda et al., 2015).

Technology

Technology is not a necessary component of PL (APLS, 2012; ASCD, 2012; Bray & McClaskey, 2017; Gates Foundation, 2014; ISTE, 2018; NCLD, 2018; Patrick et al., 2013; Powell & Kusuma-Powell, 2011; US-ED, 2015; Zmuda et al., 2015). Lokey-Vega and Stephens (2018) indicated that technology should be *harnessed* as a tool to design student learning. Others noted that technology provides access to information and tools to deliver content to meet the needs and interest of students (Bingham & Dimandja, 2017; PLF, 2012). Technology is not necessary for PL, but it is helpful to the instructional model. Bray and McClaskey (2017) and the Gates Foundation (2014) affirmed the use of technology to help students become more engaged in learning. Future Ready Schools (2017) and Zmuda et al. (2015) asserted that teachers can use technology to (1) customize instruction; (2) collect data; and (3) provide formative, diagnostic, and summative assessments. Technology provides flexibility of location, time, format, and pace of instruction and learning (APLUS; ASCD, 2012; ISTE, 2018; Patrick et al., 2013; US-ED, 2015). Except for CCSSO & Jobs for the Future, 2017 and Powell and Kusuma-Powell (2011),

who did not reference technology in PL, technology is present in all other definitions of PL. Technology in PL provides various opportunities to meet the needs of learners (e.g., access to digital content and resources, communication, collaboration, assessments, and goal tracking).

Differentiation, Personalization, and Individualization

The PL model is similar to other educational approaches such as differentiation and individualization. Some researchers considered PL, differentiation, and individualization as three distinct concepts and others considered individualization and personalization as different ways of achieving differentiation. The terms personalization, individualized, and differentiation describe individual methods, but some definitions use them as subsets of each other. Bernacki and Walkington (2018) supported the U.S.-ED (2010) stance on the differences between the methods. “As learning tasks are adapted in light of learners’ individual differences, learning becomes individualized, and when the experience is differentiated for learners based on their interests, preferences, and experiences, it becomes personalized” (Bernacki & Walkington, 2018, p. 864).

Differentiated instruction concentrates on students’ strengths to elevate their academic achievement. Grant and Basye (2014) suggested that individualization and personalization are methods of differentiated instruction for learners. These models of differentiation differ in their components (e.g., standards, goals, demonstration of learning, learning processes, assessment, collaboration, and self-direction). Individualized teaching strategies focus on basic skills in standard lessons depending on assessment results. Students work independently, complete lessons at their own pace, and receive remediation until they reach achievement levels. In personalization, students’ learning goals reflect their interests and abilities and demonstrate their learning in a variety of ways. The learning process depends on student choice and assessments

are frequent. Student collaboration is critical to learning but the student is self-directed regarding how they learn and demonstrate learning (Grant & Basye, 2014).

Clarke (2013) and Bray and McClaskey (2015) separated PL from individualization and differentiation based on the role of student agency and choice in student learning. Netcoh (2017) supported Clarke (2013) and Bray and McClaskey (2015) by suggesting that the PL environment design should depend on students voicing how they learn best and choosing ways to demonstrate learning. Differentiation and individualization give teachers primary responsibility for learning tasks and assessments. According to Clarke (2013), students' control of their learning further separates PL from the models of individualization and differentiation.

Zmuda et al. (2015) supported the idea that personalization, individualization, and differentiation are three distinct delivery models. Personalization is student-driven in development, process, and assessment of learning. In the individualization model, students control the pace of their learning and teachers drive the instruction. This is similar to differentiation in which the teacher develops instruction depending on students' needs and interests and students have a choice in the process and content of their learning. The guiding difference between the three models is that PL is student-driven, and individualization and differentiation are teacher-centered (Zmuda et al., 2015). This differs from the U.S.-ED (2010) viewpoint that "personalization encompasses differentiation and individualization" (p. 12). According to the U.S.-ED (2010), they are not distinct models; differentiation and individualization are part of PL.

The goal of all three models is to improve student engagement and academic achievement by focusing on students' strengths, interests, and needs. The clear distinction between personalization, differentiation, and individualization is role of the student in these

processes. Personalization places the student in direct control of their learning. The other two models include some student choice, but PL gives students agency in the design, process, and assessment of their own learning (Bray & McClaskey, 2015; Zmuda et al., 2015). Figure 1 visually represents the similarities and differences between the models.

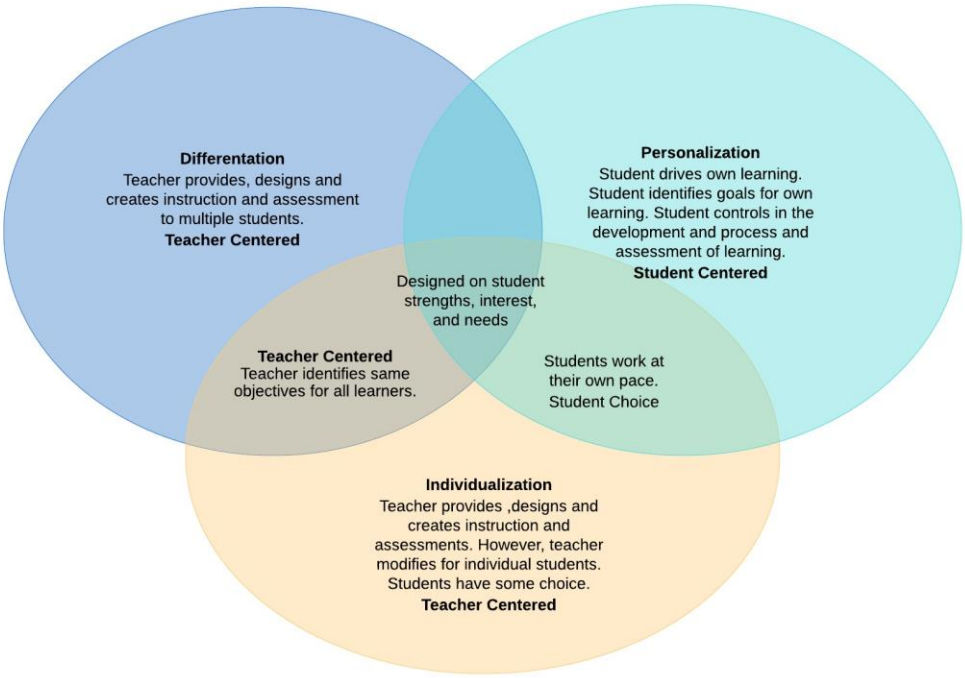

Figure 1. Comparison chart between differentiation, individualization, and personalization.

Components of the Personalized Learning Model

The definitions of PL in research provide a broad concept of the term. In further review of the research regarding a variety of instructional models a host of new terms associated with PL arise. These new terms allow further unpacking of the elements of PL. In addition to the definition of PL, some sources elaborate on the components or elements of PL. Six educational organizations and practitioners provided instructional models of PL in recent literature. Just as the definitions of PL vary, descriptions of essential components or elements of the instructional model also differ. Some descriptions of PL include very few components and others have over ten components (Bray & McClaskey, 2017; Gates Foundation, 2014; Lokey-Vega & Stephens, 2018; Patrick et al., 2013; Prain et al., 2013; Wolf, Bobst, & Mangum, 2017). Many components align with published definitions of PL (e.g., student control of learning, varied learning

environments, role of technology, student agency, and mastery/competency-based learning). Other elements in some models include feedback, parent involvement, student support needs, goal and benchmark setting, project or performance-based assessments, and customized learning paths. These essential components of PL may help teachers meet the needs of all learners. Table 2 includes components that each set of researchers described.

Table 2

Elements of Personalized Learning

Definition Elements	Gates Foundation	iNacol	Prain et al.	Wolf, Bobst, Mangum	Bray & McClaskey	Lokey-Vega & Stephens
Accommodating Student Differences	Learner Profiles Customized Learning Paths	Student Agency (Voice and Choice) Differentiate Instruction Student Profiles (Learning Plans)	Curriculum Entitlement /Choice	Student Agency	Student Agency (Voice/ Choice) Customized Learning Paths	Individual Path
Student Centered Learning			Assessment for Learning	Student Centered	Student Driven	Prioritized Executive Function Learner Voice Expanded Collaboration
Varied Learning Environments	Flexible Learning Environments	Flexible Pacing	Effective Teaching/ Learning School Organization	Flexible Pacing		
Student Mastery of Learning	Mastery/ Competency Based	Standards Based		Standards Based	Mastery/ Competency Based	Mastery Dispositions Growth Mindset
Role of Technology	Technology	Anytime/ Anywhere Learning	Extended Classroom	Digital Content Intertwine with Digital Learning Anytime/ Anywhere	Technology	Flexible Content
Assessments		Immediate Performance/Project Based Assessments Problem Solving			Goal and Benchmark Settings	Authentic and Adaptive Assessment
Other		Instructional Intervention/Supports			Support Student Needs	Dynamic Communication

Accommodating Student Differences

All models of PL include elements that support accommodating student differences (Bray & McClaskey, 2017; Gates Foundation, 2014; Lokey-Vega & Stephens, 2018; Patrick et al., 2013; Prain et al., 2013). Descriptions of ways to accommodate student differences include: *learner profiles* (Gates Foundation, 2014), *customized learning paths* (Bray & McClaskey, 2017; Gates Foundation, 2014; Lokey-Vega & Stephens, 2018; Patrick et al., 2013), *agency*/*voice and choice* (Bray & McClaskey, 2017; Prain et al., 2013), *differentiated instruction* (Patrick et al., 2013), *pace* (Wolf et al., 2017), and *curriculum entitlement* (Prain et al., 2013).

Two models include *agency*/*voice/choice* as an element of accommodating student differences in learning (Bray & McClaskey, 2017; Prain et al., 2013). Students can voice how they learn best and have choice in how they demonstrate their learning. Prain et al. (2013) included the element of choice in their model along with *curriculum entitlement*. According to Prain et al. (2013), students are entitled to a curriculum that meets their individual needs. This element has the same intent as Patrick et al. (2013): the inclusion of *differentiated instruction* to accommodate student needs. Wolf et al. (2017) included flexibility in pace of learning as an essential element of PL to accommodate different student needs. Allowing students to move at a pace that is right for them and providing different methods to progress are key to PL models. This is the concept of *customized learning paths* from the three learning models (Bray & McClaskey, 2017; Gates Foundation, 2014; Lokey-Vega & Stephens, 2018). Students' progress through curriculum and obtain mastery at their individual pace on unique pathways. The learning process reflects individual students' needs and interests without boundaries of traditional timelines for mastery. The Gates Foundation (2014) and Patrick et al. (2013) incorporated learner profiles into PL. Curriculum designers create student profiles that detail individual

strengths, needs, motivations, progress, and goals. These profiles help teachers develop learning processes to meet students' individualized needs.

Student-Centered Learning

Models of PL include elements related to student-centered learning (Bray & McClaskey, 2017; Patrick et al., 2013; Lokey-Vega & Stephens, 2018; Prain et al., 2013; Wolf et al., 2017). Student-centered learning includes concepts of *assessment for learning* (Prain et al., 2013), *student-centered* (Wolf et al., 2017), *student-driven* (Bray & McClaskey, 2017), *prioritized executive function and expanded collaboration* (Lokey-Vega & Stephens, 2018), and *student agency* (Bray & McClaskey, 2017; Patrick et al., 2013; Wolf et al., 2017). PL models support a shift in teaching and learning from teachers as decision-makers to students; this element is *student-centered learning* (Wolf et al., 2017). Learning opportunities and learning environments are not *one size fits all*. Instructional strategies, pace, and instructional support may vary by the student.

The concept of *student agency* (i.e., students leading the development of the learning process) is part of all three models of PL (Bray & McClaskey, 2017; Patrick et al., 2013; Wolf et al., 2017). *Student agency* gives students some control over how they learn. Lokey-Vega and Stephens (2018) referred to this control as *prioritized executive function.* Prioritized executive function is when students have the skills or cognitive processes to direct their own learning. Students direct their own learning and establish individualized goals (Lokey-Vega & Stephens, 2018). Students feel empowered by having ownership of their learning (Wolf et al., 2017). This is a necessary element for PL to be functional.

Student-driven learning is part of PL models that refers to students owning and co-designing learning to meet their individual needs and interests (Bray & McCaskey, 2017). This

concept is comparable to the *expanded collaboration* element in Lokey-Vega and Stephens' (2018) model. Students are equal contributors to their learning. They collaboratively set goals with teachers and stay in the same learning environment with the same teachers for several years (Lokey-Vega & Stephens, 2018). The Gates Foundation (2014) did not specify elements strictly related to student-centered learning. However, many of their elements support the idea of learning that aligned with students' interests and needs.

Varied Learning Environments

Some models of PL include references to varied learning environments (Gates Foundation, 2014; Patrick et al., 2013; Prain et al., 2013) and others do not (Bray & McClaskey, 2017; Lokey-Vega & Stephens, 2018; Wolf et al., 2017). PL may include *flexible learning environments* (Gates Foundation, 2014), *flexible pacing* (Patrick et al., 2013), *effective teaching and learning,* and *school organization* (Prain et al., 2013). In the Gates Foundation (2014) model, a *flexible learning environment* in refers to school resources such as staffing, space, and time that administrators allocate based on the needs of students. Physical learning environments may vary, and instructional time is not the same for every teacher. *Flexible pacing* elements of PL include students working at their own pace and using tools that augment their strengths (Patrick et al., 2013). Learning occurs through multiple instructional methods and not all learning is the same. Prain et al. (2013) included elements of *effective teaching and learning* and *school organization* in reference to varied learning environments. *Effective teaching and learning* require teachers to recognize that classroom environments vary (e.g., grouping of students or use of ICT). When and how students and teachers interact varies based upon the needs of the students. *School organization* (i.e., workforce or school model) may vary as well to support the

needs of students. This is similar to the Gates Foundation's (2014) ideas regarding flexible learning environments.

Bray and McClaskey (2017) did not specifically describe varied learning environments in their model, but they did describe many ways of implementing PL. Physical learning environments can be flexible learning spaces within a classroom, blended learning spaces, 1:1 devices, or computer labs. Fixed traditional classroom systems with set grade levels shift to flexible learning systems (e.g., competency-based and multi-age groups) for PL (Bray & McClaskey, 2017). Wolf et al. (2017) described flexible learning space within a classroom as students doing a variety of different tasks and teachers working as guides. Lokey-Vega and Stephens (2018) did not discuss the physical learning environment but described students working on their own path at their own pace. Student success was the meeting of individual goals, not grade level.

Student Mastery of Learning

Another common element of PL is mastery (i.e., competency-based progression and assessment based on standards and student-defined goals) (Bray & McClaskey, 2017; Gates Foundation, 2014; Lokey-Vega & Stephens, 2018; Patrick et al., 2013; Wolf et al., 2017). Across PL models, elements of student mastery include *mastery/competency* (Bray & McClaskey, 2017; Gates Foundation, 2014), *standards* (Patrick et al., 2013; Wolf et al., 2017), *mastery dispositions,* and *growth mindset* (Lokey-Vega & Stephens, 2018). One model does not include a specific element of student mastery (Prain et al., 2013).

Competency-based learning is proficiency- or mastery-based. Students advance in their learning once they demonstrate mastery of the content. In *mastery-based learning*, students work independently and must attain a defined level of mastery of prerequisite knowledge before they

may move on to the next level of learning (Bray & McClaskey, 2017; Gates Foundation, 2014). *Mastery dispositions* reflect the same concept as *mastery/competency-based learning* in that students can master any competency at their own pace with proper support (Lokey-Vega & Stephens, 2018). These competencies should align with students' needs, strengths, and interests. Mastery/competency-based learning models are not PL unless there is an element of *student agency*. Student mastery requires a *growth mindset.* In a *growth mindset*, learning is ongoing, and failures are part of the learning process; learning continues and there is no final point of success or failure (Lokey-Vega & Stephens, 2018). This element of PL negates the need for grade level or mastery deadlines. *Standards-based learning* adheres to the standards of the district and state. Students can create individual pathways based upon the standards. Once they meet the standards, students are free to explore and extend their learning according to their interests (Patrick et al., 2013; Wolf et al., 2017).

Role of Technology

The use of technology is a component of all of PL instructional models (Bray & McClaskey, 2017; Gates Foundation, 2014; Patrick et al., 2013; Prain et al., 2013; Lokey-Vega & Stephens, 2018; Wolf et al., 2017). The role of technology appears in the literature as simply *technology* (Bray & McClaskey, 2017; Gates Foundation, 2014), *anytime/anywhere learning* (Patrick et al., 2013; Wolf et al., 2017), *extended classroom* (Prain et al., 2013), *digital content* or *intertwined digital learning* (Wolf et al., 2017), and *flexible content* (Lokey-Vega & Stephens, 2018).

Technologies support anytime/anywhere learning (Patrick et al., 2013; Wolf et al., 2017). Technology allows learning to take place outside of traditional classrooms and outside normal time constraints of the school day. Additionally, Wolf et al. (2017) noted that student access to

technology (e.g., digital content or instruction via digital learning) is vital for PL. Personalization cannot occur without leveraging technology. Prain et al. (2013) described this component of PL as the extended classroom. Technology allows learning to take place outside the classroom through digital communication and collaboration. This model incorporated the use of instructional computing technology (ICT) to support learning. Lokey-Vega and Stephens (2018) suggesting that teachers leverage technology to deliver *flexible content* to meet the needs of learners. The use of digital content and systems allows teachers to access a collection of data to inform instructional decisions. Technology is a key component of PL (e.g., tracking student progress and achievement). Flexible content in PL is not limited to digital content. The Gates Foundation (2014) and Bray and McClaskey (2017) used the broad term *technology* as an element of PL to support the integration of technology in many ways. Digital course content and assessment tools provide teachers with ways to adapt instruction and curriculum based upon student progress. Technology is part of PL because it facilitates elements of the instructional model (Gates Foundation, 2014).

Assessments

Some models of PL include an *assessment* element (Patrick et al., 2013; Lokey-Vega & Stephens, 2018; Wolf et al., 2017); while others do not (Bray & McClaskey, 2017; Gates Foundation, 2014; Prain et al., 2013). Forms of assessment in PL are described as *performance and project-based assessments* (Patrick et al., 2013; Wolf et al., 2017), *goal/benchmark settings* (Bray & McClaskey, 2017), and *authentic and adaptive assessments* (Lokey-Vega & Stephens, 2018). *Authentic and adaptive* assessments are defined as ongoing, flexible, varied, and performance-based (Lokey-Vega & Stephens, 2018). Students and teachers have data to make informed decisions regarding the design of the learning process. *Performance assessment*

combined with *problem-solving skills* require that students' complete tasks with critical thinking and problem-solving skills (Patrick et al., 2013). Performance assessments incorporate the same ideas as *authentic assessments*; students apply their skills and knowledge in a real-world setting or situation. *Project-based assessments* are the capstone of the learning process. This type of learning can reflect either students' interests or district/state standards (Patrick et al., 2013; Wolf et al., 2017).

Other

Other elements of PL models are *instructional interventions/supports* (Patrick et al., 2013), *school organization* (Prain et al., 2013), *support student needs* (Wolf et al., 2017), *dynamic collaboration* (Lokey-Vega & Stephens, 2018), and *goal/benchmark settings* (Bray & McClaskey, 2017). These elements are not universal to all PL models. *Dynamic collaboration* is another core element of Lokey-Vega and Stephens' (2018) model. In this collaboration, communication between student and teacher must occur frequently, formally and informally, throughout the learning cycle.

As demonstrated in this literature review, there are many ideals, components associated with PL for K-12 students, but there is no clear or unified definition of PL. Educators and practitioners are diverse in their preferred models of PL and incorporate multiple elements while using differing terms. Therefore, educators struggle to understand what PL is and how to apply the core elements of the conceptual model.

Review of Research on K-12 Personalized Learning

This section provides a synthesis of current studies on the implementation of PL, including the use of technology used and the factors that enable and impede PL in K-12 classrooms. Also, of interest were teachers' perceptions of PL. The studies used in this literature review were procured when completing a search through JSTOR using "personalized learning" AND "implementation" in the last five years and limited to peer -reviewed academic resources. Due to limited number of studies available this required a broader search of "personalized learning" AND "K-12 education in the United States." The result of this search were 13 studies of implementations and two of studies that include teachers' perceptions of PL.

K-12 Implementation of Personalized Learning

Most of the research on the implementation of PL were case studies receiving federal funding or grants from private/non-profit organizations. The research related to the implementation of PL shares similar characteristics with the definitions of PL. Often the descriptions of personalized learning vary greatly, showing that there is little consensus of what PL is or how it should be implemented. Yet, the studies provide important clues to how educators are conceptualizing PL and what role technology is playing in the PL landscape. These studies are summarized in Table 3.

Table 3

Studies on the Implementation of PL

Study	Description	Model of PL	Implications
Operational Understandings Basham et al., 2016	Research took place over 5 years at a state over district with 12 schools in a large urban area. The research focus on how PL was operationalized and the success of students with disabilities in PL environments.	• Personalized learning paths • 1:1 computing • Online learning through LMS • Learner Voice	The data collected in this study is very high level without deep descriptors how PL is enacted in teachers' classrooms.
Bingham, 2017	The study discusses the inception of PL at one charter high school and how the implementation has involved and the implications of the implementation.	• Blended Learning • Online Learning • Mastery-based	The research provides a glimpse of how PL evolved over three years at one school. The data collection provides some educators narratives of their experiences through the process.
Bingham & Dimandja, 2017	This study examined teacher experiences in using a PL model. The study occurred at a charter high school in an urban area. The school has flexible hours and had flexible delivery of content.	• Blended Learning • Online Learning	This study does provide thick descriptions from some of the teacher in the study of their PL teaching experiences. Concerned they noted are: • Role of student discipline and accountability • Importance of data utilization and analysis • Differences in teacher experiences (technology, years teaching)

Table 3 Continued

Implementation Challenges- Bingham et al., 2018	This research focused on the challenges and where the challenges stemmed from during the enacted of PL at 28 school from variety of level. The study does not provide details on how each school implemented PL, and the specific models utilized at each school.	The schools used variety of approaches. The study was not specific in the school level or specific of in implementation. • Blended Learning • Project Based Learning • STEM • Mastery- Based	The study did provide some deep descriptors from teachers and student however not at high detail. Challenges noted: • School infrastructure and technology did not meet teacher needs • PD and strategies and practices do not meet teachers needs • School and student success in PL model measurement do not align to stakeholder measure of success
DeArmond & Maas, 2018;	Research regarding 17 sites of Next Generation Learning Challenge early implementation of PL and systems which support the implementation.	Descriptions are provided of two elementary school within the study. • Blended learning • Rotation Model	Teachers were allowed much leeway to experiment in the process which caused some confusion. The schools had to refresh and develop commons vision, mission, and practices. The information provides some descriptions of how implemented and challenges the schools faced.
DeMink-Carthew, et al., 2017	This study focuses on 11 middle school teachers in Vermont and the approach to goal setting element in PL environments. These teachers attended summer PL on this topic.	• Project – Based/Cross-Curricular Learning • Goal Setting • Student Interest	The research analyzed five approaches to goal settings, and which aligned key elements of PL. The study outlines the different approaches of goals setting and provides discussion of which best align with PL. However, missing thick descriptions of how PL is implemented in these teachers' classrooms.

Table 3 Continued

Race to the Top-District Reform Support Network, 2014	This study focuses on four Race to the Top district grantee and their implementation of personalized learning. The research provides a glimpse of how PL was implemented, including preparation, infrastructure, technology, and professional development. Each of the school districts implemented PL differently in model and scope in their districts.	• Blended learning - Rotation Model • Blended learning - Flex Model • Flipped Classroom • Individualized student pacing • 1:1 computing • Funding of Math Labs	The study provides feedback and guidelines to assist others in planning for implementation of PL. Information provide describes high level the models which were enacted whether across the schools and limited implementation. No thick descriptions are included of classroom conceptualization of PL.
Gaming-Evans et al., 2014	This study researches the impact of network learning games in middle school math. Three priority areas included students with personalized feedback, accessing student learning, and promoting deeper understanding. The online game used was Candy Factory and is used as an example of how gaming can be used to collect data to personalized learning for students.	• Online educational game • Personalized Pace and Path	The study provided detail research on the gaming in learning as well as how the Candy Factory program worked. However, it is lacking deep descriptions of how the system was enacted in the classroom.

Table 3 Continued

Hanover Research, 2012	This research focused on best practices of middle school years (4-th grade) at Race to the Top Districts. These schools focus on promising practice outside of traditional education including personalized learning. o	• Blended Learning • Personalized Learning plans • Competency/Performance Based • Non-grade band curriculum framework	The research allows for high level description of tools, technology, and programs. The data collected does not allow for student or educator perspective on the use of implementation of PL. The variety of definitions of PL is discussed.
Halverson et al., 2015	This study summarizes the practices of PL in 12 K-12 public schools in the Midwest US. The researchers spoke to the schools' community members, completed site visits, and classroom observations. The participants of the study included a variety of school levels and academic focus of the schools. The questions the study looked to answer include: how to create a culture of change, how to shift the role of educators, and how do learning technologies develop socio-technical ecologies?	Models used varied on the grade level of school and focus of school. • High school- student pathways with co-planning based upon interest- based trajectories focused on standardized math and literacy proficiencies. • Middle school level has high level of choice of how and when they work on tasks with learning pathways. • Elementary schools have weekly targets which students sequence the work themselves. • The schools use playlisting with computer -adaptive learning tools and software in addition to online productive tools, learning management systems, online assessment tools and content.	This research provides quality information of the different models of PL including the variety of technology-based tools and how tools used supported the elements of PL. Discussions are provide in the role of student and teacher regarding student choice and agency of their learning. Limited thick descriptions are provided of the daily enactment of PL.

Table 3 Continued

Netcoh, 2017	The study focused on one middle school team of teachers who implemented a dedicated PL time a team wide PL class. The study investigated the role of choice in PL class.	• Student Choice • Student Agency • Flexible Learning Environment	The data collected provides limited deep descriptions in the implementing of PL in the class. The study noted teachers and students struggle over bounds of student choice and teacher struggle with giving students control over learning targets.
Success and Challenges- Netcoh & Bishop, 2017	The study focused on one middle school team of teachers who implemented a dedicated PL time a team wide PL class. The study focused the success and challenges of the study.	• Student Choice • Student Agency • Flexible Learning Environment	The study is set for a designated time which student have control of their learning include choice. The study provides insight of success and challenges of implementing PL. However, it is unique to being implemented outside a typical standardized based classroom.
Continued Progress- Pane, et al., 2015	This research conducted by RAND to support the Gates Foundation funding of PL commitments. The study reviewed 32 schools in an urban area and focused on achievement data, design characteristics, and perceptions of PL implementation. C	These schools focused on three elements of PL: personal learning paths, learner profiles, flexible learning environments, and additional focus of college and career readiness. • Student has individual learning goals. • Students have multiple opportunities in how they completed learning tasks (path/learning environments)	The research reflects positive student achievement growth and achievement. It was noted schools with highest growth also implemented student grouping, learning space supports, and include student data talks. The data allows for discussion of teacher and student comfortability in the implementation of PL. The research provides takeaways regarding implementation, and three elements of PL utilized. While these takeaways are not deep descriptions, they provide perceptions from the school community.

Table 3 Continued

Lokey-Vega and Stephens, 2019	This study proposes a Personalized Learning Framework Continuum Framework (PLCF) as a conceptual framework to assist educators and researchers in relationships between the various models of PL.	The framework allows the distribution of the following in individual models: • Percent of ALT (Academic Learning Time) • Types of automated pedagogies • Percent of ALT on student-centered pedagogy • Types of student-centered pedagogy • Distribution of power, agency, and agents	The research provides an alternative view in conceptual foundation and discourse in definition of PL. Models of PL are diverse as educators and learners. Instead trying to determine one binary definition and enactment of PL, but instead seek to determine the effectiveness of each unique models in practice.

In the studies that discuss on the implementation of PL, the implementations were not consistent in the classrooms. Schools that have implemented personalized learning will often focus on just one aspect of PL such as student choice. These implementations vary based upon grade level, content, and number of classrooms. The studies themselves ranged in focus from broad implementation experiences or challenges to focus on one element of PL.

Implementation of Personalized Learning

Current research on the implementation of PL does not provide an example of implementation for a whole school with all the major elements of PL. Researchers provide a variety of conceptualization of PL that include the following elements: accommodating student differences (Basham et al., 2016; Bingham, 2017; DeArmond & Maas, 2018; DeMink-Carthew et al., 2017; Evans, Pruett, Chang, & Nino, 2014; Halverson et al., 2015; Hanover Research, 2012; Netcoh, 2017; Netcoh & Bishop, 2017; Pane, Steiner, Baird, & Hamilton, 2015); student centered learning (DeMink-Carthew et al., 2017; Hanover Research, 2012; Netcoh, 2017; Netcoh & Bishop, 2017); student mastery of learning (Bingham, 2017; Bingham et al., 2018; DRSN,

2014; Pane et al., 2015); varied learning environments (Bingham, 2017; Bingham et al., 2018; DRSN, 2014; Pane et al., 2015); and the role of technology (Basham et al., 2016; Bingham, 2017; Bingham et al., 2018; DeArmond & Maas, 2018; DRSN, 2014; Evans et al., 2014; Halverson et al., 2015; Hanover Research, 2012; Pane et al., 2015). However, there is no single implementation that includes all these elements of PL. Like research regarding the definition of PL, implementation of PL elements in K-12 education in the United States is vague. These researchers noted schools' approaches to PL instruction, but they failed to describe the conceptualization of these approaches.

Lokey-Vega and Stephens (2019) proposed an inclusive definition and introduction of Personalized Learning Continuum Framework (PLCF). Lokey-Vega and Stephens (2019) defined PL as, "the mass customization of learning through a unique combination of automated and student-centered pedagogies" (pg. 317). According to Lokey-Vega and Stephens (2019), *automated pedagogies* are instructional strategies which use computers systems to deliver instructions and curriculum content to learners (pg. 317). With the use of this definition, the PLCF allows customization of the model to meet the needs of the different schools and classrooms. The PLCF places the distribution of automated pedagogies and student-centered pedagogies on a continuum that allows for implementation based upon the availability of resources and needs of learners. Lokey-Vega and Stephens's (2019) proposed definition and framework seek to remove the challenge of trying to find an example which fits every context.

Accommodating Student Differences Implementation Strategies

There are eleven studies that include PL implementations with the element of accommodating student differences (Basham et al., 2016; Bingham 2017; DeArmond & Maas, 2018; DeMink-Carthew et al., 2017; DRSN, 2015; Evans et al., 2014; Halverson et al., 2015;

Hanover Research, 2012; Netcoh, 2017; Netcoh & Bishop, 2017; Pane et al., 2015). DRSN (2015) conducted a case study of the implementation of four *Race to the Top* grantees funded by the US-ED. These school districts shared some elements of PL (e.g., a blended learning environment). Teachers tailored learning activities to the needs of students using technology. The school districts used a variety of instructional strategies to accommodate student differences, including station rotation, small group instruction, self-paced/individualized work, online tools for students to work at their own pace, and project-based learning (PBL) (DRSN, 2014). Student agency was limited to high school-level students, who controlled the pace and manner in which they learned. Student choice regarding what they learn, how they learn, or how they display mastery of their learning was not part of the study.

Each school that DRSN (2014) reviewed employed a different approach to PL. One district implemented PL for middle and high school students through English language arts (ELA) classes. Individual schools had the options to expand to other content. The district implemented blended learning in conjunction with a 1:1 initiative. The blended learning supported teacher-led instruction of large and small groups, individual work, and rotation. One teacher implemented a *flipped* approach in their algebra course. In this flipped approach, students reviewed new instructional content through the use of technology outside the classroom and instructional time in class allows deeper activities regarding content. Many similar approaches to accommodating student differences appeared in a Next Generation Learning Challenges (NGLC) school's implementation of PL (DRSN, 2014). Bingham (2017) conducted a case study of one high school's implementation of PL that used the same instructional approaches: blended learning with student self-pacing and choice. In the blended learning approach, students receive instruction through a combination of online and traditional teacher led instruction. Hanover

Research (2012) described the same instructional strategies to cater to individual learning styles at one of the three schools in their case study research. The students progressed through state curriculum at their own pace (Hanover Research, 2012).

DeArmond and Maas (2018) studied two elementary schools with broad visions of PL implementation. Teachers received few guidelines except to implement station-rotation and blended learning to increase students' choices in their learning of clear learning targets. There was not a consistent model across schools; teachers were free to experiment. At one school, teachers used a variety of approaches. One team focused just on math and reading. In another model, all teachers covered all subjects and students moved to different classrooms. Another utilized self-contained traditional classrooms with teachers covering all subjects. An NGLC elementary school used station rotations and data-driven small group instruction (DeArmond & Maas, 2018). Basham et al. (2016) studied the use of similar strategies to support student learning differences through the implementation of PL. The schools used small group instruction and technology to support individualized work. Students had a voice in choosing their learning activities (Basham et al., 2016).

Pane et al. (2015) conducted a case study at 62 schools funded either by the Gates Foundation or through foundation-supported initiatives (e.g., NGLC, Charter School Growth Fund's Next Generation School Investments, and the Gates Foundation's Personalized Learning Pilots). These schools accommodated student differences using learner profiles and student learning paths. However, there was no standard among the schools regarding the extent to which students had choice. One school introduced interdisciplinary PBL for half a day depending on student interest.

Netcoh (2017) and Netcoh and Bishop (2017) found that PBL was a useful way to accommodate student differences. Netcoh's (2017) case study focused on balancing freedom and limitations regarding student choice in PL. Netcoh and Bishop (2017) noted the successes and challenges of implementation. The model of PL here was independent and interest-based; students chose topics of study. The time was designated as e-time, the approach was project-based, and students created products to demonstrate mastery of learning. Content was not standards-driven, but students gained skills that influenced their abilities in other courses. Students noted the appeal of having choice, but teachers struggled to ensure academic rigor (Netcoh, 2017). This approach to accommodating student differences appears in several other studies (DeArmond & Maas, 2018; DeMink-Carthew et al., 2017; Halverson et al., 2015; Netcoh, 2017; Netcoh & Bishop, 2017). Similarly, DeMink-Carthew et al. (2017) studied of a group of middle school teachers who set a time and place for students to engage in PBL. Likewise, one of the schools DeArmond and Maas (2018) studied expanded PL by using PBL with the expectation of students completing two projects per year.

Evans et al. (2014) researched the implementation of a game-based design of PL to accommodate student differences. The learning experience was personal and reflected individual interests of the students. Evans et al. (2014) found that learning games can provide students with personalized feedback, assess student learning, and promote deeper learning. The use of learning tools allows for the collection of data to customize instruction to accommodate student differences. Halverson et al. (2015) also reported a game-based implementation of PL. One of the schools' goals was to develop standard proficiencies in math and literacy through interest-based learning trajectories using principles such as game-based design (Halverson et al., 2015).

Student-Driven Learning Implementation Strategies

Four implementations of PL in the literature have students as the drivers or designers of their learning (Basham et al., 2016; DeMink-Carthew et al., 2017; Halverson et al., 2015; Netcoh, 2017; Netcoh & Bishop, 2017). Halverson et al. (2015) studied schools in which students drive their learners via varied approaches. One school's approach to PL included weekly conferencing between students and teachers to discuss and design student learning goals. At another school, students controlled the order and social aspects of their learning. Another school permits students to decide how to meet their weekly learning targets, whether through seminar, small group instruction, or individual work (Halverson et al., 2015).

Basham et al. (2016) noted that students meet with teachers to identify mastery levels and determine skills. They have a voice in how and where they learn. Halverson et al. (2015) also noted scaffolding opportunities for learners to control their learning. Students may benefit from choice but need to meet learning standards. DeMink-Carthew et al. (2017) focused on goal setting that incorporated student control in the design of PL. They implemented five different approaches to goal setting at one middle school: (a) independent design (i.e., students had autonomy, teachers simply created time and space for learning; (b) interest-driven co-design (i.e., students work with teachers to develop goals); (c) interest- and skill-driven co-design (i.e., students and teachers design a learning experience of interests that teaches cross-disciplinary skills); (d) skill-driven co-design (i.e., teachers introduce cross-disciplinary skills and students identify the skills they want to develop); and (e) selection (i.e., the teacher, not the student, writes the goal statement). Interest and skill-driven co-design were the most complex to implement (DeMink-Carthew et al., 2017).

Another approach to student-centered learning that Netcoh (2017) and Netcoh and Bishop (2017) noted was the implementation of e-time during which students created learning plans and designed methods for completing projects. This study differs from other implementations of PL, where the teachers are facilitators of instruction. However, they do not include students as designers in their learning (DRSN, 2014). In this study, researchers noted that students' autonomy sometimes caused conflict. Some students enjoy having control of their learning, but others benefit from structure (Netcoh, 2017). Teacher often struggle to meet learning targets without control over goals and methods. Other implementations of PL include teachers as facilitators of instruction; they do not include students as designers in their learning (DRSN, 2015).

Student Mastery of Learning Implementation Strategies

Four studies included the element of student mastery of learning in PL (i.e., mastery- or competency-based learning) (Bingham, 2018; Bingham et al., 2018; DRSN, 2014; Pane et al., 2015). Pane et al. (2015) noted a challenge for teachers implementing competency-based learning. Of the 62 schools in the study, two did not incorporate traditional grade levels. Other schools at the high school level allowed students to progress at their own pace if they demonstrated competency. Three of the schools allowed self-pacing but students still had to meet class-directed deadlines. The challenge for teachers was ensuring students covered content for district and state policies (Pane et al., 2015). Other studies reflected standards-based grading and students working at their own pace (DRSN, 2014). Students were placed as standard age appropriate grade levels and teacher guided pace with the district and state policies. Due to state and district polices, mastery- or competency-based learning tends to be the hardest element to implement due to district and state policies and school organization (Bingham, 2017; Bingham et

al., 2018; DRSN, 2014; Halverson et al., 2015; Hanover Research, 2012). The challenge for teachers was ensuring students covered content for district and state policies (Pane et al., 2015).

Varied Learning Environments: Implementation Strategies

Three case studies included the element of varied learning environments in the implementations of PL (Bingham & Dimandja, 2017; DRSN, 2014; Pane et al., 2015). Learning occurs in various locations and instructional settings. A *Race to the Top* school district middle schools created math learning centers as opposed to a traditional classroom for instruction (DRSN, 2014). In the learning centers, 7th and 8th grade students utilized an online curriculum for math coursework; teachers worked as facilitators of instruction. Another *Race to the Top* district's high schools developed pathways for students to become college- and career-ready. They created extended learning opportunities (e.g., working with community partners to receive course credit) (DRSN, 2014). Another *Race to the Top* school district used funding to create *Kid's Zone*, a community partnership to assist students outside of school with services such as GED preparation classes and parenting education (DRSN, 2014).

Flexible Learning Environments

Pane et al. (2015) did not provide a detailed description of flexible learning environments. Most schools had extended school days or years to allow extra support in math and ELA. Pane et al. (2015) noted that schools used technology and flexible instructional space to create different environments for learning activities. The high school in Bingham and Dimandja's (2017) study had flexible hours and relied on digital content for instruction during and outside of school. Other research does not provide descriptions of varied learning environments beyond blended learning, students working at their own pace, or flexibility in classroom design.

Technology Integration Implementation Strategies

Technology plays a role in the implementation of PL (Basham et al., 2016; Bingham, 2017; Bingham et al., 2018; DeArmond & Maas, 2018; DRSN, 2014; Evans et al., 2014; Halverson et al., 2015; Hanover Research, 2012; Pane et al., 2015). This design element ranges from a class that is fully dependent on technology to technology playing a supporting role in collaboration as a source of resources, communication, and data collection. As *Race to the Top* schools, the three of the four school districts in the DRSN (2014) study implemented 1:1 device initiative for PL. The other schools purchased laptops to support their math learning centers. These schools used digital resources (e.g., instructional software) to support PL. One of the common elements across the *Race to the Top* school districts was the use of blended learning; students sometimes learn through online delivery of content (DRSN, 2014). The variations of technology integration are not cookie cutter across the implementation of PL (see Table 4).

Table 4

Variations of Technology Integration in Personalized Learning

Study	Strategies	Technologies
Operational Understandings Basham et al., 2016	• Flexible grouping (small group, large group) • Teacher -led and individualized instruction • Goal Setting/Tracking	• Customized learning management system (LMS) • Interactive white boards • Productivity tools
High Tech Charter Bingham, 2017	• Blended Learning • Online Learning • Pacing	• Productivity tools • Digital Curriculum
Teacher Experiences Bingham & Dimandja, 2017	• Blended Learning • Online Learning	• Content/Instruction delivery • District student information systems
Implementation Challenges- Bingham et al., 2018	• Blended Learning • Project-Based • Small Group • Teacher -led and individualized instruction	• Content/Instruction delivery • Web-based educational environment
Leading Personalized Learning DeArmond & Maas, 2018;	• Blended learning - Rotation model	• Productivity tools • Content/Instruction delivery
Goal Setting DeMink-Carthew, et al., 2017	• Goal Setting	• Productivity tool
Race to the Top District Reform Support Network, 2014	• Blended learning - Rotation Model • Blended learning - Flex Model • Flipped Classroom • Individualized student pacing • Goal Setting/Tracking	• Productivity tools • 1:1 computing • Content/Instruction delivery • District student information systems
Gaming Evans et al., 2014	• Gaming • Student Assessment	• Online mathematics game-based learning application • Productivity tools
Strategies for Implementing Future Ready Schools, 2017	• Not noted	• 1:1 computing
Best Practices Hanover Research, 2012	• Blended learning - Rotation Model • Electronic Portfolios	• Customized learning management system (LMS) • Productivity tools • Web-based educational environment • Content/Instruction delivery
Personalization in Practice Halverson et al., 2015	• Blended learning - A-la-carte model (additional instruction to meet student needs) • Individualized student pacing • Individualized student pathways • Goal Setting/Tracking	• Content/Instruction delivery • Customized learning management system (LMS) • Web-based educational environment • Productivity tools • Digital Playlist

Table 4 Continued

Choice Netcoh, 2017 Success and Challenges Netcoh & Bishop, 2017; Continued Progress Pane, et al., 2015	• Project- Based • Student Interest • Project-Based • Student Interest • Individualized student pathways • Collaboration • Student Learner Profiles	• Productivity tools • Web-based research • Productivity tools • Web-based research • Productivity tools • 1:1 computing • Content/Instruction delivery • Communication/Collaboration tools • Customized learning management system (LMS) • District student information systems

Blended Learning

Blended learning is a common element of PL implementation (Bingham 2017; DeArmond & Maas, 2018; DRSN, 2014; Halverson et al., 2015; Hanover Research, 2012; Pane et al., 2015). Technology allows for the collection and access of data during PL implementation. DeArmond and Maas (2018) described blended learning and the use of district-mandated online tools that drive instruction through technology. Hanover Research (2012) noted schools' use of technology included the use of *playlisting* to deliver content to students (i.e., students take daily assessments to determine their skill level, which informs a daily playlist of instructional activities to meet their needs.

Gaming

Evans et al. (2014) researched the implementation of PL that was solely dependent on the use of an online mathematics game-based learning application. The application allows teachers to collect assessment data to guide student learning. The tool itself manages learning activities based upon students' abilities and skill levels. The gaming aspect engages students in learning. Evans et al. (2014) failed to discuss how students engaged with the tools and whether they augmented teacher-led instruction.

Basham et al. (2016) focused on a school district that used a customized learning management system (LMS) design to create individualized and PL environments for students. Technology facilitated small group, large group, and individualized instruction. Data collected from technology tools allowed teachers to track goals and design future instruction. The school district supported teachers using technology to design new learning spaces.

Halverson et al. (2015) revealed that schools used learning technologies to provide information management, productivity tools, computer-adaptive assessment and curriculum, and digital media spaces. The online curriculum provided individualized content for math and reading. Teachers developed digital spaces for students to foster creativity in areas such as gaming, coding, production, and performance (Halverson et al., 2015). Other implementations also included technology in support roles (e.g., data collection, communication, collaboration, and production) (Basham et al., 2016; Bingham 2017; DeArmond & Maas, 2018; DeMink-Carthew et al., 2017; DRSN, 2014; Evans et al., 2014; Hanover Research, 2012; Netcoh, 2017; Netcoh & Bishop, 2017; Pane et al., 2015).

Education practitioners often struggle to understand PL (Patrick, Kennedy, & Powell, 2013). Schools apply various approaches to the PL model, but fail to incorporate all core contents in their implementation of PL (Basham et al., 2016; Bingham, 2017; DeArmond & Maas, 2018; Pane et al., 2015). Many schools implemented PL in math or reading using a PBL approach (Halverson et al., 2015) or designated time for student support and individualized learning (Netcoh, 2017; Netcoh & Bishop, 2017). There is limited research regarding implementations of PL in K-12 schools in the United States, but no research provides descriptive data regarding how teachers enact the instructional approach in classrooms. Such details may provide valuable insight to others implementing PL. Most researchers addressed PL at schools

funded by the U.S.-ED or charter schools (DeArmond & Maas, 2018; DRSN, 2014; Hanover Research, 2012; Pane et al., 2015). More detailed research of the daily implementation of PL may inform best practices for implementing PL in schools.

The Role of Technology in K-12 Personalized Learning

According to Jenkins, Williams, Moyer, George, and Foster (2016), technology can be an accelerator of learning; PL is impossible without technology. However, some argue the use of technology is not a requirement in the implementation of PL. For example, Montessori schools successfully implement PL without the integration of technology (Bentley, 2017). Technology is not a key component of PL but it provides access to resources, delivers instruction, productivity tools, communication and collaboration options, and assessments tools; and enables easier collection of data regarding the implementation of PL (Basham et al., 2016; Bingham, 2017; Bingham & Dimandja, 2017; Bingham et al., 2018; Netcoh, 2017; Netcoh & Bishop, 2017; Pane et al., 2015).

In some implementations of PL, technology is the center of the model (Evans et al., 2014; DeArmond & Maas, 2018; Halverson et al., 2015). For others, technology plays a supporting role (Basham et al., 2016; Bingham, 2017; Bingham & Dimandja, 2017; Bingham et al., 2018; Netcoh, 2017; Netcoh & Bishop, 2017; Pane et al., 2015). Current research does not reflect best practices for technology integration in PL. The roles of technology in PL implementation include: 1:1 computing, online learning programs, gaming, data collection, and delivery of content, assessments and student display of mastery.

1:1 Computing

Schools and districts that implement 1:1 device initiatives provide every student and educator with their own personal wireless computing device with access to the Internet and

instructional software (Penuel & Johnson, 2016). Schools with 1:1 device initiatives integrate technology within PL instructional models. Access to technology in education is an ongoing struggle due to lack of funding (DRSN, 2014; Future Ready, 2017; Pane et al., 2015). School districts attempt to shift funds and non-profit or governmental organizations provide funding through grants to support technology in schools (DRSN, 2014). Technology in instruction is more than a source of information. It is a way to design learning environments that meet diverse students' needs.

The integration of technology allows for blended, flipped, and online learning. Several implementations of PL included a blended learning model (DRSN, 2014; DeArmond & Maas, 2018; Patrick et al., 2013). The blended learning model has three core attributes: (a) online learning with some student control over time, place, path, and/or pace; (b) partial traditional instruction; and (c) modalities along each student's learning path (Basham et al., 2016; Patrick et al., 2013; Zmuda et al., 2015). Technology in blended models allows learners to master content and skills they need and maximize teacher time for instruction. Students can access digital content individually while teachers work with other students. Blended learning includes several models: *rotation*, *flex*, *a la carte*, and *enriched virtual* (Bray & McClaskey, 2015, Patrick et al., 2013). The r*otation model* is a combination of online learning, small group, and teacher conferencing (DeArmond & Maas, 2018; DRSN, 2014; Hanover Research; 2012). In a *flex model*, students learn primarily online with individualized content according to their needs (DRSN, 2014). In the *a la carte model*, students take part in online learning to supplement their learning (Halverson et al., 2015). In the *enriched virtual model*, student learning is primarily online. Blended learning cannot be the whole approach to PL but is an important component.

One of the schools in the DRSN (2014) study utilized a *flipped classroom* as part of PL implementation. Use of a flipped classroom involves the use of technology to leverage learning outside the classroom so the teacher has more time to interact with learners. The implementation of flipped classrooms as part of PL is possible using technology (Bray & McClaskey, 2015). Whole class instruction is no longer part of the instructional model. Students access video lectures of content or instruction as homework, which allows the teacher to engage in small group or individualized instruction during class time (DRSN, 2014).

Online Learning Programs

Online learning programs, such as content management or LMS, allow individual learning to take place within the classroom and extend outside of the classrooms (Basham et al., 2016; Bingham, 2018; Halverson et al., 2015, DRSN, 2014). Online software, such as computer-adaptive learning (CAL) tools, allow students to work independently. These online programs allow students to progress at their own pace in a customized space (DRSN, 2014; Halverson et al., 2015). Pathways in the online system direct students to learning activities as they sign in. Educators create activities for students to complete while other students work as a small group (Bingham, 2018). These tools allow educators to develop online pathways that may be competency-based or teacher-prepared materials (Halverson et al., 2015; Nagle & Taylor, 2017; Pane et al., 2015). Students and teachers can track their mastery of content through online assessments. In some school districts, content delivery/management tools are the mode of delivery for PL using tools such as ALEKS, iPrep Math, iCandy, SuccessMaker, or Khan Academy (Bingham et al., 2016; DRSN, 2014; Evans et al., 2014; Halverson et al., 2015; Hanover Research, 2012). Along with flipping instruction, technology extends the classroom. Students can access content, be creative, or communicate and collaborate at any time (Pane et al.,

2015) Technology allows students to connect with other learners in different schools, cities, or countries. Teachers and students have access to resources around the globe.

Gaming

Today's society is affected by a variety of technology. Students engage in various forms of online gaming outside of school. Educators implement the principles of game design to engage students in learning. Gamification is the use of game design in a non-game context, such as learning. Gamification may benefit implementation of PL (Evans et al., 2014). Several researchers referenced the use of online software with gaming elements as part of PL implementation (DRSN, 2014; Halverson, 2016). Evans et al. (2014) studied designs of PL with networked learning games in middle school math. Learning systems with a gaming format provide students with personalized feedback, access student learning, and promote deeper learning. Many online learning programs have embedded gaming structures such as Study Island and AKLES (Assessment and Learning in Knowledge Spaces) (Halverson et al., 2016). The effectiveness of games depends on the customization of the learning game and understanding of its benefits and limitations. Further research is necessary to understand the effectiveness of gaming software.

Technology Use in Data Collection

The collection of data is crucial in any implementation of PL. Technology efficiently collects and aggregates data that teachers use to determine students' ability levels, progress, and levels of mastery (DeArmond & Maas, 2018; Patrick et al., 2013). Teachers can obtain data without technology, but it is a much slower process. Teacher support students by tracking progress; most data within PL are formative and summative assessments. Some districts require use of online learning programs such as iStation or RM City to provide data from learning

activities and assessments to inform small group instruction and student conferences (DeArmond & Maas, 2018; Future Ready Schools, 2017). Teachers access a variety of data through online school systems to create learner profiles, which is a component of PL (Pane et al., 2015).

Delivery of Content, Assessments, and Student Display of Mastery

Technology improves the delivery of content and assessments and provides data and access to resources. However, student choice is a key component of PL. Students choose what, when, and how they learn and how to display their mastery. Technology provides students with access to digital design and distribution tools. Students can creatively showcase their understanding. The use of technology allows students to create videos, online blogs, websites, and digital media. Students engage in activities that align with their skills and interests (Halverson et al., 2016). Technology also improves productivity in a PL model. Online tools can be a place for students to turn in assignments, receive assignments, communicate, and access grades. Students can access online gradebooks or create an online portfolio to manage their progress and curate their work (DRSN, 2015, Halverson et al., 2015; Pane et al., 2015). Teachers use technology to provide solutions such as to-do lists, texting systems for communication, and progress trackers (Basham et al., 2016).

Current research does not specify a clear role for technology in PL implementations. In some implementations of PL, blended, flipped, or online learning are synonymous with PL. Ledesma (2012) noted that educators must understand PL as being innovative with teaching practices rather than the integration of PL. School districts rely heavily on technology in their PL models (e.g., 1:1 initiatives). Such implementations require technology to deliver instruction, access content or assessments, and demonstrate understanding via projects. Teachers utilize technology to design new learning spaces to meet student needs (Basham et al., 2016). Further

research is necessary to establish the role of technology in PL. Different forms of technology personalize the learning experience. Students' interest, beliefs, and motivations influence their use of computer-based learning tasks and outcomes (Bernacki & Walkington, 2018). There is limited empirical research on the effectiveness of technology in PL environments.

Perceived Benefits and Drawbacks of Personalized Learning

Research on students' and educators' perceptions of PL is limited to one study. Waldrip et al. (2012) focused on students' and teachers' perceptions of PL. However, ten studies regarding the implementation of PL provide some insight into student and educator perceptions of the benefits and drawbacks of PL environments on K-12 education (Bingham, 2018; Bingham & Dimandja, 2017; Bingham et al., 2018; Halverson et al., 2012; Netcoh, 2017; Netcoh & Bishop, 2017; Olofson, et al., 2018; Pane et al., 2015; Penuel & Johnson, 2016; U.S.-ED, 2014). Students and educators reported in these studies the benefits of PL as student agency or control of learning, deeper student/teacher relationships, and student achievement. Perceived drawbacks of PL noted include the viability of the model, student success on state-mandated assessments, disconnect between mandated curriculum and the PL design, and control of student progress. The insight into the perceived benefits and drawbacks of PL vary across the studies and many times are not discussed (see Table 5).

Table 5

Perceived Benefits and Drawbacks of Personalized Learning

Study	Benefits	Drawbacks
Operational Understandings Basham et al., 2016	• Student Agency	• Not noted
High Tech Charter Bingham, 2017	• Improve students' academic outcomes	• Student Accountability
Teacher Experiences Bingham & Dimandja, 2017	• Flexibility to adapt to student needs	• Student Accountability • Student do not have reasonability to stay on track
Implementation Challenges- Bingham et al., 2018	• Not noted	• Unprepared for state mandated assessments • Uncertainty of sustainability
Leading Personalization DeArmond & Maas, 2018	• Not noted	• Not noted
Goal Setting DeMink-Carthew, et al., 2017	• Not noted	• Not noted
Race to Top District Reform Support Network, 2014	• Student Achievement	• Not noted
Gaming- Evans et al., 2014	• Student Agency	• Reliability of learning games
Strategies for Implementing Future Ready Schools, 2017	• Provide opportunities not readily available to rural school students	• Not noted
Best Practices Hanover Research, 2012	• Decrease in discipline issues	• Not noted
Personalization in Practice-Halverson et al., 2015	• Building student/teacher relationships • Sense of belonging • Time for project-based learning • Student agency • Utilization of variety of learning spaces empowers students	• Struggle between district and state mandates and student interest-based education
Choice Netcoh, 2017	• Student achievement • Student engagement	• Teachers want students to focus on grade- level content not individual interest
Success and Challenges Netcoh & Bishop, 2017;	• Building student/teacher relationships • Student Agency	• Student do not have reasonability to stay on track • Teachers want students to focus on grade- level content not individual interest
Teacher Practices Olofson et al. (2018)	• Student engagement • Greater student understanding	• Lack of control of pacing to meet district and state mandates • Conflict with teacher, district, and state curriculum • Viability of PL
Continued Progress Pane, et al., 2015	• Not noted	• Not noted
Lessons to be Learnt Waldrip et al. (2013)	• Redesign physical learning spaces to provide more learning opportunities for students • Builds students' capacities to be co-designers of their learning	• Not noted

Netcoh and Bishop (2017) found that building student/teacher relationships was a benefit of PL. As teachers design learning that aligns with students' interests, skills, and needs, their relationship with students strengthens. Halverson et al. (2015) argued that students and teachers should discuss learning plans and goals as part of the model; these direct interactions foster meaningful relationships (Halverson et al., 2015). As a sense of belonging and safety develops, students feel they can investigate issues relevant to them. Additionally, some implementations of PL beyond core content courses provide time for individualized learning or PBL, which further develop student/teacher relationships (Netcoh, 2017).

Student achievement and engagement in their learning are the overarching goals of PL. Student may have greater academic success if they feel engaged, motivated, and interested via a sense of autonomy and control (Netcoh, 2017). In PL, learning extends outside the classroom; students determine what, when, where, and how to learn. Students noted learning activities that occur outside of school are more useful and connect to learning activities at school (Penuel & Johnson, 2016). Waldrip et al. (2012) noted that PL builds students' capacities to be co-designers of their learning. They develop greater self-efficacy, self-management, and self-control. Educators believe that PL improves students' abilities to make choices and develop agency, which motivates them to succeed (Halverson et al., 2015).

Empowering students to control learning also has drawbacks. Olofson et al. (2018) noted teacher practices regarding design elements of PL and found teacher perceptions of the PL model. Student control of learning builds engagement and deeper understanding but may conflict with teacher or district curriculum mandates. Teachers perceived students working at their own pace as a drawback because they may not be responsible enough to stay on track with their learning or may work too far ahead of the rest of the class (Bingham & Dimandja, 2017; Netcoh

& Bishop, 2017). Teachers struggle with student control because students do not have the knowledge to ensure that they obtain necessary skills. Many teachers prefer to emphasize grade level content, which conflicts with self-paced learning (Netcoh, 2017; Netcoh & Bishop, 2017).

Change initiatives in education, driven by state, federal, and private organizations, led to reform of traditional education. Olofson et al. (2018) noted that teachers felt uncertain about the viability of PL and only recognized a shift in teaching practice every ten years. These educators saw no reason to shift their practice if preferred teaching methods will *swing back* in a few years (Olofson et al., 2018). Educators who are unfamiliar with this transformative practice may have doubts as to its validity as well.

As schools adopt PL, students and educators must navigate this new approach while meeting the demands of state school systems' polices. They feel caught between standards-based education dictated by the state and interest-based education driven by the students (Halverson et al., 2015). Students feel unprepared for state-mandated assessments due to problems of implementation of PL (Bingham et al., 2018). For PL, schools redesign physical learning spaces to provide more learning opportunities for students (e.g., learning commons, labs, and teacher classrooms) via small group instruction, whole class instruction, collaboration, and lab work. Waldrip et al. (2012) noted that students who learn in these types of environments have a more positive perception of learning. The varieties of learning spaces provide engaging environments for students with various learning needs. Empowering students to use learning spaces to meet their needs is a benefit of PL (Halverson et al., 2015).

The present research may contribute new knowledge regarding student and teacher perceptions of PL. Waldrip et al. (2012) is the only study of perceptions of PL. Further research is necessary to understand perceptions of PL of students and educators who engaged in this

instructional approach over an extended time. This may reveal new details of perceived benefits and drawbacks and the impact of PL on education.

Factors that Impede and Enable Personalized Learning

Five studies of factors that affect the implementation of PL are case studies at schools that received funding or grants from non-profit or governmental organization to support the implementation of PL (DeArmond & Maas, 2018; DRSN, 2014; Future Ready Schools, 2017; Hanover Research, 2012; Pane et al., 2015). The schools in these studies were very similar. Six other studies provided valuable feedback regarding factors that impede or enable PL (Basham et al., 2016; Bingham, 2017; Bingham & Dimandja, 2017; Bingham et al., 2016; Halverson et al., 2015; Netcoh & Bishop, 2018). Netcoh and Bishop (2018) studied successes and challenges of PL at a school that implemented PL at a specific time outside of traditional core content. Factors that enable the implementation of PL are often the same factors that impede its implementation (i.e., the definition of PL, school infrastructure, technology, staffing, teacher preparation, professional development [PD], time, support, state and district policies, and stakeholders' needs) (see Table 6).

Table 6

Factors that Enable or Impede PL

Study	Enable	Impede
Operational Understandings-Basham et al., 2016	• Clear vision and mission of PL	• Not noted
High Tech Charter Bingham, 2017	• Student accountability • Prioritization of PL • Limitations of digital content access	• Unclear definition, exemplar models, and practices of PL • Conflict with District, State, and Stakeholder Needs • Disconnect between vison and classroom realties
Teacher Experiences Bingham & Dimandja, 2017	• Technology • Consistent data use	• Teacher varied levels of experiences with technology, teaching practices, and data use • Initial student accountability/disruptions • Teacher flexibility
Implementation Challenges Bingham et al., 2018	• Clear vision and mission of PL	• Lack of technology support • District supported digital content does not align with school and teachers needs • Technology/Network disruptions • Professional Development • Teacher Preparation Programs • Conflict with District, State, and Stakeholder Needs • Lack of funding/resources
Leading Personalization-DeArmond & Maas, 2018	• Clear vision and mission of PL • Instructional Support • Leadership Support • Freedom to experiment	• Unclear definition, exemplar models, and practices of PL • Access to technology not equitable across US K-12 • Conflict with District, State, and Stakeholder Needs • Too much leeway to experiment
Goal Setting in PL DeMink-Carthew, et al., 2017	• Professional Development	• Unclear definition, exemplar models, and practices of PL
Race to the Top District Reform Support Network, 2014	• Clear vision and mission of PL • Technology infrastructure • Access to technology • Instructional Support • Teacher Readiness	• Unclear definition, exemplar models, and practices of PL • Staffing/Teacher Readiness • Professional Development • Teacher Preparation Programs • Conflict with District, State, and Stakeholder Needs • Lack of funding/resources

Definition of Personalized Learning

There is a lack of a clear definition of PL in current research. Educators struggle to implement PL without a clear definition, best practices, or exemplar model. Without a clear understanding of PL, schools struggle to develop expectations within the school community of teachers, students, and parents. (Bingham et al., 2018; DeArmond & Maas, 2018). One study participant noted, "one of the biggest challenges is teaching in a PL model…teaching is hard because people haven't done it before" (Bingham et al, 2018, p. 474). Teachers adjust their practices to match the model. According DeArmond and Maas (2018), school must have vision. One school began implementation of PL with a broad definition and by mid-year leadership noted the expectations were too broad. The next year, they set clearer expectations for the design of PL. Schools with have a common vision, mission, and leadership more effectively implement PL (Bingham et al., 2018; DeArmond & Maas, 2018; Future Ready Schools, 2017; Pane et al., 2015). Basham et al. (2016) studied twelve schools in one school district in which the chief learning architect for the district crafted a vision for PL and communicated it to educators and learners. This established a culture of equity and cooperation that drove innovation in the design of student learning. Communicating goals and reasons for change often and early encourages support from stakeholders (Future Ready Schools, 2017).

Lack of Time

Time impedes implementation of PL (Future Ready Schools, 2017; Pane et al., 2015). Pane et al. (2015) studied 62 schools with funding from the Gates Foundation and found that more than half of teachers listed time as an obstacle in PL implementation. Teachers struggled to find time to develop content and personalized lessons. Even technology use can be unreliable and time-consuming (Pane et al., 2015). Future Ready Schools (2017) noted that teachers have

limited time to learn new tools and methods. They need more time during the school day to learn digital tools for data-driven instruction in a PL environment. Time is necessary for teachers to receive PD for successful implementation of PL.

Technology and Infrastructure

A strong infrastructure for technology supports the implementation of PL because the use of technology in PL facilities more flexibility and individualization of learning (Hanover Research, 2012). Pane et al. (2015) found that teachers did not feel technology was an obstacle in their implementation of PL. They were confident in their technology skills. More than half of teachers Pane et al. (2015) surveyed did not report any obstacles in their school's implementation of PL. These *Race to the Top* schools received funding to support their PL implementation, most of which they allocated to technology (e.g., network, hardware, and digital content). DRSN (2014) provided suggestions to guide other school districts in PL implementation. Regarding technology, the district should develop a mindful approach to selecting devices, distribution, IT support, and infrastructure upgrades. Hanover Research (2012) described how technology enabled PL at a school that implemented a blended model. The online system created learning activities for students based on their previous day's work. The system used real-time data from assessments and its bank of lesson, which frees the teacher to engage in planning time for the PL model.

This was not the case in all implementations of PL. Technology can benefit student learning in PL environments but there are challenges as well. Many schools lacked support for high use of technology, uniform use of digital content, and data management staff (Bingham et al., 2018). Administrators and teachers noted that infrastructure and technology did not align with teacher needs and digital resources did not align with school needs (e.g., data collection,

standards, digital resources, and curricula). Schools lack adequate bandwidth, connectivity, digital content, and hardware. Ongoing disruptions in instruction due to technology impede PL. These disruptions led to instruction taking longer and teacher having to plan for two types of lessons (Bingham et al., 2018).

Some research regarding PL discuss the impact of lack of technology access and how it limits the implementation instructional strategies (DeArmond and Maas, 2018; Future Ready, 2014; Penuel & Johnson, 2016). DeArmond and Maas (2018) found that access to technology is not equitable across K-12 schools in the United States. As of 2009, the average 1:1 (student device) ratio in public schools was 5:1 (Penuel & Johnson, 2016). Schools in rural areas often lack access to tools, data, and support systems (e.g., highspeed Internet access) (Future Ready, 2014). According to Halverson et al. (2015) teachers reported that technology has benefits but is detrimental if teachers rely solely on technology for instruction because online systems may not understand nuanced needs and interests of students.

Staffing

In implementing PL, it is essential for schools to have appropriately trained and responsive staff. Administrators identified teacher staffing as a factor that can impede implementation (DRSN, 2014, Future Ready Schools, 2017; Pane et al., 2015). One *Race to the Top* middle school highlighted a staffing challenge. The school provided extensive training to support the implementation of PL with specific software. Throughout the school year, the school struggled with staff leaving and finding replacements to support the model (DRSN, 2014). School districts struggled with teacher sustainability and retention in general. However, this is further affected by implementation of new instructional strategies and teacher struggles in these implementations.

Pane et al. (2015) noted the same issue. Most administrators felt that the PL model was so specialized that finding and training staff was difficult. Staff turnover disrupted student learning and delayed PL implementation. Schools must be flexible in how they use staff for instruction and support. One school, for example, moved to a learning center/lab model instead of a 30-student to one teacher model. The school had labs with over 60 students with one certified teacher and several support staff members (DRSN, 2014). Rural schools struggled with a high rate of teacher turnover and often failed to invest in PD for the teachers to have the skills in PL (Future Ready, 2014). In summary, due to changes in teaching practices and the increased need for PD to understand the PL model, schools and districts struggle to find and retain quality staff.

Professional Development and Teacher Preparation

A lack of PD also affects the implementation of PL. As teachers' roles change in PL, adequate PD plan must be available as well as ongoing support (DRSN, 2014; Hanover Research, 2012; Pane et al., 2015). The plan should include when and how to train teachers, what content to include, who will deliver the training, and what the administrator's role will be (DRSN, 2014). Essential areas of PD include technology, data use, and instructional strategies (DRSN, 2014; Hanover Research, 2012; Pane et al., 2015).

Pane et al. (2015) found that teachers have favorable opinion of PD; 85% of teachers felt supported and over 50% provided positive statements about the quality and usefulness of PD regarding PL and technology integration. However, Bingham et al. (2018) found that administrators and teachers felt teacher preparation and development strategies were inadequate for PL implementation. DeMink-Carthew et al. (2017) focused on teachers who completed a week-long PD prior to implementation in which they learned district-level best practices and state-mandated implementation of PL. While the study focused on goal setting in PL, the

research noted the importance of PD and to engage in intentional work to develop best practices in regard to PL (DeMink-Carthew et al. 2017).

Bingham et al. (2018) argued that most teachers use a traditional teaching framework and struggle to change their practice. Teachers need training in the following areas: new teaching methods, designing learning experiences, technology and devices, learning platforms and content, managing student pacing, and implementing new systems of assessment and grading (Bingham et al., 2018). Netcoh and Bishop (2017) expressed the need for other areas for PD: scaffolding student-directed learning, facilitating diverse projects, and individualizing student assessments. Pane et al. (2015) found that educators felt comfortable in their level PD. Conversely, Bingham et al. (2018) reported that administrators and teachers noted insufficient PD regarding technology-based PL. Schools lack resources for more targeted PD for technology integration. Hanover Research (2012) found that three Next Generation Learning (NGL) schools implemented PL in conjunction with blended learning but lacked training for teachers to provide effective instruction in an online environment. Educators must understand how tools work, how to build engaging learning environments, and how to handle hardware and software issues.

The use of data is vital in a PL environment. Teachers unable to properly use data to guide the development of personalized instruction hinder PL. According to Hanover (2012), most pre-service teacher trainings do not provide coursework in this area. Providing teachers with PD to understand data systems is critical (Halverson et al., 2012; Hanover Research, 2012).

Support

Having leaders who provide support and commitment to the PL initiative drives successful implementation. DRSN (2014) argued the importance of teacher support. One school hired blended learning coaches. Teachers noted that having consistent on-site coaches help them

be more effective (DRSN, 2014). Schools must determine whether they will provide coaches, how teachers will collaborate, and how they will measure teachers' skills. DeArmond and Maas (2018) found that instructional coaches ensure teachers' professional growth plans align with PL expectations. DeArmond and Maas (2018) emphasized the importance of leadership that supports teacher practices that reinforce expectations and lead innovation. Pane et al. (2015) suggested that teacher leaders in technology can serve as mentors to others to support PL implementation within the school.

District, State, and Stakeholder Needs

Some schools struggle to follow district and state policy regarding curriculum, assessment, grading policies, teacher evaluations, and communication of student achievement to stakeholders. Teachers try to implement PL while meeting the needs of the district, state, and stakeholders. Bingham et al. (2018) noted that schools and teachers traditionally measured success in ways that conflict with personalized student pacing, grading, or progression. Educators feel pressure to prepare students for state-level assessments and set curriculum pacing to meet the demands of these assessments (Bingham & Dimandja, 2017; Pane et al., 2015). Bingham and Dimandja (2017) found that teachers feel pressure to respond to data from district and state levels. Teachers are expected to gear instruction to raise student achievement on state-level assessment, which may not be at the same skill levels as their students. This directly conflicts with in the principles of PL. According to DeArmond and Maas (2018), the PL approach is misaligned with traditional grade-based report cards. In PL, measurement of student achievement reflects level of mastery or competency, not traditional grade-based report cards. Conflict occurs when communicating student readiness to colleges and universities. As schools shift to PL, measurements do not align with college and university requirements. This also

creates confusion for parents. Conflicting and competing initiatives between schools and districts undermine innovation (DeArmond &Maas, 2018). School administrators struggle with implementation of innovative strategies while meeting expectations of school districts. The DRSN (2014) found that administrators struggled to implement *Race to the Top* initiatives regarding PL while trying to meet district and state mandates. Until state and district policies align with the PL model, many schools will struggle to implement PL. Schools can implement most of the elements of the design but not competency/mastery-based progression due to this misalignment.

Funding

Most PL implementation researchers focused on schools that received funding or grants from the federal government or private organizations (*Race to the Top* schools, NGL schools, and Gates Foundation PL Pilot schools). Funding allowed these schools to purchase hardware and software, upgrade technological infrastructure, redesign learning spaces, and train staff in PL. However, one *Race to the Top* school had to scale back implementation due to furloughs that affected PD and instructional time (DRSN, 2014). Bingham et al. (2018) noted the struggle to allocate resources to support PL via technology and PD.

Netcoh and Bishop (2017) reported broad factors that impede the implementation of PL. More empirical research is necessary to provide a clear vision of what teachers need for successful implementation. Current research provides a pocket that focuses on the factors affecting implementation of PL, while more research would be beneficial from a school-wide implementation perspective.

Summary

The purpose of this literature review was to investigate research about factors that influence the implementation of PL. Current research provides an overview of how some schools implement PL. However, due to the lack of clarity of the definition of PL and instructional strategies, further research is crucial. Most of the research to date is funded by non-profits which have provided resources or grants to support the implementation of PL (*Race to the Top* schools, NGL schools, and Gates Foundation PL Pilot schools). Research is needed that focuses on schools and districts that have implemented PL without support from outside sources. The literature suggests that further investigation of the PL model is important. Future findings may help members of the educational community effectively implement PL. Additional research will be needed until clear commonalities of PL emerge. Current research lacks thick descriptions of implementation of PL. Future research must include granular descriptions of the daily implementation of the PL from educators who had a positive experience implementing PL in order to inform others attempting to transition to this transformative approach to learning. These descriptions allow others to have detailed descriptors of PL implementation models and resources used and needed. Research provides a variety of perspectives in the implementation of PL, including models, grade levels, and content.

Chapter Three: Methodology

Problem Statement and Research Questions

The modern workforce requires innovation and creativity. Educators must transform learning in order for students to develop these skills (Zumba et al., 2015). Tailoring learning to meet the individual needs, skills, and interests of students is a promising approach to education. This PL approach supports the needs of individual students (Hassel & Hassel, 2011). However, definitions of PL are broad, vague, and conflicting with few descriptive studies of how teachers implement PL in classrooms. Therefore, this study aims to understand how teachers, students, and administrators in one large, suburban middle school conceptualized PL and implemented it into their daily practices. This study provides a model of PL and how to enact it in middle school. Specifically, this study will address the following research questions:

RQ1: How do four teachers at one middle school define and enact PL?

RQ2: What role does technology play in their implementation of PL?

RQ3: What factors enable and impede these teachers' implementation of PL

RQ4: How do these teachers perceive the effects of PL environments on student learning?

Research Approach

Stake (1995) described social constructivism as the belief that knowledge is constructed instead of discovered. Social constructivists assume that individuals seek understanding of the world in which they live and work (Creswell, 2009; Lincoln & Guba, 1985). Use of a social constructivist paradigm allows researchers to construct meaning from their findings. Social constructivists use open-ended questions to investigate the world. Through interactions with participants, researchers construct the meaning of a situation (Creswell, 2009; Stake, 1995). In

this study, the researcher applied constructivism to understand the phenomenon of teachers implementing PL. Social constructivism provided means to develop meaning from the different perspectives that emerged from the data (Creswell, 2003). The researcher constructed meaning via collection of data from interviews and observations. In this study, the researcher explored the implementation of PL by four different teachers and analyzed their viewpoints to determine factors that influence, enable, and impede the implementation of PL.

Qualitative Case Study Research Method

To pursue this inquiry, the researcher engaged in a qualitative multi-case study design of four teachers at one middle school striving to implement PL. The method for this research was a qualitative case study approach. Insights and perspectives reflected data collected from participants regarding the research questions. In qualitative research, the researcher gathers information and acts as the interpreter of data (Stake, 1995). Humans have a natural desire to understand and are curious. Stake (1995) noted that, for researchers, naturalistic inquiry is how they try to understand what they cannot see; they ask and interpret. Qualitative research supports the natural desire to understand by collecting data in a natural setting (Creswell, 2013). This method of research is an exploration of a central phenomenon that extends beyond cause and effect to be generalizable in diverse situations. Qualitative researchers seek transferability but recognize the importance of individual cases to understanding (Stake, 1995).

Past definitions of PL are vague and conflicting; therefore, it is valuable to collect rich descriptions of how teachers enact the model. Qualitative research provides insight to understand how actions, events, and connections affect a phenomenon that are missing from numerical data in quantitative research (Creswell, 2013). To investigate how teachers, implement PL, multiple

sources of data are necessary to provide thick descriptions of these implementation to hopefully bring clarity to the phenomenon.

Case Study

Yin (1981, 2014) defined a case study is an empirical inquiry that investigates "a contemporary phenomenon within its real-life/world context" (Yin, 2014, p. 237), especially when the boundaries between phenomenon and context are not evident. Creswell (2013) stated, "Case study research is a qualitative approach in which the investigator explores a real-life, contemporary bounded system, over time through detailed, in-depth data collection involving multiple sources of information" (p. 97). Case studies provide a researcher with data from a single setting, subject, or phenomenon. Using a case study design allowed the researcher to explore why a certain decision or set of decisions took place and the results of these actions. In conducting a case study, the researcher gathered different perspectives of what is occurring in the setting while gathering descriptive view of the phenomenon. In this case study, the researcher obtained different perspectives of four teachers and the description of their implementation of PL.

Stake (1995) noted the importance of multiple case study designs. This research is a single case study conducted at one school with a small population of four teachers. It is important to narrow the scope of the study for richer data. These teachers are at one location but have different conceptualizations of PL. Therefore, they provide a variety of insights and perspectives. Stake (2005) argued for a flexible design that would allow researchers to make major changes even after they proceed from their initially proposed design to the research itself.

The purpose of this study was to gain understanding of PL implementation. Stake (1995) referred to this type of research as an instrumental case study (i.e., to gain understanding). The

flexibility of Stake's model was ideal for this study. Through case study one school and four teachers, the research collected rich data. In focusing on a small group, the researcher collected abundant amount of descriptive data. The flexibility to modify or seek additional documentation or clarification was valuable to ensure maximum meaning, knowledge, and understanding of the phenomenon. The goal of this study is to understand shared beliefs of PL implementation and provide insights to improve upon this educational strategy. Conducting a qualitative single case study on the implementation of PL may provide findings to benefit educators who are unfamiliar with the topic.

Using a qualitative method results in multiple sources of evidence from interviews, documents, and observations. From this data, the researcher gathered thick descriptions, engaged in interpretation, and triangulated the findings. Thick descriptions convey to readers of the research what the actual experience would convey (Stake, 1995). From the thick descriptions of data collected, teacher voices emerge of their experiences and documentation of their practice PL. These descriptions of PL implementation in exemplar model classrooms, factors that influence these implementations and perceptions of PL from teachers, may provide a vital guide for others in the field. Creswell (2013) noted, "Case studies often end with conclusions formed by the researcher about the overall meaning derived from the case" (p.99). In this case, the researcher develops meaning from the experiences of teachers. Case studies of four middle school teachers who enacted PL may improve understanding of the conditions in this real-world case.

Settings and Participants

This research takes place in a large, urban school district in the southeast United States. The Center County School District (CCSD) (pseudonym) is the fourth largest school district in

the state with close to 96,000 students and 14,000 employees. In 2012, CCSD developed a new five-year plan. In this plan, the key strategic initiative was the implementation of PL. Center County public schools developed a district-wide PL model to help teachers customize learning to students' needs, skills, and interests and empower students to learn at a pace that is right for them. The district described personalized learning environments to customized to individual learners' needs, interest, and skills. The district's principles or elements of PL are very similar to those described in research including varied strategies, just in-time direct instruction, student agency and choice, mastery-based assessment, choice for demonstration of learning, flexible pacing, and co-planned learning. The district school level implementation of PL does not include a mandated model for all these elements. The individual schools were given the power to make decisions based upon their individual schools' goals and needs. Individual school controlling their design in implementing PL fosters the district charter system of local school autonomy. The CCSD has a customized implementation pathway for each of its schools (i.e., each school develops a plan for implementation and deployment of devices). These plans include school readiness (instructional, infrastructure, and device), which elements of PL to implement first, a timeline, and PD.

In support of this plan, the school district sought funding from the community via a special purpose local option sales tax (SPLOST) that funded the purchase and enhancement of technology infrastructure. This special tax may raise close to $200 million dollars (Governor's Office of Student Achievement, 2017). As part of this initiative, the district plans to deploy devices (4:1 in elementary schools and 1:1 in middle and high schools). Along with personal devices, funding supported the completion of upgrades to schools' infrastructures and networks and the purchase software and other classroom technology.

The setting for this study is a middle school within the CCSD. The middle school is a Title I school with over 50 percent of the student population on free or reduced lunch, reflecting a high poverty level. The ethnic make-up of school is 25% Black, 40% Hispanic, 28% White, 3% Asian, and 3% multi-racial. This setting provides a diverse sample of students compared to other middle schools in the same geographical area. The middle school was showcased as a leader within the CCSD PL initiative. CCSD school district used this school as an exemplar model of PL. Educators throughout the CCSD school district and surrounding state came to observe and gain insight into this school journey of PL implementation. Additionally, this school was one of the first middle schools in the district to have 1:1 device implementation. The school was nationally recognized as a leader in technology-driven PL and received a technology grant for schools that implement innovative approaches and practices. These designations are reflective of this school being an exemplar in the areas of innovative practices. Therefore, it is ideal for this study. While the district outlined seven principles of PL, the school in their roadmap for implementation only highlighted three of these principles: a) Student Agency/Voice, b) Choice, and c) Varied Strategies. The school's roadmap for implementation is designed over three phases across three school years. While the school highlights these three principles in their implementation plan; interestingly enough other principles are consolidated under these three focused principles in phases of implementation. For example, co-planning learning is included under choice in phase two and flexible pacing under varied strategies in phase three. With limited research on the topic of implementation of PL in schools, it is important to study schools that implemented PL to determine strategies that support a positive implementation

The school implemented PL environments and 1:1 device in 2015 with select teachers; and is an ongoing process. The data collected reflects a variety of experiences, attitudes, and

opinions. This middle school has 800 students between 11 and 15 years old. In the 2016-2017 school year, the school implemented PL with eight of 45 teachers. The principal selected teachers across various content areas and grade levels who were comfortable with technology integration. These teachers received two days of PD from a third-party vendor on the theories of PL and additional days for curriculum development before the school year. The teachers had one additional day for professional and curriculum development during the school year. As the 2016-2017 school year progressed, these teachers led PD sessions for other teachers on PL strategies and technology integration in PL environments. Administrators encouraged additional teachers to implement PL in their classrooms as they felt comfortable. This middle school implemented 1:1 mobile device in the 2015-2016 school year as part of a district-wide initiative. Students received a cellular data plan for use outside of school through a grant.

The researcher selected participants and the study's location. The participants in this study include four classroom teachers. The researcher selected participants using purposeful sampling. While purposeful sampling has been noted as leaving gaps in data, this approach provides information-rich data from participants who experienced the phenomenon being studied (Creswell, 2013). Participants being selected purposefully allow a sample to be selected which allow the best understanding of how personalized learning has been implemented at the study site school. The school principal provided a list of possible participants. Additionally, maximum variation sampling allows the researcher to gather perspectives from a wider spectrum of participants. Maximum variation sampling determines criteria that differentiate participants and then selects those who are different than the original criteria (Creswell, 2013). These teachers are considered exemplar by the principal in their implementation of PL. According to the principal, these teachers were eager to find strategies to personalize learning for their students. They

embraced this transformation in student learning. Their classrooms fostered student engagement with elements of PL enacted in student learning. The thick descriptions of these exemplar teachers' day to day enactment of PL in their classrooms could provide a pattern for others in education. Teacher participants will include four teachers from different grade levels, content areas, and with different years of experience teaching. These teachers were selected due to their diversity in content area, grade level, years of teaching experiences, and in their implementation of PL. Each of these teachers were faculty members of the school at the time of implementation of PL and 1:1 device. Participants are diverse in their implementation of PL and technology. During the data collection period, the participants were in their third year of implementing PL in their classrooms. The sample is small, but it includes diverse backgrounds that reflect the school population. Purposefully selecting a sample with a variety of backgrounds and levels of implementation allowed for a variety of perceptions and understandings of the phenomenon. The data collected reflect a variety of experiences, attitudes, and opinions.

To ensure the confidentiality of the participants, each participant was given a pseudonym: Anna, Alexa, Amy, and Amanda. During the interview process, descriptive data of the participants was gathered (see Table 7).

Table 7

*Demographics of Study Participant*s

Participant Pseudonym	Grade Level	Content	Education Level	Years Teaching
Anna	8th	Math	Masters	8
Alexa	6th/7th	Math	Masters	11
Amy	7th	Reading/Language Arts	Masters	4
Amanda	6th	Social Studies	Bachelors	8

The participants were selected due to their diverse content areas and grade levels, years of teaching experience, and implementation of PL. During the data collection period, the participants were in their third year of implementing PL in their classrooms.

Anna's background is as a former high school teacher. She started teaching at the middle school teacher the same year the school was implementing PL. While not a member of the original cohort of teachers spearheading i PL, she and her grade level content peers embraced the learning model in the early stages of the school's implementation. Anna was compelled to apply varied instructional strategies which were data driven to meet the needs of her students. Anna and her grade-level content peers have presented at various conferences about their PL instructional strategies.

Alexa has worked at the school for over eleven years, originally as a special education teacher and then as a Behavior Intervention Specialist before returning to the classroom. Through the combination of these roles, Alexa strives to develop learning environments that meet her students at a variety of skill levels and needs. She is viewed as a teacher-leader among her colleagues, who value her input and seek her assistance in student-centered solutions. Alexa is well respected by the school community and builds meaningful relationships with the students at the school.

Amy started her teaching career at the middle school shortly before the school began their transformation to the PL model. She worked as a special education teacher prior to moving to a general education teacher the last two years. While not a member of the PL team, Amy was intrigued by model and asked to participate in early implementation of the innovative practices. From the beginning of her career, Amy has striven to engage students in their learning using creative means through getting in character of literature or periods of time to gamifying her

classroom. These efforts have compelled her peers to employ some of these strategies in their classrooms. Using these instructional approaches, students are engaged and enjoy being in her classroom.

Amanda has worked at this middle school for eight years. She began as a special education teacher and transitioned to general education after two years. When the school first acquired mobile technology prior to the school wide initiative, Amanda was eager to use these tools in her classroom. She investigated technology tools and attended conferences regarding instructional technology and PL. Amanda embraced technology to gather data to understand her students' needs as well as to offer a variety of ways to gather knowledge and demonstrate understanding.

Before data collection, the researcher received permission from the university Institutional Research Board and the school district. Conversations informed teacher participants of the purpose of the research study. Participants completed informed consent forms before participating in the study. After the sample for this study was selected, the researcher ensured that the sample understood the sample could possibly change anything. The teachers were informed they could decline the invitation or exit the study at any time. The researcher had no supervisory role or stake in the teachers' work.

Data Collection Methods

This study occurred during two months at the beginning of the traditional school year. Data collection did not occur until the IRB approval process was complete. Creswell (2013) discussed the importance of developing an in-depth understanding of a case through multiple forms of data collection. In this study, the researcher collected data through interviews, artifact

analysis, and classroom observations. The archival, observational, narrative data outlined in this chapter will allow insight into research questions.

Data for the research were gathered from the four participants using three means of data collection. During the first month, the researcher discussed the study with the selected participants. The researcher shared the reason for the study with participants. The first means of primary data collection were individual interviews with each of the four participants. According to Stake (1995), interviews seek to aggregate perceptions or knowledge from multiple respondents. Through interviews, participants were able to express perceptions, opinions and descriptions of the phenomenon (Creswell, 2013). The teachers' stories emerged during these interviews as they describe their perceptions of PL and their experiences during implementation. Through these interviews, the researcher collected the viewpoints of the participants that the researcher was unable to observe (Stake, 1995). Interview questions addressed definitions of PL, perceived benefits and drawbacks of PL, and factors that enable and impede the implementation of PL (see Appendix C). The interviews were semi-structured, starting with a set list of questions. Most questions were open-ended to allow deeper explorations of topics. Each interview took approximately 40 minutes. The researcher recorded and transcribed interview data using Rev Voice Recorder. The follow-up interviews were conducted after all classroom observations and review of field notes have occurred. These interviews took approximately 20 minutes and allowed the researcher to seek clarifications of classroom observations.

The next set of primary data was gathered from classroom observations during the second month. According to Creswell (2013), this act of noting a phenomenon through the senses of the observer is a key tool in qualitative research. Further Stake (1995), explained that observations allow stories to emerge, provide relatively incontestable descriptions, and develop vicarious

experiences for the readers. Creswell (2012) defined observation as a "process for gathering open-ended, first-hand information by observing people and places" (p. 213).). Classroom observations revealed how teachers used PL and the role of technology in its implementation. The researcher acted as a non-participant observer, taking field notes of assignments, activities, and technology integration. The purpose of the classroom observations was to gain a vivid description of how PL was implemented via classroom instruction. An observation protocol was developed to inclusive of the various elements of PL (accommodating student differences, student- centered, varied learning environment, student mastery, and technology). These elements were utilized as categories as part of the coding of the data collected during the observations. Each participant's classroom was observed for two individual fifty-minute class periods. The researcher used an observation protocol (Appendix G) to guide the data collection. The observations obtained the activities the teacher and students were completing, how the classrooms were designed, and elements of PL implemented. The data collected were manually analyzed and coded.

Lastly, the researcher collected data obtained through documents that were representative of the school's and district's implementation of PL. Stake (1995), states, "Documents serve as substitutes for records of activities which the researcher could not observe (pg. 68). The information gathered was from the first and second year of the implementation, including presentations, implementation plan, professional development plans, instructional material, and district PL resources were part of the data review. The researcher analyzed instructional materials, which provided insights into the resources and methods teachers used to implement PL into student learning. The scope of these instructional materials allowed a broader view of instructional strategies implemented in classrooms. The review of the school and district PD

plans may reveal factors that influence PL implementation and provide insight into the support teachers receive regarding PL. The review investigated how PD was structured to support teachers prior, during, and ongoing as part of the implementation of PL. The researcher examined each document to gain a deeper understanding of the resources provided. The data were manually coded during the second reading of the documentation and themes emerged.

During the third month, the researcher reviewed all collected data and entered them into Atlas.ti for coding. This software is used in qualitative research to allow research to search, code and annotate data gathered. After data analysis was completed, the researcher created written documentation of the results. Appendix C lists the initial interview questions.

Data Analysis

Stake (1995) stated, "analysis is a matter of giving meaning to first impressions as well as final compilations" (p. 71). After the interviews, the researcher transcribed and coded the data. Significant statements about factors that influence PL implementation informed the creation of emergent themes. The researcher used a color-coding system to develop and categorize themes from interview notes and transcripts. The researcher reviewed classroom observations and field notes for commonality. Segregating data into codes is vital in a thematic analysis (Miles, Huberman, & Saldaña, 2014).

Merriam (1998) discussed data analysis as a process of making meaning from the data. Triangulation provides more variables of interest than data points (Yin, 2014). Through the triangulation of the data, thematic patterns may emerge. Triangulation between various data sources is important to verify the legitimacy of themes. Designing a study with multiple sources of data and triangulation of data for patterns provides validity to the study (Yin, 2014). The researcher will review various data sources to develop categories to maintain creditability and

prevent misinterpretation (Creswell, 2013). Multiple sources of data in one study can provide different findings. However, triangulation allows the findings to be supported by multiple data sources.

In order to examine teachers' perceptions of PL and factors which affect the implementation of PL, the researcher collected and analyzed data collection from four teachers interviews and classroom observations, and primary sources. As the data were collected, the researcher continued to gather and analyzed data. The researcher analyzed the data through organizing data, coding, creating themes, and grouping by theme or category.

Rev Voice Recorder was used to record and transcribe the interviews. Immediately after each interview, the data were transcribed in order to ensure accuracy and understanding (Creswell, 2013). The transcripts were compared to the recordings for accuracy. A deep understanding of participants perspectives was developed by the researcher through this review process. Member checking occurred after the interviews were transcribed. A second interviews occurred if clarification was needed to ensure validity. These transcripts were provided to the participants to verify accuracy of participants' voices. Member checking was used to verify accuracy between transcripts and participants' recollection. These steps alleviated any potential bias by the researcher. Participants were provided with the major themes and findings and were provided the opportunity to provide commentary. Atlas.ti software assisted with the coding, annotation, and analysis of the data. Data, including transcripts and observational field notes, were entered in Atlas.to software. Data from classroom observations, individual interviews, and document review were triangulated in order to avoid misinterpretation. The researcher reviewed transcripts and audio recordings to develop understandings of participants' responses. In this process, the researcher highlighted key ideas which were meaningful to answer the research

questions (Saldana, 2009). The researcher sorted the data by four anchor codes which aligned with the research questions (Appendix A). Next, the researcher further sorted the data into organizational categories to develop an organizational schema. After this cycle of coding, the data were reviewed to identify patterns or commonalities which have emerged. Once all data were thoroughly coded, the researcher consolidated it into seven themes with specific findings. The software will also provide visualization of the themes which emerge. The researcher considered themes from the data collected and made connections. From within these themes forty categories emerged from the coded data.

Trustworthiness

This study will ensure trustworthiness by establishing credibility, dependability, confirmability, and transferability. To ensure trustworthiness of the data, participants will review the descriptive analysis for accuracy and review their transcripts (Creswell, 2013; Guba, 1981). In order to obtain trustworthiness, the researcher will certify that triangulation, member checks, and peer review are achieved (Creswell, 2013). Designing a study with multiple sources of data and triangulation of data for patterns provides validity to the study (Yin, 2014). Multiple sources of data in one study can provide different findings. However, triangulation allows the findings to be supported by multiple data sources. Through member checking, the researcher showed participants results of the study to ensure credibility of their interpretations and findings (Creswell, 2013). The researcher used peer review as a method to keep the study and researcher honest. In this role of "devil's advocate," this person will ask hard questions about interpretations, meanings and method (Creswell, 2013). Trustworthiness will ensure validation of the research among the participant's and readers (Creswell, 2013). According to Creswell

(2013), validation is “the account made through extensive time spent in the field, the detailed thick descriptions, and the closeness of the researcher to the participants in the study” (p.250).

Credibility

In this study the researcher will use data triangulation, member checking, and peer review (Creswell, 2013). Through these steps, the data collected from variety of sources will be compared to validate the information. Triangulation between various data sources is important to verify the legitimacy and accuracy of the findings. Designing a study with multiple sources of data and triangulation of data for patterns provides validity to the study (Yin, 2014). Member checking will provide the researcher with credibility and ensure accuracy of the account (Creswell, 2012). The participants had the opportunity to review transcripts of their interviews to ensure accuracy. Participants did not inform the researcher of any errors which needed to be addressed. The researcher was able to make corrections and collected more data.

Transferability

Transferability occurs when the results of research have the applicability in other settings (Creswell, 2013, Guba 1981). To create transferability, the rich, thick descriptions to be collected in this research must be able to be transferred to other settings (Creswell, 2013). In future studies, researchers could apply these descriptions relating to the implementation of personalized learning to other studies.

Dependability and Confirmability

The researcher provided rich, thick descriptions from data which will be dependability and confirmability (Creswell, 2013). The researcher provides rich, thick descriptions of data followed by member checking and provides detailed description of methodology which ensure accuracy and dependability. Confirmability speaks to the neutrality and the merit of the findings

of the research (Creswell, 2013). Confirmability is determined through peer review and triangulation of data.

Personal Interest and Goals

In developing the conceptual framework for my research study, I reflected on the conditions, experiences, and viewpoints that influenced my interest in PL (Maxwell, 2012). I developed personal goals and interest in the study. The purpose of this research is to determine a design for implementation of PL. As a second-career teacher who began work as an educator later in life, I approach learning through a unique lens. I had experiences in college and as a parent that informed my approach. I acknowledged and accepted that traditional education models do not work for everyone. Working as a special education teacher, I understood that learners do not gain knowledge or display mastery of knowledge in the same manner. Students may feel disengaged in learning due to their skill level, interest, or instructional strategies. I sought ways to increase engagement informed by experiences from my former career and my use of technology. Technology integration provides a variety of learning environments.

In my third year of teaching, I became a member of the district's technology leadership forum. This experience increased my knowledge of instructional technology and my desire to improve students' learning experiences. I embraced the PL model and the use of technology to design learning environments based on individual needs. My membership in the leadership forum led to my being part of a new team of educator coaches two years later. In my classroom, I adopted new tools to integrate into instruction and showcased these integration strategies during PD sessions and conference presentations. Five years ago, my district began implementation of PL. As an early adopter, I was a member of a team at the school that designed and executed the

implementation plan. I ensured that PD on the elements of PL was part of the plan. I gained a strong understanding of the PL model through these experiences.

At the time of the study, I am a Media and Education Technology Instructor at another school in the district. In this role, I have various responsibilities including overseeing the Learning Commons and Makerspace location at the school I am employed as well as an instructional coach. Before this position, I was a classroom teacher. In my role as a teacher and an early adopter of PL, I wanted to develop positive learning experiences for students. As part of a team of educators within the district, my role is to coach others on the integration of instructional technology and PL. In this role, I help build capacity within the school to support PL for students. Assisting in this capacity led to my desire to grow as an educator and increase my understanding of instructional technology. I investigated the role of technology in instructional practice and learned to design instruction that met the interests, needs, and skills of learners. I noted discrepancies in definitions of PL, varying models, and several factors that influence in its implementation. I hope to clarify how educators define and implement PL to guide implementation for others.

Worldview

Creswell (2013) described worldview as "broad philosophical assumptions researchers use when they conduct a study" (p. 537). Guba (1990) described a worldview as a "basic belief which guides action" (p. 17). Worldview changes as we interact with the world around us through personal experiences, fields of study, what we learn, and social experiences (Creswell, 2013; Guba, 1990). Knowledge begins with external stimuli and one realm of our reality develops from this interaction. As people make interpretations, they develop assumptions about why actions occur (i.e., beliefs). Through these interpretations, we seek the *truth* by attempting

to understand phenomena (Stake, 1995). This paradigm consists of beliefs, laws, and assumptions that guide research and practice. The paradigm or lens in which we view the world influences researchers' methodology.

Four worldviews are common in research: (a) post-positivism; (b) constructivism; (c) pragmatism; and (d) transformation (Creswell, 2013; Guba, 1990; Willis, Jost, & Nilakanta, 2009). Creswell (2013) argued that social constructivists hold assumptions that individuals seek understanding of the world in which they live and work". Using a constructivist view, researchers gain knowledge via social interpretations rather than from external reality (Stake, 1995). Glesne (2016) argued that accessing a variety of perspectives of a phenomenon can reveal common patterns of thought and actions. The post-positivist worldview, in contrast, is the scientific method applied in quantitative research. The constructivist worldview relies on participants' understandings of a situation or event (Creswell, 2013).

As a researcher, I believe that learning is a holistic experience; therefore, I hold a constructivist worldview. I want to understand meaning (i.e., why something occurs). Through this form of inquiry, a theory or pattern of meaning develops, as opposed to post-positivism that start with a theory (Creswell, 2013). Through interaction with participants, I developed a variety of meanings and work to develop a theory. I understand that my own experiences shape my interpretation of events and processes. A social constructivism worldview acknowledges researchers' multiple viewpoints. Interactions with participants will shape my interpretations of the phenomenon (Creswell, 2013). Through qualitative methods, such as interviews and observations, I interpreted meaning by asking broad, open-ended questions. This dialogue provided *thick descriptions* from those most knowledge about the situation (Stake, 1995). As a researcher, I interpreted the views of others to create new knowledge (Creswell, 2013).

The purpose of this study is to gain a deep description of the implementation of PL in K-12 education in the United States from the perspective of teachers who have implemented PL. I investigated the perceptions and experiences of educators who implemented the model in their classroom. Through interviews and first-hand experiences, I gathered rich and valuable descriptions of the phenomena.

Researcher Position

The researcher's positionality relative to this study is as an educator within the school district and a former educator at the school being studied. I currently work at another school in the same district. Being an employee of the school district provides access to details of district initiatives regarding PL. As an early member of the district's PL team, I learned ways to improve the implementation of the PL model. As an early adopter of PL, I am committed to understanding how to improve implementations. By completing this research at this location, I worked collectively with the participants to reflect on themes that may inform plans to improve PL in this community.

Strengths and Limitations

This study has limitations resulting from focusing on only one school and the implementation of PL by only four teachers. The researcher recognized three limitations: (a) the sample size of four individuals is small; (b) the research focused on only one school district; and (c) the research focused on only one school within that district. Additionally, my work for the school district may have created some bias. The researcher paid careful attention to participants' words via recording, transcripts and checking to mitigate any possible bias. Three years prior to the beginning of this research study, I was a teacher at this school. At the onset of this research, I had transitioned to another role at another school within this school district. The study reflects a

small portion of the school district's population who transformed their instructional approach from the traditional model to PL. This limits the study in the amount of data available for analysis.

Despite these limitations, this multi-case study research may reveal many new insights regarding implementation of PL. Using purposeful sampling, I gained detailed insights from teachers who had a positive implementation for deeper analysis. The strengths of the study are these thick descriptions of implementations of the model that may allow for transferability of the research to other contexts (Guba, 1990).

Ethical Considerations

The researcher obtained signed informed consent forms from each study participant and their principal. These forms provided the details the study's purpose, autonomy, and possible risks. The identities of all participants of the study remain confidential. Additionally, participants in the study understood that they could withdraw from the study at any time.

Summary

Personalized learning is an instructional model that supports the needs and interest of all learners. However, there is limited research available on the implementation of PL. Through a qualitative descriptive case study, the researcher explored how these teachers implemented the PL model. The study provided context for factors that improve conditions for the implementation of PL and technology integration. The findings can guide schools and districts making decisions regarding PD, tools, strategies, and technology purchases. Such strategies may enhance the use of PL to improve student engagement, advocacy, and achievement. The following chapter will outline the findings in which these participants define PL and how they enact PL in their

classrooms, then followed by the perceived factors which both impede and enable educators to enact PL in teaching and learning.

Chapter Four: Findings

This qualitative description case study focused four middle school teachers' perceptions of PL and their experiences as they transitioned and the implementation of personalized learning model in their classrooms. The archival, observational, narrative data outlined in this chapter will allow insight into these three research questions:

RQ1: How do four teachers at one middle school define and enact PL?

RQ2: What role does technology play in their implementation of PL?

RQ3: What factors enable and impede these teachers' implementation of PL

RQ4: How do these teachers perceive the effects of PL environments on student learning?

This chapter will outline the findings of this study using thick descriptions in which these participants describe the influence on their definitions of PL, followed by how they enacted PL in their classrooms including the role of technology and the factors that both impede and enable their implementation of PL. Finally, the chapter will conclude with these participants perceived effects of PL environments on student learning.

Teacher Definitions of PL

In 2015, in conjunction with an E-SPLOST tax for technology, the school, and its district begin the journey in their implementation of PL. This school was one of the five pilot schools within the district to begin planning, conceptualizing, and implementing PL. The school had a designated PL implementation team led by the school principal. Amanda acknowledges school administration orchestrated the school's vision of personalized learning. She states, "Our last principal was very focused and a strong proponent of PL. The school community was very aware of the initiative due to his advocacy of the model."

These four teachers' definitions of personalized learning are influence by the school district and principal along with professional development received at the time they began their journey implementing PL at this school. Their experiences as they have implemented PL has also shaped their definitions. Even in this bound setting, these teachers' definition of PL varies due to influences and experiences.

With an average number of years teaching experience being less than ten years, these teachers had heard of personalized learning but were unaware of the definition of the instructional model. Anna acknowledges personalized learning was not a popular concept in education when she began her teaching career eight years ago, so, it was not the center of her instructional design. Anna notes teaching at this school influence her definition of PL. She states, "I don't think my definition of personalized learning has changed since the time of implementation. I didn't really hear about it until I got to this school, and so my first definition of the word wasn't really until about three years ago. At that time, I don't think enough about the model has changed that my definition has changed. It also helps that my first exposure to it was where it was well vetted out and pretty embedded into the culture of the school."

According to Anna, the initial PD regarding PL the teachers at the school received provided a glimpse into how the school was rolling out PL and the school focus would be. Anna stated, "We were given a high-level description of what PL was and how it was intertwined with our 1:1 rollout. The administration advised us that student agency or voice would be our focus or beginning point. Our principal spoke to this a lot to us, students, and parents. About how students have ownership in how, when, and what they learn. We had to work at this changing mindset."

Similarly, Alexa notes the school administration had the most significant influence on her definition of PL. Of these teachers, Alexa has taught at this school the longest amount of time.

She has worked with three different principals, and she notes they each have influenced her instructional and teaching style. Alexa supports Amanda and Anna's views, "Our previous principal pushed the PL model at the same time the model was being implemented in the district, our principal was a leader in that movement. So, my knowledge of PL began when the district and principal pushed our implementation at the school. What I understood to be PL came from what was driven at our school through professional development and our principal influence. Our principal at the time of our implementation was a proponent of the growth mindset of failing forward. This mindset was to transform learning in our schools, whether it was different strategies we would experiment or try out in our classrooms or students in their learning. Somethings may not work, or it may take a little longer in mastering a skill, but it was part of the learning process."

Before the school's implementation of PL, Amanda did not have a clear conception of PL. Through her implementation and training, Amanda's understanding of PL deepened. Amanda notes, "Did I know what PL was? Yes and no, I had an idea of what it meant before implementation at our school." Amanda sought out training at school and outside of school, including going to conferences that focused on PL. At the time of the school's implementation of PL, the school also became an AVID (Advancement Via Individual Determination) school. AVID is a non-profit organization which collaborates with school to switch instruction and learning to a student-centered approach (AVID, 2002). According to Amanda, each teacher received some type of professional development on AVID strategies on-site and at extended summer conferences. Amanda describes, "The AVID strategies we learned provide new methods for student ownership of their learning. Their ideas supported the idea of student agency." Through this extended summer training with AVID and additional project-based learning, PD

reinforced Amanda's definition of PL. Amanda further acknowledges, "I just went to more and more training that helped me clarify the best routes to personalized learning. So, my definition really stayed the same. However, I could explain it better and use it better."

Being intrigued by teachers who were taking part in the first part of the implementation and who received professional development from an outside vendor, Amy's definition and insights to PL were influenced by the PL implementation team and administration at the time of implementation. Amy notes,

> Our principal focused on students having an agency/voice in their learning. This was noted in the design plan of our rollout of PL. They believed this is where we needed to start. Students having a voice or ownership in their learning. The students being able to say I don't understand this yet, I'm not ready to move on, or I want to learn by taking notes, or watching a video, etc. Our admin stressed listening to the students, letting them have that ownership, and drive instruction from that. (Amy, personal interview, August 3, 2019)

Amy notes her definition of PL was altered since she implemented PL to be more data-driven and to be able to understand where they are in their learning. Amy states,

> I think I am much more data-driven now as opposed to the beginning. I would differentiate but did not really have data to show why I grouped them as I did. With students having mobile devices, I have the capability to collect data from a variety of data sources. I can make data-driven decisions about individual student's learning at any time. (Amy, personal interview, August 3, 2019)

These teachers noted their definitions of PL were influenced by their school, district, school administration. They have been individually affected by PD they attended and their

implementation. Due to these influences, their definitions of PL have some similarities, but the influences have also individualized their definitions.

While the teachers' definitions have many commonalities, they differed slightly in how they evolved since they implemented PL. Nearly all of the participants' definitions of PL included the elements of student agency (voice), choice, and students working at their own skill level. Some definitions included a variety of elements such as pace, path, common goal/guideline or curriculum, and technology. The participants' definitions of PL are highlighted in Table 8.

Table 8

Participants' Definition of PL

Participant	Definition
Anna	"PL is having several different layers with students working at their own pace, doing their own activities but working towards a common goal." "There is a more broad, general definition to those outside of the classroom, who see it as a lot of technology-based learning."
Alexa	"Students are learning at their own individual pace and working where they are."
Amy	"Meeting students at their levels and then trying to move them up in their knowledge and skills individually."
Amanda	"Personalized learning is when a student is directed into some paths of some options that they can decide what to do, but there is a guideline, as a curriculum is the guideline."

The elements of PL that these participants included in their definitions of PL varied, with student agency as the only shared commonality. The elements of PL that these participants include in their definitions are highlighted in Table 9.

Table 9

Elements of PL in Participants' Definitions

Elements	Accommodating Student Differences				Student Centered Learning	Varied Learning Environments	Student Mastery of Learning		Role of Technology	Assessment
Participants	Voice	Students Working at Their Own Level	Choice	Path		Pace	Common Goal	Curriculum Guideline		
Anna	X						X		X	
Alexa	X	X				X				
Amy	X	X				X				
Amanda	X	X	X					X		

Student Agency/Voice

Student Agency or Voice is a commonality in all four teachers' definitions of PL. While they all include students having some control in their learning, the type of control could vary. Anna and Amanda defined student agency or voice as students having control over how they learn. Amanda includes students deciding how to display their mastery of learning, while Alexa allows students to establish their own goals.

Amanda defines student agency or voice as, "Students having a voice in their learning when they provide input into how they are going to learn and show mastery of their learning." Amanda's students provide input into creating activities in learning activities and how they can show mastery of their learning. Amanda notes, "Students having control or voice in their learning they are more drawn to their learning."

According to Anna, student agency or voice in their learning is a student having autonomy or control in their learning. In her classroom, students having a voice or control and

ownership of their learning by having a choice in how they learn. Anna says, "Students are provided choices in how they learn, practice, and show mastery of learning while working with her in establishing goals in their learning." Along with choice, the student agency translates to a student setting goals. Anna works with her students to set their learning goals based on their needs.

Alexa agrees with Amanda in her definition of the student agency/voice regarding goal tracking. Alexa states, "Students have a voice in their learning by taking ownership in their learning by setting goals and acknowledging when they feel they have accomplished their goals."

While Amy does not give designated definition of how students have a student agency/voice in their learning, she believes they do have some control. Amy describes voice as, "Voice is students have some control or say in their learning express whether they need more time in understanding." Amy believes when a student has some control or voice concerns/feedback, they are confident in their learning.

Choice

Student choice can be perceived as what they learn, how to learn, and how they show mastery of their learning. Students having a choice in their learning is a piece of these teachers' definitions of PL. However, the manner in which they have choice varies.

Anna defines student choice, "As allowing students to have a choice in what they learn, how they learn, or how they display mastery of their learning." As Anna reflects on her thoughts on PL, she believes her students would define PL as "be able to learn the way I want to learn."

According to Amy, student choice is students having a choice in what and how they learn, which is based upon their interests. Amy does not include a choice in how they display mastery of their learning. Amy explains,

> Students do have a choice in their learning by allowing them to choose the literature they read and activities to master the language arts and reading standards. In allowing them to make choices based upon their interests increases their success in their learning. I want them to engage and enjoy reading truly. Giving them a choice in what they read as much as I can is going to enable this. (Amy, personal interview, August 3, 2019)

Additionally, in Amanda's definition, students have a choice in how they are going to learn and how they will show their mastery of learning. Amanda explains,

> Students have a choice in a variety of activities to gain knowledge and display of mastery. While they are bound to learning the social studies curriculum, students do have a choice of parts of the curriculum. They direct their focus. (Amanda, personal interview, August 5, 2019)

While Amanda provides choices of activities, resources, or focused topics, she also allows choice and diversity in how students show their mastery of learning. Amanda notes,

> I want to provide to my students their best opportunity to showcase their learning. In many cases, students do not shine in a traditional assessment, including essays. I want them to enjoy and engage in their learning, so in many cases, they have the autonomy in how they reflect their mastery; it could be a video, song, or a children's book. I allow their creativity to shine and their interests. (Amanda, personal interview, August 5, 2019)

Working at Their Own Skill Level

Alexa and Amy are similar in their definition of PL by including students working at their level or where they are. At the same time, Anna mentions students doing their activities to work on their skill level.

According to Alexa, students working at their level is, "Meeting students as their skill level to increase their skill level instead of holding them back or pushing them ahead of what they have yet mastered" (Alexa, personal interview, August 5, 2019). While Amy says, students influence her definition of PL because the purpose is to meet them at their level. She says,

> The kids must influence my definition of PL. Reading is an animal in itself. If the students at our school are in reading and not a world language course, then they are not reading at grade level. So, I must meet them at whatever their skill set is to drag them up to get them on-level. So, I guess the kids do and their needs, to personalize their learning in any way I can. (Amy, personal interview, August 3, 2019)

While Anna explains how she tailors instruction and learning for each student by differentiation, Anna states, "I try to teach the material in ways that students are going to learn best, many times that is switching up how I explain something or what they are using to learn or practice" (Anna, personal interview, August 3, 2019). Anna notes she can differentiate learning by creating activities and on-line learning environments, which are differentiated to meet the student's skill levels.

Pace

Anna and Alexa consider students working at their own pace in their mastery of the curriculum as a critical piece in their definition of PL. These two teachers are math teachers, while other content teachers do not include pace in their definition. Alexa notes,

> Math is precise in students being able to move forward in their learning. You have to understand a certain concept or skill to be able to apply it to the next level. Some students may master one skill quickly but not the next, and it is not always the same skill set. So,

> the students' pace in learning is always functioning based upon their needs on a certain skill or standard. (Alexa, personal interview, August 5, 2019)

In her definition of PL, Alexa refers to pace as students moving along the curriculum as the individually master different skills in the curriculum. Alexa states,

> Students will move on when ready. So, once they have mastered a standard, they should be able to move on and not by their classmates or how the class did as a whole and not be pushed to move on. (Alexa, personal interview, August 5, 2019)

According to Anna, personalizing student learning through pace can occur by allowing students to work on specific skills until they have mastered the material. Anna supports this by stating,

> Some students grasp certain concepts quicker than others. Allowing them to work at their own pace, lets students manage the time they need. One math concept they may get quickly, others they may need more time or instruction based upon their needs. (Anna, personal interview, August 3, 2019)

Path

Amanda is the only teacher who refers to students working on their path in learning the definition of PL. Amanda states, "While all students should achieve the same goal in their learning, they may all get there in a different manner or path" (Amanda, personal interview, August 5, 2019). These paths are designed using a variety of different activities based upon student's choice, interest, and student's individual needs. Amanda further states,

> With the diversity of my students, they are all not going to master the material the same way. One example, social studies require a lot of reading. In one class, I may have students who are still in a required reading class, some still reading at a fourth-grade level, or new to the country ESOL students. The resources and tools

> I use for these students are not going to be the same. Some students will take longer to grasp the topics, or others may be interested in a specific person or event. So, the path in their learning is not going to be the same. (Anna, personal interview, August 3, 2019)

Common Goal/Guideline/Curriculum

Amanda and Anna are the only two teachers, which include components of a common goal, guideline, or curriculum in their definition of PL. The teachers refer to this purpose as a goal, guideline, or the defined curriculum. However, the other teachers mention mastery of learning in their definitions of PL, and they do not explicitly include a goal or curriculum.

While Amanda sees PL as the student's having agency and choice in their learning, there is a guideline that teachers and students must follow in instruction and learning. Amanda expresses this guideline is state and district-mandated curriculum. Amanda states,

> Curriculum drives everything in personalized learning because this material is what the state or district wants them to learn in the end. It would be great if the student could truly focus on areas where they have interested, and this could be easily accomplished in social studies. In social studies, students can easily pick a topic, a country, or an event they want to delve deeper into. However, our students and we are bound to what the state and district require students to learn and master by the end of the year. (Amanda, personal interview, August 5, 2019)

Similarly, in Anna's definition of PL, students have agency and choice in how they learn and show mastery and working at their own pace to reach this mastery. However, in the end. Anna explains, "I may have students who are at an elementary level in their math skills, but I have to work with them to mastery the 8th grade standards" (Anna, personal interview, August 3,

2019). The common goal Anna refers to is the mastery of the skills determined by state and district curriculum. to work with them to mastery the 8th grade standards (Anna, personal interview, August 3, 2019).

Technology

Anna is the only one of the teachers who specifically include technology in their definition of PL. She believes technology is essential for PL to occur, while the other teachers see technology as an enabler but not a defining piece of the model. Anna feels the schools where she has worked and how she has worked with technology specifically influences her definition of PL. Anna states, "there is a more broad, general definition to those outside of the classroom, who see it as a lot of technology-based learning" (Anna, personal interview, August 3, 2019). Teaching at a 1:1 school with student mobile devices and access to various software tools influences Anna's definition of PL. When referencing technology in the use of instruction and learning, Anna and her students have access to a variety of technology at their school, including software, online resources, interactive software, and the use of mobile devices. Anna provides multiple ways for students to practice math skills. An example, Anna provides, "We have software available where a student takes a pre-test, and then their path is personalized going forward, and it is so specific to what they have shown that they know" (Anna, personal interview, August 3, 2019). While not every student utilizes this or not every unit or lesson of study is through this software, this based upon the best needs of the student and class.

PL Enacted in Teachers' Classrooms

Just as these teachers do not have a common definition of PL, their implementation of PL does not mirror each other. Without a district or school set standards, these teachers have been allowed to design their implementation of the instructional model in a manner which works best

for them and their students. Given the flexibility from their administration, these teachers have experimented with various tools and resources as they develop learning environments to meet the needs of their students. Even in their classrooms, these teachers' implementations of PL are fluid to ensure students are engaged.

Anna

As Anna begin her teaching career, her instructional practices were focused on differentiating instruction for the needs of her students. When she transferred schools, Anna has integrated these strategies and migrated from the traditional classroom mindset. In this shift, Anna noted, “I have to change my thinking of the whole group but what will work for each individual” (Anna, personal interview, August 3, 2019). Anna's definition of PL is evident in its components, including differentiation, student agency, and choice, and is technology-based as she implements PL in her classroom.

According to Anna, due to the subject of math specific content, there are limitations due to skills or standards the students must master. However, Anna feels allowing students to have a student agency, choice, and to work at their pace is essential to their commitment to their learning. The integration of technology as a component of PL is key to Anna. She states, "Technology is core to tailoring learning to each student. It allows real instruction due to the ease of data collection and access to resources and tools to meet their needs” (Anna, personal interview, August 3, 2019).

Student agency. Anna has stated that students must have buy-in to the learning process, and student agency drives this in their learning. The amount of control or voice in their learning depends on the individual student in Anna's classroom. According to Anna, "Students who are more intrinsically motivated have more control in their learning than others” (Anna, personal

interview, August 3, 2019). For students who are motivated, she provides greater autonomy in what skills they want to practice and how they will do so. Other students, Anna feels she must guide them at the beginning stages of new material or standards. Anna tries to guide them at this point and do so without the students realizing they do not have as much control. Anna notes, "There are students who, if I am not helping them with a lot of the beginning steps, they are not going to get it themselves, or they would not make the correct choices" (Anna, personal interview, August 3, 2019). For the students who may need more help making choices in their manner of learning or the skills they need to take extra time or review, Anna will modify choice boards for students to have specific steps they need to complete different than other students, they might be doing more practice using an online tools, or they may be working with this students individually or in small group.

Instructional models. Walking into Anna's classroom, typically two models of instructional /learning activities enacted, station rotation and choice boards. Anna says the model implemented on any given day generally depends on where the classes are in learning a skill or a standard. Anna states,

> Most activities in my class are data-driven, I use exit-tickets to determine skills or concepts the students need practice with or for grouping within rotations. Previously, I used a tool called Exit-Ticket, which analyzed the data quickly for my students and me to know exactly where they are in mastering a skill. This software previously had been supported by the district. Now, I use tools such as Quizizz to assess my student's understanding quickly. (Anna, personal interview, August 3, 2019)

Anna's day to day class schedule is typically 20 minutes of instruction, which could be direct instruction or review, then the rest of the class is either station work, individual, or choice work.

Anna saw her shift from differentiation to PL moving from just differentiating activities or practice of skills based upon the levels to integrating student agency and choice. Through learning new strategies, she was able to make this shift. Anna states,

> As we made this shift in our classrooms, I learned new strategies such as station rotation but how to take something I knew and use it a different way such as choice boards. I had used choice boards in the past as a way to provide different activities for students to use. But through some of the professional development at school, we were show ways to use them for personalize learning even more so with the integration of technology. I could tailor their choices built upon their needs. For example, if they chose to work on IXL, and they still struggled with integers, that is what it would set them up to do. While another student may want to create a flipbook, and theirs could be on translations. (Anna, personal interview, August 3, 2019)

Student choice/choice boards. In many cases, students do have choices in how they learn in Anna's classroom. However, Anna starts each new concept in math with direct instruction in a whole group setting. Anna states, “Sometimes they may not have that choice because, for math, especially a lot of things require a little bit of direct instruction before they can do a lot of it, beyond that, then it is kind of free rein” (Anna, personal interview, August 3, 2019). Since the school integrates AVID strategies in instruction, Anna uses the Cornell note-taking method when introducing a new math skill. This is a process which the school has implemented as part of AVID. Cornell Notes is a systematic note-taking format developed at Cornell University, which condenses and formats notes (AVID, 2019). The variety of the Cornell Notes format can vary based upon the students. Anna describes,

> I can have students who have a blank sheet of Cornell Notes and take all of the notes, while others could have the questions typed already for them, and students who have more of guided notes/fill in the blank note sheet. Even when working with the whole group, there is a differentiation of the activity for the levels and needs of the students. (Anna, personal interview, August 3, 2019)

As the unit progress, Anna generally provides students choice boards for additional instruction, practice, or to show their mastery. The students can choose activities, assignments, or projects which they feel works best for themselves.

Anna described a choice board for a project before that she thought went well for students. The students can choose a combination of all kinds of activities such as basic iXL practice scores and scores on Quizizz, up to more complicated items such as creating a children's book to teach others the mathematical concepts. Anna stated she,

> designed the choice board where the simpler choices were fewer points and the more complicated things were more, and their choices had to total to 100. Certain items on the choice were mandatory, such as a study guide for the unit. For students who need more practice, they will complete more of the lower value items, while the advance would complete fewer more complicated items. (Anna, personal interview, August 3, 2019)

For another choice board Anna implemented in her classroom, she allowed students to choose the order in which they completed activities on the topic of representing and comparing fractions. Students had certain activities they must complete one called "Word Work" with students completing activities related to vocabulary and lessons and practice they had to completed using technology.

Observing one of Anna's class periods, as the students walked into the classroom, the looked to the interactive board to review the day's activities while going to their seats. The class size is about 20 students. The students took out their agenda and noted any homework. While this was occurring, several students were talking and asking questions about activities at school including recess. After the first couple of minutes of class, Anna had the students get out their iPads for their warmup. The warmup for the day was a Kahoot which had five quick questions regarding fractions. They students were enthusiastic and focused while playing the game. This warmup through an online tool provide Anna quick access to data about her student's progress in the unit. Once the warmup is completed, Anna directs the students to work on their choice boards they were given for the fraction unit. The students begin to mill around the room and their desk getting out material they need to complete their work. Throughout the period, student get up from their desk students get paper, colored pencils and other items from a supply area in the classroom. The students can be viewed completing a variety of activities such as online lessons or practice using Blendspace or Study Island using their iPads. Many students completing online activities have headphones and stay focused most of the time. Students are creating charts or flipbooks on paper or creating games for their peers to play. Several groups of students creating digital presentations on how to compare and order fractions. Two groups of students are in the hallway creating videos using iMovie. The students are focused on their tasks, and Anna moves around the classroom, checking on students. You will see students with headphones working on their iPads while others are completing writing on worksheets or using construction paper, glue, and scissors, creating games and flipbooks. In the last five minutes of class, Anna brings the class together and discusses with the students as a group in where they are in completing their work. Anna believes,

> Allowing the students to choose their activities to complete each day drives ownership in their learning. And at the same time, they are more engaged because the students know what they are comfortable in that moment of what they can accomplish or what they are interested in doing that day. One day they may be really into using technology, and sometimes they just wanted to paper activities. (Anna, personal interview, August 3, 2019)

The choice boards Anna implements in her classroom are not the same with each unit. She changes the types of activities in the different sections, technology resources selected, and the task to show their mastery.

Anna feels students liked choice boards for a couple of reasons. Anna notes,

> One is that they were able to use the mediums that they preferred—the artistic kids chose the more artsy options, and the ones that liked doing just straight practice have the chance to do that. It allowed students to be as comfortable as possible in showcasing their learning. (Anna, personal interview, August 3, 2019)

Students were also more likely to complete this assignment because it was personalized. Anna noted,

> The students felt like they had real ownership in the products they were turning in, so the students were confident in what they were doing and turned out better products than normal. In general, it also broke up what can be a monotonous review at the end of a unit. (Anna, personal interview, August 3, 2019)

Station rotation. Along with the use of choice boards, Anna uses the station rotation model in her classroom. Anna's grade level math counterparts had come across the Tabor Rotation framework to differentiate and personalize math instruction. Anna's colleagues went to

training for this framework and shared this strategy with her as they co-planned. Tabor Rotation is a framework using stations and teacher-guided small group instruction, which allows differentiation based upon the needs of the learner to accelerate mastery of math skills and concepts (Tabor Rotation, 2020). As these teachers utilized this strategy in their classroom to begin their implementation of PL, Anna became attached to the framework when she transferred to this school. Anna notes, "I use a station rotation model usually near the end of a unit when we are reviewing preparing for an assessment. However, I have utilized it as well during the middle of a unit" (Anna, personal interview, August 3, 2019).

The station rotation model in Anna's classroom usually has student desks arranged in five different groupings as well as a station for small group instruction. Anna describes,

> The determination of which station each student is working on is based upon data usually the exit-ticket from the day before. If a student has a low score on, let's say equivalent fractions, I might have them working in a small group with me, while a student who scored high on the same skill may be working on a station comparing and ordering fractions. I usually do this model for a couple of days to allow remediation for as many students who need it.(Anna, personal interview, August 3, 2019)

As part of station rotation, each student is provided with a productivity card. The card list each of the different stations the student is required to complete as part of the rotation. The last station is for a student to take an online assessment. Anna then has the students review topics the scored the lowest using a tool such as IXL Math. Anna notes,

> With the productivity cards, student have the expectations laid out for them of what individually they are supposed to complete. It holds them accountable for their work while I work with other students. With an assessment at the completion, the students and

> I know where they stand and what they need to review. (Anna, personal interview, August 3, 2019)

Anna thinks it is essential to have the time to work with struggling students, but it does have some issues. Anna states,

> When you have a class size of 30 students, and you are the only teacher in the room, it hard to focus on them and manage the needs of the rest of the students. It works best when I have another teacher in the room, and luckily, we have leadership in the building who are always willing to come in and help out on these days. (Anna, personal interview, August 3, 2019)

Pace. In her classroom, Anna incorporates the elements of student agency and choice when she allows students to work at their own pace. Anna incorporates pace in her instruction in various manners in her classroom. Anna notes,

> Students can work on at their own pace when we are working through a unit using choice boards, unit pathways, and when working online in iReady software but this pace has to align with the expected completion date of the unit. (Anna, personal interview, August 3, 2019)

An example Anna describes relates to a unit regarding linear equations. Anna states,

> Each section of the unit as a pathway for students to complete at their own pace as long as they finish the path. Each section has four tiers valued one to three points, and each tier has various activities. To complete each section, the student must complete enough activities to equal four points. So, the students have the choice of doing two one-point activities and one two-point activity. It's; however, they choose to reach that point level. The students then must complete a checkpoint in which the student much reach a score of

> 85% before they can take their formative assessment to move on to the next section of the unit. The student can work through the unit at their own pace, take formatives early, take longer or shorter on each section has needed for their individual needs. (Anna, personal interview, August 3, 2019)

If a student is struggling with a skill, one can provide them additional instruction or time in a way to master the skill. According to Anna, "if a student already gets a concept, you can give them more things to further their conceptual understanding or move them up" (Anna, personal interview, August 3, 2019). She observes that math is easy to do in this regard. Students can always go more in-depth in a standard needed for their individual needs.

Anna states, "For those students who master eighth-grade standards, you can try to push them to dig deeper on a concept – take the next level/hard work" (Anna, personal interview, August 3, 2019). The pace allows teachers and students to have conversations regarding their goals where are they in their learning, do they need more time on a concept or have they mastered the concept. Anna noted, "the beauty of math it is effortless to build because it is continually building" (Anna, personal interview, August 3, 2019). For example, a student who has mastered an eight-grade standard can experiment with the same material in how it might be used in ninth grade algebra.

Challenge. However, Anna states, "it takes a lot of organizational skills on her part, to have students working at a different pace" (Anna, personal interview, August 3, 2019). Students are completing various activities using various tools, including online software. This makes knowing what point each student is in their learning a struggle. Anna feels this is her biggest challenge in implementing PL is monitoring student progress. While mandate curriculum is a starting place for developing instruction or personalized activities and sets a goal, they are

working towards completing. When students are all at different locations, there are time constraints in keeping track of where each student is in meeting their set goals or the standards. Anna describes,

> With me providing a variety of activities for students to complete and the work is not all on-line, this requires me to be organized in my grading of activities students complete on paper and check the various online software the students have the options to choose. With over 100 students, this can be a daily struggle. The best options I have been using online tools such as Quizizz for an exit -tickets for key checkpoints in mastery or with weekly usage of iReady the district is implementing. It is a struggle monitoring student progress when they are all in different places. (Anna, personal interview, August 3, 2019)

Role of technology. Anna believes technology is an integral part of PL; it allows a variety of tools and resources to be used and to track student progress. As the school is with a 1:1 mobile device, has reliable internet access, and she can push out applications or software to the students widens the number of resources and tools to aid instruction and learning. Anna notes, in some ways, she can "let some students be" for some students she can allow them to work, check their progress on the software they are using. At the same time, it enables her to assign different types of activities on different software to meet the needs and interests of her students. Anna believes in technology-integrated learning, and students are more engaged because they are using an iPad instead of a piece of paper. Technology improves her ability to develop and implement personalized learning environments, Anna further notes, "students are more naturally inclined to do things which are technology-based" (Anna, personal interview, August 3, 2019). In her classroom, students use technology for the most part for practice on different skills and display

their mastery of learning. With the integration of technology, Anna can track students' progress. With district-mandated software, Anna can determine what they need to know or what they do know or how they tested on something. This data facilitates further instruction. Anna can identify areas that need additional review or students who may need remediation on a certain standard.

Anna uses several online tools to give a formative and summative assessment, and the use of technology eases data-driven decisions. For formative assessment, Anna notes, “Many days I use an online quiz game such as Kahoot or Quizizz either as a warm-up or an exit -ticket to gauge student understanding. The use of these tech tools provides immediate analysis” (Anna, personal interview, August 3, 2019). The tools collected student data online, and the teacher can make real-time instructional decisions. Anna says,

> I can use this at the beginning of class and have the data for grouping or assignment of class activities for the day, or if I use it as an exit ticket, it will guide me as I am making instructional decisions for the next day. I know who understood the material, who didn't, was it most of the class or not. I can decide does the whole class need to spend more time, I reteach the material, do I need to remediate certain students or is the class ready to move. While the tools provide me immediate feedback, the kids also receive the same feedback as well. (Anna, personal interview, August 3, 2019)

Alexa

In designing PL learning environments in her classroom, Alexa maybe is responsible for having a smaller number of students. However, in her role as a special education teacher, her students have specific goals, needs, and accommodations. Alexa must ensure she encompasses the design of their learning. With this in mind and the school focused on student agency, Alexa concentrates on goal tracking and student agency in her implementation of PL.

With this set of students, Alexa is focused on data-driven instruction for herself and students to have a clear understanding of where they are in meeting the student's individual goals. While her students may have the same goals or standards to master, they still do learn or achieve mastery in the same manner or rate. Through her experience as a special education teacher and behavior intervention specialist, she has been differentiating instruction throughout her career.

Goal tracking. As Alexa further implements PL in her classroom this year, the main component she is having her students focus on goal tracking as part of their pathway to a mastery of standards. As a special education teacher, Alexa must ensure she is curating a learning environment that focuses on student-specific goals along with meeting grade-level curriculum. Alexa focus will be based on the district's framework and Standards Mastery Framework, with her students having a voice in planning their learning. She notes this can be challenging and overwhelming. According to Alexa,

> The students will help me kept track of their learning, when they master a standard and when they are ready to move on. There will be a system in the place for myself and my students to know exactly where they are. (Alexa, personal interview, August 5, 2019)

Along with goal tracking, Alexa has individual conversations with her students on their goals, where they are, where they need to be. She feels this builds ownership in their learning.

With the use of district-mandated software in math, goal tracking can be simplified. Alexa says,

> With the requirement of the use of iReady in math, I can preset learning goals for each student's individual goals and needs. With the use of this system and other student

> collected work, I easily have the data required to support each student's progress in meeting their goals. (Alexa, personal interview, August 5, 2019)

With the use of software, goal tracking can be easily accomplished. However, Alexa wanted an extension of this with her students. She weekly conferences with her students and has a class display of where each of her students in their goals.

Alexa has four small classes with each about seven students and her other classes she co-teaches with other teachers in their classrooms. Alexa's room is smaller than other classrooms and is decorated with soothing décor. She has tables that allow for flexible seating for her students with dim lighting. Each wall is designated for one of her classes with a display of students' names with a track for each of their individual goals. Each goal has a number and a marker where they are meeting their goal. Each student has designed their stamp based upon their particular interests, such as basketball, cars, celebrities, or a character from a game.

The expectation for each student is to spend at least forty minutes each week in iReady for practice and checkpoints. If a student meets this expectation each week, they earn an additional recess period during the school week. With this reward in place, students are driven to achieve their expected time. With each unit of study, Alexa creates a tracking sheet for each step/activity in the unit. Alexa 's students take a pre-assessment at the beginning of each unit. This score is noted at the top of the sheet. The students mark their progress as they moved along. Alexa builds into each class day five minutes to conference at least one student a day regarding their progress in the unit and other goals.

In her role as a special education teacher, there is substantial importance to Alexa understanding where each student is in meeting their individualized goals. Alexa states,

> Having the time to conference each week with almost every student is valuable on many levels. With my group of students, I have individual goals from their IEP (Individualized Education Plan), which the students are progressing through, statewide curriculum targets, and our units of instruction. My students and I must have an easy way to see where they are in their learning and set the next milestone. Setting the time with the students and having these discussions allows us both to have input into their learning. For example, in one class, I could have one student who still is working on an individual goal to multiply and divide with more than two-digit factors or another one working on order of operations and, at the same time, master the sixth-grade goal of ratios and percentages. Having these goals right in front of us, we can make decisions for the week of work I set up for them to complete, whether in IXL or Study Island or small groups. (Alexa, personal interview, August 5, 2019)

Goal tracking goes hand in hand in with students having a voice in their learning in Alexa's class. While they each have specific goals to meet, the students using these goals with their teacher can determine work for each day in class. In Alexa's class, you can observe students coming into the classroom, and as part of their warmup for the day is to look at their progress trackers, and most days, students use this to take ownership of their learning and shape their work for the day.

Student agency. As Alexa and her students set goals in their learning, these students have a voice in how they are going to learn. Alexa allows students to make decisions in most cases in tools and learning activities in her class. Alexa states,

> Allowing students to have agency or choice in their learning is going to increase their engagement in their classwork. In some cases, there is an increase in excitement when a student has the option in how they are going to learn. Or some of my students when they have mastered a simple skill and can try something new. (Alexa, personal interview, August 5, 2019).

Observing one of Alexa's class, the seven boys came into the class excited and asking what they were going to do that day while reading the board when they came in. The students had a quick warm-up question as well as writing in their agenda before starting individual work. The standard for the day related to master rules of decimals using all operations. Alexa asked each student the tool they would like to complete their work. The students chose IXL and Study Island, and Alexa then set each program for the students to work individually. Another student asked if they could work on iReady because they needed their minutes for the week, while one student preferred to complete worksheets as opposed to an online tool. The students sat at the tables in the classroom, each working on their individual assignments for twenty minutes. During this time, Alexa was able to pull a couple of students aside and conference with them about their goals, what area they felt they needed to work on, and see where they are in learning.

After this time period, the students had the option to complete partner work. Since this was a group of eleven-year-old boys, Alexa notes, “I work to ensure transition time is limited with the energy but letting them have the time to select their activities is essential” (Alexa, personal interview, August 5, 2019). During these twenty minutes, the boys can be seen working a card game (multiplication), dice rolling (division of decimals), and putting a puzzle together (addition/subtraction). The students were active in completing their activities while Alexa moved around the room, eventually sitting down to help the students with the puzzle. At the end of the

class period, the students were given a sticky note with a math problem for them to complete as their exit ticket. Their responses Alexa will use for their small group instruction the next day.

Along with this ownership in her students' learning, Alexa feels students have control in their learning in the sheer fact of being focused. While having numerous tools available to her through technology and creative ways to all her students at different levels, in the end, it is the student's decision. Alexa states,

> Students can either choose to focus and try, and work on the task or choose not to. So, in a way, they have control. But as far as what is going to be learned, that pretty much mandated, so the topics aren't always going to be learned by the students. (Alexa, personal interview, August 5, 2019)

It is the challenge she has with many of her students.

With the curriculum being determined, Alexa tries by going outside of the box relating to math to their interest or what is happening in the world. Alexa states,

> I try to allow some voice and choice in how they learn, by thinking outside of the box, as far as how math relates to them right now in the world, so at least it is more interesting to them while learning a skill. (Alexa, personal interview, August 5, 2019)

When students correlate the skills, they are learning to their interest. Alexa feels "this allows students to stay focused are interested and are engaged in classroom discussion/learning" (Alexa, personal interview, August 5, 2019).

Alexa acknowledges with PL that there is a shift: "Students become the drivers of their knowledge, whereas teachers facilitate learning based upon their skills and interest. I have to let go, and the classroom environment shifts to the students are the center" (Alexa, personal interview, August 5, 2019). As Alexa develops instruction for her students, she uses her

relationships with students to design instruction, which is going to capture their attention. Alexa states,

> When you have a group of energetic boys, you have to find something they relate to. For example, I have a couple of boys who are into sports. I've used a football field and the outcomes of plays, to have students work on addition and subtraction. Another boy loves cooking, and this has been the easiest way to get him to focus on fractions. I even had him use dry and liquid measuring cups for an activity to show his mastery. It is a huge shift from a traditional classroom. (Alexa, personal interview, August 5, 2019)

When describing how PL in her classroom would look if someone came into observe, Alexa states, "From the outsider's point of view or someone who has taught before, it may seem a little chaotic because so many things are going on in the room" (Alexa, personal interview, August 5, 2019). The classroom is not in the traditional form of rows, and it is not quiet. Students are working in groups, huddled around different activities to create, work, or build with teachers continually roaming.

Technology. While student agency through goal tracking and a voice in their learning are the major components of PL in Alexa's classroom, she states technology is the one tool allowing this implementation. Alexa indicates, "Technology eases your learning curve, as far PL, in how to implement it. It helps you build your knowledge, your background, and focus on various topics for your students" (Alexa, personal interview, August 5, 2019). The resources and tools which she can access using technology allow Alexa to design PL environment, which is geared to each of her students. Alexa states,

> It makes my job easier for me to go and find things that the kids can then do. Sometimes, it is also for the students, because then they are focused when something specific that is

> geared towards them, like iReady, where they are working at their level in math, even though I may be teaching them at a sixth or seventh grade standards, they are still learning at their fourth-grade level, or third-grade level. Technology allows this to happen without the students understanding or knowing this easily. (Alexa, personal interview, August 5, 2019)

Technology also allows students to work independently or individually while Alexa is working with an individual or small group of students. They could be using mobile devices, headphones, and online tools. Alex states,

> I like to use technology when students work independently because it is geared directly towards them. Other times, I might use technology when there is an application on the iPad. I want them to use when they are working on a project or activity together. (Alexa, personal interview, August 5, 2019)

Observing Alexa's classroom in most cases, you will find students quietly engaged in their learning using mobile headphones and online tools. Alexa describes,

> Students use their iPads as just a manipulative, as a piece of a puzzle of what they are working on. Sometimes they are using it to submit final ideas or projects, so they may be using it build out their ideas for like a video or drawing. (Alexa, personal interview, August 5, 2019)

However, Alexa finds technology can be a "double-edged sword." Alexa states, "Sometimes we rely too heavily on it. Kids are wrapped up into it, not because they are learning, but finding ways to stay busy" (Alexa, personal interview, August 5, 2019). With the world being so heavily technology-based, she finds it nice to take a break and use paper and pencil. Alexa states,

> I think technology is a double edge sword. I think sometimes we rely too heavily on it, and the kids get wrapped up into it, but it's not about the learning, it's because they are finding their ways to stay busy. Sometimes I think kids take pencil and paper more seriously. (Alexa, personal interview, August 5, 2019)

Challenge. Alexa notes the most challenging part of implementing PL is, "Keeping up with where your kids are" (Alexa, personal interview, August 5, 2019). She indicates the amount of data that is collected, trying to keep track of where each student is in their mastery. Alexa explains,

> The data, the output from each of the students to figure out where they need to be next, what they need. Do they need more remediation? Do they just need to show mastery at this point? Just keeping up with all those flows, as in the flows of each of your students, is probably the most challenging point keeping up with the flow for each of my students is the most challenging and overwhelming at the same time. (Alexa, personal interview, August 5, 2019)

Amy

As a reading teacher, Amy has flexibility when designing learning for her students. She wants their learning environment to be creative and tries to draw them in by gamifying her classroom. Amy believes,

> Allowing her students to have a voice in their learning opens possibilities for students to grow in their abilities, especially in reading when they controlled their learning. My students are all at different places in their reading levels and a wide range of interests. So, learning has to be designed to incorporate these facets. (Amy, personal interview, August 3, 2019)

Because she has only been teaching for four years, PL is the first instructional model Amy has implemented outside of differentiated strategies. Amy notes that her students are her driving force in implementing PL. She notes that most students placed in reading class, struggle, and this is hard on their self-esteem. Amy wants her classroom to focus on positive effects. She believes integrating gamification provides an environment to occur. Amy describes,

> I can personalize learning for each of my students through the game. They have a quest to complete based their needs and abilities and making their own decisions along the way. Through the steps completed and rewards/levels achieved, they become confident in themselves. (Amy, personal interview, August 3, 2019)

The integration of gaming, along with PL, sets Amy apart from the other teachers at the school. This is part of her personality and reflects how the teachers have flexibility in their PL implementation.

Observing Amy's class, one sees many of the elements occurring throughout the period. Her classroom is set up in a warm environment with low lights, murals painted on the wall, and different sections in the room for different activities. When the students arrive actively talking into the classroom, she directs them to place their belongings at their table and join her at the front of the class.

Amy has designed an area in her classroom for whole group instruction. She has built wooden stadium seating for the students in front of the interactive projector. The students are excited to see what they will be doing, since she has ClassCraft displayed on the screen. Since the class stayed on task the day before, she informs the students they have earned coins as group in the ClassCraft. Each of her classes has a class goal in which they can receive certain rewards. Within ClassCraft, Amy has created questions and quests that also earn points for students. On

this day, one student was prompted with a question of, “How can you determine the point of view in an article or book?” The student earned individual coins for herself. Prior to the class beginning individual work, Amy tells them a story about a book that she has had since she was middle school, the impact the book had on her, and how it engaged her to become a reader.

The students move back to their tables. There are five tables in the classroom with most having four students at the table and one table had only one student. The students got out folders and either their iPads or a book. In their folders, each of the students had questions they were working through as they read their individual books. The students had the choice to pick books from the school media center, the classroom library, or through the school district’s online books. As the students read, they would work through questions individually. One or two students would get up to go to restroom or get other items in the classroom.

The one student who was sitting alone was reading a book on his iPad. He had a hard time focusing and would be across the room trying to talk to other students. He then asked the teacher if we could sit on the floor and read. Amy’s classroom had an area by some bookshelves which had large pillows and stuffed animals where students could read. The students stayed there quietly for about 15 minutes and then was up and about the classroom.

While the students were working, Amy could move from table to table and have discussions with the students at each table. One table, Amy and the students discussed from what view their individual story was told. The students would have to explain to the table the point of view and give example of how they determined this. At the end of the class period, the students were direct to track their reading in their folder. They had a reading log for each day for how long they read and what page they were on. The daily activities in Amy’s classroom vary from

day to day. Student on most days can be found individually reading books of choice, completing individualized quest in ClassCraft or working on choice boards.

Student agency and choice. Amy explains voice and choice in her classroom:

> Student agency and choice are used in my classroom most days. Students have the choice to choose four novels they would like to read throughout the year. This is outside of other leveled text selected for instructional activities. When I assign leveled text for student to read, they are provided five to choose from and have study guides which go along with each book. Each student having access to supports using an iPad, for example, struggling readers, if a student feels they need an audio reading of the text to assist them as they go, they have that voice. (Amy, personal interview, August 3, 2019)

Amy provides another example of a student who was taking ownership of his learning. Amy says,

> I do a lot of check-ins in my class, but today, I had a student who did great on a formative when I asked the class who still was not comfortable with central ideas. He raised his hand. So, tomorrow, the students will be working on a different article on their iPads, while he and I work together through a higher text article to see how he feels. (Amy, personal interview, August 3, 2019)

Using student agency and choice to tailor learning to the individual needs of our students, Amy describes how she has used this to advantage for transient students. For example, Amy says,

> Students who moved middle or late in the year is placed in reading class as opposed to having the opportunity to take a world language. For example, I had a student who had taken Latin at her previous school and was placed in reading since our school does not

> offer Latin. The little girl was "me'? She was reading at a way higher level than the rest of the class. I was able to conference with a student to find her interest. While the rest of the class reads a lower level short story mystery lesson on the death of Edgar Allen Poe, this student was reading the Murder in the Rue Morgue. (Amy, personal interview, August 3, 2019)

Along with students being able to choose from a variety of books, Amy permits students to make choices according to their interests. Amy describes one of these activities,

> I have an assignment called fact or fiction, which was to distinguish between supporting details and actual evidence. The students could choose any mystery of the world, and they had good ones, such as the murder of Tupac, Bermuda Triangle, angels, and Megalodon. I was amazed they understood this stuff. The students were intrigued by their topics, and they had a great debate about what was real or not. Being able to choose their topic and material they needed to read increased their mastery of the standard. (Amy, personal interview, August 3, 2019)

Path, pace, and goal tracking. Along with students having an active role in choosing their reading material, Amy utilizes path and pace with goal tracking in student learning. Amy describes how she uses these elements of PL when students are working on these leveled text units. Amy says, "Calendars are created with checkpoints, and the study guides are chunked. Students worked at their pace with these spot checks built in to monitor progress for the students to gauge where they should be." The district has implemented iReady online in Math and Reading, and students are to spend forty-five minutes each week per subject working on differentiating instruction based upon their needs. Amy notes,

> While in iReady, students can track their progress, I made them data tracking sheets for students to monitor their minutes and percentage of lessons completed. Students have control of when they complete this work, during class or at home, they have ownership. If they do not meet this goal, the students do not receive certain coins in ClassCraft. (Amy, personal interview, August 3, 2019)

Gamification. Amy, through the integration of online educational gaming software called ClassCraft, has been able to further develop pathways for her students by creating Quest for them to complete. Amy describes,

> With ClassCraft, I can create online pathways which incorporates choice as well in the Quest. Each of the Quest has varied activities students can choose from along the way. I can also develop unique pathways for individual students based on their needs. Students are very motivated to move along the path and earning gold coins and other cool things. The tool is similar to the game Fortnite. They all are playing. With gamifying the classroom, I can differentiate lessons and assignments, students can make choices along their path, and they are. (Amy, personal interview, August 3, 2019)

When you walk into Amy's reading classroom, you see, she has designed an environment to be comfortable and is inviting to the students. The lights are low, and there are tables for the group and individual work, a table for small group instruction, areas of the floor with stuffed animals for students to read comfortably, and wooden benches for stadium seating for whole group instruction. Along with creating a welcoming learning environment for students, Amy likes to energize students in their activities by dressing up in character or included activities that would drive interest. Amy describes an instructional activity she designed for students at their own individual levels, interests, and they were highly engaging the students. Amy says,

> The grade level was going to Medieval Times on a field trip, so all the texts for classes chosen had something to do with that time period. I dressed up in characters from the period each day, which would excite the students as they come into the classroom. I had four different levels of the same article and grouped the students by BAS scores (reading levels). I even organized them by symbols (horse, shield, castle, etc.) to disguise their reading levels. Students wrote a T-chart on the tables on whiteboard tables at the time. They received a brown paper bag with strips of paper that matched the article they read (by their own choice, i.e., popcorn, read silent, etc.) and had a question on the back. They were to decide if the strips were details or evidence to answer the questions. While most students were doing independent practice, I worked with small groups, either introducing the c/k rule or remediated to improve their reading skills. (Amy, personal interview, August 3, 2019)

Students moved through their individual quests in ClassCraft, and if they showed mastery of the skill, they moved on to more difficult leveled articles. Amy stated,

> The students were very receptive to this lesson, they loved the hands-on aspects, and I was able to reflect questions back to them regarding why they thought a strip was evidence or detail. I will definitely be using this lesson again because they enjoyed it so much. But also, because it was a herculean effort to put it all together. (Amy, personal interview, August 3, 2019)

Amy noted, "several students made genuine progress in learning levels, due to starting at their individual levels and being intrigued with topics such as the Black Death and The Crusades" (Amy, personal interview, August 3, 2019).

Using tools such as ClassCraft, iReady, and creating goal tracking sheets for students, Amy feels she has allowed her to manage students working on different paths in her classroom. Amy says, "Creating these quests in ClassCraft with approximately the same number of questions and check-in dates, helps keeps students on track and manageable for me" (Amy, personal interview, August 3, 2019).

Role of technology. Amy notes the use of technology improves her ability to develop and implement PL in her classroom in many different ways, access online resources and instructional activities, assistive technology, iPads, and even as a third classroom teacher. Amy notes,

> Through the use of online resources such as a tool like NewsELA, I can assign differentiated articles on the same topic to my students based upon their levels. This easily saves me time by not having to create the text myself. With the district mandate of iReady, I have access to data derived from instructional activities and assessment for each of my students. (Amy, personal interview, August 3, 2019)

Amy mentioned the use of audiobooks, which students have access to through district digital content, and the iPads provide assistive technology. Amy describes, "If a student is reading text on their iPads and does not know a word, they can have the device read the word out loud and even find the definition. This makes the text attainable to them" (Amy, personal interview, August 3, 2019).

With the use of iPads, Amy says,

> They open so many possibilities for me, and students have access to a lot more content from articles to books outside of what we physically have in our building. This year, I will be flipping the classroom for a few units. I plan to record short stories for them to

> listen outside of the classroom. When they hit the door, we can start working on what we have read. I think this would be more efficient. It would allow me more time to delve into getting the lower kids up to where they need to be and enrich the upper ones. iPads are valuable tools. (Amy, personal interview, August 3, 2019)

According to Amy,

> Students can use online tools such as dictionary and thesaurus as well as being able to create media to display mastery of their learning. Without the iPads, we would not be able to implement tools such as ClassCraft or even iReady. They can also act as a third teacher in the classroom by delivering instruction to students while myself or my co-teachers are working with other students. (Amy, personal interview, August 3, 2019)

In several of Amy's classes, she has a co-teacher who works equally with students in the classroom. Amy notes,

> Having a co-teacher really helps because when there is only one of me, I cannot break students in low and high groups, or work with a small group and have someone else to monitor the rest of the class. With students having iPads, it is like having an additional teacher in the room. (Amy, personal interview, August 3, 2019)

Amy provides details of PL in her classroom with technology incorporated, stating,

> In our Reader Workshops, students select the book they would like to read. At the beginning of the class, we do a mini lesson of either, "I do," "we do," or "you do" for about ten minutes. Then based upon the formative assessment, the students took the day before, we have already organized students into groups. The students who need more support would work with me or my co-teacher. The students in the higher group would work with the other teacher to move them on to the next topic or delve deeper into the

> subject. The students in the middle, who sort of get it, I would use technology, such as a tool like EdPuzzle, which presents the information to review but stops them and makes them answer questions before they can move. (Amy, personal interview, August 3, 2019)

Amy believes technology is an integral piece of the implementation of PL in her classroom. Amy states, "I think of my classroom as a puzzle with different puzzle pieces, and I feel like I use the iPads is a puzzle piece informing all the different aspects that students need to be successful in this standard" (Amy, personal interview, August 3, 2019).

Challenge. While Amy believes PL powerful for student learning, her biggest challenge in its implementation is the intrinsic motivation of the students. Amy states the group of students she teaches are, "Not motivated by grades, they are not motivated by knowledge, and some not even motivated by candy. The fact they do not have even a tiny drop of curiosity is challenging" (Amy, personal interview, August 3, 2019). She mentions students having one click away from access to information on their iPads. This is the reason Amy gamified her classroom, hoping to reach someone who motivates this generation of students. While the motivation of students is the biggest challenge in Amy's implementation of PL, she believes this is an excellent answer for students who are not on grade level in any content. Amy says,

> If you give them something that is way above their head, that is when you are going to have behavior issues, they are not going to be engaged and will cause mayhem in your classroom. But I do struggle with "how much do I meet them at their level, but yet prepare with the higher levels skills they are going to need. (Amy, personal interview, August 3, 2019)

Amanda

In Amanda's classroom, PL is implemented in various forms. Walking into Amanda's classroom on a variety of days, the layout of the classroom would change day to day. In her implementation of PL, Amanda notes,

> The elements of personalized learning used would vary day to day. I use agency and choice, paths, and varied environments. Most units, I create a variety of pathways depending on pre-test scores, but it depends on some days they may work in small groups or independently. It could be all of those pieces going on at one time dependent on the student. (Amanda, personal interview, August 5, 2019)

Amanda further notes the use of these elements make her classroom, "very engaging and organized" (Amanda, personal interview, August 5, 2019).

In her classroom, Amanda has the most diverse group of students in terms of educational background in this study. Amanda notes,

> In my content of social studies, my students range all over the continuum in their knowledge and abilities. My class sizes are large, and many who need additional support small group, pull out classes, or even additional support do not receive it. I try to leverage all possible means to drive instruction to get the students where a traditional model does not work. (Amanda, personal interview, August 5, 2019)

Pathways. To engage some students in the material, Amanda has designed creative pathways for students to work through. Amanda describes,

> I know this helps for some of the kids, like especially the middle of the road kids. They like a pathway, like a game board, and they should by this date you should be here, and it is visual, and they can color it in, and in the end, they should be in the right place.

> Because I am not always there to say like, you should be this far. This allows the students to have checkpoints for themselves or me, which are easily displayed. So, it is almost like a game board, like Candyland game board. (Amanda, personal interview, August 5, 2019)

Amanda does find it challenging to have students working on different pathways. Amanda says,

> It gets a little tricky, with most of my classes being large, and it is just me. It is difficult to manage. Students tend to slack off, and there was not enough of me to go around, check-in with students, or lead a small group. I would try to check-in at the beginning or end of class, but I am never able to hit everyone at the same time. (Amanda, personal interview, August 5, 2019)

However, this guides the students and Amanda, social studies, unlike math and reading, do not have a district mandate and guided checkpoints in mastery.

Student agency/voice and choice. In Amanda's implementation of PL, students do have some control in their learning through agency and choice. Amanda prefers to use choice boards in her classroom as a means for learning and assessment. While Amanda had utilized choice boards before the implementation of PL, it was during school PD where she learned more about how to incorporate these as a manner to personalized learning. Amanda does not use choice boards in every unit, and the types of activities are not the same for each board. One board may have the option of writing a journal or creating a presentation; the next unit may have different options. Amanda states,

> In my opinion, I think choice boards work best when classes have a say in creating them. One example of a choice board that worked very well for me was when we first went one

> to one. I was not familiar with the apps like the students were. I allowed them to add to each box on the board an app they could use to show mastery. It gave them a chance to have agency in how they were going to learn the material and show mastery. This provided me exposure to tools and apps, which I wasn't aware of. But the students found them engaging and wanted to use. (Amanda, personal interview, August 5, 2019)

Amanda notes that students are having the option of how they are going to learn and show mastery are more engaged in their learning. Amanda said,

> I have had students come up to me with very creative ideas in how they want to show their mastery of learning. The students are excited because they can do something other than a test; it is their idea. It captures all of their talents, whether it is music, drawing, video creating. I've had students even create physical maps of countries and continents out of cookie cakes. (Amanda, personal interview, August 5, 2019)

Amanda admits she does struggle with students having more control in their learning regarding the pace in which they move through standards. Amanda notes,

> I want them to have a voice, but at the end of the day, I need them to be at a certain place at a certain time. I understand how people like the movement of students just need to get to the whole curriculum by the end of the year. But it is a struggle when you have all of those students who are going to take longer and always are kind of behind. We get to the end of the year, but what happens they haven't done the last unit and not ready for big testing? (Amanda, personal interview, August 5, 2019)

Amanda notes that someone walking into her classroom would see,

> 20 kids doing 20 different things. Maybe not 20 different things, but there would be a few kids overlapping, but there would be multiple activities going on. They would all be

> working on hopefully the same unit at this point, but just different ways of doing it. (Amanda, personal interview, August 5, 2019).

This would be the case. Walking into Amanda's classroom, you see it is tastefully decorated in bright colors. She has lamps throughout the classroom instead of using the overhead light. The desks are organized in groupings of four, with a small table for her to work with small groups. At the beginning of class, her 2nd-period group of over 30 6th graders fill the room. The come in loud talking, but at the same time looking at the board in the front to see if there is a task to be completed. The students have something on the board each day, which they must write on their paper agenda. Amanda moves around the room, checking to see if they wrote down the information. While trying to remind them if each student does not meet their agenda goal for the week, the student would not earn extra recess. The particular class is a combination of on-level, ESOL, and remedial level students, and there is a co-teacher in the room. As she is trying to get the class focused, students are running up to her asking to go to the restroom or looking for pencils. As the class settles down, Amanda begins passing out Plicker cards to her students. While doing this, she says, "Go ahead and get ready for classwork, get out your iPads and path cards." One young girl yelled out, "Mine is dead," and another boy raises his hand, "I left mine at home." So, Amanda stops what she is doing and gets out two iPads from her desk for the students to use.

Each of the Plicker cards has numbers and are assigned to each student. The card is divided into four sections, which each can be designated as different answers to questions. Amanda posts four answers to a question she asked, and the student shows the part which reflects the answer to each question. Amanda then uses her iPad to scan each student's response. Amanda asks, "Who was the Spanish explorer who defeated the Aztec?" Most students are

focused on the question, while two boys in the back of the class are hitting each other with the cards. After she gets the scores of this question, Amanda asks the class who would like to tell the class this answer. A girl in the front raises her hand, Amanda selects the student, and she provides the answer. The next question, Amanda asks the students, "What of these is an example of the Columbian Exchange?" She scans the cards for answers. Once she has done this, she reviews the answer to the question. She then has the students pass up their cards and to start working on their paths. While this is happening, Amanda looks at the data from the warm-ups and will use this data for students to work in small groups. Several students are up walking around looking for supplies such as paper, and markers.

Amanda notes getting the students on task can be a struggle. She presently has a long-term substitute for her co-teacher in some of her classes. She notes,

> While I have some support in the classroom, I do not have someone who truly understands the needs and skill level of the students. With the combination of ESOL and very low students who previously who had a small group class, it is a challenge to meet all of their needs. (Amanda, personal interview, August 5, 2019)

In the next 40 minutes of class, the students work individually on their tasks. Amanda pulled two different groups of three students to work with her for twenty minutes each. While she is working with these students, the other person in the room roams the classroom assisting students and keeping them on task. The path card Amanda has given to the students for the unit is designed as a menu for each daily meal plus dessert. Each meal is designated by the name of a popular restaurant such as IHOP, and the depth of knowledge increases in each meal. The students have choices of activities for each meal period. For example, breakfast choices are tasks such as acrostic poem and creating a map, while dinner choice is "You be the Person" speech

with costume and speech in front class and create a cartoon strip of the fall of the Aztecs and the Incas. Amanda also notes for the students; they could propose new ideas or adjustments to the selection.

For example, one student in a class is observed, creating a script for a news show telling the events that happened during the Cuban Revolution. While Amanda is working with small groups of students reviewing a graph organizer of vocabulary terms, a few students were noted using their iPads. One student was creating a collage while another student was using an online cartoon maker, while another student across the room was creating a cartoon on paper. One girl was in the back of the room on the floor, creating a large paper doll of Simon Bolivar and noting facts on the back. After about twenty minutes, Amanda switched students she was working with. Thought out the class period, the majority of students were working and focused. The majority of students had headphones in their ears, which helped. There was one young boy who always has a hard time staying in his seat and would be up and down in his chair, walking over to other students to see what they were doing or talking to them. He will settle down and work for short periods, then be back up roaming. If a student completed an activity, they would mark this on their path card and then decide what would be their next task. Amanda said later,

> The students will mark what they had completed and had to have a total number of activities which would equal 100 points. The path card provides choices or ideas of what they could complete. The card was also an accountability piece for the students to keep them on track, and I could use this to spot check them. (Amanda, personal interview, September 17, 2019)

Days in Amanda's class generally work in this manner. Amanda describes,

> Most days, the students are working on an individual task. Usually, at the beginning of the unit, I do some whole group instruction with the AVID strategy of students taking Cornell Notes for them to use throughout the unit. At some point, another whole group AVID strategy like Socrative Seminar for some topics which bring deep conversations or classroom discussions such as Chernobyl. (Amanda, personal interview, August 5, 2019)

Another day observing Amanda's classroom, the student's behavior was similar coming into class. At the beginning of class, the students were given a formative assessment regarding physical and political features on a map. Amanda described how she administered the assessment:

> The students used their iPads, and the assessment was taken through the technology tool Nearpod. The pictures of the maps were loaded on different screens with different numbers on each page to represent a different feature. The students were able to take the assessment at their own pace, and their answers where entered in the system and automatically graded and the data stored for my access. Using this tool, allows students to work at their own pace, can be differentiated for types of learners such as special education, ESOL, or need accommodations such as visual or audio prompts. (Amanda, personal interview, September 25, 2019)

After the students individually finished their quizzes, they started working on their paths. In most cases, the students work quietly until everyone was finished. Amanda notes:

> I like the students taking the assessment online, it is immediate feedback for them and myself. They do not have to wait for other students. Students are not up and down turning in a paper. I can give a variety of assessments to meet the accommodations of different students I have. (Amanda, personal interview, September 25, 2019)

Challenges. While Amanda's believes in the PL model, she does explain the problems she has with its implementation. Amanda has struggled with the change in classroom climate and her personal preferences she had to overcome to benefit the shift in instruction. Amanda states,

> I like a very quiet classroom, and I like it when everyone is doing the same thing. You walk in, and there may be students making a video in the corner and kids doing something else in another spot. Just like the motion, the sound is challenging. However, the outcomes for the students overweighs this. (Amanda, personal interview, August 5, 2019)

Role of technology. Amanda relies heavily on technology in her implementation of personalized learning. Amanda states, “I can't do it without technology” (Amanda, personal interview, August 5, 2019). Amanda notes technology improves her ability to develop and implement personalized learning. Amanda states,

> It makes it more engaging. It makes it easier and a little bit harder. You can pull from a million different things but having a million different choices isn't always a good thing. Some activities are better than others for these students. For the advanced students, the more choice, the better. But for my lower level students, they only need a couple of choices, and we do better than giving them a million. (Amanda, personal interview, August 5, 2019)

Amanda notes that the use of technology allows her to differentiate content delivery easily for her students. Amanda says,

> I use tools such as Nearpod to deliver the content of the students. I can have them work along with me or at their own pace. The students can have checkpoints along the way to gauge their learning. I can create multiple versions of the same content for different

> groups of students. The students are not even aware of. (Amanda, personal interview, September 25, 2019)

Amanda believes students having access to iPads and software allows more options when students are displaying the mastery of their learning. Amanda explains:

> With the iPads and when I use choice boards, there are several different applications they can use. They are demonstrating their learning, and they have choices such as timeline makers, cartoon makers, or creating videos. They could do some of the activities using paper, but today' s students are engaged with technology. They come up with amazing ideas and are excited in their work. (Amanda, personal interview, August 5, 2019)

Summary

Similar to their definitions of PL, all of the teachers include the element of student agency or voice in their implementation of PL. Through the support of school administration, these teachers had the flexibility in how they implemented student agency in their classroom as well as other facets of PL. Due to this flexibility, each of their implementations varied to elements, strategies, and technology utilized in their classrooms. The elements of PL in which these teachers implemented in their classrooms, in some cases, contradict their definition of PL. The elements of PL enacted in each teachers' classroom are highlighted in Table 10.

Table 10

Elements of PL Enacted

Element Participant	Student Agency Voice	Choice	Station Rotation	Pace	Path	Goal Tracking	Gaming	Technology
Anna	X	X	X					X
Alexa	X					X		X
Amy	X	X		X	X	X	X	X
Amanda	X	X			X			X

While Anna is the only teacher who includes technology in her definition of PL and notes that you must have access to technology to implement PL, the other teachers do depend on access to resources and tools via technology in their implementations. As their definition and how they implement PL is not cookie-cutter, neither are the tools they used in their classrooms. The table below notes technology each teacher integrates into her classroom. These tools are identified in Table 11 and defined in Appendix B.

Table 11

Technology Integrated in Teachers' Implementation of PL

Teacher	Content	Assessments	Instruction
Anna	Math	Exit Ticket – Formative Assessment Quizizz – Formative Assessment iReady – Checkpoints	RedBird, IXL, iReady Blendspace Study Island
Alexa	Math	iXL, Formative iReady- Checkpoints Kahoot – Formative	Study Island iXL iReady
Amy	Reading/ELA	iReady- Checkpoints	ClassCraft Blendspace NewsELA Overdrive
Amanda	Social Studies	Plickers-Formative Assessment Nearpod- Formative, Summative	Nearpod Blendspace Discovery Education Safari Montage

Factors that Enable and Impede Implementation

In the implementation of PL in these teachers' classrooms, there were factors that enabled and impeded their implementation. According to teachers, the access to technology and the support of school leadership were crucial factors that enabled this school's implementation of PL.

The majority of the teachers noted professional development they received enabled their implementation of PL. However, the lack of some components of PD impeded a more productive implementation of the instructional model. While the teachers feel their implementation of PL is positive, some factors restricted a more productive and intensive implementation of PL. These factors included district and state policies and curriculum, students' responsible use of technology, class size, need for modeling and extensive professional development, and lack of student motivation.

Factors that Enable the Implementation of PL

Access to technology. Teachers believe that implementing personalized learning without technology would be nearly impossible. Amanda says,

> What enables it? It has to be technology. While it took me some time to figure out the devices and students were giving me suggestions of applications they wanted to use. It would just have been way harder without it. The number of activities I would need to create for the different needs of the students, manually have to track their understanding, and limitation of what they could create. (Amanda, personal interview, August 5, 2019)

Anna has observed how technology has a significant role in the implementation of PL through the ability to design various learning activities based upon the needs of the students. Anna states:

> Without access to technology through online software and the student's mobile devices, implementing PL would be way harder. The amount of time I would be spending creating a variety of activities, trying to work individually with students and monitoring student's progress would be overwhelming. With the use of mobile devices, I can easily assign students individually to various online resources to practice certain math skills. With the

> use of the tools, the students and I can easily assess their individual needs. (Anna, personal interview, August 3, 2019)

Anna describes how she can easily switch the activities particular students are completing at the beginning of class through the use of technology. Anna states,

> For example, we were being to do reflections, rotations, and translations in class, I had two students who were still struggling with how y and x-axis are set up on a graph with positive and negative numbers. I was easily able to assign the rest of the class, a module on the new material in IXL. This allowed me to sit and work with these two students and try to get us all in the same place. Technology allows this flexibility. I can change things on the fly. There are many days I may have a class working on five or six concepts through technology. (Anna, personal interview, August 3, 2019)

Amy notes that she wanted to be innovative in her use of technology in how she could engage her students in the learning. She did not want to use technology for the sake of using technology. She researched tools that would allow her to easily personalize the instructional material and activities for each of her students but also have their buy-in to the process. Access to technology opened the door for Amy to develop a learning environment that caught attention through the use of gaming. Amy acknowledges,

> Technology has allowed me to implement ClassCraft as a learning platform in my classroom, which is based upon students completing quest or adventures, and it is a type of gaming. Using this platform, I can create specialized pathways and assignments for students to work at their own pace and make a choice in how they want to learn. With the students each having an iPad, they have access to many different tools and resources available to them to assist in their learning as well. Without access to these resources, it

> would take me longer to create activities to work with students at their levels, tools on the iPads such as digital media, or audiobooks it how be challenging for me to implement PL. (Amy, personal interview, August 4, 2019)

Support of leadership. With the school's expectation that teachers implement PL, these teachers believe having an administration with flexibility further enables teachers' implementation of PL. According to Alexa,

> Knowing you can try something, and if it does not work, and they are okay with that, and you are not frowned upon, because you are trying new things, new ideas and new ways to run a classroom and teach. I think that if admin is open to, and they are all for you finding the best way that works for you, that enables you to put in place personalized learning. (Alexa, personal interview, August 5, 2019)

The administration did not have a set expectation of what PL looked like in every classroom. As Alexa noted, the administration was flexible in the resources, strategies, and tools each teacher utilized. Alexa says,

> Our principal could walk into my classroom, my students could be using an online tool such as IXL. They could go across the hall, and in that classroom, the students would be working on choice boards in their social studies or science using a playlisting tool such as Blendspace. Learning looked different in classrooms. However, the teachers were personalizing learning for their students using tools and strategies the teachers were comfortable with implementing. (Alexa, personal interview, August 5, 2019)

Since the principal was the driver in the transformation from traditional instruction to this student-centered approach, the administration team understood the perception of what learning

looks like in any classroom would change and would not necessarily look the same in each classroom. Amanda notes,

> We were not handed template and told this is how everyone will facilitate personalized learning in their classroom. It was not a cookie-cutter approach, and not everyone implemented it at the same time. The administration supported us in finding tools and strategies which we were comfortable and starting small. (Amanda, personal interview, August 5, 2019)

While the strategies teachers used in their implementation of PL varied, including station rotation, choice boards, pathways, Amy tried an approach, no one else in the school was using. Amy describes why she gamified her classroom. Amy states,

> When I look at how I wanted to implement personalized learning, I wanted to try something I was intrigued by and something which would motivate my students. At the time, I was a special education teacher and had a small class. I interested in gaming, and the Fortnite craze had just started, and the kids were all into that. I went to our principal with my idea, and he fully supported me in trying the methods and purchasing the software I want to use. He and I both knew that it may or may not work, but he was supportive in the direction I was attempting. The principal was a huge proponent of the fail forward growth mindset. It is with this support; I think most of the teachers were truly comfortable in going outside of the norm. (Amy, personal interview, August 4, 2019)

Anna states, "I would say having leadership saying, ‘We do not want you doing that’ would stop many from being able to try new instructional methods. Our admin was quite the

opposite" (Anna, personal interview, August 3, 2019). Anna notes that the importance of support from throughout the school is critical. Anna further expounds upon this support,

> Having a principal and staff who support you and each other is very important when making such a shift in school culture. At the beginning of this shift, we had a principal who was bought in and focused on personalized learning. This support resonated across the school. The ideas of trying something and it not working was okay. Having admin and other staff come in the classroom when you need an extra hand when implementing an activity makes you feel supported and willing to try new strategies. (Anna, personal interview, August 3, 2019)

Anna further mentions that when she and her peers first started implementing station rotations in their classrooms, they had full support from the administration team at the school. Anna states,

> When the 8th-grade math team came across the station rotation model, it was about the same time as the first group of teachers were implementing PL. Station rotations had not been tried at the school or within the school district prior. The principal was very supportive of us trying this model to personalize learning for our students. Once we had the system down, he supported having other teachers from within and outside the school coming to observe our classroom and supporting us presenting our implementation of the model at several conferences. It is with this support; we become confident in trying new things. (Anna, personal interview, August 3, 2019)

The administration understood with the shift in instructional models, the teacher's role in the classroom was shifting as well. The teachers had concerns about what impact this transformation would have on their evaluations and observations. Amanda notes,

> Our administration made us feel comfortable as we went through the year, and there were days, we felt like we were struggling through the process, they would remind us it was not going to be perfect, and we all were learning as we went along. Teachers worried about what would happen when the administration came into complete our observations. Administration discussed with us there would be a shift in what they were looking for in the classroom. They wanted to know more and see what the students were doing, not what the teacher was doing. The administration made the time to talk with the teachers allowed us to voice our concerns, they always listened and let us know that change is not always easy, and they supported us. (Amanda, personal interview, August 5, 2019)

The support of the administration was visible throughout the school community, and this was clear through the administration, especially the principal's use of social media. The administration team was eager to see what was occurring in the classrooms. The principal would post on various social media platforms providing a glimpse of what was happening in the classrooms, and this was a further catalyst to drive the transformation. These posts would showcase learning was taking place at the school. A few examples of these posts displayed how station rotations worked in 8th-grade math and 7th-grade science and students creating Public Service Announcement (PSA) videos in language arts. These posts reflected the principal being proud of the work taking place at the school. Amanda describes,

> Throughout the day, the administration came into our classrooms, observing the different activities taking place throughout the day, and sharing on social media. Anyone inside or outside of our school community could see what was happening at our school. Our principal, as he would go into classrooms, would tweet throughout the day. He was a champion of our school to the district office and others, and it showed. This made us feel comfortable with what we were doing. I remember in just one week alone; we had groups of visitors every day from the district, other districts within the state, and outside the state coming into our classroom. (Amanda, personal interview, August 5, 2019)

As the members of the school and administration were asking to present and speak at various technology and middle school conferences, as a model of implementation of PL. At the same time, the change was not always easy and noted that every strategy would not work for every teacher and student. Anna states,

> Our principal would say yes to any new tool we wanted to try, and if something works for us and if there were a cost, he would do his best to get the resources. He pushed us to learn and share ourselves. He was a proponent of us sharing our stories, we went and presented at several conferences throughout the country individually and in groups. He was a strong advocate of the growth mindset, and failing forwarding was not just for our students but for us as well. (Anna, personal interview, August 3, 2019)

Alexa describes that school administration has a significant influence that allows PL to occur within the school. Alexa states, "sometimes teachers can lose sight of PL, because it is easier to teach to the whole group than to individually teach to the standard, with an

overall expectation at the school to implement PL it stays at the forefront" (Alexa, personal interview, August 5, 2019).

When school leadership drives the expectations and continues to support the initiative, this influences the school's initial and ongoing implementation of PL. If this does not occur, according to Alexa, there is not a commitment to the instructional model from teachers. Teachers and the school community understood this commitment through constant and ongoing communication from the principal in weekly newsletters to the community, social media posts, and messages to the staff regarding personalized learning.

Professional development. The teachers believe having school leadership team who understand the importance of professional development before and during the implementation of PL is crucial in ensuring teachers are comfortable and committed to the implementation. Before the school implementing PL, the district required each school to create a team that would develop the school's design of PL, implementation timeline, and professional development plan. This team comprised of the principal, an assistant principal, a technology coach, a media specialist, and three teachers. The school's PL design team believed there needed to be teacher-led PD as a component of the PD plan. The use of teacher experts and teacher feedback was to promote authenticity and teacher buy-in to the training and implementation of PL.

The initial group of teachers who implemented PL at the school received designated PD over the summer before their implementation. This PD was delivered by a third party and delved into what PL is, how it is defined, and different models of implementation. The teachers were allocated time to develop learning plans or units for the school year while the rest of the teachers at the school were exposed to the work of these teams through PD during the school year.

According to Amy, receiving professional development was key to her being able to implement PL in her classrooms. Amy states,

> I feel like I have a good grasp of choice and student agency from the PD we did within the school. Additionally, being part of the PL committee at the school, taking part in the ED-Tech cohort provides support in my initial implementation of PL along with the AVID training on differentiation and personalized learning. Without these pieces of training, I would be lost. (Amy, personal interview, August 4, 2019)

Amy took part in the design PL team for the school and provided input into the development of the PD, which was delivered to the teachers.

Additionally, she was part of a cohort of teachers who received PD from an outside vendor on the integration of technology into instruction. Describing initial training they received on agency/voice and choice, Amy says,

> One of the first exposure to PL was about agency/voice and choice. One of our admins and our instructional coach led a session on this topic. They gave us provided background on agency and choice, why this element of PL was chosen as the school's initial focus, and how to implement this in the classroom. The teachers were provided with a variety of choice boards and provided time to collaborate with our content teams to modify one of the examples to utilize in our classrooms. (Amy, personal interview, August 4, 2019)

Alexa further describes the PD during the first year of implementation:

> PL team led the initial PD sessions, which informed the teachers of the school's PL design and implementation plan. Then we meet weekly during our grade level planning for professional development. Our instructional coach and one of the assistant principals were responsible for the content based upon teacher feedback.

> Sometimes our training was in person as a group, and on occasion, we had the option to do the training online. We were given the option of whether to attend a session based upon our own needs. For example, if the session offered one week was how to implement Apple Classroom, we could opt out if we were not ready to utilize this tool yet. While another option could be an online webinar offered to us about classroom management tools we could watch instead. Each week was like this; there several options such as tech tools or other strategies to choose. PD was developed similar to personalized learning designed based upon our needs and given choices in what we took part. (Alexa, personal interview, August 5, 2019)

Anna described that implementing PL felt daunting to her. She does note the importance of PD (professional development) before and during the implementation of PL enabled her to implement personalized learning. Anna states,

> Before receiving PD on any of those things, it is daunting to use it or foray into how can I make this not so much of a traditional classroom? So, I would say the PD makes it a little bit more palatable. (Anna, personal interview, August 3, 2019)

Anna further describes why, as a teacher, the implementation of PL was daunting. She notes,

> When it was announced we would be implementing PL, it was intimating. I felt comfortable as a teacher in how to prepare instruction and classroom management. This went out the door. I did not know what PL was and how my classroom structure was going to change. I felt like I was starting over in my design and role as a teacher. In many ways, I was starting from scratch. It was scary. (Anna, personal interview, August 3, 2019)

Anna acknowledges that having PD led by teachers who have completed the work has weight when gaining buy-in from other teachers. Anna describes,

> When wanting to try something new in a classroom, it is helpful to have someone we work with who may have tried a certain tool. One of our social studies teachers were using a tool called Symbaloo to create pathways for students. The tool allowed her to create pathways based upon prior student knowledge but also allowed a choice of activities within the pathways. She also had created paper versions of pathways. She was able to discuss with us why and when she used both methods. We were able to pick her brain in how we could utilize the tools, and we could go back to her for assistance. It may have or might not work in their classroom, but there is someone we can go to who can support or give feedback. Teachers are more bought in when it is one of their own sharing and providing insights. It is this type of professional development, support, and knowledge in the school which enables PL to be implemented. (Anna, personal interview, August 3, 2019)

According to Amanda, professional development is a factor that is vital in her implementation. She believes it is essential to have professional development provides practical insight and use of tools and strategies. Amanda states,

> The training we received was great. You need it. While I had used technology for instruction in my classroom, the weekly PD focused on how certain tech tools could be integrated with PL. For example, one science teacher showed us how they used Blendspace to create playlisting. She modeled how the content utilizes the tool we viewed in Blendspace was about playlisting. We were able to learn about playlisting, and personalized instruction could occur by incorporating the tool. These types of pieces of

> training were invaluable to us as we were preparing for implementation. (Amanda, personal interview, August 5, 2019)

An integral piece of the school's PD plan was to utilize teacher experts in the building, Amy describes an example of training the staff received from their peers which also incorporated modeling of the strategies. Amy says,

> We had a group of math teachers who came upon the station rotation method. These teachers received permission from our principal to attend training on the method and came back to incorporate it into their classrooms. The math teachers incorporating station rotations were outside of the PL initiative. They became experts in the method and how they could employ it as part of PL. Station rotations were how our training session was delivered. We had stations that we moved through, which had different tools that can be used at each station, such as technology, manipulatives, and small group instruction. The teachers are then given time to reflect and develop ideas of when they could use the method in their class. Having training designed with modeling the strategies are key to a teacher wanting and feeling comfortable in integration into their classes. It gets buy-in. (Amy, personal interview, August 4, 2019)

Alexa noted that professional development gave her some idea of what is considered PL. She describes training in which she attended. Alexa states,

> While I was not in the classroom when the school began implementation, I took part in professional development offered during the school's implementation of PL. One session I remembered was a combination of different learning spaces and data-driven instruction. As part of PL, the school was looking to transform our learning spaces, including the classes with diverse learning spaces. One of our

> classrooms was redesigned, and we held our training in this room. The classroom had flexible spaces, including an area for a small group, collaboration area, and independent work. In each of these areas of the classroom, we had resources on how we can use data from formative and summative assessments to drive classroom instruction. For example, in the independent work area, we complete a Nearpod, which focuses on ways students can use data to reflect on their progress and goal setting. While the collaboration area, teachers discussed different resources that allow quick access to data. In the small group area, the school's data specialist reviewed how the state's data system could be used to drive personalized instruction. (Alexa, personal interview, August 5, 2019)

According to Anna, the staff received a variety of professional development ranging from apps/software to how to assist your students in having agency and choice in their PD weekly during a designated teacher planning period. Having a wealth of knowledge to support PL, whether it is support from the school or recommendations from a coworker, Anna believes it is essential to understand numerous strategies to reach every child. Anna notes,

> Having many things to look at can be overwhelming, but at the same time, it makes it hard for teachers to say, 'do not know how I can do this,' when there is support within the school and professional development offered. (Anna, personal interview, August 3, 2019)

Factors that Impede the Implementation of Personalized Learning

District and state policies and curriculum. While a supportive administration enables PL to occur, the timelines and expectations from the district and state are factors that impede the implementation of PL. Teachers' non-instructional time is consumed by district-mandated PLC meetings, staff meetings, and training, which impairs their ability to plan instruction. While at

this same time, teachers are pushed to meet state timelines in covering the curriculum. Alexa states,

> I feel like our timeline, and our expectations from the county and state, and the requirements that we have to meet as teachers impede our implementation of PL. The time we do not have to plan inhibits our ability to sit down and look at what we have and where we need to go for all of our students. (Alexa, personal interview, August 5, 2019)

Planning and implementing properly for PL is very time-consuming, and according to Alexa, teachers never have enough time to accomplish all that they need for their students. Alexa further notes,

> We have to cover all the curriculum before the last month of school to be ready for standardized assessments. We have many county mandated requirements that take away our planning time. Planning for personalized learning is very time consuming, and teachers never have enough time. In one school week, I have two periods each day of planning. Grade level meeting, content grade level meeting, professional development each take one of these planning periods. Also, I could have one or two IEP or 504 meetings each week, plus parent meetings, and all of these meetings could go over the planned time. So, I am left with about three planning periods to grade assessments, go through the data, and then use it to plan quality personalized instruction for my students. Even our district teacher workdays and professional development days are consumed by district training. There must be some give in what we are required to do and prioritize or not try to implement so many different things at one time. (Alexa, personal interview, August 5, 2019)

Amy concurs teachers do not have enough time to implement PL to its fullest truly. District requirements consume teachers' time to plan quality learning environments. Teachers and students are pushed to meet the state and district deadlines of mastering standards to the detriment of student's learning. Amy notes:

> Designated planning time for teachers is consumed by meetings required by the school districts. In one week, we have grade-level meetings, grade-level content PLC (Professional Learning Community) meetings, professional development meetings, plus any other parent meetings such as IEP, 504, or district meetings. Quality planning time is lacking. At the same time, we, as teachers, have to push our students to master the standards for the year by the time of statewide assessments. We are struggling with trying to get a student who may be on a 6th grade or even elementary reading level and have them ready by mid-April. That is six weeks before school is over. I think it defeats the purpose if we are supposed to meet the students at their level and have them work at their own pace, but still expect them all to be at the same place in the spring. That does not work. (Amy, personal interview, August 4, 2019)

Anna has mentioned how district and state policies and curriculum have a considerable effect on her implementation of PL in her classroom. According to Anna, state and district policies and curriculum mandates can make it harder to implement PL. While these policies and curriculum place limitations on how she implements PL, they do not completely inhibit the implementation. Anna states,

> We cannot truly personalize learning for students and meet state and district requirements for assessments and curriculum. What if a student is in 8th grade and is not on an 8th

> grade level in math and are expected to meet the pacing of the district curriculum? How do we truly personalize their learning for them? While our district allows us to place students, let us say in a high school math class while they are middle school, we do not have the same policies for the opposite. Schools are structured on the age/ grade level methodology. It is going to take a huge shift in education to personalize learning for students. (Anna, personal interview, August 3, 2019)

Student's responsible use of technology. With the school being 1:1 with mobile devices, the students have constant access to technology. However, at the same time, the teachers believed 1:1 access to technology could also be a distraction to students. In the first two years of the school going 1:1 with iPads, Anna notes the school did not have the restrictions on the devices as they do today. Anna says,

> The iPads can be a big temptation or distraction for some students. Since students do have access to the internet, they will sometimes easily go on to YouTube or some online games. While you are working with a group of students and the other students are working on an online assignment, you can look across the room, and it looks like everyone is busy. However, you could have that one or two students who are watching music videos or a sporting event video and have not completed anything. The district cannot lock every website or filter every YouTube video. (Anna, personal interview, August 3, 2019)

Extreme disruption due to technology occurred on occasion. Alexa notes,

> You will have at least one of your students during the day who is constantly on their iPad, phone, or just having headphones that is a constant daily struggle. In most cases, the

> distractions would occur in each class who would just need a simple redirection. (Alexa, personal interview, August 5, 2019)

Recently the school started using Apple Classroom with the iPads in the classrooms. This tool allowed teachers to lock student devices on specific applications or see what each student is doing. Anna notes,

> This is still not fool proof. Kids find ways to override safeguards in place. You have those students who are so into technology, and they try any means to go around the safeguards. We have had a couple of students who have hacked in the operating system and overrode security tools and downloaded all kinds of gaming or social media apps. (Anna, personal interview, August 3, 2019)

Amy concurs that while it is not the technology directly, it is her student's ability to be mature enough to use technology independently. Amy notes, “I have students who are not mature enough to work with technology or work independently, that a huge one” (Amy, personal interview, August 3, 2019). Students have so much available at their fingertips with technology. For example, Amy notes,

> Student's iPads do have some restrictions on what they can access through a device, but at the same time, you cannot block everything. I have one student who can always find some website that gets past the filter because it looks to be educational. However, in reality, it is just games — another type of distraction. There is a pottery wheel app in our App catalog for students to use in art class. So, it has validity. When it was available, it seemed like every student was installing it on their iPad. I was constantly having to redirect students off the app and refocus on math. (Amy, personal interview, August 4, 2019)

Amy notes the challenge of having to monitor student devices, and this additional piece of classroom management struggles take away from the teachers' ability to work with individual students or small groups. Amy states,

> We try to ensure they are not watching unrelated videos on YouTube, playing an online game, or just distracted with the capabilities of using the camera. We have access to Apple Classroom, but sometimes you forget to activate, or the students come up with a way to go around it. So, it becomes a classroom management issues while trying to work with other students. (Amy, personal interview, August 4, 2019)

An additional hindrance to Amy implementing PL is students not having the technology. Amy describes,

> Some days are frustrating when I prepare activities that cannot be implemented as planned because of the students do not bring their iPad to school or they are not charged. When a student breaks or loses their devices so many times, they cannot afford the fees to replace or repair the device, which adds to this frustration. Due to the demographics of the school, may students struggle to pay $100.00 or $250.00 for damaged or lost devices. (Amy, personal interview, August 4, 2019)

Amy's has gamified of her classroom using the online tool ClassCraft, which her students' access daily. Amy creates an online quest for students to complete. But also, throughout the class period; they can earn points/coins for certain activities such as engagement, class behavior, and having the technology. Amy explains,

> I have one student who refuses to bring his iPad every day and others who has several fines due to damage. I have created this engaging online learning environment. It is difficult when even this incentive does not motivate them to bring their devices. I can

> provide access to computers or other iPads during class. However, this hinders the work I want them to do outside of class, so as a class, we can do more creative activities. (Amy, personal interview, August 4, 2019)

With student's lack of responsibility with technology, whether it is due to damage or sheer disregard in bringing their device to school, Amanda expresses it is a struggle to prepare lessons for students. She states,

> We strive to place accountability on students in taking care of their iPads, by not replicating technology-based lessons with a paper supplement for students. We let the students know that if they do not have their devices, they have to figure out how to complete the assignment on paper. However, that is hard, and it is placing more work on teachers to create extra lessons for the instances. Moreover, it tends to be the same students over and over. (Amanda, personal interview, August 5, 2019)

The school now has provided teachers with extra iPads in each classroom for times when students do not have their devices. Amanda further notes,

> Even with the extra iPads in the classroom, students can borrow this does not help with the issues with students who do not have on due to damage. Many students do not have access to technology at home. These iPads are all they have. They are losing out accessibility at home when they cannot or will not repair cost due to damage. (Amanda, personal interview, August 5, 2019)

Class size. Traditional class sizes hinder the purpose of the PL instructional model due to teachers unable to devote the time to the individual needs of the students. Amanda states,

> The amount of time it takes me to check in on everybody and to create the content impedes my implementation of PL. With the large class sizes, I struggle to keep up with

> every student's progress and needs. Just trying to get with students and check-in is a struggle. Initially, creating content and activities for students was an issue in the beginning because I did not know what I needed in the beginning. Moreover, the time to meet the needs of the students but get them there where they need to be. (Amanda, personal interview, August 5, 2019)

With some class sizes with thirty or more students, Amanda expresses the struggle in creating activities that meet the needs of all of these students and, at any point, know where they stand. Amanda describes,

> In a traditional classroom setting, everyone is completing the same activities or instruction is teacher-led, everyone is doing the same thing. Now, for example, the class was studying Native Americans in Latin America. I created a pathway for students to complete with a variety of options for them to complete. I have a class of 30 students, the majority of them are low readers, and with five ESOL students. I struggle because I want to work these students in small groups to push their understanding. I try to work four students in small groups, but how do I manage the other students? Some are completing a variety of online assignments, others are taking notes from the text, and some could be further than all of them and could creating things such as videos or posters. I just kept trying to keep up with their needs. Through having students providing suggestions on types of activities they like and a positive behavior system in the class helps with behavior management. I still feel as though I am slighting the students. (Amanda, personal interview, August 5, 2019)

According to Amy, class sizes encumbers her ability to implement PL, and having an additional teacher eases implementation. Amy recognizes team teaching supports the PL model:

"I have some classes that have over thirty students and need the extra support for her students. I struggle with having the time and ability to work with individual students and even small groups" (Amy, personal interview, August 3, 2019). Having another teacher in the classroom allows teachers to work with students in two different small groups or a small group and another teacher to assist others. Amy states, "My classes were there is a co-teacher we can work with students with their individual needs, we can have individual conferences with students and discuss where they are in there learning" (Amy, personal interview, August 3, 2019).

Amanda supports the benefits of team teaching in the PL model:

> Having another teacher in the rooms lends itself to more opportunities to fully support our students. We can be flexible in our roles in the classroom. Another teacher allows us more time to work more one to one or small groups with students. (Amanda, personal interview, August 5, 2019)

Amy believes having large class sizes and classes with no team teacher impedes the implementation of PL due to her availability to work and manage their needs. Amy states,

> This last year, I had one very large class period, and a good amount was on the remedial roster as well as ESOL students, and I was there by myself. While trying to manage this large class with so many needs, keep them on track, I could not truly know where each student was in their learning. This class I consistently had the most failures in, they showed the lowest growth with their scores. It broke my heart because I was not enough. (Amy, personal interview, August 4, 2019)

Teachers experience being overwhelmed in crafting individual learning environments for their class size of students. According to Alexa, the implementation of PL left her having the feeling of sheer overwhelming and thinking, "What have I gotten myself into?" Alex explains

that her biggest concern is looking at the data and trying to determine where all of her students are. Alexa says,

> Looking at the data and being worried if I am going to have so many kids in so many different spots, that I will not be able to keep up and have everything prepared for them so they can continue their pace. (Alexa, personal interview, August 5, 2019)

Due to her position, Alexa has a smaller roster of students. She notes:

> I have a smaller number of students than most teachers. However, I still worry about keeping up with her students' needs. It is a struggle knowing if they need remediation or do, they need to show mastery at any point. I would say it harder for most teachers. (Alexa, personal interview, August 5, 2019)

Need for modeling and extensive professional development. The professional development the teachers received before the implementation of PL could have been improved by more in-depth district training, modeling of PL, or the opportunity for on-site visits. The school's PL design team wanted the initial implementation to focus on agency and choice in instruction and learning. The teachers noted the PD at the school focused on the design team goals for the implementation without a broader scope into the school district's ideology of PL or understanding of how others have tackled the transformation. According to Anna,

> When we started to implement PL, teachers did not have a deep understanding of PL, what it was. We did not have anywhere to go observe, or someone tells us this is what it looks like, this is how you do this. (Anna, personal interview, August 3, 2019)

The teachers felt a more definite direction is needed from their school district of its expectations and beliefs of what PL is. Alexa notes, “We did not receive any training from the district that said, ‘this is what personalized learning is, and this how it should be done in the

classroom'" (Alexa, personal interview, August 5, 2019). Alexa further acknowledges that due to this lack of direction, teachers did not receive guidance or training from the district with its ideology or a format which to implement PL in their classrooms. She noted it would be helpful to have some flow or topic chart with suggestions or methods for different points in PL. Alexa states,

> I think a flow chart or topic chart of what personalized learning looks like, would be helpful. Knowing how you can show outcomes with it, better ways to track the kids and where they are. I think it would help many teachers. You have so many kids in different spots. Where are they? Who are they? What are they doing right now? How can I support them? (Alexa, personal interview, August 5, 2019).

The professional development was limited in its focus. The teachers felt they need more in-depth and enriched training on how PL is implementation and the district's expectations. Anna recognized,

> While it was great that the expectation was it was okay for us to start with a small focus on agency/voice and choice, no set way to implement, and sometimes pieces may not work. We would have been more comfortable with required training from the district and the opportunity to network with others in how they are undertaking this transformation. (Anna, personal interview, August 3, 2019).

Alexa explains the need for more professional development before implementing would enable the teacher to have a better understanding. Alexa states,

> What PD I received gave me some idea of what is considered personalized learning and, and I have to look at it, it is not just one definition. However, I had to do much figuring out on my own because there is more than one way to do personalized learning. So, I had

> to take what I learned and kind of mold it to how I am as a teacher, how I teach, how I think. So, I do not know if it had a heavy hand on my ideas or not. (Alexa, personal interview, August 5, 2019)

According to Amanda, professional development is a factor that had an effect on her implementation. Amanda states,

> The training we received was great, you need it, but I do not think it prepared us for what would happen or what it looked like. The training we received how to set up a classroom and how to use some applications on the iPads, but we did not receive anything from the school or district of this is what personalized learning is. (Amanda, personal interview, August 5, 2019)

While the teachers received training regarding agency and choice and technology resources available, the teachers were left to understand other pieces of PL on their own. According to Amanda, it is vital to include follow-up training and other training:

> When we started, trying to explain to the students we need be here by this date, by this date you are here. We started creating the path boards for them. No one sat down with us and said, here are some examples of things we used in the classroom. We had to search online for ideas. However, I think there should have done some closing type of training. Like, here you have tried it, how well did it go? Here are some more things to try. (Amanda, personal interview, August 5, 2019)

She also explained the importance of seeing PL being enacted before implementation. She says, "I wish we would have gone to another school to see how they were doing it. It would have been important to see how it was done" (Amanda, personal interview, August 5, 2019).

While teachers who were in the initial rollout of PL assisted with PD for the rest of the staff, the teachers argue it is essential to have the ability to observe other implementation of PL. Amy notes she struggled with what PL should look like in the classroom and believes the opportunity to observe a classroom would help any teacher in their implementation. Amy states,

> This is going to sound kind of selfish, but I would, of course, want more professional development. I would love to observe another teacher who had it down. To see how it is indeed to look like, even observe several other teachers, maybe I can grab it from here and here and here. We went in blind, and we had no model classroom or something to observe to grasp this is what you do. We were given an idea of how a classroom should be laid out, agency/voice and choice, and a lot of tech tools ideas, but no visual of this is how it is done. (Amy, personal interview, August 4, 2019)

Amanda supports the necessity of modeling. She states,

> I wish we would have gone to another school to see how they were doing it. It would have been important to see how it was done. It would have beneficial to go on-site visits and observe multiple classes and see how they undertook their implementation. If possible, have the time to talk with teachers and hear their stories, their success, and what did not work. (Amanda, personal interview, August 5, 2019)

While the teachers understood there would be challenges in transforming their instructional model, they felt they could have been better prepared. Amanda provides an example of what she was not prepared for in her implementation. Amanda states,

> It did not prepare me through for when the students… like I was so excited, and then I realized the students were not as engaged as they would be if we were sitting like face to face. Then kids were trying to slack off, and I did not realize how quickly it could fall

> apart. I guess just like any lesson, but I was not prepared for that. (Amanda, personal interview, August 5, 2019)

Alexa further explains that without prior or ongoing support makes it challenging to implement personalized learning. Alexa says, “Because you are feeling like you are being pulled a lot of different directions and without guidelines, supports, or a lot of background knowledge of how to run it in your classroom, you feel overwhelmed” (Alexa, personal interview, August 5, 2019).

Lack of student motivation. PL is designed to increase motivation, but with some students this cannot be achieved. All teachers agree that PL is a motivating instructional approach, but there are times that some students are still disengaged in even a PL environment. While student motivation can be an issue in a traditional learning environment as well, the teachers believe PL provides more significant opportunity to increase their motivation. The teachers provide examples of students which PL has increased motivation. However, there are still those few disengaged students. More research needs to occur to determine what can be done to reach disengaged students.

Anna recognizes that PL can affect student motivation, which can translate to their success. Anna observes,

> One of my students who had previously struggled in math, they have increased their mastery of specific math skills. The student comes into class, ready to learn and doing super well. He seems to work spent when we work in rotations. The student is motivated by a variety of activities geared toward his needs more than a traditional classroom had. (Anna, personal interview, August 3, 2019)

One of Alexa's class is a sixth-grade small group math class, comprised of seven boys. Many days it is a struggle to get them on task. However, as she is personalizing their learning for them and finding out the different things which the students are engaged in, it easier to get them on task. Alexa describes,

> At the beginning of the school year, they are loud and hard to get them on task. They struggle with the material. However, once the boys have realized they have different options for how they can learn, it is great. They come in asking what are going to do today or asking if they can work on IXL. While it has not been a total success, it has made a difference in their motivation. (Alexa, personal interview, August 5, 2019)

While PL serves to meet the needs of all students and increase their engagement, these teachers observed there are some students who this model still does not reach. According to Anna,

> Being able to motivate a student to be wanting to learn and be engaged is so critical in any environment, but if designing learning to meet the needs and interests of each student is mute if you still cannot motivate the student to be engaged. (Anna, personal interview, August 3, 2019)

Amy strives to create meaningful activities that are fantasy or crime based as well as gamification of her classroom to engage these struggling learners. She notes,

> PL constantly involves in the classroom-based upon the needs of the students. I may think I have it down pat, but the one kid who will not stay in his seat, and everything will make the entire thing fall apart. (Amy, personal interview, August 4, 2019)

Amy strives to create activities which are fantasy or crime based as well as gamification of her classroom to engage these struggling learners. Even with devoting a lot of time and energy to

developing lessons to meet the variety of levels in her reading class, Amy speaks to a student who still is not motivated in their learning. She says,

> Since my students are struggling readers, for the most part, I allow them to choose their reading material. I have one student that I try everything to engage him to read. I have offered all genres, from sportsbooks to graphic novels, online books, and even audiobooks. He is not interested. With gaming my classroom, I hope he would be motivated by rewards he could receive by work completion. I have different areas in my classroom for students to work, including bean bags chairs. There are days where he looks to be motivated in learning and his quietly sitting in his chair reading. I will be working with other students quietly, the next thing I know, he is across the room asking other students what they are doing, or he is playing around on his iPad. I spend much time working with him to focus, it distracts and takes away from the other student's learning. (Amy, personal interview, August 4, 2019)

According to Anna, teachers work to try figure out was is causing a lack of motivation. These reasons could be a type of activity, students struggling with the material, or just a general lack of motivation. She speaks to an individual student's lack of motivation:

> If you have a kid who is not motivated, you could personalize the heck out of their learning, and they are still not going to want to do any of it. One of my 8th-grade students, I give her so many options in activities she can complete daily. I work with her one on one, let her play math games on her iPad, and even activities with coloring and creating. If I give her four math problems to complete during a class period, she will only do one. Instead of focusing, she will doodle or want to talk to anyone around her. She

> understands the material. I keep trying to get her to push herself to do the best she can. (Anna, personal interview, August 3, 2019)

Despite Alexa's success with the majority of her students in her small group class, PL, in some cases, it still is not a motivator for every student. Alexa speaks to one student, but no matter what she tries, it is a struggle to motivate him in the classroom.

> I have this one student that he tends to draw the class off task. It is a different classroom when he is there. A traditional classroom environment is not conducive for his learning, but even trying anything I can to get him engaged, it is just a struggle. He moves all around the classroom. I have tried using manipulatives, card games, or working he can do on the floor. With it just being me in the classroom, I do not have enough time to focus on him and working with the other students. He moves all around the room. I cannot quite figure out what it is I can do, yet that is going to get him focused on his learning. It is already hard for a 12-year-old boy six grade boy to get focused. Unfortunately, this is a distraction to the other students, and the days that he is not there, it is a different classroom. (Alexa, personal interview, August 5, 2019)

Even with working to create meaningful and engaging activities for their students, these teachers are discouraged when their students still are not motivated. Anna says, “As teachers, it is frustrating, we try everything, we encourage them, and some students still are not motivated. Furthermore, this can be distracting and take away from the learning of others” (Anna, personal interview, August 3, 2019).

Teachers' Perceived Effects on Student Learning

As these teachers experience their implementation of PL, they perceive the following positive effects on student learning: tailored instruction, learning is more accessible, and student engagement. All four teachers believed the PL has the greatest effect on student engagement. However, these teachers believe the mandated curriculum is the biggest hindrance to a more significant impact on student engagement and success.

Student Engagement

Anna believes that tailoring instruction to each child plays a significant role in student engagement. Anna noted, "When something is tailored to someone, they are already going to be way more bought into it" (Anna, personal interview, August 3, 2019). She feels that students' attention spans are shorter today. PL combats this by allowing students to switch up how they learn or show their learning and teachers to switch their teaching model. When she can tailor student's learning in a manner they individually enjoy, they become engaged and many cases invested in their learning. Anna provides examples such as some students prefer to her instruction through a video and the use of headphones, others in a small group with the teacher, and others it could be simple instructions or steps on paper with personalized learning this is possible. Anna notes the same engagement when given a choice in their display of mastery of a skill. According to Anna,

> When a student can choose how they can show what they have learned, they become in many cases, creativity and excel more so than in a standard assessment. However, there is still a struggle with preparing students for state-mandated assessments. (Anna, personal interview, August 3, 2019)

While Alexa's students may not see a difference in each of their individual learning, she believes it does have a positive impact on student learning. Alexa states,

> If you are meeting your students where they are and pushing them to where they need to be at their own level, they would be fewer interruptions, see more kids engaged in the classroom, and in the instruction, because its where they are. You are not slowing anyone down who is ahead, and you are not too far ahead of where other students may not be, and they get confused. (Alexa, personal interview, August 5, 2019)

With meeting students where they are, Alexa feels this will increase student engagement in the classroom. She notes that students will be more focused on their tasks due to the fact that they can accomplish it with little or some teacher support. According to Alexa, students will be engaged in their learning:

> I think students will be more focused on the task at hand, because they feel they can accomplish it with some or little teacher support, and they are doing it at their own pace. since they are not feeling flustered, or confused, or bored, it is right where they need to be. (Alexa, personal interview, August 5, 2019)

While Alexa feels PL improves student engagement in learning, at the same time, her implementation can be hindered by district and state policies and curriculum. Alexa notes,

> There is a lot that has to be taught within a specific year that you have your students because they have to take a test, a standardized test, and master it. You will have kids all over the spectrum, as far as where they are. So, although the curriculum can hinder you, as a teacher, hopefully, you can find creative ways, which would go to personalized learning, to help fill in the gaps and still meet the grade level requirement, even at their own level. (Alexa, personal interview, August 5, 2019)

In her classroom, Amy feels that PL engages students more in their learning. Students feel more successful and that they can accomplish their work. Amy describes, "I have seen them be kind of startled when they have been able to connect something and figure it out. When work because more attainable to the student, it helps them become more engaged" (Amy, personal interview, August 3, 2019). In Amy's reading class, students in most cases have a choice in their ready materials based upon their interests. Amy tries to engage student further in their learning by building learning environments which are intriguing and by including gamifying her classroom. Amy says,

> I try to create units which are driven by student's interest, such as the medieval period with such issues as the Black Death, the Crusades, and military improvements. Decorating my classroom in this theme with castles and dragons on the wall and different learning places drives their interest. Building a space that is inviting and draws their interest increases engagement. Two years ago, I brought the element of gamification as a part of PL into my class. Creating individual quests for learning, student engagement increased because students have their own path in learning. (Amy, personal interview, August 4, 2019)

While Amanda believes it still too early to tell what the impact of personalized learning has on her students, so far, she has seen an effect on some groups of students and not others. Amanda says,

> The TAG (Talented and Gifted) students take it very seriously, while I have seen my on-level and remedial kids just like floundering. Students not knowing the direction to take. In social studies, having students who can read at or above grade level can work independently and, in most cases, master the material. Having students who cannot read

> on grade level, they struggle to work on their own. I have to work with them or in grouping have other students in the group who can assist others. (Amanda, personal interview, August 5, 2019)

Amanda feels the same way regarding the role personalized learning has on student engagement. Amanda notes,

> How much students are engaged in their learning depends on the student. Many students get frustrated. They just want you to tell them what they need to know. They do not want to have to investigate or learn the answers by themselves. Interestingly, many of my TAG or honors students are that way. They prefer a traditional model. I think it can be highly engaging for the right student. The students who need things changed up, different options in ways to learn. (Amanda, personal interview, August 5, 2019)

Amanda does note that most students have a choice in their learning increases their enthusiasm for the activities they are completing in the classroom. In teaching social studies, Amanda says,

> Curriculum drives everything in personalized learning because this is what we want them to master at the end. Luckily, in this content at this grade level, we are not necessarily dependent on students having a base of too much prior knowledge. If a student is intrigued by a topic such as the Mayans in Central America, they can delve deeper. To further this if the student has agency in how they show their mastery, they are open to learn and try something new and give a better effort in doing so. (Amanda, personal interview, August 5, 2019)

Results and Analysis

The study used three types of data: interviews, classroom observations, and implementation and PD plans. The study aims to understand these teachers enacted of PL. in

their classroom. From the research questions five initial anchor code were determined (Appendix A). The interviews were transcribed and the data upload into Atlas.ti. After reviewing the data, seven common themes emerged. Next the researcher furthered sort the data into organizational categories to develop an organizational schema in the system. After this cycle of coding, the data were reviewed to identify patterns or commonalities which have emerged. Once all data were thoroughly coded, the researcher considered themes from the data collected and made connections. From these similar themes, seven major themes emerged from these participants' transformation to PL. The software provided a visualization of the themes which emerged. Figure 2 shows these emerging themes from the study.

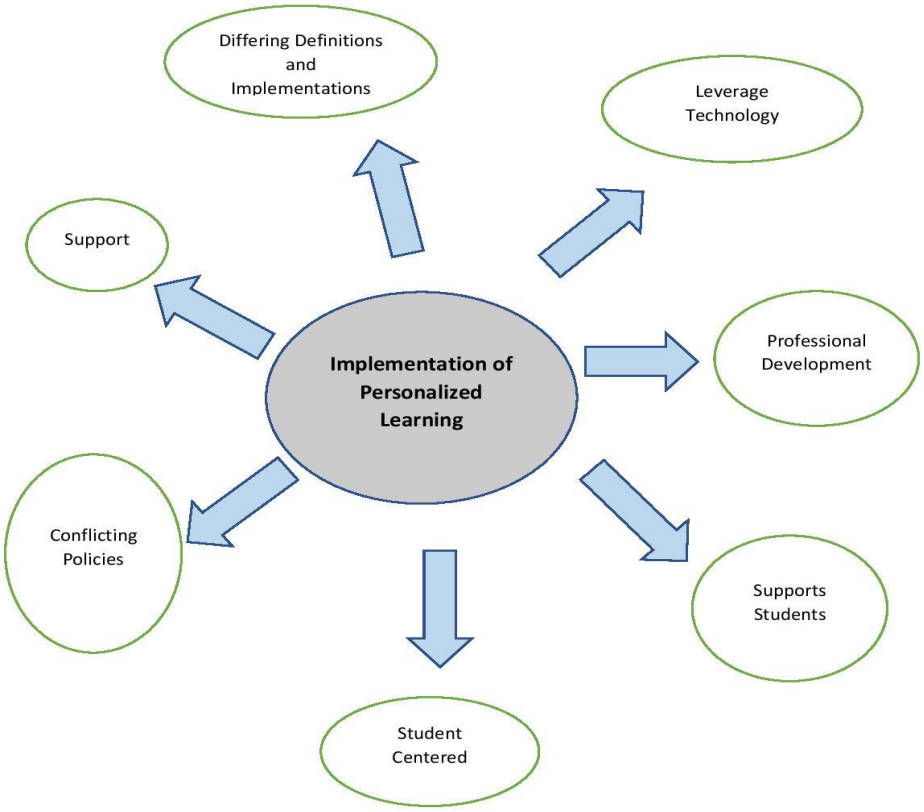

Figure 2. Emerging themes.

The seven themes were aligned to the research questions and the descriptive data were further analyzed using open coding. This allowed descriptions of these themes to emerge and be coded. As the data were analyzed, forty descriptions emerged and coded from these themes. Table 12 reflects the relationship between the seven themes and the research questions, categories of themes, and their forty coded descriptions.

Table 12

Categories of Themes and their Associated Codes, by Research Question

Categories of Themes	Coded Descriptions
RQ1 How do four teachers at one middle school define and implement PL?	
Student Centered	Student centered, student engagement, relationship building, student agency/voice, meeting students at their level, real time data driven instruction, learning achievable for students
Differing definitions and implementations	Lack of universal definition of PL, definitions and implementation models do not match up, no set parameters in implementation, flexibility in implementations, experimentation
RQ2 What role does technology play in their implementation of PL?	
Leveraging of Technology	1:1 student mobile device initiative, access to resources, ease of design of instruction and learning to meet students' levels and interest, mastery of student learning, varied learning environments, real time data
RQ3 What factors enable and impede these teachers' implementation of PL?	
Support	Leadership support, communication, culture, professional development, resources, funding, flexibility, commitment to initiative
Conflicting Policies	Numerous districts implemented programs, state-wide and district assessments, mandated curriculum, state and district mandated timeline for curriculum and assessments
Professional Development	Lack of in-depth initial training for all teachers, need for modeling, ongoing professional development
RQ 4 How do these teachers perceive the effects of PL environments on student learning?	
Supports Students	Tailored instruction, student engagement, learning accessible to students, mandated curriculum, achievement

Summary

This case study provided insight into the experiences of four teachers at a 6-8 school as they transitioned to the PL instructional learning model. This study strove to understand these teachers' perceptions of PL and how they enacted this learning model in their classrooms. It aims to identify their definition of PL, the influences which shaped these definitions, the role of technology in PL, the factors which impede and enable implementation, and teachers' perceived effects on student learning.

Data collected through this study revealed that participants' experiences had both commonalities and variations in their influences of definitions and enactment of PL. The findings showed that the school and district did not have a mandated model of PL and the teachers had the freedom to experiment. However, student agency was the one common element of PL which was enacted across all implementations in their classrooms. The data provided descriptions of how these teachers individually enacted PL in their classrooms with a variety of agency and choice, path and pace, goal tracking, gamification, and integration of technology being employed. These findings revealed common factors that impede and enable their implementation. These themes include access to technology, support of the administration, professional development, district/state curriculum, students' responsible use of technology, class size, need for modeling and extensive professional development, and lack of student motivation.

The aim of this study is to provide support for others who are transitioning to this instructional model and to provide clarity and a guide for others in their own implementation of PL. Through the experiences and voice of these teachers, this study will inform those who are embarking on this transition and provide a resource as they develop and design their implementation. These reflections will enable others to make informed decisions that could

enrich their learning experiences in student learning. Chapter 5 will discuss the themes in-depth and provide examples from the participants to support these themes.

Chapter Five: Discussion

This study focused on how teachers in one large suburban middle school conceptualized and implemented PL in their daily practices. The purpose of this study is to gain an in-depth description of the implementation of PL in K-12 education in the United States from the perspective of teachers who have implemented PL. The study investigates the perceptions and experiences of four educators at a middle school. These teachers were deemed exemplars of PL implementation by their school district. Four teachers each took part in semi-structured one-on-one interviews and classroom observations. The following research questions drove this qualitative case study:

RQ1: How do four teachers at one middle school define and enact PL?

RQ2: What role does technology play in their implementation of PL?

RQ3: What factors enable and impede these teachers' implementation of PL?

RQ4: 4 How do these teachers perceive the effects of PL environments on student learning?

In this chapter, the researcher delves into the themes that emerged and applies the literature to the findings. Limitations of the research findings are discussed, and the limitations of the study are noted. The researcher concludes with recommendations for future research and future practices.

Summary of Findings

Through analysis of these data sources, five descriptive themes emerged in this study: (a) student-centered, (b) leveraging technology in instruction, (c) supportive leadership, (d) differing definitions and implementations, (e) conflicting policies, and (f) the importance of professional

development. The findings of the study will be outlined below and organized by research question.

Research Question 1

How do four teachers at one middle school define and implement PL?

The data revealed the following themes regarding RQ1: (1) varied definition of PL, and (2) teacher definitions conflict with elements of PL implemented.

Varying definitions of PL. Current research lacks a clear definition of PL. Schools struggle with communicating a clear understanding of PL to the school community. Teachers struggle with the lack of clear definition, established best practices, and exemplar models (Bingham et al., 2018; Lokey-Vega and Stephens, 2019; Pane et.al., 2015). Furthermore, previous research has noted that schools with a shared vision, mission, and leadership more effectively implement PL (Bingham et al., 2018, DeArmond & Mass, 2018; Future Ready Schools, 2017; Pane et al., 2015).

Consistent with the literature, the teachers in this study school did not convey a standard definition of PL. Their definitions were not derived from the school or the district. However, these teachers did note that the school and administration influenced their definitions of PL. Their students and training also influenced their definitions. The teachers themselves were aware that there is not a consistent definition of PL. One teacher noted, “There is not one definition of PL” (Alexa, personal interview, August 5, 2019). The commonality of their definitions focused clearly on students working individually at their levels towards mastery of knowledge and skills.

Similar to Pane et al., (2015), the teachers believed that having a shared vision which was communicated to the school community led to their success. The school district in which the study school is located crafted a vision, seven principles, and a definition of PL in their roadmap

for implementation. The individual schools were tasked with creating their vision and implementation roadmap for their schools derived from this material. The study school narrowed their focus to three of these principles in their outline for implementation: (1) agency, (2) choice, and (3) varied strategies.

According to one of the teachers, those outside of the classroom would describe PL as technology-based learning. Students also have a lack of clarity on the definition of PL. The teachers noted students' view PL as working independently, having a choice in their learning, using technology, and learning the way they want to. While this ambiguity did not hinder this school's implementation of PL, it can continue to affect others' implementation.

Teacher definitions are incongruent with elements of PL implemented. Similar to definitions in the literature where there is not a clear definition of PL, even among these teachers at the same school, there is not a universal definition. With the lack of a clear definition and lack of district or school mandated implementation model, it understandable that these teachers' implementation of PL in their classroom was not precisely the same. However, the elements these teachers include in their definitions of PL (see Table 10) do not correlate to the elements of PL (see Table 11) they implement in their classrooms.

All of the teachers include student agency(voice) in their definitions, and it is evident in their implementations that students have an agency in their learning. This could be attributed to the fact that this was the central element in the school implementation plan and communicated to the teachers by their principal and through PD. In publications, the concept of what is inclusive to student agency varies and is not one size fits all (Bray & McClaskey, 2017; Lokey-Vega and Stephens, 2018; Lokey-Vega and Stephens, 2019; Wolf et al., 2017). While one teacher only included student choice in the definition of PL, the majority of these teachers allow students to

have a choice in either activity, how they learn, the topic of learning, or have they show mastery of learning. While they may not include choice specifically in the definition of PL, they translate choice as inclusive to student agency.

One teacher addresses student agency as the student having a choice in how they learn, practice, and show mastery as well as setting goals. Two of these teachers address a common goal or guideline that still must occur in learning. However, they did not note goal tracking as a specific element within their implementation. While another two teachers specifically address goal tracking in their implementation of PL and have a clear design of how they and their students understand progress in their learning. But they do not mention goal tracking in their implementation of PL.

While technology is only explicitly mentioned in one teacher's definition of PL, it is clear these teachers view technology as a crucial element of PL. Research has shown technology allows teachers to easily incorporate other elements of PL (Bray & McClaskey, 2017; Gates Foundation, 2014; Prain et al., 2013; Lokey-Vega & Stephens, 2018; Wolfe et al., 2017). On the other hand, when pace is included in the definition of PL, it has been noted that it is the hardest element to enact in PL. Students' progress through content at their own pace and move forward as they show mastery or competency of concepts and skills. While students can work on their own pace through specific units or it takes longer to master a particular skill, teachers and students are bound to district and state pacing guide. Similar to Pane et al. (2015), the challenge for teachers was ensuring students covered content for district and state policies. While these teachers believe pace is a core piece to personalized learning, they know the challenge in its enactment.

Some of these teachers' definitions of PL are very high level and do not address specific elements of PL, and they incorporate different elements to design learning to meet students at their levels and interests. The participants of this study see their understanding and implementation of PL is fluid to meet the needs of their students. This fluidity between its definition and implementation shifts on strategies that work best for their students and their style of teaching until there is a concrete outline of the model.

Flexibility in PL models. DRSN (2014) and Pane et al. (2015) revealed not all implementations of PL are the same across schools, district, and states. This school was similar flexible in the resources, tools, and strategies each teacher employed in their classrooms. It was noted that the teachers were not handed a template to use as they facilitated PL. With no expectations, this allowed the teachers to feel comfortable in their instruction. As one teacher expressed, "We were not expected to utilize a strategy that would not be part of who I am as a teacher" (Amanda, personal interview, August 5, 2019). Some teachers utilized technology more than others as some of the teachers were more open to using more technology than others because they were comfortable in its use (DRSN, 2014). With administration not having expectations of what PL looked like in every classroom, teachers were secure in exploring new things and their classrooms being different. One teacher expressed the sentiment, "Admin was open to and all for finding the best way which works for you" (Amy, personal interview, August 3, 2019).

These participants support Lokey-Vega and Stephens' (2019) view that models of PL are diverse as the teachers and students. Along with not having set parameters in their implementations, the participants expressed the importance of the ability to experiment with tools and resources. Since there were no set parameters, teachers were able to design their

classrooms and instruction based upon who they were as well. As their degree in the use of technology fluctuated, the model of PL varied across content areas as well (DRSN, 2014). One participant was interested in gaming and she felt this would augment students' interest. Because the teachers were not expected to use specific strategies in their classrooms, she was able to try to implement gaming as a way to implement PL. Gaming is something she was am interested in as are many students. Other teachers in the school probably have no interest in gaming. This teacher noted, "The flexibility was awesome. If gaming did not work out for the best interest of my students, I knew I could try something else" (Amy, personal interview, August 3, 2019). This same sentiment was expressed by one who chooses to implement station rotations as part of PL. This group of teachers was interested in exploring a strategy they wanted to try in math classes. It was different strategies than others were trying. The teachers wanted to see if it worked for their students. If it did not have good results or they did not like how it worked, the teachers knew they could try another approach.

Research Question 2

What role does technology play in their implementation of PL?

The data revealed the regarding RQ2: (1) the role of technology in PL definition varied, (2) technology leverage daily in instruction in their enactment of PL.

Leverage of technology in instruction. The use of technology in the implementation of PL varies from the center of the model (Evans et al., 2014; DeArmond & Mass, 2018; Halverson et al., 2015) and others see technology as a supporting role (Basham et al., 2016; Bingham, 2017; Bingham & Dimandja, 2017; Bingham et al., 2018; Netcoh, 2017; Netcoh & Bishop, 2017; Pane et al., 2015). One of these four teachers include technology in her definition of PL, while the

others did not. However, similar to Bingham et al. (2018), all four of these teachers note that technology plays a critical role in their daily enactment of PL.

Technology was leveraged in many ways throughout these teachers' implementation of PL daily. One teacher expressed that they, "could not implement PL without the use of technology" (Anna, personal interview, August 3, 2019). A key component of PL is understanding where each student is in the learning process. With the use of technology, teachers have access to tools that can provide immediate feedback on student progress. This allows real-time instruction. Teachers can immediately gear learning activities based upon results.

Similar to Basham et al. (2016) allows students to opportunity to make choices in how they gain information. Access to the technology provides access to digital content and resources to deliver engaging learning environments, which teachers could easily personalize by mastery level, style of learning, or student interest. Participants acknowledged that technology allows instruction and learning to occur anywhere inside and outside of school. There became a shift in how students were allowed to show mastery within the classroom. The use of technology allowed more performance-based assessments based on a student's agency.

The school and district provide access to the vast amount of digital resources and student mobile devices. Research noted access to an LMS provides greater ease of implementation of PL through data collection, delivering of instruction, and collection of student work (Basham et al., 2016; Bingham, 2018; Halverson et al., 2015; DRSN, 2014). However, even with robust access to technology, the participants noted the school district lacked a Learning Management System (LMS). The participants noted that this deficiency caused challenges in tracking student work, goals, and mastery due to the collection of student data in multiple places.

Research Question 3

What factors enable and impede these teachers' implementation of PL?

Analysis of the data revealed the following themes regarding RQ3: (1) Administration flexibility in teachers' implementation, (2) community of support, (3) conflicting policies, (4) necessities of adult learning and modeling.

Administration flexibility in teachers' implementation. The participants believed having school administration, which allowed flexibility in how they implemented PL was a driver in their implementation. While other research does not specifically speak to school administration flexibility in teacher implementation of PL, DeArmond and Mass (2018) was similar in administration's early expectations of implementations. The similarities were flexibility of implementation start with small expectations, allow opportunity to experiment, then identify approaches which were successful. In this case, the school or school district did not expect a cookie-cutter approach in the implementation of this instructional model. With this flexibility, the participants did not feel uneasy in their implementation of PL because they were the designers of instruction and learning still in their classrooms. Since they were not expected to shift their teaching style to a specific model, the teachers felt comfortable in strategies they choose to implement.

A community of support. Having leadership within a school that provides support and is committed to the implementation of Pl is what drives a successful implementation (DRSN, 2014; DeArmond & Mass, 2018; Pane et al., 2015). According to these participants, the support of the school administration was driving support in the school's implementation of PL. Similar to DeArmond and Mass (2018), the participants expressed support of leadership was through their commitment to the transformation at the school and vivid through communication to the school

community and beyond. Having leadership who empowers others by modeling the same transformation themselves.

According to the participants, having leaders who are supportive and who express their support and commitment to the transformation was key to the implementation. Through trends in education were specific strategies, methods, and programs seem to be on a couple of year cycle, the leadership at the school and district were committed to the transformation through guidance, understanding, and funding. Teachers must feel supported as they transition into new models of instruction and learning. Teachers transforming their classrooms require an understanding that is ok if something does not work. This was evident in their proponent of the growth mindset and failing forward for the school, teachers, and students. The transition to the PL model is a learning and growth experience. School administration understanding change is not always easy or perfect. The teachers felt it was important that our administration continued to support us and the initiative. The teachers learned from their own mistakes, and it was ok. The administration knew and understood and conveyed to the teachers when they came to classrooms for evaluations; it would not be perfect. A shift was occurring not to focus what the teachers were doing but what the students were.

Part of the commitment to the transformation to PL is the communication of this commitment (Bingham et al., 2018, DeArmond & Mass, 2018; Future Ready Schools, 2017; Pane et al., 2015). Through the communication of this transformation to the school community and beyond the principal and others, the teachers at the school felt this commitment was reinforced. The ongoing and constant communication from the principal kept the expectation of the change at the school, and it was kept forefront as a school-wide expectation. This communication of what was happening in the school also provide positive reinforcement to the

teachers. Their hard work was supported and valued. The principal was always eager to share what the teachers were doing at the school, through posting pictures of classrooms via social media, newsletters, or during presentations at educational conferences. It made the teachers feel proud and supported in what they were doing.

Conflicting policies. The participants expressed conflict between the district and state policies and how it impedes the implementation of PL (Bingham et al.,2018; Bingham & Dimandja, 2017; DeArmond & Mass, 2018; DRSN, 2014; Pane et al., 2015). These conflicts consist of non-instructional time consumed and district and state curriculum and timeline mandates. Teachers feel pressured to prepare students for state-level assessment and curriculum, which conflict with principles of PL.

According to these participants, personalizing learning to students' individual needs and skill levels conflicts with curriculum mandates and timelines. Similar to Bingham et al., (2018), teachers communicated there is still conflict in how traditionally student success is measured to truly personalized student pacing, grading, or progression. The teachers expressed the challenges in their implementation, noting they have students who could be up to a couple of grade levels behind in their mastery of levels but having to drive instruction and give mandated assessment based upon grade level. If the expectation is to personalize student learning to meet them where they are genuinely and at their own pace, there must be changes in state-mandated assessments and curriculum. Until there is a shift in how we truly personalize learning, the participants expressed that schools are still setting so many students up for failure. Halverson et al. (2015) concurs district policies constrain the efforts of PL.

Participants communicated frustration in trying to truly meet the interest of the student, which conflicts with district and state policies and curriculum. The timeline and expectations

from district and state impede teacher implementation of PL. Similar to Pane et al. (2015) and Future Ready Schools (2017), teachers need time to plan quality instruction is consumed by meetings and training for other initiatives. The district has overlapping initiatives that limit time to learn new tools, methods, and plan data-driven instruction. The participants expressed concern of overlapping initiatives is comparable to DeArmond and Mass (2018) noting mixed signals can undermine innovation.

Necessities of adult learning and modeling. According to the participants, professional development, including observing an exemplary implementation of the model, are vital during an ongoing during implementation. This supports DRSN's (2014) stance in the importance of intense PD prior to implementation of PL. The participants in this study became learners themselves through the shift in their instructional knowledge and practices . Teachers at the school were open and eager to learn and try new approaches in their classroom but initially did not have the knowledge to do so.

Each participant acknowledged that the professional development they received enabled them to make this shift in practices to implement PL in their classroom. Similar to Pane et al. (2015), the teachers were positive about the quality and the usefulness of the PD they received. The participants felted they would be lost with the training we received. The teachers note the importance of having professional development and its support when implementing PL. One participant described feeling daunted by moving into a new mindset. However, having the PD makes it more palatable.

However, the training they received enable them to implement PL. The majority noted an inability to see the model implemented. The teachers felt that this impeded their implementation of PL. Similar to Bingham et al. (2018), these teachers noted feeling unprepared due to adequate

training and exemplar models. Amanda expressed, “When implementing the model, we were going in blind, we had no model classroom or something to observe” (Amanda, personal interview, August 5, 2019)” Teachers noted they were not prepared for what it would look like, nor were they able to observe a teacher. This unpreparedness was a common thread between all four teachers. Without some clear directions or guidelines, Alexa noted “being overwhelmed” (Alexa, personal interview, August 5, 2019).

While initial training at the beginning of PL implementation is essential, ongoing support is crucial as well (DRSN, 2014; Hanover Research, 2012; Pane et al., 2015). One participant argued that follow-up training after implementation is critical. She explained, “There needs to be some follow-up to discuss what was working and what was not. Based on this feedback, be offered suggestions on tools or strategies” (Alexa, personal interview, August 5, 2019). Another teacher further explained this perspective: “Without prior or ongoing support makes it difficult to implement PL” (Amy, personal interview, August 3, 2019).

Research Question 4

How do these teachers perceive the effects of PL environments on student learning?

Analysis of the data revealed the following themes regarding RQ4: student engagement.

Impact on student engagement. Student engagement is an overarching goal in PL. According to Netcoh (2017), students may have greater academic success if they feel engaged, motivated, and interested via a sense of autonomy and control. Allowing students to have some control in their learning through agency and choice motivates students to succeed (Ferlazzo, 2017; Halverson et al., 2015). These participants believe students are more focused and successful in their learning when it is tailored to them.

The teachers in this study believed that meeting students where they are in their learning has a positive impact on student engagement in the classroom. All four participants noted that tailoring instruction to the students' needs plays a significant role in student's engagement in their education. Student engagement goes hand in hand with student agency and choice, as these teachers observed. When having choices in how students gain knowledge skills and displaying mastery of their learning, students show more creativity and excel more than in a standard assessment. These teachers noted that when the students' work was more achievable, students became more engaged. While PL allows learning to begin at students' level, it is also designed around student interest. Teachers try to create units that draw students' interest or select topics that are intriguing, or they allow students to choose what they would like to learn.

While these teachers noticed the positive impact, PL has on student engagement, they also noted that there were students for whom PL does not have an impact on their learning. Some students were not going to be motivated. They believed it is still too early in the implementation of PL to determine its impact on student learning and achievement. One teacher expressed, "Some students still want traditional instruction. It depends on the student and how they want to learn" (Amanda, personal interview, August 5, 2019).

Limitations of the Study

This case study revealed the lived experiences of four teachers as they transformed their classrooms from a traditional model to a personalized learning model and cultivated an in-depth description of the transformation. In this case study, the teachers were informed of the elements of the investigation. Qualitative studies allow in-depth descriptive data to be collected, which would be challenging to illustrate these teachers' experiences through other manners. The following limitations were noted in this study: (a) small sample size and (b) the focus on one

school. Purposeful sampling was used when designing the case study. While a larger sample could allow greater variation of experiences, a smaller sample allows a holistic understanding of specific experiences. The small sample size of four participants was a limitation of this study. However, although data may have been limited in quantity, the depth of information allowed the researcher to provide a rounded understanding of a precise situation. These participants provided detailed and vast information for the study. Member checking took placed to ensure the accuracy of findings and conclusions of the participants. However, a wider group of participants may have provided different outcomes.

Second, the school was one in the school district was included in this study. Due to the variations of PL implementation models, one school was considered a limitation. While the inclusion of other schools might have shown the different manners and expectations of PL implementation, the focus of this study was very narrow. The choice to investigate one school was purposeful. By studying one school, the researcher was able to collect in-depth descriptive data to illustrate the transformation into a working PL model. Focusing on one school allowed the researcher to understand the distinctive implementation of PL and facilitated a detailed understanding of the application. Broadening the scope to multiple schools within the school district would allow insight into the manner of implementation and variation of PL models across the district. Investigating different PL models could provide different data than were obtained in this study. However, a broader scope of study deepens the understanding of the phenomenon of implementing PL for school and district leaders.

Future Implications of Findings for Educational Practice

This study investigated four teachers in a suburban middle school where PL had been implemented, and the purpose of this study was to construct meaning from the in-depth

descriptive data collect to develop an understanding of how the PL model is enacted. As the transformation from the traditional instructional model of desks in rows and all students completing the same task to the PL model that could be seen as chaos from the outside, teachers need to be supported. This support from the educational community can take the form of providing professional development, flexibility, time, and technology resources. School administration must foster a community where teachers can experiment with their instructional practices and learn. The district and school administrators must allow teachers to develop personalized learning at their own pace and in their way. Flexibility is key, as stated by these participants. Schools need to be flexible in how PL is implemented in classrooms. Schools and teachers must understand that part of this flexibility is understanding not every strategy or model will work in every classroom setting. Not every classroom will look the same or use the same strategies when implementing PL. PL may be similar or different based upon content, access to resources, and the level of technology integrated. While it may be a struggle to begin with, but educators must keep trying. Educators need to look to each other for new ideas or strategies as they look to implement PL. Modeling of PL is crucial piece of PD, where teachers are provided a glimpse of how the instructional model could be implemented. Along with the importance of teachers access to observe implementation of PL, ongoing PD is critical and safeguard designated time for teachers to analyze student information and plan for instruction and learning based upon learners needs.

PL is still new, and it is the direction educators must take. Just like our classrooms do not look the same, the nature of our students today is not the same. Today's students engage with digital and print media and technology in ever changing ways. Funding for traditional resources such as textbooks should migrate to tools and resources to support immediate access to

information. Finding knowledge can be as easy as typing a question into a smart phone, tablet or computer. With this shift in how learning takes place, the role of teachers will shift as well. The role of teachers needs to adapt to the needs of students and new learning environments. The role of teachers is transitioning into a facilitator of student learning. As this role transitions, school districts need to alter the structure of the classroom including an increase of teachers or facilitators. Districts should look to shift resources in staffing and support, which could include increasing the number of paraprofessionals in classrooms to support the role of facilitator. The ratio of one teacher to thirty students does not work in a PL environment.

As personalized learning spreads to classrooms, there are many opportunities for research. This study provides a starting point for understanding a small sample size of personalized learning teachers in the hope that future research expands on the understanding of the transformation to personalized learning. Additional research is needed to provide a lens into another implementations of PL

Recommendations for Future Research

While this research provides an initial investigation of the transformation to personalized learning, opportunities for future research remain. The findings of this study, three questions related to future research on the transformation to personalized learning, and educational reform emerged:

1. Do the experiences of teachers implementing PL vary based on different school levels?
2. How do district and/or state policies and curriculum influence the transition to personalized learning environments?
3. Do the central themes in this study transfer to other educational change initiatives?

Effects of Grade Levels

While this study focused on experiences and perceptions of teachers implementing PL at the middle school level, would teachers at the elementary and high school levels have comparable or different experiences? Research could provide insights into tools, resources, and strategies which may or may not transcend across grade levels. These experiences could provide valuable data to guide school districts as they make the transformations from the traditional learning model to the PL model.

District and/or State Policies and Curriculum

With the implementation of the PL model, educators strive to design learning environments to meet the needs, skills, and interests of their students in order to drive success in learning. However, educators are still bound to the policies and curricula set by school districts and the state Department of Educations. Educators struggle to gear instructional activities to meet students at their levels while preparing students for traditional standardized testing. Students are expected to master skills at district and state designated grade-level outcomes. Presently, students are bound to age-designated grade levels that do not match student's skills and needs for success. More research is needed regarding the impact of these policies and curricula on the shift to the PL paradigm.

Other Educational Change Initiatives

Each recommendation for future research may potentially impart new insight into the present and future educational change initiatives. Can the same factors which these teachers believed allowed a positive implementation of PL in their classroom have the same impact in implementations of other educational initiatives? These participants noted the importance of administrator flexibility, professional development, time, and access to resources.

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APPENDIX **A**

Anchor Codes

Anchor Codes and Meanings, by Research Question

Anchor Codes	**Meaning**	**Research Question**
Definition	Definition of PL by teachers and students	RQ1
Enact	Implementation of PL in classroom, student control, agency/voice and choice, tools and strategies	RQ1
Technology	Role of technology in PL, factors in the use, student and parent use technology	RQ2
Factors	Factors which influence, enable, or impede PL, role of professional development	RQ3
Effects	Teachers perceived ideas of impact on student learning	RQ4

APPENDIX B

Definition of Technology Resources

This section comprises of a list of technology resources these participants utilizes in their classrooms as they implement PL.

Blendspace- allows the storage of digital content, interactive lessons, and online assessments across any content.

ClassCraft- using technology, gaming, and storytelling to allow teachers to create personalized learning quest for students across contents.

Discovery Education- provides standard based digital curriculum and media including digital textbooks and multi-media content.

Ed Puzzle- allows teachers to deliver videos in instruction and learning and personalize to students' needs. Students can learn at own pace and allows assessments for student comprehension.

iReady- using assessments effective instruction is created to address individual students needs in math and reading.

IXL- provides personalized learning with K-12 curriculum and through analytics provides guidance to meet the needs of each learner.

Kahoot- a gaming platform which allows quick and easy formative assessments throughout the learning process.

Nearpod- a learning engagement platform with classroom ready curriculum or teacher created lessons and provides immediate student feedback.

Newsela- allows differentiated instruction across content with the use of text across five different reading levels with access to student performance.

Overdrive-provides students access to digital and audio books.

Plickers- is a card activity with allows quick and easy formative assessments.

Quizizz- is a self-paced digital quiz which allows teachers to review, assess, and engage students from any location.

RedBird Mathematics- is a digital K-6 math curriculum which provides adaptive instruction, gaming, and project-based learning.

Safari Montage- is a K-12 digital learning repository allows students and teachers to curated resources and playlist for learning.

Study Island- is a K-12 provides state grade level standards-based lessons through use of gaming and interactive lessons.

APPENDIX C

Interview Questions

Interview Questions	Research Questions
How do you define personalized learning?	RQ1
What influences your definition of personalized learning?	RQ1
How does personalized learning differ than traditional instruction?	RQ1
What efforts have you seen in your school to personalize instruction?	RQ1
How would your students define personalized learning?	RQ1
What do you perceive the impacts of personalized learning environments in your student's learning?	RQ4
What role does personalized learning have on student engagement?	RQ4
How long have you implemented personalized learning in your classroom?	RQ1
How comfortable are you developing personalized learning environments?	RQ1
What impact does curriculum play in the implementation of personalized learning?	RQ1
How do you implement personalized learning in your classrooms?	RQ1
What are the major components of personalized learning in your classroom?	RQ1
What tools and/or strategies allow you to implement personalized learning environments in your classroom?	RQ1
What control do your students have in their learning?	RQ1
How do you allow students to have a voice and choice in their learning?	RQ1
How do you manage students working at different paths in your classrooms?	RQ1
Give me an example of what would someone observe in a PL lesson in your classroom?	RQ1
What role does technology play in your implementation of personalized learning in your classrooms?	RQ2

How does technology improve your ability to develop and implement personalized learning environments?	RQ2
How do you use technology when you implement personalized learning in your classroom?	RQ2
How do students use technology when you implement personalized learning in your classroom?	RQ2
How do parents use technology when you implement personalized learning in your classroom?	RQ2
Is there anything else you would like to share regarding technology and personalized learning?	RQ2
What professional development have you received in the area of personalized learning?	RQ3
What extent do you believe the amount of professional development and the type of professional development prepared you to implement personalized learning in your classroom?	RQ3
What could improve your development of personalized learning environments?	RQ3
What factors influence, enable and impede personalized learning in these classrooms?	RQ3
Are their factors which hinder your integration of technology into personalized learning environments?	RQ3
What is the most challenging aspect of personalized learning implementation in your classroom?	RQ3
What are some factors which inhibit your use of personalized learning?	RQ3

APPENDIX D

Kennesaw State University IRB Approval

04/17/2019

Christa Evans Heath, Student

KSU Department of Secondary and Middle Grades Education

RE: Your follow-up submission of 4/17/2019, Study #19-502: Implementation of Personalized Learning

Hello Ms. Heath,

Your application for the new study listed above has been administratively reviewed. This study qualifies as exempt from continuing review under DHHS (OHRP) Title 45 CFR Part 46.101(b)(2) - Educational tests, surveys, interviews, observations of public behavior. The consent procedures described in your application are in effect. You are free to conduct your study.

NOTE: All surveys, recruitment flyers/emails, and consent forms must include the IRB study number noted above, prominently displayed on the first page of all materials.

Please note that all proposed revisions to an exempt study require submission of a Progress Report and IRB review prior to implementation to ensure that the study continues to fall within an exempted category of research. A copy of revised documents with a description of planned changes should be submitted to irb@kennesaw.edu for review and approval by the IRB.

Please submit a Progress Report to close the study once it is complete.

Thank you for keeping the board informed of your activities. Contact the IRB at irb@kennesaw.edu or at (470) 578-6407 if you have any questions or require further information.

Sincerely,

Christine Ziegler, Ph.D.

KSU Institutional Review Board Director and Chair

APPENDIX E

Consent Cover Letter

Title of Research Study: Implementation of Personalized Learning

Researcher's Contact Information: Christa Evans Heath, 404-434-7618, cevans@students.kennesaw.edu

Introduction

You are being invited to take part in a research study conducted by Christa Evans Heath of Kennesaw State University. Before you decide to participate in this study, you should read this form and ask questions about anything that you do not understand.

Description of Project

The purpose of the study is to explore personalized learning through evidence, indicating the presence or absence of the supports focused specifically on the beliefs, perceptions, and practices of a group of teachers within this community. The study aims to discover teachers' perceptions, experiences and motivations, and factors which influence their implementation of PL in their classroom daily.

Explanation of Procedures

The data gathered will comprise of in-depth semi-structured interviews and classroom observations. The interview processes will be comprised of questions that are open-ended and focused on the implementation of personalized learning environments. Additionally, teachers will be interviewed separately and face to face. Lastly, participation will be on a volunteer basis. Classroom Observations will take place over a two-week period with two fifty-minute class periods.

Time Required

Each initial interview will be designed to take 40 minutes. Observations will last 50 minutes each and will take place twice with each teacher over a three-week period. Follow-up interviews will occur after observations have taken place and will take 30 minutes. I would like your permission to audio record this interview, so I may accurately transcribe the information you convey. All of your responses are confidential. Your responses will remain confidential and will be used for educational purposes.

Risks or Discomforts

There are no known risks anticipated because of taking part in this study.

Benefits

Your participation in this study may benefit from a transformational change in their thought process regarding the transition to a personalized learning environment. More specifically, your participation will enhance their understanding of leveraging instruction specific to the needs and interest of their students in a personalized learning environment.

Although there may be no direct benefits to you for taking part in the study, the researcher may learn more about the shift from a traditional learning paradigm to a personalized learning model. In other words, this study will provide recommendations for leaders, schools, and districts on the implementation of personalized learning including models of implementation, factors which impede or enable its implementation. Moreover, this research could provide clarity and a guide for others in their own implementation of PL through the experiences and voice of teachers who have implemented the PL.

Confidentiality

The results of this participation will be anonymous. The use of pseudonyms will be used such as participant A will be used in the individual interviews and observations, A special code not including names will be used to help identify the participants. All the data collected and analyzed will not include any names or identifying information. Additionally, the identification of the school, school district, and any other information that will give the identity away will also be kept confidential through a given pseudonym.

With using pseudonyms all the data collected will be anonymous data. All documents will be stored on an external drive. The documents will be encrypted and password- protected. Additionally, the external drive will be password-protected. Further, when the external drive is not in use it will be secured and stored in a locked safe. All digital audio or other electronic data will be stored on the flash drive, encrypted, and password-protected. Any and all paper records will be securely stored and locked in the safe. Only the primary investigator and faculty advisors will have access to the files, documents, and flash drive.

All final records will be retained for three years following the completion of the research. Once this is achieved the data will be destroyed. The external drive used to store the data will be shredded. Additionally, digital audio and other electronic data will be erased as soon as the information is transcribed and coded and no longer needed for the research.

Inclusion Criteria for Participation

The participants will consist of five teachers from a Georgia middle school all over the age of 25. The five teachers were chosen because they are all have experience in the implementation of personalized learning in their classrooms.

Statement of Understanding

The purpose of this research has been explained and my participation is voluntary. I have the right to stop participation at any time without penalty. I understand that the research has no

known risks, and I will not be identified. By completing this survey, I am agreeing to participate in this research project.

Signed Consent
I agree and give my consent to participate in this research project. I understand that participation is voluntary and that I may withdraw my consent at any time without penalty.

_____
Signature of Participant or Authorized Representative, Date

_____
Signature of Investigator, Date

_____
PLEASE SIGN BOTH COPIES OF THIS FORM, KEEP ONE AND RETURN THE OTHER TO THE INVESTIGATOR
Research at Kennesaw State University that involves human participants is carried out under the oversight of an Institutional Review Board. Questions or problems regarding these activities should be addressed to the Institutional Review Board, Kennesaw State University, 585 Cobb Avenue, KH3417, Kennesaw, GA 30144-5591, (470) 578-6407.

APPENDIX F

School District IRB Approval

July 2, 2019

Dear Christa Evans Heath:

Your request to conduct the research study *"Implementation of Personalized Learning"* has been approved. Enclosed is a copy of the Research Agreement. Please note that while this approval permits you to approach individual schools and/or teachers within the (REDACTED) County School system, the final decision regarding participation is a local option and rests with each school principal and teacher. A copy of this letter must be provided to schools along with any correspondence requesting participation in this study.

No identification of (REDACTED) County Schools (students' names, teachers' names, administrators' names, etc.) is to be included in data collected as a part of this study. Also, complete confidentiality of records must be maintained. Please remember to send a summary report once the study is complete to the address below.

If any additional information or assistance is needed, please feel free to reach us at (REDACTED). If data collection continues for more than one year, you will need to complete and submit the "Research Modification / Continuation Form" (available on the DPE web page) before each additional year. This form can also be completed to request approval for changes to your data collection procedures.

We appreciate your interest in conducting research with (REDACTED).

Sincerely,

APPENDIX G

Observation Protocol

Observation Form	
Location:	Subject:
Date:	Grade:
Time of Day:	
Length of Observation:	

Demographic Descriptions:	
Race/Ethnicity:	Number of Students:
African-American:	Female:
Asian:	Male:
Caucasian	
Hispanic	
Multi-racial	

Description of Lesson:

Time	Observation Notes	Reflection Notes

Description of Varied Student Activities:	Classroom Layout:

Additional Notes: