

# Journal on Empowering Teaching Excellence

---

Volume 7  
Issue 2 *Journal on Empowering Teaching  
Excellence, Volume 7, Issue 2, Fall 2023*

Article 4

---


December 2023

## Preservice Teacher Education Preparation: Implementation of Personalized Learning and Technology Integration in the Fifth Industrial Revolution

Crystal C. Loose  
*West Chester University of Pennsylvania*

Rose Jagielo-Manion

Follow this and additional works at: <https://digitalcommons.usu.edu/jete>

 Part of the [Educational Technology Commons](#), [Elementary Education Commons](#), and the [Higher Education and Teaching Commons](#)

---

### Recommended Citation

Loose, Crystal C. and Jagielo-Manion, Rose (2023) "Preservice Teacher Education Preparation: Implementation of Personalized Learning and Technology Integration in the Fifth Industrial Revolution," *Journal on Empowering Teaching Excellence*: Vol. 7: Iss. 2, Article 4.

DOI: <https://doi.org/10.26077/34a9-66ed>

Available at: <https://digitalcommons.usu.edu/jete/vol7/iss2/4>

This Article is brought to you for free and open access by the Journals at DigitalCommons@USU. It has been accepted for inclusion in Journal on Empowering Teaching Excellence by an authorized administrator of DigitalCommons@USU. For more information, please contact [digitalcommons@usu.edu](mailto:digitalcommons@usu.edu).



---

## Preservice Teacher Education Preparation: Implementation of Personalized Learning and Technology Integration in the Fifth Industrial Revolution

### Cover Page Footnote

The author(s) disclosed the receipt of the following support for research: The study was supported with funding through the West Chester University Provost Research Grant during 2020-2022.

# PRESERVICE TEACHER EDUCATION PREPARATION:

## Implementation of Personalized Learning and Technology Integration in the Fifth Industrial Revolution

Crystal C. Loose, Ed.D. and Rose Jagielo-Manion, Ed.D.

---

### Abstract

It has been argued that we have moved into the age of personalization. One can see this while ordering drinks at a local Starbucks, where options are limitless. This personalization has been called the Fifth Industrial Revolution, a time noted for a deep, multi-level cooperation between people and machines. With emphasis on innovation, purpose, and inclusivity, this revolution calls for changes in the classroom setting to focus on relationships and lived experiences. So, how do we prepare our preservice teachers for this reality? Methods of instruction that create an engaging and collaborative learning community need to be considered when designing classroom experiences. The five facets of personalized learning will be examined through the lens of student research and application. These facets include assessments, instructional rigor, equity, study agency, and classroom culture. Qualitative data will be shared emphasizing student experiences as they engage in research and implementation of personalized learning tools during their field experiences. In addition to this, data from administrator and mentor teacher surveys regarding our teacher preparation program will be examined to better understand viewpoints from the schools that host our teacher candidates. Situated learning theory will be cited to emphasize the necessity of learning in context for preservice teachers.

*Keywords:* personalized learning, preservice teachers, Fifth Industrial Revolution, teacher preparation

## Preservice Teacher Education Preparation: Implementation of Personalized Learning and Technology Integration in the Fifth Industrial Revolution

Challenges in education confronted during the pandemic have caused teachers and researchers to study the way we have been instructing students both present day and prior to the COVID-19 pandemic. Although the pandemic caused setbacks in academic achievements, lessons learned about the classroom environment continue to challenge current perspectives and future discussions about the way students learn. Connections made to recent realizations in the literature regarding personalized learning experiences, both the benefits and challenges, need to challenge educators and instructors in higher education to consider the classroom experiences necessary to prepare our students for the Fifth Industrial Revolution (FIR) (Voskoglou, 2020).

Over the course of the last century, we have moved from an industry focused on standardization and mechanical production to the influence of technology becoming an integrated and essential part of our lives. These shifts have created

a demand for learners who actively solve problems using creative thinking (Sudibjo et al., 2019; Voskoglou, 2020). The advent of the FIR takes the concept of the digitalization of our lives to one where all technology is used strategically to personalize products and services to meet the varied needs of individuals. (Paschek et al., 2019). Increases in collaboration between humans and technology have caused the need for different types of skills. With this in mind, undergraduate programs need to consider teacher training models with emphasis on technology-based teaching-learning models which encourage collaboration, creative and critical thinking, and problem-solving skills (Aslan, 2022).

With investment in improving teacher quality during teachers' preservice training, it is essential that we study teacher preparation and the immediate impact on teacher comfort levels upon entering the workforce. Moreover, recent evidence suggests that the context of a teacher's preservice teaching is associated with important consequences for their later employment outcomes (Goldhaber et al., 2017). High performing student teachers are more likely to stay in the profession. In recent years, school districts have begun to adopt schoolwide personalized learning (PL) models (Stuart et al., 2018). Personalized education has shown positive impacts on student education (Lee, 2014). However, to ensure student academic achievement, we need to better prepare preservice teachers with in-depth training and reflective experiences that consider the role of technology in promoting PL experiences for students as the FIR and technology have greatly enabled PL capacities (Kraft & Papay, 2014).

Responsibility for preparing preservice teachers to enter the world of education armed with the thinking, tools, and skills to teach their K-12 students rests on university teacher education programs. This paper will address background related to the FIR and PL and discuss how teacher education programs can use this knowledge to successfully prepare preservice teachers for classrooms of today and tomorrow. Furthermore, results of a two-year study on PL will be shared.

## Theoretical Framework: Adult Learning Principles

In addition to considering research related to the FIR (Paschek et al., 2019) and PL (Lee, 2014), it was important for the authors to ascertain the challenges, needs, and goals of student learning with emphasis on adult learning principles. Recent needs and trends pointed to changing instruction to adapt to the new and most likely permanent place of virtual instruction, consideration of culturally diverse materials, the importance of transferring instruction to real-world experience, and on teaching in inclusive environments.

Adult learning principles were considered while prompting changes in instruction and classroom environments. Adult learning theory, or andragogy (Knowles, 1975), highlights the importance of students being in control of their own learning. Adult learners are self-directed and self-dependent, they assume a problem-centered approach to learning and, consequently, are typically internally motivated (Knowles, 1975). In fact, active adult learners who take initiative in learning tend to learn more and learn better than passive learners (Loeng, 2020). Research also supports self-directed learning as a vehicle for critical awareness (Freire, 1970; Loeng, 2020). Andragogy fuses nicely with all aspects of PL as learners are asked to participate in self-directed learning to explore and expand upon topics of interest to them. Situated learning theory (SLT) gives meaning to learning in context and views learning as a recursive process that occurs through participation in a collaborative environment where adults act in and with context and tools (Lave & Wenger, 1991). SLT informs learning that is not only context-dependent but also rooted in the situation in which a person participates with support and guidance (Loose, 2020). The authors provided authentic learning experiences to support learners as they tried new pedagogical tools to support PL in the classroom during their student teaching field experience. With emphasis on SLT, students were instructed on how to incorporate new instructional strategies by using the platforms in a classroom directed by their instructors.

## Literature Review

### Fifth Industrial Revolution

Rapid technological advances, as well as continuing changes in industry, shape the way we live. These shifts impact our lives in all ways and influence how we live, work, and behave (Sudibjo et al., 2019; Voskoglou, 2020). Historically, schools and other learning institutions have been slow to shift and respond, often being accused of not adequately preparing individuals for the demands of the life and job market they will face.

These shifts require educators to think critically about the ways they create learning experiences that provide students with opportunities to develop creative thinking and problem-solving skills. As indicated in the World Economic Forum, graduates need to be prepared with soft skills such as teamwork and independent thinking (Davos-Klosters, 2018). Many graduates are prepared with the academic knowledge necessary for the workplace but lack interpersonal skills and practical experience (Ginting et al., 2020; Prinsley & Baranyai, 2015; Sarfraz et al., 2018). A recent survey showed that employers perceived a lack of appropriate skills as the biggest barrier to employing graduates. These skills, among others, include time management, teamwork, and interpersonal skills (Lisa et al., 2021; Swafford, 2017). This has led to transformation in HE, particularly in assessment practices that foster teamwork and effective feedback practices (Ashford-Rowe et al., 2014; Sarfraz et al., 2018). This shift from traditional assessments, such as multiple-choice questions, to more authentic opportunities has created further scope for soft skill usage (Gulikers et al., 2008).

Teacher training programs should be organized, taking into account collaborative learning and research-oriented opportunities that support technology integration as they develop their skills to support student learning in a classroom environment that is more personalized and embellished with technology integration.

### Personalized Learning in the Classroom

Personalization is not a novel approach but rather the goal of education. The FIR and use of technology have greatly enabled PL as educators to reimagine their curriculum post-pandemic to address not only social justice and empathy but also include opportunities that allow for personal voice, choice, and active engagement. PL reconsiders the traditional classroom setting with increased personalization based on student achievement, interest, and learning styles (Patrick et al., 2017).

Findings from recent research confirm that optimal learning conditions include environments that give students choice, ownership, and voice through authentic learning experience (Thibodeaux et al., 2019). This environment will be discussed through a lens that is applicable to higher education preservice teacher preparation programs. Through immersion in PL techniques within higher education courses, students not only learn the meaning but experience methods that they can utilize in real-life circumstances. PL environments reconsider the use of assessments and data, instructional rigor, student agency, project-based learning, and technology to support student learning paths while cultivating creative learning experiences (Thibodeaux et al., 2019).

For the intent of this paper, the authors have considered five facets of PL, including classroom culture, assessments, instructional rigor, equity in education, and student agency. Each of these areas were studied by preservice teachers (PST) with emphasis on implementation in the classroom and contextual design. First, creating a classroom culture that inspires learning is the goal of education, as without a safe environment, learning will not transpire. A student-driven model of education should empower learners to pursue their goals, investigate problems, design solutions, and develop curiosities that foster creative thinking and dialogue. These are all essential ingredients of a setting conducive to the FIR. Second, the design of such a space should support peer accountability and self-assessment. Personalized assessments can

be developed to support authentic learning opportunities through project based learning and feedback loops. Third, rigor is standard in all classroom environments, but for personalization to be impactful, student interest, learning styles, and academic needs should be considered. Fourth, fostering an environment of collaboration means that not only is the group benefiting from each other, but there is awareness of how to support one another when there are trials. This environment encourages equity in education with dialogue that fosters an understanding of cultures and varying viewpoints. Finally, through self-directed learning, personalization is supported as students recognize their own interests and best methods for learning. Student agency is a natural offset of personalization as they learn through activities that are meaningful and relevant to their own interests. This type of ecosystem is not possible without the establishment of trust, where it is understood that it is okay to make and learn from mistakes.

## Intentional Use of Technology to Engage and Prepare

The role of digital learning in promoting PL cannot be overlooked. When considering the FIR (Paschek et al., 2019), PL (Lee, 2014), andragogy (Knowles, 1975), SLT (Lave & Wenger, 1991) and what this means for the classroom context, the authors confronted the question of how instructors can leverage technology as a tool to not only engage, but to also foster innovation, purpose, collaboration and critical awareness (Young & Nichols, 2017). To maximize student learning, instructors must make intentional decisions related to learning outcomes and develop “constructive” and “interactive” learning activities involving the use of technology for engagement, problem-solving, and/or collaboration (Sailer et al., 2021, pp. 4-5). Moreover, in contemplating which specific technological tools might be most effective, factors such as anonymity of participant responses, opportunities for individual reflection and/or collaborative thinking, sharing of varying perspectives and/or experiences, and whether a process- or product-driven use of technology is best, must also be addressed. Responses to these questions allow the instructor to create opportunities that maximize engagement and learning, all the while preparing them for classroom environments at the conclusion of the teacher education program.

Prior research on teacher preparation programs examined learning experience designs to prepare first-year teachers, technology incorporation during field experiences, and reflection to promote success in the classroom setting (Brown & Englehardt, 2017; Kang & Windschitl, 2018; Shelley, 2019). However, there is minimal research on action research experiences of preservice teachers with emphasis on personalized learning techniques for classroom application and preparation for FIR. Through intentional and focused uses of technology, the instructors were able to blend principles related to PL, andragogy, and the FIR while also addressing career preparation in the classroom setting. As research suggests, these learning experiences were designed to meet the specific needs of students in personal, engaging, and collaborative ways to expand the competencies required for their future careers (Mogas et al., 2021; Zhao & Watterston, 2021).

The purpose of this study on PL was to first increase preservice teacher (PT) knowledge regarding PL through the development of PL modules and secondly, to measure comfort levels in the classroom setting. Follow up focus groups and surveys administered to K-8 mentor teachers and administrators provided the researchers with an opportunity for further study of preservice teacher skill sets and the effectiveness of higher education teacher preparation programs to prepare students to instruct in classrooms on the cusp of the FIR. Thus, this study had four research questions: (1) What do preservice teachers know about personalized learning? (2) Does participation in research improve preservice teachers' knowledge and awareness of personalized learning? (3) Does preparation in personalized learning influence the relationship between the mentor and preservice teacher? and (4) To what extent can preparation in personalized learning impact teacher preparation and comfort level in the classroom setting?

## Methodology

This research used qualitative action research to examine PT perspectives and the perspectives of mentor teachers, as well as administrators in the buildings that hosted PT during their field experiences. The objectives of this study were to 1) evaluate PT knowledge of personalized learning using survey data; 2) develop modules along with the PT revolving around personalized learning; 3) collect data on PT comfort levels of PL through the answers to open-ended questions on the survey; 4) explore the impact of the modules on PT performance in the classroom.

## Participants

There were three different cohorts of participants in this multi-part study. Cohorts of participants included 25 Early and Middle Grades Education PT enrolled at a suburban public university in Pennsylvania. They participated in seminar cohorts designed by the student teaching supervisor during which they shared field experiences and learned about PL topics pertaining to career readiness. These PT, making up three different cohorts, were recruited to participate in the creation and utilization of research modules. Additionally, K-8 mentor teachers and administrators in schools and districts that hosted university PT as student teachers during the 2021-2022 school year served as survey respondents. Lastly, focus group participants included 24 K-8 mentor teachers and/or administrators in schools/districts hosting student teachers. There were 16 participants in the Fall 2021 focus group meeting and 8 participants in the Fall 2022 focus group meeting.

## Procedures

This qualitative action research study immersed PT participants in the research process with direct classroom applications in a five-phase process. PT participants self-selected topics pertaining to PL, researched this topic by gathering artifacts, testing technology tools, and reading peer-reviewed journal articles. Participants then implemented newly learned knowledge during their field experiences in their classrooms. Participant data was collected using surveys and reflection journals. Mentor teachers and administrators were also surveyed and focus group meetings took place at the end of the 15-week implementation.

The focus of Phase 1 was to assess PT knowledge and introduce the PL modules to PT. PT completed a digital pre-survey of their understanding of PL and its application to classroom environments and technology usage. Information gained from this survey was utilized to create modules for PT to extend their existing knowledge and to address gaps in their understanding of PL practices.

During Phase 2, the instructors developed training materials on the PL topics, including classroom culture, assessments, instructional rigor, equity in education, and student agency. This material was shared with PT during weekly seminars at the beginning of the 15-week semester. PT chose a topic that appealed to them and added to each module as they researched the topic. Each PT had a partner that they worked with to research their topic. Presentations were developed for each topic and each PT group was provided feedback after their presentations were shared during weekly seminars over the course of the 15-week semester.

In Phase 3, PT implemented the modules they created in their classroom settings, engaging in action research throughout this process. The action research experience allowed PT to apply their PL focus area during their field experience. After researching their chosen topic with a group or partner, PT designed and implemented lessons that included elements of PL practices. PT utilized reflective journals to reflect on their new learning in the field and during seminar course experiences related to PL.

Phase 4 focused on gathering feedback from mentor teachers and administrators in schools that hosted PT at the end of the 15-week semester. A focus group of mentor teachers and administrators then met over Zoom to discuss the impact of PL and technology training. The Zoom meeting was recorded and transcribed. PT data was also once again collected using a digital post-survey.

In the last phase, Phase 5, data from the PT surveys, K-8 mentor teacher and administrator surveys, focus group meetings, and PT reflective journals were analyzed for PT understanding and application of PL and elements of technology.

## Data Collection

This study used four data collection tools across the three different participant groups. PT participants completed surveys and reflective journals. Surveys were also administered to mentor teachers and administrators. Notes from focus group meetings with mentor teachers and administrators also served as data collection instruments.

### PT Pre- and Post-Surveys

A digital pre-survey pertaining to knowledge of PL and PT comfort levels was distributed to PT during the first student-teacher seminar using Survey Monkey. The same survey was administered as a post-survey during the final PT seminar at the end of the 15-week semester. The survey included open-ended questions such as, “What is your comfort level of technology usage in the classroom?” and “What changes do you expect to see in education as a result of the COVID-19 pandemic?” Ten survey questions utilized a four-point Likert scale rating in response to statements such as “I understand how PL can be applied to the classroom through authentic, rigorous, and relevant assessments” and “My comfort level in the classroom setting is influenced by training in PL.” Likert scale ratings ranged from strongly agree to strongly disagree.

### PT Reflective Journals

PT participants were asked to keep a reflective journal pertaining to their perspectives of being a researcher, comfort levels in their classroom placement, and knowledge gained regarding PL during the 15-week semester. Prompts were used at the beginning and end of each seminar to encourage PT reflection. Reflective journal prompts included questions such as: How is online learning impacting student instruction? Do you see PL happening in your placement? What have you done to influence classroom culture in your Zoom classroom? How do you support student agency? How are racial, ethnic, and cultural backgrounds represented in the classroom and in student output? Did preparation in PL influence your relationship between your mentor teacher and yourself? Did researching PL improve your understanding of it? How did preparation in PL influence your comfort level in the classroom setting? In addition to this, PT were encouraged to journal about their PL experiences during the field placement. This type of journaling was unprompted and based on each participant’s experiences in the field.

### Survey for K-8 Administration and Mentor Teachers

In order to explore the impact of the modules on PT performance in the classroom, a digital survey was distributed to K-8 mentor teachers and building administrators that hosted PT during the 2021-2022 school year. Participants for the survey were selected based on their involvement with our PT. Surveys were distributed at the end of the 15-week semester in 2021 and 2022. This three-question survey was created using Qualtrics. Two questions included a list of options



where respondents could check responses that applied. These questions were: (1) Thinking of the PT that you have worked with, which of the following would you consider are strengths that they have exhibited? (2) What areas should we focus on in strengthening our candidates' preparation? Possible options to check included competency using instructional technology, competency with data-driven instruction, ability to think creatively, etc. The third question was open-ended and asked respondents what trends in the field the university should be aware of when preparing WCU teacher candidates. These questions were expanded upon in the focus group meetings to gather more data on ways to improve our teacher preparation program.

## Focus Group Meetings with K-8 Administration and Mentor Teachers

Two focus group meetings were held in Fall 2021 and Fall 2022 as an additional source of data related to PT application of modules to their teaching practice. These meetings aimed to delve more deeply into the survey results and to gather additional information used to guide program decisions in effectively preparing PT to enter the profession. Researcher notes during the focus group meetings served as the additional data source.

## Data Analysis

Thematic analysis was used to identify and interpret patterns and themes in qualitative data from the digital journals, open-ended survey questions, and focus group interviews. The researchers used a constant comparative data analysis method (Fram, 2013). This method of analysis requires that all data be systematically compared with the other data in the data set. This method ensures that the data collected will be evaluated rather than possibly disregarded on thematic grounds. Using coding methods, the researchers examined the data, looking for patterns in the reflective journals, open-ended survey questions, and focus group interviews. The researchers completed a multi-step process of coding the data to capture participant perspectives. Descriptive coding was used to surface the main topics represented in the data. During the second-cycle coding process, color coding strategies were used to refine understanding of patterns emerging throughout the first-cycle coding process. Pattern coding was utilized to group first-cycle codes into larger categories with associated subtopics. Focused coding helped us determine the most frequent codes within and across data sets. Elaborate coding allowed us to deductively code using a priori concepts drawn from the research literature (e.g., personalized learning and assessments). Structural coding allowed us to use our research questions to guide data analysis directly. The coding and analysis of qualitative data is strengthened by triangulation through a variety of data sources. Any weaknesses in data can be compensated for by the strengths of multiple sources of data, thereby increasing the validity and reliability of the results.

The 10-question digital survey, including questions to be answered using a four-point Likert Scale, was used for data analysis. The Likert scale ranged from disagree strongly to agree strongly. Using Survey Monkey tools, data was grouped using tables and percentages. This allowed us to examine PT responses before and after their experiences with training in PL. The administrator and mentor teacher survey was implemented using Qualtrics to gather input on PT preparedness. The questions and answers from these surveys were designed to provide information for future seminar design.

## Results

The results of this study informed researchers' understanding of current trends in education and the challenges currently present in teacher preparation programs. It is important to realize that Cohort 3 had a different experience than Cohorts

1 and 2. Due to the COVID-19 pandemic of 2020-2021, the first two cohorts of PT experienced teaching using Zoom or other remote learning platforms for part or all of their student teaching experience. This caused students to view learning from different perspectives. Most interesting were the journals after COVID-19 restrictions. Cohort 3 put more emphasis on writing their thoughts than previous cohorts. Their desire to write and reflect for longer periods of time resulted in lengthy passages for each journal prompt. The research questions will be examined and explained below through analysis of the four data collection tools.

## Preservice Teachers' Knowledge of PL

The first research question, *What do preservice teachers know about personalized learning*, aimed to discover PT assumptions about PL. Survey findings indicated that PT assumed initial understanding of PL. 66% of participants indicated that they felt secure in their understanding of PL topics during initial survey completion. The topics that PT felt confident in were using relevant and rigorous assessments, feedback cycles, and rigorous learning experiences. After seminar study and field experience application of PL topics, 90% of PT felt secure in their understanding. At the onset of this study, PT assumed that they understood the meaning of PL in the classroom environment. After learning more about the topic of PL and how to embed this in the classroom, PT's open-ended responses suggested that they wished they knew more about student profiles, lesson planning, curriculum components at various grade levels, and the difference between differentiated instruction and PL.

The use of journals in this action research project allowed for the documentation of PT participants' involvement in the research, understanding, and application of PL. Three cohorts of PT participated in the use of reflective journals after being exposed to presentations on PL and then through their own research and application of topics pertaining to PL in the classroom. Journal reflection and open-ended question analysis showed that PT comfort levels increased because of PL module study and authentic learning experiences through application of content learned in seminars in their own classrooms. Upon further analysis, it was evident there was some initial misinterpretation of what PL looked like in the classroom setting. For example, after a journal prompt, "How do you personalize learning in the classroom?" PT assumed that differentiated instruction and PL were the same. There were also assumptions that using technology programs for K-8 students was a way to personalize learning. The in-depth study of each area of PL, including classroom culture, assessments, instructional rigor, equity in education, and student agency, created a culture for learning in PT seminars and assisted with misinterpretations that would have impacted PT classroom performance and evaluation. Review of journals revealed words associated with each area of PL after instruction in PL. During a seminar session, PT were prompted to list words that summarized their understanding of each PL topic. Analysis of this prompt resulted in two recurring words associated with PL as indicated in Table 1.

**Table 1: Words to Explain Facets of PL**

Facet of PL	Word 1	Word 2
Instructional Rigor	Challenging Students	Enrichment
Equity	Fairness	Empathy
Assessment	Variety	Fair
Classroom Culture	Inclusion	Community
Student Agency	Choice	Responsibility

PT were asked to answer the journal prompt “How do you personalize learning?” in their reflective journals at the conclusion of their action research experience. The following responses were recorded in the PT responses: classroom seating, sociogram, choice in writing topics, choice in how to learn material, self-assessments, and gearing instruction towards interests/abilities. Furthermore, analysis of responses showed that classroom culture was emphasized through shared experiences, cultural days for holidays, and representation through books, videos, and art. Classroom culture was also explained through what PT observed based on overall classroom environments, including positive reinforcement, accountability in and out of the classroom, respect, growth mindset, and activation of prior knowledge. Finally, student agency was written about with emphasis on the use of packets to provide independent work time. Online resources were also suggested as a method to encourage student agency. The researchers would argue that this is a misinterpretation of student agency as packets do not provide authentic learning opportunities for students to apply what they have learned. It was evident that PT initially misinterpreted several areas of PL and that in-depth discussion during seminars and field experiences allowed them to grow in their understanding.

This is further explained through the second research question: *Does participation in research improve PT knowledge and awareness of personalized learning?* Post-survey results indicated that PT awareness improved in some areas after training and application in the field. The most noted areas of improvement included authentic assessments with 100% indicating improvement on how to use PL to create authentic, rigorous, and relevant assessments. PT demonstrated their understanding by promoting the use of assessments that offered real-world experiences rather than only multiple-choice assessments. An example of a higher-level assignment included presenting to a community audience on the creation of a dog park. 100% of PT indicated that they understand how PL can be applied to the classroom through authentic, rigorous, and relevant learning experiences. This was demonstrated when they designed a variety of learning experiences that offered opportunities for transfer of knowledge in authentic ways. This included project-based learning, using adaptive software, group collaboration, and inquiry-based learning. However, 40% of PT did not feel confident using PL in the classroom to support a classroom environment emphasizing reflection, student-led accountability, and feedback cycles. PT were still learning how to provide learners with multiple opportunities to express their interests through practices that allow students to advocate for themselves. PT were still learning how to promote student usage of long- and short-term goals. PT were also still learning how to support feedback cycles by establishing systems for giving, receiving, acting upon, and tracking feedback. Surveys also indicated that when PL planned lessons, they were able to use PL to create opportunities for flexible learning choices that recognized student strengths. Flexible learning choices were not leveled but offered a variety of choices to complete assignment expectations. 20% of PL did not feel confident in the ability to use learner profiles and 40% did not tailor lessons to personalized learning paths.

Student agency, development of classroom culture, and creating environments to foster equity were areas that PT felt least comfortable during their field experience. It was evident that they were unsure how to accomplish this in the classroom setting. Although PT became more aware of PL topics, they were not always able to capitalize on this awareness because of mandated curriculum found in K-8 education. It was difficult for PT to create personalized pathways and utilize student learning profiles to support accomplishment of academic goals because each student had to satisfy mandated curricular components. Therefore, students were mostly completing the same activities at the same time rather than activities customized to reflect individual or group needs.

Analysis of themes from journals and open-ended post-survey questions indicated that after training on PL, PT reported a lack of PL opportunities for students in K-8 public education. They saw more differentiated instruction for students that were academically below grade level but not for those that were above grade level. They witnessed a one size-fits-all assessment approach that connected to scripted programs. Although PT were trained and aware of PL techniques, there were times that they felt tied to a curriculum that did not encourage creativity and problem-solving skills.

Findings revealed that PT were able to apply newly learned knowledge of PL techniques to improve elements of classroom culture and student agency. For example, it was noted that K-8 students were able to take charge of how they

learned material at times. Team-oriented learning was used to support various abilities, interests, and talents. Online resources were used to support the student agency through interaction with self-paced academic programs. Classroom culture was emphasized through lessons on growth mindset and activation of prior knowledge, which was different for each student. Real-life experiences were incorporated through lessons designed to represent different cultures.

Feedback from the surveys of K-8 mentor teachers and administrators revealed that even though PT show strengths in the areas of instructional technology usage, lesson planning, and flexibility in their teaching, they need to grow in the areas of culturally responsive teaching, social-emotional learning strategies, use of data-driven instruction, managing classroom behaviors, and thinking creatively. Additional educational trends noted on the surveys that should be addressed in the teacher preparation program included the following: varied uses of technology in virtual, hybrid, and in-person settings to meet all students' needs, equity, the science of reading, and responsive, differentiated instruction. Focus group discussions also pointed to needs in the areas of PT lesson planning that involve creative lessons geared to K-8 student needs, even when scripted curricula are provided. PT questioning and student engagement were noted as areas in need of growth as well.

## The Influence of PL on Mentor Teacher and Preservice Teacher Relationship

The third research question aimed to discover, *Does preparation in personalized learning influence the relationship between the mentor and student teacher?* Findings indicated that PT felt inspired by the learned material and having opportunities to share PL topics with their mentor teacher. However, scripted programs often found in K-8 education limited application of PL in areas of assessment creation and instructional rigor. PT felt tied to mandated district assessments and often designed lessons, so students were successful with assessments, rather than appealing to student interest and learning styles. The time required to learn district programs, content, and classroom management skills took time away from the implementation of PL strategies.

However, PT reflective journals indicated that there was increased dialogue with the mentor teacher on topics outside the school agenda and curriculum pertaining to their study of PL topics. PT felt confident in discussing their chosen PL topics with their mentor teachers and this created a collaborative space early on during their field experience. During the first and second weeks of student teaching, it was evident that PT felt more confident in their ability to suggest PL techniques. One PT wrote, "I was nervous to begin my student teaching experience because I was unfamiliar with the grade level curriculum. Since it was a grade 1 classroom, I could easily see PL happening in the classroom through choice boards that supported student agency and choice. It also impacted student rigor since choice boards were leveled. It gave me an opportunity to talk to my mentor about PL happening in her classroom."

Thematic analysis also suggested that conversations with mentor teachers supported the development of creative assignments supporting PL. Several PT mentioned that their study of PL led to increased creativity when designing lessons and assessments. The use of technology, authentic assessments, and flexible project choices were a result of their research in PL.

## Impact of Preparation in PL on Teacher Comfort Level and Preparation

This study also endeavored to answer the question, *To what extent can preparation in personalized learning impact teacher preparation and comfort level in the classroom setting?* Analysis of initial survey data indicated that only 20% of PT felt their comfort level in the classroom setting was influenced by training in PL compared to 100% after training. Upon completion of PL modules and research application, PT used words to explain their experiences, including the necessity

of instructional rigor and challenging content, the support of equity and empathy, the creation of varied assessments, designing a classroom that fosters inclusion and collaboration, and supporting student agency through choice. Supporting student-led accountability through feedback cycles was one of the most challenging areas for PT to facilitate in the classroom. Utilizing student reflection was a second area that scored lower on post-surveys.

Initially, PT used technology as an instructional tool to convey information, but not for PL. PT felt extremely comfortable using technology in the classroom overall but felt less prepared to find new ways to incorporate that into the classroom to increase PL experiences for students. A portion of field experiences took place online, so students were required to be on computers during this hybrid learning experience. This impacted PT capacities to personalize instruction, however it forced them to utilize the technology that was available to them. Upon the return of K-8 students to the classroom setting from virtual classroom experiences, PT noted a lack of motivation and academic struggles. Despite this roadblock, their training in PL prepared them for more interactive technology activities in the classroom.

Results from mentor-teacher and administrator surveys and focus group meetings substantiate PT limited use of technology in the classroom and lack of creativity in lesson design/implementation. Although PT felt comfortable integrating technology, findings clearly showed that teacher preparation programs can better support PT in learning ways to not only utilize technology as a resource for personalized learning, but also as a tool to be responsive to students' needs, whether academic, social, or emotional. PT would also benefit from learning how to use technology to foster K-8 student engagement which will hopefully result in better, more inclusive learning environments, stronger classroom management and comfort levels for PT, and, ultimately, better learning outcomes for students.

Responses on PT post-surveys corroborate these recommendations from mentor teachers and administrators regarding support in how to integrate technology and PL into K-8 classrooms. When asked what professional learning sessions they would be interested in attending on the post-survey PT's responses pointed to topics such as how to successfully blend PL and the required district-wide assessments and how to integrate PL into specific content areas such as math.

## Discussion

Transforming teacher education programs to cultivate seminar environments that encourage self-directed learning on topics that support educational demands today will support PT as they transition to the classroom setting during their full-time student teaching semester. Topics need to support in-depth study of PL environments, including assessment, instructional rigor, technology, equity, engagement, and cultural awareness. However, results of this study clearly demonstrate that, while helpful, PL is not enough to effectively teach students in the FIR. As higher education classrooms take steps to create classroom settings that support authentic learning experiences, PT will be prepared to better transition to their own classrooms upon graduation. Considering the necessary changes to support learner needs for the FIR and beyond, initiatives should include the identification of practices that teacher training facilitators can and should use to develop learners' skills in thinking creatively (Nahavandi, 2019). This gives educators an opportunity to reimagine what and how they teach (Zhao & Watterston, 2021).

To best prepare learners to thrive in this new environment, we must engage students and teachers in critical dialogue about how and why we use technology, focusing on how it helps to support or meet a need (Mogas et al., 2021; Sudibjo et al., 2019; Voskoglou, 2020). PT must be taught how to move from the use of technology as a tool for direct substitution and more for creation and transformation purposes with K-8 learners. Additionally, teacher education programs should demonstrate and have PT practice ways that they can leverage technology to address the individual needs and personalize instruction where K-8 students create, collaborate, communicate, and use critical thinking skills. Inviting technology and/or instructional coaches/coordinators from local school district partners to facilitate training for PT prior to their

student teaching semester would be advantageous. These changes or additions to teacher preparation programs will help to bring meaning to the use and application of technology in classroom environments.

Moreover, designing teacher education programs to prepare PT with ways to adapt scripted programs often found in K-6 classrooms, will require revision of higher education curriculum with more emphasis on PL techniques and strategies for promoting active student engagement. Teacher preparation programs must also focus on teaching their PT how to create equitable, culturally responsive learning environments that foster K-8 student creativity and engagement, as these are critical skills for the future. For example, as situated learning theory dictates, teacher education courses should provide opportunities for PT to practice designing lessons with scripted curriculum that maximize student engagement with instructor support and guidance (Lave & Wenger, 1991; Loose, 2020). In this way, PT will enter classrooms during their student teaching experience better prepared.

Future research should address ways to support PT in fostering engagement in classrooms with pedagogical approaches in addition to PL, such as inquiry- or problem-based learning and design thinking. A follow up study that focuses on a systematic, collaborative, and reflective process for guiding student teachers through lesson plan design and implementation in their specific classroom context would be worthwhile in better preparing the PT of today for the classrooms of tomorrow.

## Limitations

The results of this were obtained from three cohorts. Each cohort offered unique perspectives that could not be controlled. For example, cohorts 1 and 2 had mixed-field experiences that included all or some of their placement online using Zoom or Office to interact with students due to COVID-19 restrictions. This offered unique challenges and experiences that differed from Cohort 3. The impact of these experiences cannot be fully explained given various confounding variables. For example, because cohorts 1 and 2 had to utilize technology to instruct students, this may have impacted their comfort levels in the classroom. This forced technology experience could have influenced PT opinions regarding technology usage as noted by one student who indicated that using Zoom and the Smart Board at the same time was a lot. Cohort 3 had very different experiences because their entire field experience was in a classroom setting. This group approached journal writing differently and spent considerably more time reflecting on prompts provided during seminars. Another limitation of this research is the lack of quantitative data. In later studies, better survey tools and data analysis methods will be considered. Finally, generalizations from this study are assumed based on research completed in higher education within the Pennsylvania State School System. Lastly, researcher bias must be considered as the researchers served as instructors for the PT during seminar sessions.

## Conclusion

This research has shown that exposure to PL strategies influences PT comfort levels in the classroom in the areas of instructional rigor and assessment utilization. PT felt extremely comfortable using technology in the classroom overall but felt less prepared to find new ways to incorporate that into the classroom to increase PL experiences for students. Supporting student-led accountability through feedback cycles was one of the most challenging areas for PT to facilitate in the classroom. Utilizing student reflection was a second area that scored lower on post-surveys. Research results in these areas may have been influenced by experiences during the COVID-19 pandemic.

As indicated by administrator and teacher focus groups and surveys, PT need to be better equipped to use technology as a hybrid method of instruction or to differentiate instruction. It was also evident that PT need better training regard-



ing scripted curricular programs encountered in many school districts in the United States and how to add creativity to enhance these programs. Going forward, it will be necessary to complete research on mentor relationships and how they influence PT creativity in the classroom. There are many burdens placed on teachers today and this may impact their time available to cultivate creative opportunities in the classroom. Allowing educators time to build a curriculum around their students' interests or customize their lessons to maximize their engagement could influence student productivity. This needs to be examined to meet the needs of the FIR

## References

- Aslan, S. (2022). Using cooperative learning and the flipped classroom model with prospective teachers to increase digital literacy self-efficacy, techno pedagogical education, and 21st century skills competence. *International Journal of Progressive Education*, 18(3), 122-137.
- Brown, C. B. & Englehardt, J. (2017). A case study of how a sample of preservice teachers made sense of incorporating iPads into their instruction with children. *Journal of Early Childhood Teacher Education*, 38(1), 19-38.
- Dintersmith, T. (2018). *What school could be*. Princeton University Press.
- Fram, S. M. (2013). Constant comparative analysis method outside of grounded theory. *The Qualitative Report*, 18(1), 1-25.
- Freire, P. (1970). *Pedagogy of the oppressed*. Continuum International Publishing Group Inc.
- Fullan, M. (2016). *The new meaning of educational change*. Routledge.
- Goldhaber, D., Cowan, J. & Theobald, R. (2017). Evaluating prospective teachers: testing the predictive validity of the EdTPA. *Journal of Teacher Education*, 68(4), 377-393.
- Kang, H. & Windschitl, M. (2018). How does practice-based teacher preparation influence novices' first-year instruction? *Teachers College Record*, 120(080307).
- Knowles, M. S. (1975). Adult education: New dimensions. *Educational Leadership*, 33, 85–88.
- Kraft, M. & Papay, J. (2014). Can professional environments in schools promote teacher development? Explaining heterogeneity in returns to teaching experience. *Education Evaluation and Policy Analysis*, 36, 476-500.
- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Lee, D. (2014). How to personalize learning in K-12 schools: Five essential design features. *Educational Technology*, 54(3), 12-17.
- Loeng, S. (2020). Self-directed learning: A core concept in adult education. *Education Research International*, 1-12. <https://doi.org/10.1155/2020/3816132>
- Loose, C. (2020). *Practice-based professional development in education*. IGI Global.
- Loose, C. C., & Ryan, M. G. (2020, November). Cultivating teachers when the school doors are shut: Two teacher-educators reflect on supervision, instruction, change and opportunity during the Covid-19 pandemic. In *Frontiers in Education* (Vol. 5, p. 231). Frontiers.
- Mogas, J., Palau, R., Fuentes, M., & Cebrián, G. (2021). Smart schools on the way: How school principals from Catalonia approach the future of education within the fourth industrial revolution. *Learning Environments Research*, 1-19.
- Nahavandi, S. (2019). Industry 5.0 – A human-centric solution. *Sustainability*, 11, 4371. <https://doi.org/10.3390/su11164371>.
- Oke, A., & Fernandes, F. A. P. (2020). Innovations in teaching and learning: Exploring the perceptions of the education sector on the 4th industrial revolution (4IR). *Journal of Open Innovation: Technology, Market, and Complexity*, 6(2), 31.
- Paschek, D., Mocan, A., & Draghici, A. (2019, May). Industry 5.0—The expected impact of next industrial revolution.

- In *Thriving on Future Education, Industry, Business, and Society, Proceedings of the MakeLearn and TIIM International Conference, Piran, Slovenia* (pp. 15-17).
- Patrick, S., Worthen, M., Truong, N. (2017, December). *Rethinking state accountability to support personalized, competency-based learning in K-12 education*. Issue Brief. iNACOL. Vienna, VA.
- Sailer, M., Schultz-Pernice, F., & Fischer, F. (2021). Contextual facilitators for learning activities involving technology in higher education: The C<sub>h</sub>-model. *Computers in Human Behavior, 121*, 1-13. <https://doi.org/10.1016/j.chb.2021.106794>
- Shelley, T.B. (2019). Metacognition: Importance of reflection in the preservice teacher journey. In *Advances in Higher Education and Professional Development*. IGI Global.
- Stuart, T., Heckmann, S., Mattos, M., Buffum, A. (2018). *Personalized learning in a PLC at work*. Solution Tree Press.
- Sudibjo, N., Idawati, L., & Harsanti, H. R. (2019). Characteristics of learning in the era of industry 4.0 and society 5.0. *Advances in Social Science, Education and Humanities Research, 372*(1), 276-278.
- The Danielson Group (2022). Framework for Teaching Evaluation Instrument. <https://danielsongroup.org/framework/>
- Thibodeauz, T., Harapnuik, D. & Cummings, C. (2019). Student perceptions of the influence of choice, ownership, and voice in learning and the learning environment. *International Journal of Teaching and Learning in Higher Education, 31*(1), 50-62.
- Voskoglou, M. G. (2020). Thoughts for the future education in the era of the fourth industrial revolution. *American Journal of Educational Research, 8*(4), 214-220.
- World Economic Forum Annual Meeting. (2018, January 23—26). Davos Klosters, Switzerland <https://www.weforum.org/events/world-economic-forum-annual-meeting-2018>.
- Young, S., & Nichols, H.M. (2017). A reflexive evaluation of technology-enhanced learning. *Research in Learning Technology, 25*, 1-13.
- Zhao, Y., & Watterston, J. (2021). The changes we need: Education post COVID-19. *Journal of Educational Change, 22*(1), 3-12.