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Experiences with Personalized Learning in a Blended Teaching Course for Preservice Teachers

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In this study, we explored the experiences of preservice teachers as they learned about and experienced personalized learning in a one-credit class designed to introduce students to four core competency areas in K–12 blended teaching contexts: online integration, data practices, personalization, and online interactions. The course included online synchronous, online asynchronous, and in-person class meetings. Using both quantitative and qualitative methods, we examined students' pre and post readiness surveys, activity data, and reflections on their experiences in the course. We found that through course readings; creation of an online module based on blended learning pedagogies, which included personalized learning experiences; and participating in parts of the course that were personalized, preservice teachers felt more prepared to engage in personalized learning at the end of the course than they did at the beginning. Their attitudes generally became more positive and confident as they learned about and experienced personalized learning in the course. They felt they had tools they could use in personalizing their future classrooms and had learned to value the role personalization could play in student growth and motivation.

EXPERIENCES WITH PERSONALIZED LEARNING IN A BLENDED TEACHING COURSE FOR PRESERVICE TEACHERS

In this paper, we share our journey in helping preservice teachers across a wide range of grade levels and subject areas to strengthen their dispositions and skills related to personalized learning. The journey began approximately five years ago when the Utah State Office of Education updated the state licensure requirements to include coursework specifically designed to prepare candidates "to teach effectively in traditional, online-only, and blended classrooms" (UT Admin Code R277-504-5.C.3.d & 4.A.3.f) and "to facilitate student use of software for personalized learning" (UT Admin Code R277-504-5.C.3.c & 4.A.3.e).

Due to these new requirements, we sought to learn what pedagogical competencies, what skills and knowledge the students could develop, related to blended learning would be most essential to teach preservice teachers, given limited space in the program. Our investigations around core competencies for K–12 blended teaching led to research collaborations with colleagues around the country (Pulham & Graham, 2018; Pulham, Graham, & Short, 2018; Graham, Borup, Pulham, & Larsen, 2019) and ultimately to the publishing of an open educational text connected to our efforts (Graham, Borup, Short, & Archambault, 2019). This text identified four core competency areas for blended teaching: (1) online integration, (2) data practices, (3) personalization, and (4) online interaction.

We developed a one-credit hour course that taught and modeled many of these competencies for our preservice teachers. This paper will focus specifically on our efforts to teach about personalization. We provide a literature review for personalized and blended learning in K–12 contexts; a description of the course, its students, and our methods for gathering and analyzing data; as well as findings concerning preservice teachers' attitudes and readiness for personalized learning from throughout the semester.

LITERATURE REVIEW

The idea of *personalized learning* has received much attention during the past decade. While not a new concept, its recent popularity has drawn both proponents and detractors to the discussion around how to define personalized learning and what the implications are for K–12 schools, teachers, and students. In this section, we review the recent rise in attention given to personalized learning in K–12 schools. Then, we share definitions of personalized learning and how those relate to blended learning. Finally, we present a framework that was used to guide our instructional model and research related to preparing K–12 preservice teachers for personalizing their instruction.

Rise in Attention to Personalized Learning

National dialogue among educators around the concept of personalized learning has increased dramatically over the past decade. In 2010, the Office of Educational Technology for the United States Department of Education (USDOE) issued a *National Educational Technology Plan (NETP)* that introduced the concept of personalized learning to many K–12 leaders (USDOE, 2010). Incentives to implement personalized learning approaches were provided through competitive federal *Race to the Top* grant monies. In 2017, the USDOE updated the NETP to even more prominently feature personalized learning, mentioning it over 30 times (USDOE, 2017). With the infusion of money and focus, the national dialogue in the U.S. around personalized learning exploded with dozens of think tanks, research centers, and advocacy groups publishing policy briefs and white papers attempting to contribute to the conversation. A sampling of just a few of these organizations includes: Educause (2014), Michigan Virtual (2013), SRI International (2018), WestEd (McCarthy & Schauer, 2017), RAND (2017), National Center for Learning Disabilities (2018), The Learning Accelerator (2018), Education Elements (2018), and Digital Learning Now (2013).

Additionally, interest has increased in proposals for conventions and symposia as well. For example, the *International Association for K–12 Online Learning* (iNACOL) reported that the proportion of proposals on personalization grew from 28% in 2015 to 48% (almost half the proposals) in 2017 (Gross, Tuchman, & Patrick, 2018). This national trend has led many professional organizations for educators to include personalized learning in their teaching standards for inservice and preservice teachers. For example, iNACOL includes personalization in two sets of competencies—one for blended teaching (Powell, Rabbitt, & Kennedy, 2014) and one for online teaching (iNACOL, 2011). Their blended competencies express the need for teachers to "create learning environments that are flexible and personalized" and to "use [data] to personalize learning experiences" (Powell et al., 2014, p. 10) while their online competencies express the need for designers and instructors to "provide students with multiple learning paths, based on student needs that engage students in a variety of ways" (iNACOL, 2011, p. 10). Additionally, the *International Society for Technology in Education* (ISTE) recently refreshed its Standards for Educators to include using "technology to create, adapt and personalize learning experiences" (ISTE Standards, 2017, p. 2).

While the concept of personalized learning is not dependent on educational technology, in recent years, educational technology and online learning advocates have emphasized that the use of educational technologies can strongly support and enable blended learning and personalization as a pedagogical approach (Chatti & Muslim, 2019; Kucirkova & Littleton, 2017;

Gross et al., 2018). It is therefore relevant for preservice teachers to be introduced to concepts and skills related to using technology in personalized learning.

Defining Personalized Learning

The concept of *personalized learning* is often conflated with terms such as *blended learning* and *competency-based education* (Patrick, Kennedy, & Powell, 2013; Drexler, 2018). This challenge comes from the fact that these are all terms with somewhat fuzzy, evolving, and even overlapping boundaries. For example, a "working definition" provided through an iNACOL white paper states,

> 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 et al., 2013, p. 4.)

Similarly, the most commonly referenced K–12 definition of blended learning describes students as learning "at least in part through online delivery, with some element of student control over time, place, path and/or pace" (Horn & Staker, 2011, p. 3). The last part of this definition goes beyond the combining of online and in-person instruction to include a pedagogy of personalization. This same pattern can be seen in the following statement by researchers Watson and Murin (2014): "Fully blended schools have an element of student control over time/pace/path/place that, in one or more ways, changes the instructional model away from one-to-many (teacher-to-students) instruction and toward a personalized, data-driven approach" (p. 13).

Definitional murkiness comes from the fact that this K–12 definition of blended learning actually incorporates elements of the definition of personalized learning. Blended learning, in the broadest sense, is an umbrella term for the combination of both online and in-person instruction (Graham, 2013; 2019). It is pedagogy agnostic and therefore accommodates many different pedagogies, both student-centered and not. While it may be that the most effective blends involve giving students increased choice, blends also exist that are teacher-centered.

For the purpose of this research, we adopted the following definitions as outlined in more detail in *K–12 Blended Teaching: A Guide to Personalized Learning and Online Integration* (Graham, Borup, Short, Archambault, 2019).

> **Blended learning** is the strategic combination of online and in-person learning. (p. 12)

> **Personalization** involves giving students some element of control over customizing the goals, time, place, pace, and/or path of their learning experience. (p. 115)

These definitions provide clearer guidelines for differentiating between blended learning as a description of modalities and personalized learning as a description of a pedagogical approach.

Personalization Framed Within Blended Teaching

Personalization can have an important pedagogical role in blended learning. Along with online integration, data practices, and online interaction, it is one of four competency areas that characterize an effective blended learning classroom (Figure 1) (Graham, Borup, Short, Archambault, 2019).

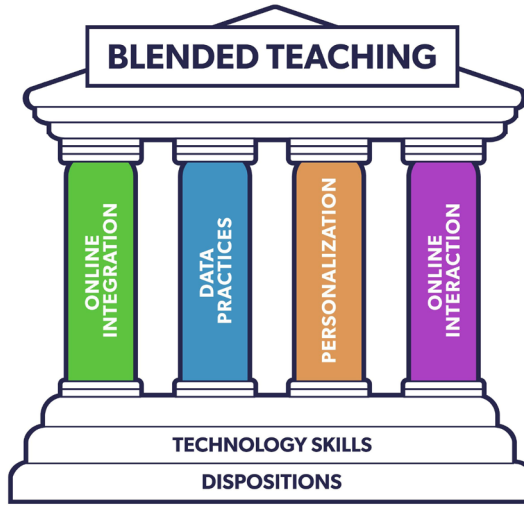

Figure 1. Blended teaching is supported by four core competency areas (1) online integration, (2) data practices, (3) personalization, and (4) online interaction (from Graham, Borup, Short, Archambault, 2019, p. 197).

In this model, personalized learning involves the learners as co-creators of their own education by giving them choice and increased autonomy in their learning experiences. In education, there are three common actors that make instructional decisions: the student, the teacher, and the software. All three of these actors can make choices that customize learning experiences for students. When students are making instructional choices, we refer to this as *personalization*. When teachers are customizing instruction for students, we refer to this as *differentiation.* Finally, software can enable personalization by offering student opportunities for choice, but it can also make choices on behalf of the students (typically based on their performance); in this case, the software is better referred to only as *adaptive learning software* instead of *personalized learning software*.

Students can be given autonomy to make instructional decisions along many different dimensions including *time, pace, place*, and *path* mentioned earlier in the definition of personalized learning (Patrick et al., 2013). Our perspective on student choice and autonomy has been influenced by the Theory of Transactional Distance which identifies core dimensions of autonomy as *execution, evaluation*, and *goals* (Moore, 2007). We see choices of time, pace, place, and path as specific representations of autonomy in the execution and evaluation of instruction. While personalizing student goals may have been considered by others as a part of personalizing path, we have chosen to distinguish personalizing *goals* (or purpose of a learning journey) from personalizing *path*, which describes the specific learning activities that will lead to the achievement of goals that students may or may not have had a choice in. Therefore, the framework we used with preservice teachers in this study emphasized dimensions of personalization in *goals, time, pace, place,* and/or *path.*

RESEARCH QUESTIONS

In order to better understand preservice teachers' attitudes toward and preparation for personalized learning in a blended context, this research sought to answer the following questions:

RQ1: How are the perceptions of preservice teachers toward personalized learning in blended contexts affected by participating in a course focused on K–12 blended teaching?

RQ2: Does participating in personalized learning experiences increase students' desire and confidence to implement personalized practices in their own classrooms?

METHODS

The purpose of this research was to explore the experience of preservice teachers in learning about personalization in K–12 classrooms and having their own personalized learning experience. We sought to discover if these experiences increased students' desires to and confidence for using personalized learning approaches in their own classrooms. To fulfill this purpose, we employed inferential and descriptive statistics as well as qualitative interpretation via the template method (Crabtree and Miller, 1992) and thematic analysis (Attride-Stirling, 2001).

Program Description

The setting of the research was four sections of an undergraduate, preservice teacher course called *Teaching in K–12 Online and Blended Learning Contexts*, a one-credit course designed to prepare preservice teachers to teach in online and blended contexts and to fulfill state law requirements. The text for the class was *K–12 Blended Teaching: A Guide to Personalizing Learning and Online Integration* (Graham, Borup, Short, Archambault, 2019) an open educational resource guide available through EdTech Books. Elementary and secondary students were typically enrolled in different sections.

The class was divided into three units. The first unit focused on online and blended theory and practices related to the four competency areas of teaching in a blended context: online integration, data practices, personalized instruction, and online interactions. It was held synchronously using video conferencing software. Students read the textbook and took mastery quizzes outside of class. In class, they discussed blended teaching competencies and participated in activities that reinforced what they had learned.

In the second unit, the students met in-person and created a Canvas module. The students chose a learning standard, collected resources for teaching that standard, then created a quiz, an assignment, a discussion board activity, a playlist or choice board, and a lesson plan and rationale that detailed how each element they created could be used in a K–12 blended classroom. The in-person classes modeled different types of blended learning contexts (station rotation, lab rotation, and flipped classroom).

The third unit was online and personalized using asynchronous activities. Students first engaged in an activity where they learned how to create and interpret mastery data in a tool called MasteryConnect. Then students were given a choice board created by the instructors with three activities in each of the four blended learning competency areas. The students chose two of the 12 learning experiences based on their own learning goals and interests. They were also invited to design their own experience if they did not find

one on the choice board that was suitable. Once the students chose the two experiences they wanted to complete, they set goals for when they would submit each project. Choice over learning activities and due dates allowed students to personalize their path and goals. The online nature of the course allowed for additional personalization concerning when students completed the experiences (*time*), the amount of time they spent on each experience or when they planned to complete each experience (*pace*), and where they did the work (*place*). This organization of the unit allowed for personalization across all five dimensions of personalization: *goals, time, place, pace*, and *path* (Graham, Borup, Short, Archambault, 2019).

Students

Students involved in this study were 81 undergraduate, preservice teachers enrolled in four sections of T*eaching in K–12 Online and Blended Learning Contexts* during the winter semester of 2019. The course demographics are shown in Table 1.

Table 1
Research Participants

Section	Total
1 (secondary)	22
2 (elementary)	26
3 (elementary)	20
4 (secondary)	13
Total	81

Data Collection and Analysis

Because the purpose of this research was to understand preservice teachers' experiences in participating in their own personalized learning activities and in preparing to teach using personalized learning strategies, we found insights by collecting data from a variety of sources and in using a mixed methods approach to data analysis.

Pre- and post-survey data

Students were administered a Blended Teaching Readiness Survey (http://bit.ly/K12-BTR) before the course began and as part of their final exam. The survey consisted of five sections: dispositions (eight questions); online integration (11 questions); data practices (eight questions); personal-

izing instruction (eight questions); and online interactions (eight questions).

Fourteen students had incomplete survey data, so 67 students' data was analyzed. Because the total possible scores differed across the four blended teaching competency areas, scores in each of the areas were normalized as percentages of the total score to facilitate comparison. The total scores and the scores for each subsection of the Blended Teaching Readiness Survey pre- and post-tests were compared using paired sample t-tests in IBM's SPSS 26 statistics program.

Student assignment reflections

As part of their choice board assignments the students included a reflection on their experience in doing the assignment. Most of the students' reflections focused on the product they created, but some (n=39) included thoughts on the personalized aspect of the assignments. These reflections were included in the study.

We analyzed the assignment reflections qualitatively using the template method described by Crabtree and Miller (1992). We first read through all the texts to get an initial and overall sense of their comments. We found that most of the comments focused on the five dimensions of personalization: goals, time, place, pace, and path (Graham, Borup, Short, Archambault, 2019). We used these dimensions as a thematic structure and coded for positive and non-positive comments on students' control of the *goals, path, time, pace,* and *place* of their assignments. During coding, we remained open to the possibility of other themes. This openness yielded one additional theme: the need for support in personalized learning experiences.

Final exam reflections

As part of the final exam, the students again completed the Blended Teaching Readiness Survey then reflected on the changes between their Blended Teaching Readiness scores from the beginning of the semester to the end of the semester. The students included reflections on the personalized learning part of the course. These reflections (n=79) were included in the data.

We analyzed the test reflections using thematic network analysis as described by Attride-Stirling (2001). We organized and analyzed the text on three different levels: basic themes (the smallest units of text from which a theme can be drawn), organizing themes (groups of basic themes with similar ideas), and global themes (broad themes that included the organizing themes in a way that unified and represented the entire data set). We discovered twenty organizing themes, which we grouped into four global themes: practices of personalized learning, benefits of personalization, attitude changes, and implementation.

Student goals and assignment activity

As mentioned in the program description, students were given a choice board with three assignment choices for each of the four blended teaching competency areas. Students chose two assignments from the choice board to complete and set goals for the dates of completion. All assignments had a final due date at the end of course set by the instructors. Using descriptive statistics to compare students' goal dates and the final class due dates to the days they actually submitted their assignments gave extra insight into the students' experiences.

Trustworthiness

Lincoln and Guba (1985) established the basis for trustworthiness in qualitative research. They required the researcher to engage in trustworthiness checks to ensure credibility, transferability, and dependability of research.

In this research, we established credibility through the triangulation of various data sources. Together, the different data sources provided a more holistic understanding of the students' attitudes and experiences with personalization throughout the course. Additionally, credibility was assured by our prolonged engagement with the students. Each author taught one section of the course. We were persistent in observing and interacting with the students and their data, and we met weekly to discuss our findings. Finally, we improved the credibility of the research by having colleagues review the coding and thematic structure of the study. Their suggestions were used to improve the analysis.

Transferability is made possible through our attempts to provide thick descriptions of the data we collected in this paper (Nowell, Norris, White, & Moules, 2017). These thick descriptions are a result of using the students' own words wherever possible to preserve their voice, allowing future practitioners and researchers to see likely responses to their own attempts at creating a course on personalization.

Finally, we attempted to show dependability by thoroughly documenting our thought process in this paper and illustrating how it leads to our findings (Tobin & Begley, 2004).

FINDINGS

Overall, as preservice teachers progressed through the class, their understanding of personalized learning, their desire and enthusiasm for implementing personalized practices in their classrooms, and their confidence in their ability to collaborate with their students in personalized practices increased. At the end of the course, they expressed excitement about what they had learned and what they would be able to do in their future classrooms.

Pre- and Post-Survey Data

The students' pre- and post-survey scores were compared using paired sample t-tests. The results are shown in Table 2. All areas showed significant change. Personalization scores had the lowest mean in both the pre- and post-tests, but they had the highest average percent increase, aligning the final score more closely with the other final scores. In the pre-test, there was a 20% difference between the mean personalization score (57.5%) and the highest pre-test mean score—the dispositions score at 77.5%. In the post-test, however, there was only a 4.0% difference between the mean personalization score (82.5%) and that of the highest post-test mean score—online interactions at 86.5%. The data in Table 2 seem to suggest that students felt more prepared to utilize personalization in their own classrooms than they had at the beginning of the course.

Table 2
Descriptive and Paired Samples T-test Statistics for Pre-Post Readiness Survey Data (N=67)

Competency Areas	Disposition	Online Integration	Data Practices	Personalizing Instruction	Online Interactions	Total
Total Possible	48	66	48	48	48	258
Pre Mean	37.3	44.5	28.6	27.6	34.2	172.7
((SD)	(4.6)	(8.8)	(8.0)	(8.0)	(8.0)	(29.9)
Percent	77.5	67.4	59.6	57.5	71.3	66.9
Post Mean	40.0	54.8	40.3	39.6	41.5	217.3
(SD)	(7.3)	(7.4)	(5.9)	(6.3)	(5.6)	(30.1)
Percent	83.3	83.0	84.0	82.5	86.5	84.2
Post – Pre Mean	2.8	10.4	11.7	12.1	7.3	44.6
(SD)	(7.1)	(9.5)	(7.8)	(8.5)	(7.4)	(30.8)
Percent	5.8	15.7	24.4	25.2	15.2	17.3
Paired Sample t	3.2	8.9	12.4	11.6	8.0	11.8
Significance	.002	.000	.000	.000	.000	.000

*Discrepancies in the differences between the percentages come from rounding the numbers to the nearest 10th.

As shown in Table 3, for each section of the survey, some students' scores decreased. The higher pre-test scores of these students suggest that students who decreased may have had a more inflated sense of their readiness at the beginning of the course than at the end. However, the number of students whose scores decreased was fewer for personalization (n=4) than for any other area except that of data practices (n=3). These two areas may have been less familiar to the students at the beginning, so fewer overestimated their abilities. Despite these lower levels of overestimation, students' experiences in the course could have made them more accurate in their awareness of their abilities to personalize. Alternatively, the decrease in the scores could be evidence that the experiences of four students made them feel less prepared for personalization.

Table 3

Students in Each Area Whose Scores Decreased

Competency Areas (n=)	% Who Decreased	Score Possible	Pre-test Mean (SD)	Post-test Mean (SD)
Disposition (16)	(8.0)	48	38.6 (5.9)	36.9 (8.2)
Online Integration (7)	57.5	66	51.0 (6.7)	46.0 (7.8)
Data Practices (3)	4.2	48	36.0 (6.2)	32.3 (8.0)
Personalization (4)	5.4	48	34.3 (3.4)	31.5 (3.1)
Online Interaction (7)	9.9	48	44.4 (2.2)	42.3 (2.7)
Total (5)	7.4	258	187.4 (19.6)	178.2 (18.3)

Assignment reflections

As part of the final unit of the class, students reflected on the assignments they chose to complete. Most of the students focused on what they had done for the assignment, but some (n=39) reflected on their experiences with the personalization aspect of the assignments. The lead author coded these perceptions as positive or non-positive according to the dimensions of student control in the competency area of personalization: goals, time, place, pace, and path. The third and fourth authors reviewed the coding, suggesting changes. We adjusted the coding until we agreed that the coding represented the data accurately. The results are recorded in Table 4.

Table 4

Student Responses to Dimensions of Personalization Experienced during the Final Unit

	Goals		Time		Place		Pace		Path	
	#	%	#	%	#	%	#	%	#	%
Positive	11	79*	14	93	7	88	19	86	24	96
Not positive	3	21*	1	7	1	12	3	14	1	4
Total	14	36**	15	38	8	21	22	56	25	64

*Percent of students who commented on that dimension of personalization (n= number in the "Total" row for each dimension).

** Percent of total respondents who commented on any dimension of personalization (n=39).

The top row of data shows that in every area of personalization, more than three quarters of the students who commented on that dimension of personalization did so positively, ranging from 79% positive comments for goals to 96% for path. Pace and path received the highest percentage of the total comments, with 56% and 64% respectively of the 39 students commenting on them. The majority of their comments were positive with 86% of the students making positive comments about personalizing pace, and 96% on personalizing path. In general, the students enjoyed being able to choose projects that fit their needs as future teachers. They were more motivated to spend time on the assignment(s) and were grateful for control over pacing.

It should be noted that five of the positive comments in the count of each element mentioned all five elements of personalization. Additionally, all the non-positive comments were made by three students, only 7.7% of the 39 who wrote about their experience in terms of how it was personalized. Two of these three students mentioned how their own tendency to procrastinate made it difficult to create goals and meet them. The third student was uninterested in personalization and did not enjoy receiving choice in any of the five elements. A sampling of the students' comments in each area is included in Table 5.

Table 5

Assignment Reflections: Responses to the 5 areas of personalization

Theme	Evidence
Goals	**Positive**
	"Because I was the one who set the goal, I had a surer knowledge that I could do it."
	"I really enjoyed being able to choose this assignment and the due date! I was tempted to put the due date for the last day, but with your [the instructor's] encouragement, realized that was a pretty bad idea."
	Not Positive
	"It did teach me that I am a kind of student that puts things off, so perhaps it will be helpful for students like me to set their goals as a more hard and fast individually set due date."
Time*	**Positive**
	"I enjoyed being able to . . . do the assignment when it was best for me."
	"I felt [this assignment] taught me how to manage my time as if I was really a teacher now. . . . I got to decide when to do this just as if I was a teacher deciding when to do this."
	"I was able to find a way to fit it into my schedule instead of forcing my schedule to fit with the assignment."
Place*	**Positive**
	"Having more control over . . . where . . . I accomplished this assignment made me feel more positively about it."
Pace	**Positive**
	"One thing I really liked about this assignment was I could take the time to think about what kinds of questions would really help me learn about my students and set them up for success."
	"I enjoyed being able to work at my own pace and being able to do the assignment when it was best for me."
	"I was very glad that my assignment to do this had an open schedule because it took a while to work with my teacher and get this implemented in class, and I think that is a great thing to do for students when they have a project is give them plenty of time to do what they need to do."
	Not positive
	"I learned through this assignment that I am actually really bad at pacing myself."
	"Having more control over the aspects of personalization proved difficult for me because of all the other classes and work I am balancing. It was easy for me to lose track of my timeline and have to finish things at the last minute."

Table 5, *Continued*

Theme	Evidence
Path*	**Positive**
	"I think that I was a prime example of an interested student that spent a lot of time on something that interested me and I learned from it."
	"I liked the freedom it gave me. I was better able to pick something relevant and useful, as well as fit it into my schedule at a perfect time for me."
	"I was so motivated to work on these assignments because I had so much choice. I felt that I was able to choose things that are actually applicable to me and my own learning."
	"Having more control in the assignment helped me value personalization."

*Dimensions with no "non-positive" comments all received the same non-positive comment from the student who had a negative experience with all five elements.

Finally, one additional theme emerged from the students' assignment reflections: support for students. Nine students (23.1%) commented on this idea. One expressed gratitude for follow-up emails to remind her of the assignment. Two others said they needed more support. Six felt their future students "would need much more support," especially for "planning their plan of attack." Preservice teachers recognized the challenges they experienced and understood that they would need to address those challenges with their own students.

Final test reflections

As part of their final exam, students reflected on how they felt they had grown in knowledge and skills in the four blended learning competency areas. The lead author coded each reflection at the idea level, each idea being coded separately. Each students' comments generally coded for more than one idea. The coding was reviewed by the fourth author and the coding revised accordingly. This analysis (organizing the ideas into organizing themes then into global themes) produced four global themes: benefits of personalization, specific practices of personalized learning, changes in attitudes, and ideas for implementation. These themes and the organizing themes that define them are illustrated in Figure 2.

Final test reflections overall indicated that students had grown in their understanding of the importance of personalization, their knowledge of how to implement it into their classrooms, and their desire to incorporate it into their teaching. One student summarized her experience this way: "In taking this class and actually getting to see personalization in action I really feel more empowered to use it in my future classroom." Another student

described her experience similarly: "For me, the biggest growth in personalization was seeing how beneficial it was for me and how much more I enjoyed this course because of it. It was cool to learn about it, and then see it in practice in my own classroom."

Thirteen students specifically mentioned their increased confidence in being able to use personalization in their classrooms. Comments such as "I am confident in saying that I am prepared to implement this in my future classroom" were typical of these students. They felt like they really knew "how to make things personal for students" and were confident in their ability to "analyze students' work to . . . personalize learning." One student succinctly stated: "I am so proud of the growth I've seen and felt in this area of my teaching."

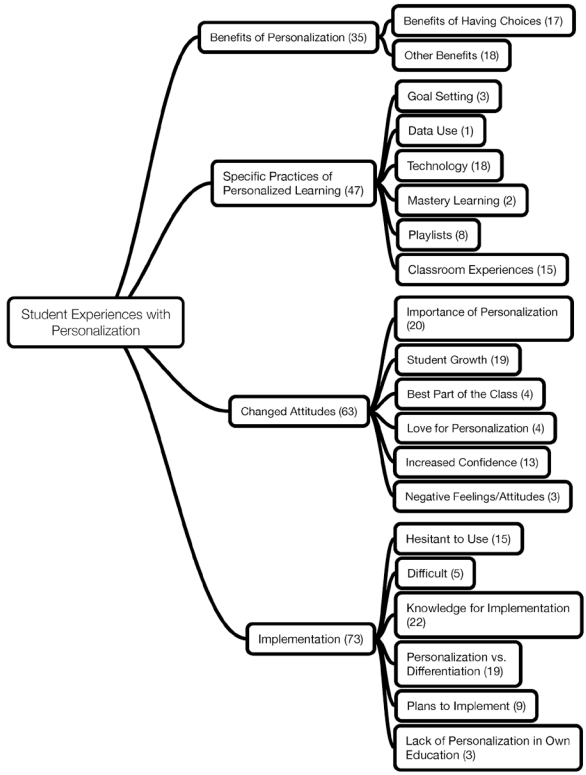

Figure 2. Number of comments for organizing and global themes around personalized learning.

Many began for the first time to see how "useful technology can be for personalizing instruction for students" and became more willing to learn how to use it for that purpose. One student explained that she saw the importance of "turning to and relying on data to back up your teaching," explaining that "data lets you know how your students are doing and where they need help." Others learned "to use playlists and choice boards effectively," to help students "make decisions about . . . their own individual learning goals" and to "incorporate a mastery-based learning approach" in their classrooms.

Teacher candidates saw benefits in giving students choice. They felt that students who have choices in their education "are more motivated and able to succeed," "become responsible for their learning," "feel more empowered and care more about school because of the ownership they have," and are more "engaged and committed."

Although 68 students commented positively overall (192 coded comments), not all students were enthusiastic about implementing personalized learning in their future classrooms. Eleven students (20 coded comments) either felt personalization would be difficult to implement or were hesitant to do so. Some were frightened, others struggled with not knowing "enough online resources," and still others thought it would "be hard for me to trust that the students would really take their own learning seriously." Some felt that personalization "does seem like a lot more work." However, while the students who expressed hesitation may have been fearful or intimidated by the amount of work personalizing a classroom would take, all but one also recognized advantages to personalizing and could see themselves personalizing instruction someday. These students' attitudes were typical of one among them who stated:

> This is one area, though, that I think will be the hardest to implement because of how much extra planning and preparation it will take. I don't see myself being as capable of doing this my first year of teaching than I do after I've been there for a couple years and have things more under control.

The student reflections seem to suggest that the course structure helped them grow in understanding, ability, and confidence to implement personalized learning in their classrooms.

Student Goals

Although the students' attitudes toward personalized learning improved, and their knowledge of how to create a personalized classroom increased, in one area of personalization they were not as well prepared: making and achieving their own goals. The students were asked to set a submission goal

for each choice board assignment of the final unit sometime before the last day of class. All assignments had to be completed by the last day of class. Of the 81 students, eight students (total of 16 assignments) set no goals. Even though the remaining 73 students set goals (146 assignment goals), most did not achieve them. Table 6 shows the distribution of when students completed their assignments in relation to their goals.

Table 6
Assignment Submissions in Relation to Student Goals

Assignment Submission Status	# of Assignments	% of Assignments
Turned in before goal	45	28
Turned in day of goal	15	9
Turned in after goal	82	51
Turned in after class deadline	4	2
Had no goal	16	10
Total	162	100

Sixty of the assignments (37%) were turned in before or on the date of the submission goal. Eighty-two assignments (51%) were turned in after the goal but before or on the class due date. All but four students submitted their choice board projects by the final class (97.5%). Almost two-thirds of the assignments (60%, including those who did not set goals) did not meet goal dates, suggesting that students may have seen the last day of class as the "real" due date, their goals having little impact on the pacing or completion of their work. None of the students consulted an instructor about changing their goal. They did not seem to feel bound by the date they had set. Because goal setting is an important part of personalizing instruction, this experience seemed to indicate that these students still needed more experience with setting and achieving their own goals and helping their students do so as well.

DISCUSSION

From our findings, it seems clear that the *Teaching in K–12 Online and Blended Learning Contexts* course had a positive impact on students' perceptions of and preparation for personalized learning. Students seemed to leave the class with a greater acceptance of personalized learning

practices, understanding the benefits that such pedagogies could provide to their future students. Additionally, most students seemed to feel more confident in their abilities to one day implement personalized learning pedagogies in their future classrooms. Despite these increases, there are still limitations to what we were able to uncover about preservice teachers' experiences and what students perceived as their readiness for personalized learning.

As stated in the literature, technology can aid in the implementation of personalized learning (Chatti & Muslim, 2019; Kucirkova & Littleton, 2017; Gross et al., 2018). The course used for this study specifically focused on the inclusion of the online space as a means of providing personalized learning in a blended setting. Such a context meant that students in the study felt more prepared for using the online space for personalization but may not have felt as prepared to personalize learning in less technology-rich environments. Additionally, the course introduced students to the rudiments of personalizing instruction in a blended setting, but did not address more advanced considerations, such as providing students with deeper, more meaningful ownership and agency over their learning:

> The most significant personalized learning challenge for advanced practitioners is engaging students in authentic learning opportunities, which suggests that creating opportunities for students to engage in deeper, more relevant, and more powerful learning may be the most challenging personalized learning domain of all, even for the most experienced and skillful practitioner. (Liberty, Rucker, Joseph, Buck, & Guerrero, 2017, p. 4.)

Despite these limitations, it is still important to recognize that students demonstrated improved attitudes toward personalized learning, which may open possibilities for further learning in inservice settings. For those students who felt as though they were not more prepared for personalized learning, these professional learning opportunities may help them build more confidence in the future. It is also possible that the few students who did not have improved readiness scores or did not perceive personalization as beneficial may have felt as though personalized learning was not important to their future teaching careers. Experiencing professional learning opportunities and seeing other teachers practice personalized learning pedagogies may also help these students build their confidence. Due to the limitations inherent in a one-credit hour course and limited access to masterful personalized learning teachers, we were unable to provide students with real-life classroom experiences for the applications of personalized learning.

We feel assured that students' experiences with personalized learning helped them feel more confident and prepared for personalizing instruction through blended teaching, but more could be done to help them implement such practices in their future classrooms. First, more time could be dedicated to helping students learn about advanced personalized learning practices. Little was done throughout the course to help pre-service teachers understand how to build learner profiles for their students, provide valuable goal-setting conferences for students, manage the balance between giving students too much agency or not enough, and using adaptive learning platforms. This was difficult to do in our course due to the time constraints placed on a single credit hour course. While there were some assignments, readings, and choice board experiences related to learner profiles and helping students with their own goals, there was less content that focused on using adaptive learning systems. It may be the case in K–12 education that blended teachers are using pre-packaged educational software or applications more often than they are creating their own playlists or curating their own online content. In such circumstances, more class time devoted to using adaptive systems to personalize learning would be helpful for building pre-service teachers' readiness for personalized learning.

Second, we recognize that it would be beneficial for our pre-service teachers to gain hands-on experience using personalized pedagogies with current K–12 students and to see experienced educators employ such pedagogies with their own students. The elementary education students enrolled in the course completed a four-week practicum during the semester they took the course. This created an added burden to their coursework and made it difficult for them to experience blended and personalized learning in practice. While some students chose to do assignments in Unit 3 that directly connected personalized learning to their practicum experience (e.g., collaborating with a classroom teacher to create a choice board, playlist, or online discussion to be used in a future lesson), this experience was only open to students in practicum who also had classroom teachers willing to work with them.

Lastly, students in the course mostly worked toward creating their playlists on their own. This situation is unlikely to happen in practice, where teachers or grade level teams work together to create learning activities. The lack of collaboration in the course may be responsible for some of the student comments related to the additional work needed to personalize education. Providing more opportunities for our pre-service teachers to collaborate with each other so they can understand that creating a playlist is a lesser burden when working together can provide them with a clearer understanding of developing a playlist in practice. Yet, because one of the goals of the course was to make sure all students could create their own playlists and curate their own online content, making such assignments group assignments could harm learning outcomes.

CONCLUSION

Preservice teachers' experiences using a personalized learning approach varied by student but were generally seen as positive experiences that helped prepare them for using personalized learning with their future students. Preservice teachers experienced personalized learning through participating in a unit that allowed them to choose which assignments to complete from a given list of assignments, create personal goals for when they would submit the selected assignment, and then decide when, where, and how long they would work on their assignments. This practice allowed students to personalize their learning across all five dimensions of personalization—goals, path, time, place, and pace. Generally, students felt that this experience gave them a greater understanding of what their future students may experience during personalized learning. They realized that personalization requires greater self-regulation and may therefore require additional support from teachers in order to guide students toward success.

Additionally, preservice teachers who participated in these personalized learning experiences generally seemed to have increased desires and confidence for instituting personalized practices in their own classrooms. Reflections from student assignments at the end of the semester indicated that students felt that they better understood both the challenges and benefits of personalized learning. They seemed to feel as though the benefits outweighed the challenges because they generally planned on using personalized methods in their future classrooms. These reflections also suggested that preservice teachers felt more confident in their abilities to personalize learning because they were able to experience challenges that their own students may face.

While this study suggests that experiences with personalized learning can help preservice teachers feel more confident in their abilities to implement personalized learning pedagogies in blended environments, more research is needed to determine why preservice teachers felt more prepared. Additionally, more advanced areas of personalization were not explored in the course used for this study. Future research could examine student perceptions concerning these more advanced areas in courses that both explicitly seek to prepare students for such areas and those that do not. Lastly, students in this course were unable to observe or practice personalization pedagogies in K–12 settings. Research concerning students' experiences with personalization in K–12 settings could uncover additional influences on students' perceptions regarding their readiness for personalized learning in blended contexts.

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