Participation in the UTeach Blended Learning Professional Development Program and Long-Term Teacher Retention

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Texas Education Research Center

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Authors

Pedro Reyes, Celeste D. Alexander, Janet Solis Rodriguez and Wajiha Saqib

Texas Education Research Center

Department of Educational Leadership and Policy

The University of Texas at Austin

1912 Speedway STOP D5400

Austin, TX 78712-1604

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UTeach Professional Development

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Abstract

Participation in the UTeach Blended Learning Professional Development Program and Long-Term Teacher Retention – June 2024

This evaluation examines the relationship between the UTeach Blended Learning Professional Development (UTeach BLPD) program and long-term teacher retention. The UTeach BLPD is a state-approved and sponsored professional development program for educators that combines best instructional practices with technology to provide personalized learning experiences for all learners, in line with Texas Education Agency's core strategic priorities of supporting and retaining Texas educators. Since the COVID-19 pandemic, blended learning platforms for teaching have been crucial in today's world because they allow students to be instructed more engagingly through technology. States nationwide are increasingly investing in high-quality BLPD for educators to implement in their classrooms, given the positive outcomes associated with these strategies. Research shows that professional development utilizing blended learning increased teachers' content knowledge, improved technology use, and improved self-efficacy. Studies also highlight that blended learning or flipped classrooms lead to better student learning engagement, achievement, motivation, and interaction. This study explores whether UTeach BLPD participation predicts long-term teacher retention for participating teachers compared to nonparticipating teachers. Findings suggest that the UTeach BLPD is positively associated with long-term teacher retention in the classroom and in education, delivering effective teacher development that significantly benefits teachers by supporting their skills to integrate technology in their classrooms. This study has implications for policy and practice regarding high-quality professional development and teacher retention.

Participation in the UTeach Blended Learning Professional Development Program and Long-Term Teacher Retention

The adverse effects of low teacher retention on the education system are far reaching. These effects include impacting students' achievement, disrupting collegial relationships among teachers, and placing significant financial burdens on schools when they must replace teachers (Reyes, Marder, Alexander, Solis Rodriguez, & Rhodes, 2022; Wang, 2019). To create a future where each student benefits from experienced and effective educators, it is crucial to prioritize evidence-based strategies to increase teacher retention. One potential lever to improve teacher retention lies in professional development programs, specifically those that train teachers to leverage technology in the classroom to provide more personalized learning environments.

Since the pandemic, the use of technology in PK–12 classrooms has increased. Blended learning (BL), which combines conventional classroom teaching with technology to improve student learning, is a growing instructional strategy showing positive gains for both teacher and student outcomes, both at the PK–12 and postsecondary levels (Freidhoff,, DeBruler, Cuccolo, & Green, 2024; López-Pérez, Pérez-López,, & Rodríguez-Ariza, 2011). States nationwide are increasingly investing in high-quality blended learning professional development (BLPD) for educators to implement in their classrooms, given the positive outcomes associated with these strategies. Research shows that professional development utilizing BL increased teachers' content knowledge, improved technology use, and improved self-efficacy (Anthony, Kamaludin, Romli, Raffei, Nincarean, Abdullah, Ming, Shukor, Nordin, Baba, 2019). Studies also highlight that BL or flipped classrooms lead to better student learning engagement, achievement, motivation, and interaction (Abrami, Bernard, Borokhovski, Wade,

Surkes, Tamim, & Zhang, 2006; Zainuddin, & Halili, 2016). However, to reap the benefits of BL instruction, teachers must be trained in the use of technology. They should have a good command of blended platforms for delivering instruction.

UTeach Professional Development in the College of Natural Sciences at The University of Texas at Austin is a BLPD provider that is approved by the Texas Education Agency (TEA). The UTeach BLPD is a state-sponsored professional development initiative available to all educators across Texas. The program's participants include in-service teachers across various disciplines and school administrators (e.g., principals, assistant principals, and instructional leaders). Using funds provided by the Texas Legislature (Texas Education Agency, 2024a) for this initiative, the TEA reimburses the cost of registration and coursework completed to Texas school districts and open-enrollment charter schools. The UTeach BLPD program, which aims to increase educators' use of BL instruction to help improve learning and achievement for all students, is one of only two TEA-approved BL providers in the state.

This study examines long-term teacher retention following participation in the UTeach BLPD program by linking participant data with state longitudinal administrative data accessed through the Texas Education Research Center (ERC), one of the state's most comprehensive data warehouses. This study also analyzes survey results on teachers' readiness to implement BL strategies and to identify which programmatic elements likely contribute to the observed teacher retention rates. Finally, this study examines individual written reflection papers, which were responses to the following prompt: *How do I best combine technology-enhanced learning activities with teacher-facilitated instruction to maximize a personalized learning experience in my BL environment?*

The UTeach BLPD Model

The UTeach BLPD courses were developed by UTeach Master Teachers and UT faculty with expertise in BL and instructional technology at the University of Texas at Austin. Experts in the field reviewed the BLPD courses. Courses are continually modified based on participant feedback (UTeach Professional Development, 2024). UTeach BLPD offers a high-quality, research-based, facilitated online learning experience:

- Course participants work independently but receive coaching and personal feedback on all assignments submitted. Assignment due dates are included to help keep participants on track for completion.
- Participants have on-demand access to a UTeach Success Coach and Online Course Facilitator.
- Coursework involves creating work products to implement in their classrooms quickly, collaborative discussions with peers, reflection, and action plans.
- All UTeach BLPD is aligned to the T-TESS and standards from the International Society for Technology in Education.
- Access to coursework is flexible: new participants are enrolled on a rolling basis.
- All coursework aligns with the 5E learning cycle: engage, explore, explain, elaborate, and evaluate.
- Testimonials and survey data from teachers across Texas who have completed the UTeach BLPD attest that the job-embedded, just-in-time, and facilitated online professional development truly helps teachers change their practice (UTeach Professional Development, 2024).

Table 1

School Year Seasons

Blended Learning Courses	Hours	Weeks	Academic Year Courses Begin
1. Foundations	30	12	2018–19
2. Advanced	30	12	2019–20
3. Coaching and Collaboration	20	12	2021–22
4. Designing PBI	30	12	January 2022
5. Implementing PBI	20	12	Spring 2022

Research Questions

1. What were the long-term teacher retention rates of UTeach BLPD program participants compared to nonparticipants?
2. What were the long-term teacher retention rates of UTeach BLPD program participants compared to nonparticipants in *education overall*? By *education overall*, we mean whether participants are retained in the public schools in Texas possibly in a role other than teacher.
3. Which teacher attitudes and beliefs toward BL and teaching changed between the pretraining and posttraining stages?
    a) What were teachers' concerns about BL before and after exposure to BLPD?
    b) How helpful was the knowledge gained from the BLPD regarding the five categories (disposition, online integration, data practices, personalized instruction, and online interactions)?
    c) What were teacher reflections about implementing BL in the classroom, and what elements were associated with changes in confidence, teaching ability, and ability to use technology after taking the BLPD program?

Data, Sample, And Methods

In this section, three areas are presented: Participant retention, participant survey, and participant written reflections. In each of these areas we address the sample and the analytic strategies. In addition, we describe the data used in the analyses.

Participant Retention

This section discusses the data and procedures for long-term teacher and educator retention tracking in three cohorts. The first phase comprises descriptive analysis to better understand each of the cohort characteristics. In the second phase, we utilize propensity score matching (PSM), which is a technique that balances the treatment and control groups based on confounding variables. In this phase, different outcome models were run to determine whether BLPD participants remained 1) in teaching, and 2) in education overall (whether participants are retained in the public schools in Texas possibly in a role other than teacher). The three participant cohorts are categorized by school year: Cohort 19 (academic year 2018-19), Cohort 20 (academic year 2019-20), and Cohort 21 (academic year 2020-21). We first describe the data and descriptions of the three cohorts used in the survival analysis and then the survival analysis.

Data

This study uses comprehensive state longitudinal administrative data accessed through the Texas ERC. In 2006, the 79th Texas Legislature (3rd called session) identified the need for connecting educational information sources into a longitudinal data warehouse for the use of policy and practice. Legislators authorized the creation of three ERCs to house Texas data and

facilitate research that benefits all levels of education in Texas. The ERCs provide access to high quality, student-level data from the Texas Education Agency (TEA which includes the State Board for Educator Certification data), the Texas Higher Education Coordinating Board (THECB), the Texas Workforce Commission (TWC), and other sources of educational information for the state of Texas. The ERC data resources span from the Pre-K level through higher education (P-16) and into the Texas workforce. This includes information on educators and the roles (positions) for which they are employed in Texas public schools.

Participant information and data provided by the UTeach BLPD program were merged to the longitudinal administrative data from the TEA and the State Board for Educator Certification residing at the ERC.

Sample for Survival Analysis

Using the ERC data, we followed 1,614 teachers across three cohorts who participated in the program and enrolled in UTeach BLPD between September 3, 2018 to June 1, 2021, representing 92 districts and 358 campuses throughout this period. One school district serving over 33,000 students sent at least one teacher from 54 of its 55 campuses during this period.

Since teachers participated in the program at different points throughout the year, we categorized these teachers into different cohorts by school year. In total, our study followed three distinct cohorts of teachers. Table 2 outlines how we measured the school year, capturing the fall, spring, and summer terms in which teachers participated in the program.

Table 2

School Year Seasons

Three Parts of the School Year	Academic Year - Sept 1–Aug 31
Fall	Sept 1–Dec 31
Spring	Jan 1–April 30
Summer	May 1–Aug 31

Table 3 describes the demographics of each of the three teacher cohorts analyzed. Overall, most participants are white, female, and veteran teachers (three or more years of experience) with a median age of approximately 38. Interestingly, there was a greater representation of teachers of color in the 20–21 cohort compared to the rest of the cohorts, following similar trends to the rest of the state, where teachers of color make up a higher percentage of Texas teachers (Texas Education Agency, 2024b).

Table 3

Teacher Demographics by Cohort

Teacher Cohort	18–19	19–20	20–21
N	550	524	502
Gender			
Female	86%	90%	87%
Male	14%	10%	13%
Race/Ethnicity			
Black	4%	6%	8%
Hispanic	28%	28%	36%
White	64%	63%	54%
Other	4%	2%	2%
Experience			
Novice	22%	20%	21%
Veteran	78%	80%	78%
Age			
Average	38	40	39
Median	37	38	38

Note. Novice teacher = less than three years of experience. Veteran teacher = three or more years of experience.

The top two courses with the highest enrollment numbers were Foundation Blended Learning (n = 1,512) and Advanced Blended Learning (n = 100) – see Table 1. Approximately 10% of the participants took more than one UTeach BLPD course during the time observed.

Analytic Strategies Applied to ERC Data

We evaluated the UTeach BLPD program on teacher retention in three phases. The first phase comprised descriptive analysis to better understand cohort characteristics and gauge preliminary outcome data. During this phase, we focused on describing the characteristics of each of the three teacher cohorts. We examined differences in attrition from teaching and education across treatment and control groups using chi-square tests. In the second phase, we utilized propensity score matching (PSM), which is a technique that balances the treatment and control groups based on confounding variables. These variables affect the treatment assignment (UTeach BLPD program participation) and the outcome. In this way, PSM creates groups that mimic those from randomized assignments (Stuart, 2010). Table 4 describes the variables used in this study, including those used to match the teachers who participated in the sample with similar teachers on their campus during the year they participated in the program.

Table 4

List of Variables

Key Outcomes	Definition
Left Teaching	The individual no longer holds a teaching position in Texas
Left Education	The individual is no longer associated with a district in Texas
Main Predictor	**Definition**
Treatment	Teachers who participated in the UTeach BLPD program (1) compared to teachers who did not (0)
Variables used for Matching	**Definition**
Age	Age of teacher
Gender	Gender of the teachers (male/female)
Race/Ethnicity[a]	Race/ethnicity of teachers (Black, Hispanic, White, Other)
Experience	The number of years (not including current year) of creditable professional experience
Tenure	The number of years that a person has been employed in any professional position in the current district or education service center
Certification Type	The type of certification held by the teacher (including no Texas certification)
Base Pay	Base pay received by the teacher

Note. [a]Race/Ethnicity Other includes Asian, Pacific Islander, American Indian, and Two or More Races.

Before conducting propensity score analysis, we identified a pool of possible comparison teachers. We focused on campuses where the BLPD participants (treatment) taught in the year that they attended the program. We identified teachers on the same campuses in the same years who did not attend the program as the comparison (control) group pool.

We estimated propensity scores using Bayesian Additive Regression Trees using the MatchIt R package (Greifer, 2023) to identify comparison teachers, such as teachers who attended the UTeach BLPD program based on observable characteristics. We then matched teachers using nearest-neighbor matching without replacement to minimize bias. Individuals in the treatment who did not match were excluded from the analysis, about 2% of the overall teachers' sample (n = 1,614).

Next, we calculated balanced statistics using the Cobalt R package (Greifer, 2024) to examine how similar treatment-group teachers are to comparison-group teachers after matching. We calculated standardized mean differences for continuous covariates and differences in proportions for categorical covariates. We then created a love plot based on these statistics. The balance plots showed that all the covariates were balanced between the treatment and comparison groups since, after the adjustment, the differences were very close to 0, under the 0.1 recommended threshold (Stuart, 2010).

In the last phase, we applied survival analysis to analyze the program's effect on retention. We used three distinct cohorts to assess the survival rates (Cohort 19, Cohort 20, and Cohort 21). In survival analysis, the event (in this case, leaving teaching or education) captures whether the event happened (1 – leaving teaching or education) or whether the event did not occur (0 – remaining teaching or education). In our study, we tracked two types of retention (events): ***left teaching*** (the teacher's departure from teaching) and ***left education*** (the teacher's

departure from education entirely). For participants who did not experience leaving, we included a censored time to indicate that they remained in teaching or education at the end of the study, though they could have left after the study. The censored time across all cohorts was 2023, representing the latest year for which we have administrative data.

We used Kaplan–Meier survival modeling to estimate the survival probabilities over time and visualize the survival curves between the treatment and control groups. To gauge overall survival times as well as estimate the effect of the treatment on the hazard rate or risk of teachers leaving teaching or education, we applied Cox proportional hazards regression modeling. For each teacher cohort, we compared these outcomes to matched control groups.

Limitations

Because we compared teachers within the same campus, we reduced the variability teachers experience in their school settings. However, a limitation of PSM is that it does not account for unobserved characteristics that might influence whether teachers participated in the UTeach BLPD program or teacher attrition. It should also be noted that the outcome models used in the survival analysis only included treatment as a variable and did not incorporate other covariates. However, when using PSM to match teachers to a control teacher sample, we controlled for all confounding variables listed in Table 3 under "Variables Used for Matching."

Participant Survey Analysis

This section discusses the data and procedures for analyzing the participant survey results. We first describe the sample of respondents, then the analytic strategies used for the analysis.

Sample for Surveys

The number of participants in the presurvey was $N = 316$, and the number in the postsurvey was $N = 174$. The responses to the presurvey are not necessarily the same as the responses to the postsurvey. This means that only some teachers who responded to the presurvey responded to the postsurvey. Additionally, some teachers only responded to the postsurvey. Thus, analytical limitations are present.

The survey included two sections; one was a simple checklist of teachers' concerns about implementing BL in the classroom. The second part of the survey focused on how teachers changed their perceptions about BL before and after their exposure to the UTeach Blended Learning Training.

Analytic Strategies Applied to Survey Data

The survey analysis aimed to assess how participation in the BLPD was associated with teacher confidence in teaching ability, dispositions, and, ultimately, the ability to use technology in the classroom, and how these influence a teacher to remain in teaching. We analyzed surveys administered before and after participation in the BLPD.

The survey's primary objectives were to identify the teachers' attitudes and beliefs toward BL and teaching and their differing abilities, such as 1) the ability to combine online

and in-person learning effectively; 2) the ability to use digital tools to monitor student activity and performance; 3) the ability to make informed choices about interventions to help all students progress; 4) the ability to customize goals, pacing, and learning paths for students; and 5) the ability to facilitate online interactions with and between students. These are the categories measured by the survey. Teachers participating in the BLPD then provided perceptions in each category.

Some preliminary questions were included in the pre- and postsurveys regarding *concerns* that provide some context that may explain teacher attitudes or apprehensions. Then, the five survey categories (disposition, online integration, data practices, personalized instruction, and online interactions) were listed, with about eight questions each. Teachers rated each question in each category on a six-point Likert-type scale of low to very high agreement. The categories and questions are the same in the pre- and postsurvey, but the few preliminary questions differ (see Table 5 and the complete survey in Appendix A).

To understand the teachers' responses to the questions on the pre- and postsurveys about these categories, we calculated the total average score for each category. Following the teachers' ratings of the question using the Likert-type scale, the total score of all the items in a category was averaged to assess the average total score of that category. This was done for both presurveys and postsurveys. The difference between pre- and postresponses was then analyzed for significance by a *t*-test.

Table 5

Organization of BLPD Pre- and Postsurvey

Pre- and Postsurvey*	
Five categories with about eight questions in each category. Likert Scale: 1 = Very Low Agreement to 6 = Very High Agreement	
1. Disposition	Focuses on the teachers' attitudes and beliefs toward BL and teaching.
2. Online Integration	Focuses on the teachers' ability to make and implement decisions related to selecting when and how to effectively combine online and in-person learning as part of core instruction.
3. Data Practices	Focuses on the teachers' ability to use digital tools to monitor student activity and performance to make informed choices about interventions to help all students progress.
4.Personalized Instruction	Focuses on the teachers' ability to implement a learning environment that allows for student customization of goals, pacing, and/or learning path.
5. Online Interactions	Focuses on the teachers' ability to facilitate online interactions with and between students.

* See pre-survey questions in Appendix A and postsurvey questions in Appendix B

Written Reflection Analysis

Finally, we analyzed the reflection responses that the participants wrote describing the changes in classroom environments following the completion of the BLPD. The BLPD participants provided the reflections at the end of the professional development.

Analytical Strategies Applied to Teacher Reflections

To understand the changes in scores from presurvey to postsurvey, participants were asked to provide reflections on how they felt after taking the BLPD program. The participants provided these reflections at the end of the professional development. It was not mandatory for participants to respond to any specific set of questions. Thus, we analyzed their freely expressed thoughts. Given the importance of the initial categories in the survey, we adopted the significant codes of participant dispositions, online integration, data practice, personalized instruction, and online interaction with students and others. The reflection analysis used the qualitative software *Dedoose*.

Results

Retention Data Analysis

The evaluation of the UTeach BLPD program on educator retention was conducted in three phases. The first phase comprised descriptive analysis to better understand cohort characteristics and gauge preliminary outcome data. In the second phase, we contruct the "matching" control group using PSM. In the last phase, we applied survival analysis to analyze the program's effect (treatment) on retention. In survival analysis, the event (when participant leaves teaching or education) captures whether the teacher left teaching/education (1) or not (0). Our study tracked two outcomes: left teaching (departure from teaching) and left education (departure from education entirely).

Research Question 1: What were the long-term teacher retention rates of UTeach BLPD program participants compared to nonparticipants?

We created contingency tables to explore the relationship between participants who took the UTeach BLPD program and those who did not leave teaching or those who did. Table 6 highlights these events' (Left Teaching and Did Not Leave Teaching) observed frequencies. It shows that fewer teachers in the treatment group left teaching than teachers who did not participate in the program. Chi-square tests revealed that, across the teacher cohorts, there was a significant association between teachers in the treatment group (professional development participants) and control group (nonprofessional development participants) and whether they left teaching. This result indicates that participation in the UTeach BLPD program is associated

with a difference in the likelihood of teachers leaving teaching. We tracked three cohorts of teachers.

Table 6

Observed Frequencies: Participation in the UTeach BLPD Program and Leaving Teaching

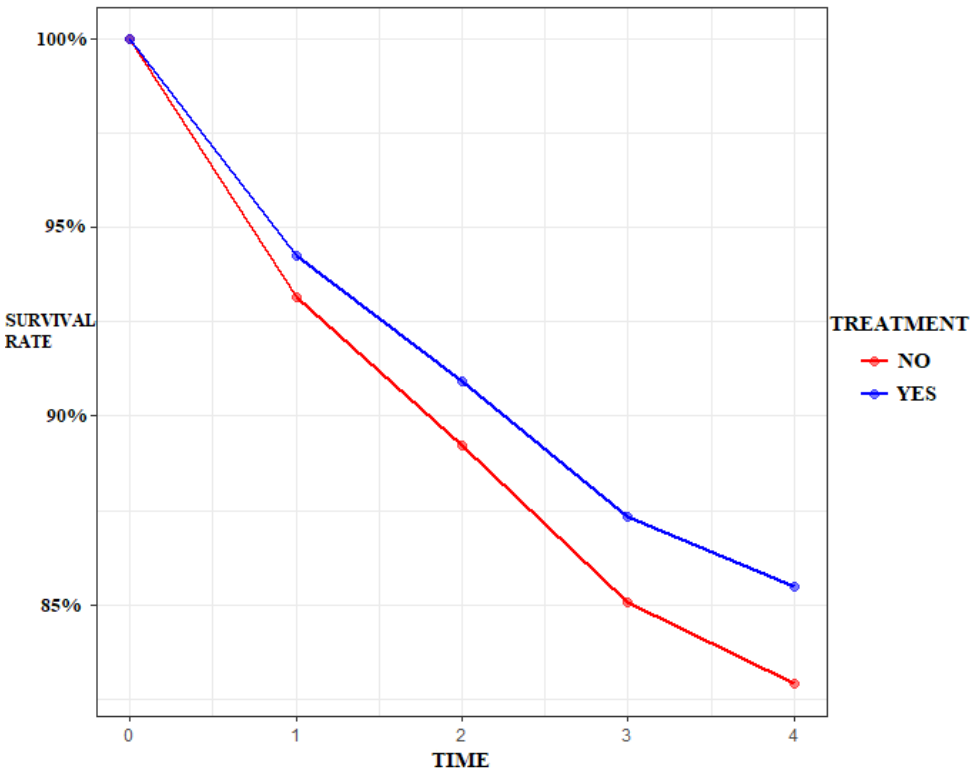
Teacher Cohort 19*		
Event	Control	Treatment
Did Not Leave Teaching	2,302	2,361
Left Teaching	448	389
Teacher Cohort 20*		
Event	Control	Treatment
Did Not Leave Teaching	1,809	1,853
Left Teaching	287	243
Teacher Cohort 21***		
Event	Control	Treatment
Did Not Leave Teaching	1,323	1,391
Left Teaching	183	115

Note. Pearson's Chi-Squared Test with Yates' Continuity Correction
Note. Cohort 19 = $X^2(1, 550) = 4.74$, *p < 0.05
Note. Cohort 20 = $X^2(1, 524) = 3.99$, *p < 0.05
Note. Cohort 21 = $X^2(1, 502) = 16.72$, ***p < 0.001

Teacher Cohort 19. Survival analysis via Cox proportional hazards and Kaplan–Meier modeling confirmed these results. The results for Teacher Cohort 19 revealed that following participation in the UTeach BLPD program (Treatment = YES), teachers who participated in the program exhibited a higher probability of staying in teaching compared to similar teachers in their school who did not participate in the program (Treatment = NO) from 2019 to 2023. Figure 1 and Table 7 display the results from the survival models.

Figure 1

Teacher Cohort 19: Cox Model Survival Curves from 2019 to 2023 – (Teaching)



The Cox proportional hazards modeling suggests that the hazard, or risk, of a teacher leaving teaching in the treatment group is estimated to be 0.84 times the hazard for the control group ($p < 0.05$).

Table 7

Teacher Cohort 19: Kaplan–Meier Model Survival Estimates from 2019 to 2023

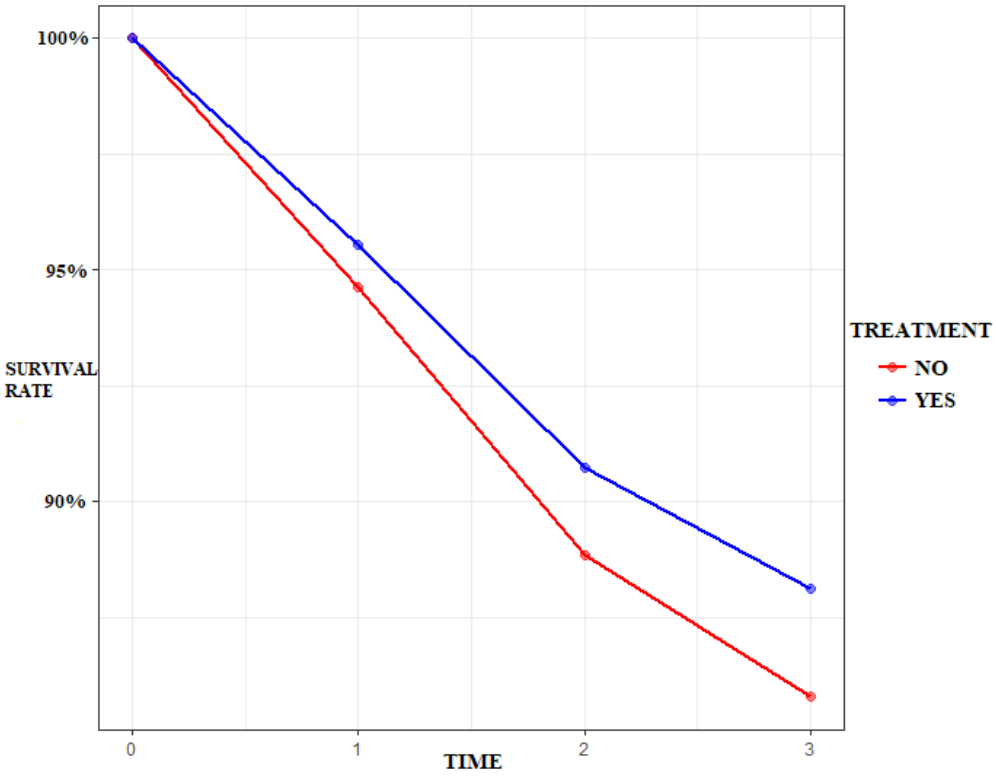
Group	Time	N.Risk	N.Event.	Survival	Std. Error	95% CI	
Treatment	1	2,750	129	95%	0.004	[0.945	0.961]
	2	2,572	99	92%	0.005	[0.906	0.927]
	3	2,397	108	88%	0.006	[0.863	0.888]
	4	2,107	53	85%	0.007	[0.84	0.867]
Control	1	2,750	217	92%	0.005	[0.911	0.931]
	2	2,439	95	89%	0.006	[0.873	0.897]
	3	2,263	92	85%	0.007	[0.836	0.863]
	4	2,021	44	83%	0.007	[0.817	0.845]

Teachers in the treatment are estimated to have a probability of staying in teaching beyond 2023 at 85%. Teachers in the control group are estimated to be likely to stay in teaching beyond 2023 at 83%. A log-rank test was used to assess if there were significant differences in survival times between teachers in the treatment and teachers in the control group. The results from this test indicated a significant difference in overall survival between teachers in the treatment and those in the control group (X^2 (1, 550) = 6.5, $^{**}p < 0.01$).

Teacher Cohort 20. Turning to Teacher Cohort 20, survival analysis also revealed that teachers who participated in the program exhibited a higher probability of staying in teaching than similar teachers in their school who did not participate in the program from 2020 to 2023. Figure 2 and Table 8 display the results from the survival models.

Figure 2

Teacher Cohort 20: Cox Model Survival Curves from 2020 to 2023 – (Teaching)



The Cox proportional hazards modeling results suggest that the hazard, or risk, of a teacher leaving teaching in the treatment group is estimated to be 0.82 times the hazard for the control group ($p < 0.05$).

Table 8

Teacher Cohort 20: Kaplan–Meier Model Survival Estimates from 2020 to 2023

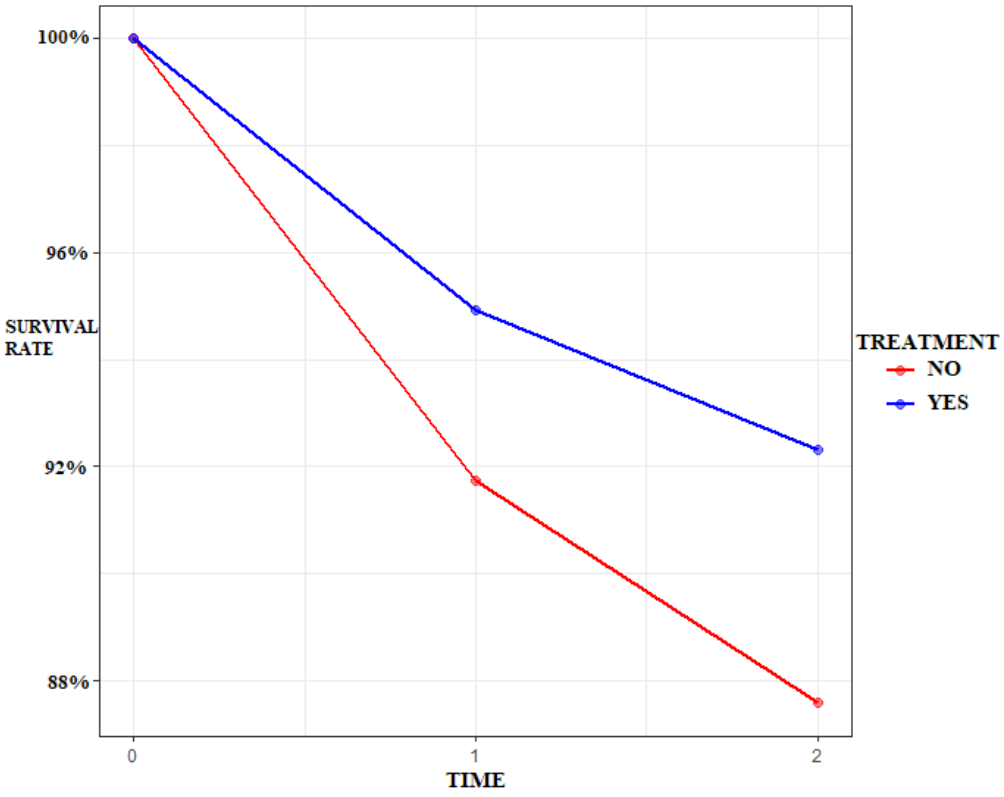
Group	Time	N.Risk	N.Event	Survival	Std. Error	95% CI	
Treatment	1	2,096	92	96%	0.004	[0.947	0.965]
	2	1,965	99	91%	0.006	[0.896	0.920]
	3	1,757	52	88%	0.007	[0.867	0.895]
Control	1	2,096	114	95%	0.005	[0.936	0.955]
	2	1,912	117	89%	0.007	[0.874	0.902]
	3	1,664	56	86%	0.008	[0.843	0.873]

Teachers in the treatment are estimated to have a probability of staying in teaching beyond 2023 at 88%. Teachers in the control group are estimated to have a likelihood of staying in teaching beyond 2023 of 86%. The results from the log-rank test indicate a significant difference in overall survival between teachers in the treatment and those in the control group ($X^2(1, 524) = 4.9, {}^{*}p < 0.05$).

Teacher Cohort 21. Lastly, turning to Teacher Cohort 21, survival analysis also revealed that teachers who participated in the program exhibited a higher probability of staying in teaching than similar teachers in their school who did not participate in the program from 2021 to 2023. Figure 3 and Table 9 display the results from the survival models.

Figure 3

Teacher Cohort 21: Cox Model Survival Curves from 2021 to 2023 – (Teaching)



The Cox proportional hazards modeling results suggest that the hazard, or risk, of a teacher leaving teaching in the treatment group is estimated to be 0.60 times the hazard for the control group ($p < 0.001$).

Table 9

Teacher Cohort 21: Kaplan–Meier Model Survival Estimates from 2021 to 2023

Group	Time	N.Risk	N.Event	Survival	Std. Error	95% CI	
Treatment	1	1,506	68	96%	0.005	[0.944	0.965]
	2	1,392	47	92%	0.007	[0.909	0.936]
Control	1	1,506	133	91%	0.007	[0.897	0.926]
	2	1,293	50	88%	0.009	[0.860	0.893]

Teachers in the treatment are estimated to have a probability of staying in teaching beyond 2023 at 92%. Teachers in the control group are estimated to be likely to stay in teaching beyond 2023 at 88%. The results from the log-rank test indicate a significant difference in overall survival between teachers in the treatment and those in the control group ($X^2(1, 502) = 18.2, ^{***}p < 0.001$).

Summary: Survival Analysis of Teachers Who Remained in Teaching. The survival analysis results for the likelihood of remaining in teaching indicate that participants in the BLPD program tend to remain in teaching at a higher rate than teachers not participating in the BLPD program. Table 10 illustrates the percent likelihood of participants (treatment) and nonparticipants (control) remaining in teaching.

Table 10

Likelihood to Remain in Teaching at the End of Time Observed

Cohort	Likelihood to Remain in Teaching	Teaching – Significance of Difference
Cohort 19 – Treatment	85%	
Cohort 19 – Control	83%	p < 0.01**
Cohort 20 – Treatment	88%	
Cohort 20 – Control	86%	p < 0.05*
Cohort 21 – Treatment	92%	
Cohort 21 – Control	88%	p < 0.001***

Note. Log-rank significance test was used to assess significant differences in survival times between teachers in the treatment and teachers in the control group within each cohort.

Research Question 2: What were the long-term teacher retention rates in education overall of UTeach BLPD program participants compared to nonparticipants?

We also created contingency tables to explore the relationship between teachers who took the UTeach BLPD program and those who did not leave education or those who did leave education. Table 11 highlights their observed frequencies, indicating that fewer teachers in the treatment group left education than teachers who did not participate in the program. Chi-square tests revealed that, across the teacher cohorts, there was a significant association between teachers in the treatment (professional development participants) and control group (nonprofessional development participants) and whether they left education. This result indicates that participation in the UTeach BLPD program is associated with a difference in the likelihood of teachers leaving education.

Table 11

Observed Frequencies: Participation in the UTeach BLPD Program and Leaving Education

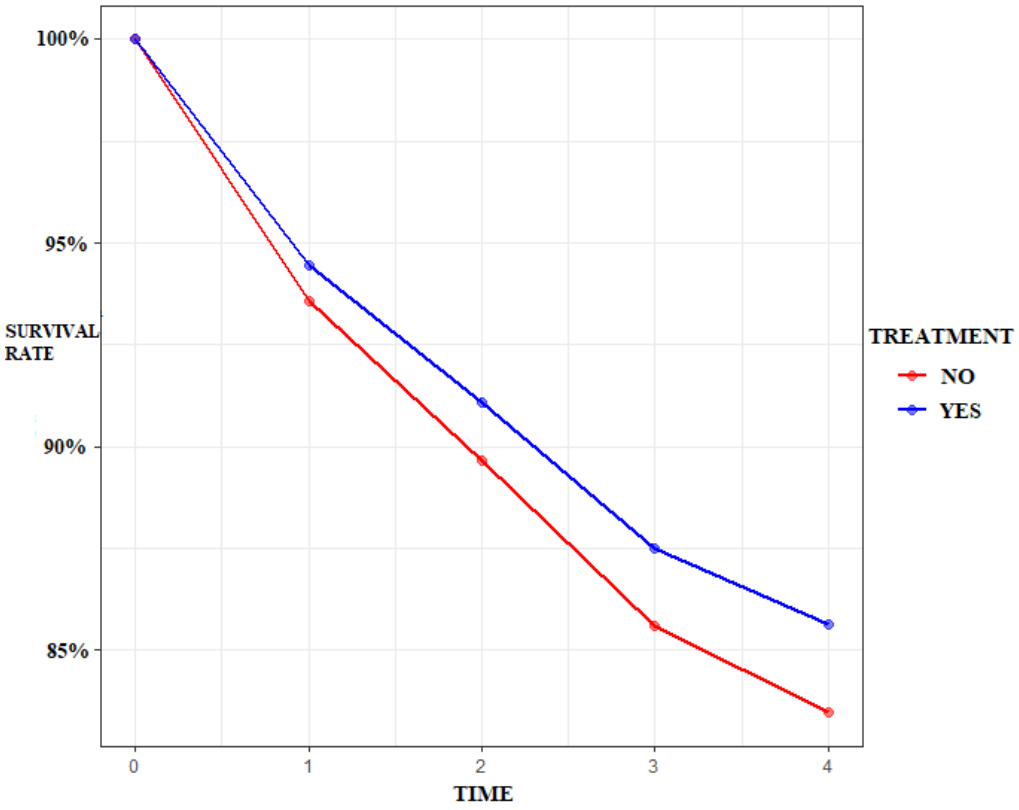
Teacher Cohort 19~		
Event	Control	Treatment
Did Not Leave Teaching	2,317	2,366
Left Education	433	384
Teacher Cohort 20*		
Event	Control	Treatment
Did Not Leave Teaching	1,819	1,863
Left Education	277	233
Teacher Cohort 21***		
Event	Control	Treatment
Did Not Leave Teaching	2,317	2,366
Left Education	433	384

Note. Pearson's Chi-Squared Test with Yates' Continuity Correction
Note. Cohort 19 = X(1, 550) = 3.31, ~p < 0.1
Note. Cohort 20 = X(1, 524) = 4.13, *p < 0.05
Note. Cohort 21 = X(1, 502) = 14.90, ***p < 0.001

Teacher Cohort 19. Survival analysis was also conducted using Cox proportional hazards and Kaplan–Meier modeling. The results for Teacher Cohort 19 revealed that following participation in the UTeach BLPD program (after time = 0), teachers who participated in the program exhibited a higher probability of staying in education compared to similar teachers in their school who did not participate in the program from 2019 to 2023. Figure 4 and Table 12 display these results.

Figure 4

Teacher Cohort 19: Cox Model Survival Curves from 2019 to 2023 – (Education)



The Cox proportional hazards modeling results indicate that the hazard, or risk, of a teacher leaving education in the treatment group is estimated to be 0.86 times the hazard for the control group ($p < 0.05$).

Table 12

Teacher Cohort 19: Kaplan–Meier Model Survival Estimates from 2019 to 2023

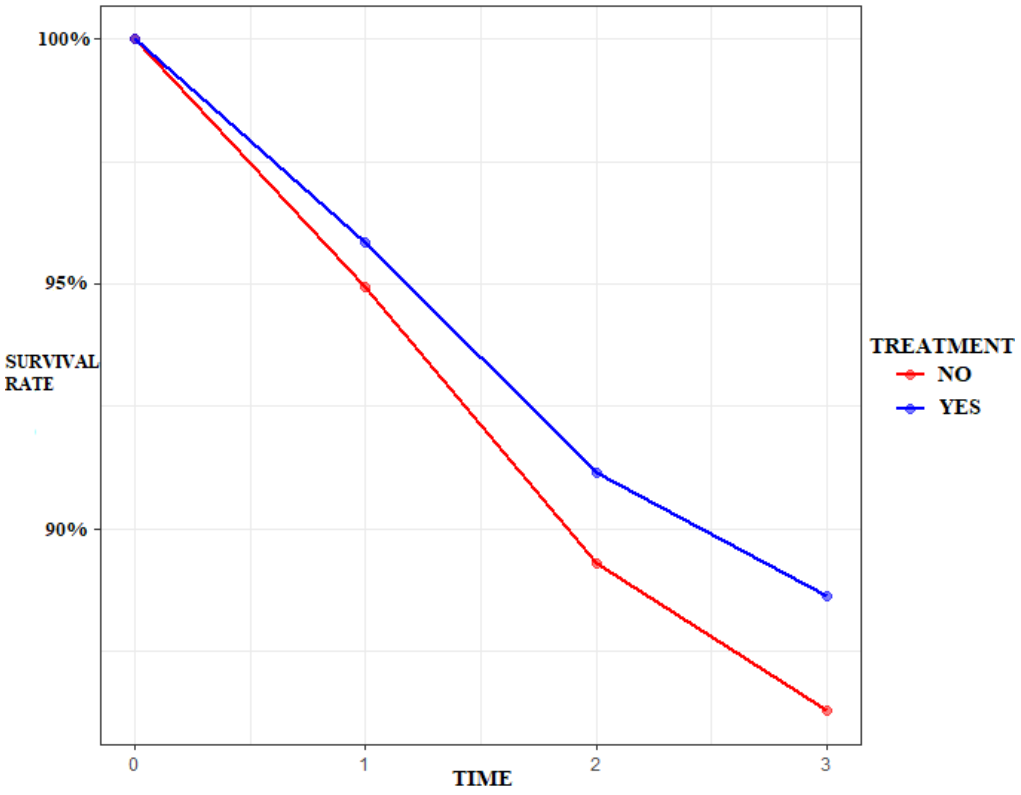
Group	Time	N.Risk	N.Event.	Survival	Std. Error	95% CI	
Treatment	1	2,750	124	96%	0.004	[0.947	0.963]
	2	2,577	102	92%	0.005	[0.907	0.928]
	3	2,397	106	88%	0.006	[0.864	0.889]
	4	2,112	52	86%	0.007	[0.842	0.869]
Control	1	2,750	205	93%	0.005	[0.916	0.935]
	2	2,449	93	89%	0.006	[0.879	0.902]
	3	2,278	91	86%	0.007	[0.841	0.868]
	4	2,036	44	84%	0.007	[0.822	0.851]

Teachers in the treatment group are estimated to have a probability of staying in education beyond 2023 at 86%. Teachers in the control group are estimated to be likely to stay in teaching beyond 2023 at 84%. A log-rank test was used to assess if there were significant differences in survival times between teachers in the treatment group and teachers in the control group. The results from this test indicate a significant difference in overall survival between teachers in the treatment group and those in the control group ($X^2(1, 550) = 4.7$, $^*p < 0.05$).

Teacher Cohort 20. Turning to Teacher Cohort 20, survival analysis also revealed that teachers who participated in the program exhibited a higher probability of staying in education than similar teachers in their school who did not participate in the program from 2020 to 2023. Figure 5 and Table 13 display these results.

Figure 5

Teacher Cohort 20: Cox Model Survival Curves from 2020 to 2023 – (Education)



The Cox proportional hazards modeling results suggest that the hazard, or risk, of a teacher leaving education in the treatment group is estimated to be 0.82 times the hazard for the control group ($p < 0.05$).

Table 13

Teacher Cohort 20: Kaplan–Meier Model Survival Estimates from 2020 to 2023

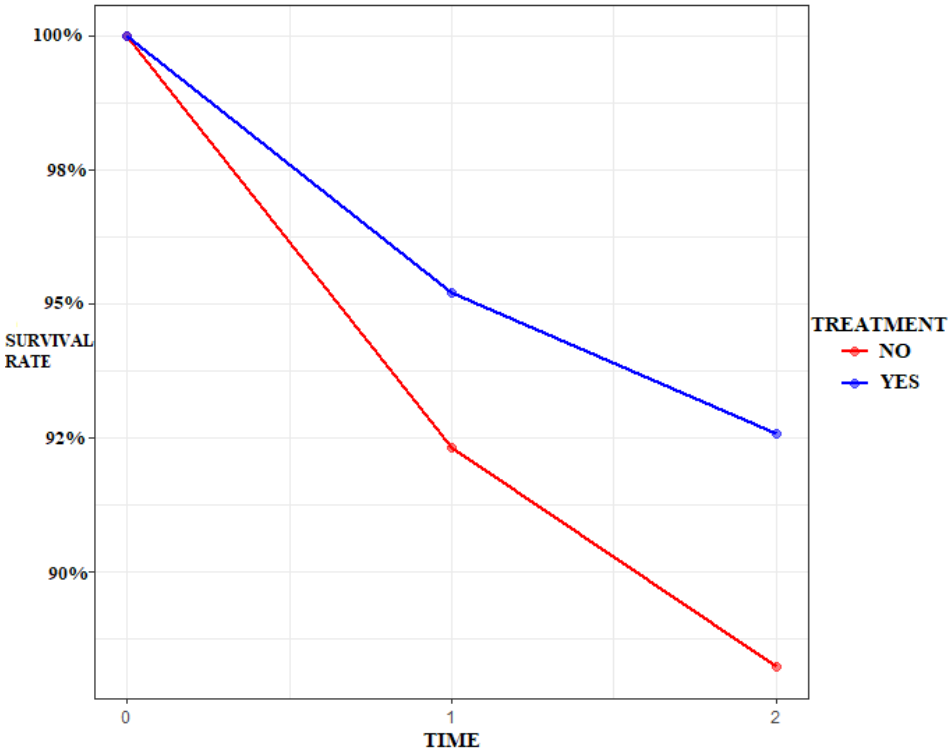
Group	Time	N.Risk	N.Event.	Survival	Std. Error	95% CI	
Treatment	1	2,096	87	96%	0.004	[0.95	0.967]
	2	1,974	95	91%	0.006	[0.900	0.925]
	3	1,774	51	89%	0.007	[0.872	0.900]
Control	1	2,096	106	95%	0.005	[0.940	0.959]
	2	1,923	116	89%	0.007	[0.879	0.906]
	3	1,675	55	86%	0.008	[0.848	0.878]

Teachers in the treatment are estimated to have a probability of staying in education beyond 2023 at 89%. Teachers in the control group are estimated to have a likelihood of staying in teaching beyond 2023 at 86%. The results from the log-rank test indicate a significant difference in overall survival between teachers in the treatment group and those in the control group ($X^2(1, 524) = 5.1$, $^*p < 0.05$).

Teacher Cohort 21. Lastly, turning to Teacher Cohort 21, survival analysis also revealed that teachers who participated in the program exhibited a higher probability of staying in education than similar teachers in their school who did not participate in the program from 2021 to 2023. Figure 6 and Table 14 display the results.

Figure 6

Teacher Cohort 21: Cox Model Survival Curves from 2021 to 2023 – (Education)



The Cox proportional hazards modeling results suggest that the hazard, or risk, of a teacher leaving education in the treatment group is estimated to be 0.62 times the hazard for the control group ($p < 0.001$).

Table 14

Teacher Cohort 21: Kaplan–Meier Model Survival Estimates from 2021 to 2023

Group	Time	N.Risk	N.Event.	Survival	Std. Error	95% CI	
Treatment	1	1,506	66	96%	0.005	[0.946	0.967]
	2	1,398	45	93%	0.007	[0.912	0.939]
Control	1	1,506	122	92%	0.007	[0.905	0.933]
	2	1,311	52	88%	0.008	[0.866	0.899]

Teachers in the treatment group are estimated to have a probability of staying in teaching beyond 2023 at 93%. Teachers in the control group are estimated to be likely to stay in education beyond 2023 at 88%. The results from the log-rank test indicate a significant difference in overall survival between teachers in the treatment group and those in the control group ($X^2(1, 502) = 16.2, ^{***}p < 0.001$).

Summary: Survival Analysis of Teachers Who Remained in Education.

The survival analysis results for the likelihood of remaining in education (in any position) indicate that participants in the BLPD program tend to remain at a higher rate than teachers not participating in the BLPD program. Table 15 illustrates the likelihood percentage of participants (treatment) and nonparticipants (control) remaining in education.

Table 15

Likelihood to Remain in Education at the End of Time Observed

Cohort	Likelihood to Remain in Education	Education Significance of Difference
Cohort 19 – Treatment	86%	
Cohort 19 – Control	84%	p < 0.05*
Cohort 20 – Treatment	89%	
Cohort 20 – Control	86%	p < 0.05*
Cohort 21 – Treatment	93%	
Cohort 21 – Control	88%	p < 0.001***

Note. Log-rank significance test was used to assess significant differences in survival times between teachers in the treatment group and teachers in the control group within each cohort.

Research Question 3

We collected data from one survey, which included two sections. The first was teachers' concerns about implementing BL in the classroom. The second focused on how the training impacted teachers' abilities and dispositions toward BL. The same sample of teachers responded to both surveys.

Concerns Survey Analysis

The concerns survey was a checklist that provided some context that may explain teacher attitudes and concerns in both pre- and postsurveys. For the questions of concern, we conducted a descriptive analysis. The participants also indicated they have the necessary technology tools to implement BL. Additionally, they mostly had sufficient technology and administrative support to implement BL. These answers demonstrated that teachers felt supported after the BLPD. The following question guided the data collection and analysis:

Question 3a: What were teachers' concerns about BL before and after exposure to BLPD?

Here are the findings of the descriptive analysis that we performed for both surveys regarding the concerns listed. The participants were asked "What concerns do you have about implementing BL in your classroom?" before and after professional development participation. Teachers could check on any or all the concerns listed (see Table 16).

Table 16

Teachers' Concerns About Implementing Blended Learning in the Classroom

Concerns with Implementation	Pre N = 316	Post N = 174
Student access to technology	18.04%	13.79%
School/campus access to technology and resources	16.14%	9.19%
Developing lesson plans	36.71%	16.66%
Time constraints	56.01%	55.17%
Student ability to use and understand standards/TEKS	20.57%	10.92%
Testing	17.72%	10.92%
Logistics	18.35%	15.52%
Student behavior management/monitoring	42.72%	36.78%
My own technology skill level	15.19%	4.60%
Monitoring/measuring student progress	30.70%	30.46%
Implementing correctly into classroom	46.20%	25.86%
Backup plans when technology fails	43.04%	33.33%
Personalized learning	31.96%	21.84%
Giving students control of learning	34.49%	17.24%
Student conferences	9.18%	10.34%
None	1.90%	8.05%
Other (please specify)	6.33%	6.32%

In sum, in the preliminary survey, two significant concerns were time constraints and implementation in the classroom. Furthermore, there was a reasonably high concern about backup plans, student behavior management, and monitoring when technology fails. In contrast, the postsurvey shows fewer concerns overall. There are still concerns regarding time

constraints and student behavior management and monitoring. Moreover, implementing correctly in the classroom was much less of a concern in the postsurvey responses than in the presurvey responses. The participants also indicated they have the necessary technology tools to implement BL. Additionally, they mostly had sufficient technology and administrative support to implement BL. This result demonstrates that teachers felt supported after the BLPD. This was substantiated by the evidence from the reflection responses, which is presented in the final section.

Teachers' Dispositions Survey Concerning BL

To achieve the primary objectives of the survey, we posited the following question: *Which teacher attitudes and beliefs toward BL and teaching changed between the pretraining and posttraining stages?*

In the pre- and postsurveys, five categories (disposition, online integration, data practices, personalized instruction, and online interactions) were surveyed with approximately eight questions for each category. Teachers rated each question in each category on a six-point Likert-type scale of low to very high agreement.

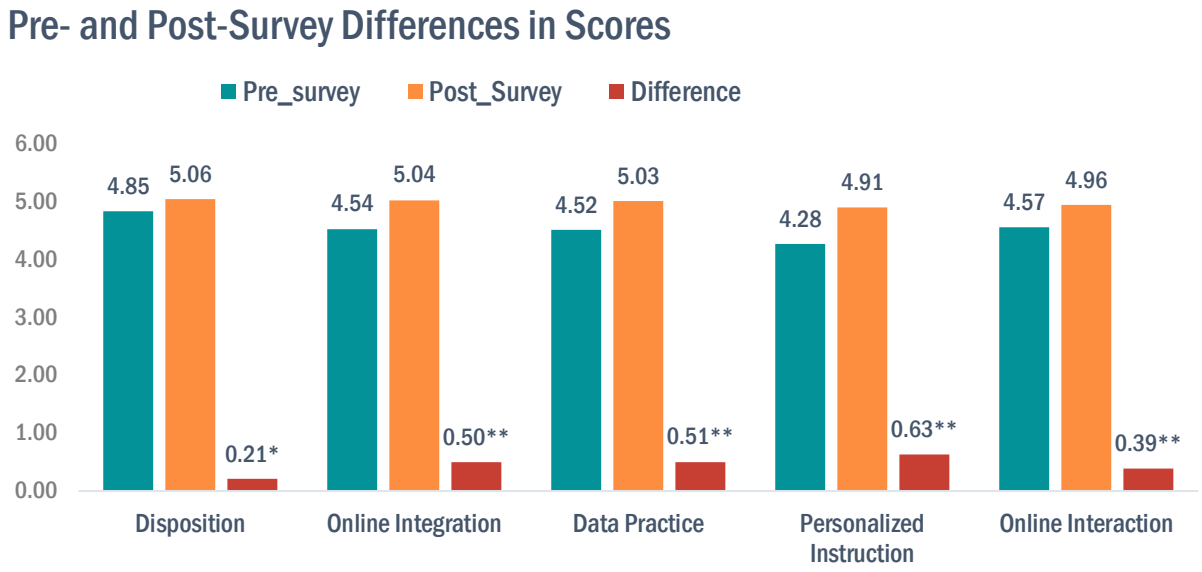
Question 3b: How helpful was the knowledge gained from the BLPD regarding the five categories outlined above?

The primary objectives of the pre- and postsurvey were to identify the teachers' attitudes and beliefs toward BL, teaching, and differing abilities of teachers - see Table 5.

Teachers rated each question in each category on a six-point Likert-type scale of low to very high agreement. The total score of all the items in a category was then averaged to assess the average total score of that category. This was done for both pre- and postsurveys. The difference between pre- and postaveraged responses was then analyzed for significance by a *t*-test. Figure 7 illustrates pre- and postsurvey differences in response scores.

Figure 7

Difference in Pre- and Postsurvey Scores



For the **disposition** category, the difference in the average score from pre- to postsurvey is a 0.21 increase with a *p*-value of < 0.005, which is statistically significant. This means that the teachers' attitudes and beliefs toward BL and teaching changed significantly by participating in professional development. Therefore, the participants had a higher level of agreement with the eight questions in the disposition that relate to combining in-person and online learning.

For the category of **online integration**, the difference in the average score from pre- to postsurvey is a 0.50 increase with a *p*-value of < 0.001 and is therefore statistically significant. This means the professional development participants developed more confidence in making and implementing decisions regarding when and how to effectively combine online and in-person learning as part of core instruction. Therefore, the participants had a higher level of agreement with the eight questions in the online integration that relate to decisions about online activities and moving between online and in-person activities.

For the **data practice** category, the difference in the average score from pre- to postsurvey is an increase of 0.51 with a *p*-value of < 0.001, which is statistically significant. This means that the professional development participants increased their ability and confidence in using digital tools to monitor student activity and performance. Data practice also includes belief in their ability to make informed choices about interventions and when a group or individual may need additional support using online assessment results.

For the **personalized instruction** category, the average score from pre- to postsurvey is an increase of 0.63 with a *p*-value of < 0.001, which is statistically significant. As a result, professional development participants increased their confidence in implementing a learning environment that allows student customization of goals, pacing, and learning paths.

Personalized instruction includes skills to use technology that let each of their students adjust their learning speed.

Finally, in the last category of **online interaction**, a difference from pre- to postsurvey was found to increase by 0.39 with a *p*-value of < 0.001, which is statistically significant. This means the professional development participants increased their ability and confidence in facilitating online interactions with and between students. Abilities in online instruction show an increased ability to use online communication to help strengthen students' feeling that they belong to the class and give students a chance to help each other using online technology (both inside and outside of class).

Summary of Comparing Pre- and Postsurvey Likert Scale Responses.

The participants had a higher level of agreement with their attitudes and beliefs toward BL and teaching in the **disposition** category, which relates to combining in-person and online learning. In the **online integration** category, professional development participants have developed more confidence in making and implementing decisions regarding when and how to effectively combine online and in-person learning as part of core instruction. In the **data practice** category, participants have developed higher confidence in using digital tools to monitor student activity and performance. As a result, there was an increased belief in their ability to make informed choices about interventions when an individual may need additional support using online assessment results. In the **personalized instruction** category, professional development participants developed increased confidence in using technology to implement a learning environment that allows students to customize goals, pacing, and learning paths. This learning environment helps students adjust their learning speed. In the

online interaction category, professional development participants developed an increase in ability and confidence in facilitating online interactions with and between students. Online interaction knowledge helps strengthen students' feeling of confidence that they belong to the class and gives students a chance to help each other using online technology (both inside and outside of class).

Teachers' Reflections Question 3c

Question 3c: What were teacher reflections about implementing BL in the classroom, and what elements were associated with changes in confidence, teaching ability, and ability to use technology after taking the BLPD program?

Teacher Dispositions. Many teachers discussed how their disposition toward BLPD changed, reflecting upon how the meaning of BL in the classroom, their confidence in their teaching ability and ability to use technology, and their self-efficacy as a teacher changed. While reflecting upon the change in their disposition about BL, one eighth-grade mathematics teacher stated the following in their June 2022 reflection:

Overall, this course has transformed my thinking about blended learning. I no longer think that more work or something else must be done in the classroom. The course's articles, activities, and assignments have shown me that the only thing I must change is my way of thinking. I will still get to cover all the items I have to cover in the classroom, but I can stop thinking of following the components of a lesson as a list and think of the lesson components horizontally. This will allow me to place the different components at stations. Then I can incorporate any technology components to make learning fun, give students a choice, and create lessons that will prepare students for the next grade level and the future.

Similarly, a high school English teacher reported how the BLPD changed his attitudes about BL. He stated his reflections in April 2022:

As a result of this course, I not only gained a better understanding of blended learning, but I also have tips, tools, and ideas for implementing this system in my classroom. I have always been tech-savvy and have used technology to enhance my instruction. Now, I understand how to use technology more meaningfully to personalize student learning. I aim to create a learning environment where students learn to take responsibility for their learning. By seeing improvement in their writing, I will see the results of what I am trying to do. A classroom should feel like a community, so simply asking the students what is working and what is not will be tremendously helpful. These discussions will also give students more agency in the learning process.

Teacher dispositions about BL were greatly enhanced by the training they received, yet teachers were quite innovative by integrating many technologies into their instruction.

Online Integration. Teachers also highlighted how their experience of online integration in BL classrooms changed when they took the BLPD program. When discussing how they plan to integrate technology with other in-person activities, the way teachers' confidence in BL has increased is visible in many reflections. One second-grade teacher stated the following in her reflection in June 2022:

I will provide clear instructions and routines to ensure my students succeed. An elementary blended classroom uses a station rotation model, like the learning model of more common centers or stations. As I set up my classroom for next year, I need to reevaluate how my teaching material is delivered and completed. Utilizing blended learning in the classroom requires a portion of the learning to be delivered through digital or online media. Some of the learning will be student directed, and some will be teacher directed. This will provide an appealing learning experience that delivers successful learning outcomes. In the classroom, students will utilize the rotational model. Students rotate through different learning modes, at least one of which is online or digital.

Similarly, one fourth-grade bilingual teacher discussing similar aspects of integrating technology with in-person activity stated the following in their November 2022 reflection:

In my classroom, I hope to promote a culture of self-paced learning as the students begin to take ownership of their learning. There are many things that I currently do, such as small group work, flexible seating, and an island for students who would like to work alone, but I know that there are areas where I can improve. I have begun to learn the apps that the district currently uses. However, I do not know enough about many, and I have not used them to the fullest of their potential. Also, I have not effectively used our current L[earning] M[anagement] S[ystem] due to not being trained on the current one since I came from a district that used a different one and since we are moving toward another one next year. I know there are areas where I need to improve, but I must know the learning benefits for my students before giving them random tasks. I plan to study and research the apps that will help differentiate and customize the learning for all our students so that as I create checklists and playlists for them, I will know the purpose of the activity and task.

The teachers' possibilities to integrate other technologies into learning allowed them to experiment and multitask with the different student levels of conceptual mastery. Teachers like being able to promote customized and self-paced learning to further increase learning. That was also enhanced by the teachers' ability to include data practices in their teaching.

Teacher Data Practices. As teachers discussed their data practices and how they changed after taking the BLPD, they highlighted some significant aspects of using data effectively in a BL classroom. One third-grade teacher stated the following in their reflection from June 2022:

There is a lot to blended learning, and one thing I need to make sure to have in place is progress monitoring. This would allow me to differentiate my instruction to meet the needs of the students. Student Data Trackers and Teacher Data Trackers will be implemented so students can monitor their learning. Did they meet their goal? What instructional changes must I make to personalize each student's learning? […] I need to find

time to create choice boards and playlists. These are great tools that support student ownership. Students have the freedom to choose what learning path they want to follow. Choice boards provide activities that can be done individually or in groups and establish a blended learning environment. They allow students to feel successful when they demonstrate mastery.

Another sixth-grade teacher discussed parent involvement and student progress in her reflection from June 2022:

Another change I have made this school year is to get parental involvement from the get-go. This year, I provided an online syllabus. In the syllabus, I provided a link to a Google form for parents to fill out about their child. I felt that using this platform from the beginning would begin the parents' journey into our blended learning classroom. I asked the students to share their Schoology with their parents, and the parents had to open the syllabus from there to read and complete the form. I told my students that their parents must know how our blended classroom works, and they, too, must know how to maneuver through many of the learning platforms we will be using this school year. They especially must know about our self-directed learning slide that I provide daily for their learning and responsibilities in my classroom.

Next, we discuss how teachers developed personalized instruction to adapt to students' learning. This was an essential component of the BLPD, given that personalized instruction significantly and positively impacts students' learning. One of the main advantages of personalized instruction is that students are never left behind. Teachers work diligently with each student at their level of conceptual mastery.

Personalized Instruction. While discussing how BL classrooms allow increased personalized instruction, teachers expressed views about how student-enhanced engagement, working at their own pace, and taking ownership of their work are byproducts of personalized

instruction and lead to a better learning environment. One teacher stated the following in their reflection of February 2023:

My experience with blended learning has been a great one. This course has helped me understand what I want to accomplish through the blended learning environment I provide for my students. I enjoy putting into practice many of the strategies/ideas that I have learned. I have found ways to keep some of the more traditional activities that have worked for me and combine them with technology-based activities to enhance my students' learning. My main goal has been to create a classroom where all learners of all abilities progress academically and feel successful. I strive to meet the needs of all types of learners' needs by providing choices and various learning modalities. I have focused on increasing student engagement and keeping them motivated to meet their individual goals by using data and giving feedback. I allow my students to collaborate, problem-solve, and show ownership of their learning.

In their reflection on April 20, 2022, another fourth-grade math and science teacher expressed similar ideas about personalized instruction, a prominent feature of BL, and how it enhanced student engagement:

I believe that this blended learning environment will enhance student learning by creating students who take more ownership over their learning. I think they will feel empowered in the classroom because they will know their goals and how to achieve them. It will put the student in the driver's seat, hopefully leading to more self-directed learning. I hope this will create more critical thinkers and students ready to solve real-world problems. The evidence that I will use to determine if this has been successful comes from the MAP tests and the STAAR test, as well as other formative assessments conducted throughout the year. I hope to see larger improvements in their overall scores and a greater love of learning.

Another teacher, in their reflection in February 2023, also highlighted the importance of personalized learning and BLPD and how that leads to student success:

The changes I have made have enhanced my students' learning experience. I have seen consistent growth since I started implementing blended learning strategies. My data reports from I-Station, I-Ready, Imagine Math, and MAP Growth are evidence that these changes have been beneficial to my students. My students' scores have improved greatly. They have been able to meet goals and show great progress. Seeing my students engaged and excited about their learning is another way to see that I am on the right path. I have had great feedback from my administrators during walk throughs. They see students engaged, collaborating, answering questions, and problem-solving. Routines are set and run smoothly. I take their feedback and work on improving, always keeping my student's best interests in mind.

At the heart of BL is student-centered teaching, and several teachers reflected upon the student-centric teaching of a BL environment. While discussing empowering students to learn, one third-grade teacher said the following in their reflection of December 2022:

As I started my journey with blended learning, I gained many insights on how to help empower my students and help them grow in their education. It has had a positive impact since I implemented the changes in my classroom. Blended learning is making our students more successful in today's evolving education with the use of technology and the more rigorous testing that they are taking. What I want to accomplish in my classroom is having students gain the confidence to take control of their learning. Having students take control of their learning allows me to give more attention to small groups and plan individualized plans for my students. The students in my current year have so many gaps in their learning that it requires more of my time to be spent on teaching all that was not gained in the past two years. I want to be independent, look at their data, and know what they want to work on to progress in their education.

Student-centered and personalized teaching and learning appear to be important to teachers. Next, we cite a few examples of teachers' perceptions of online interaction. They perceived online interaction as a positive step to engage students, parents, and others in collaboration in the classroom.

Teacher Online Interaction. As teachers learned more about BL classrooms in the BLPD, their perception of online interaction, group work, and collaboration changed. One third-grade English teacher, in their reflection from February 2023, stated the following:

One of my reservations about blended learning was that the students would be more solitary since they work at their own pace. However, I was proven wrong while watching blended learning videos. Many teachers still encourage or require group work where students interact with each other and collaborate to meet goals and complete assignments. It is important to ensure these students can work as a team since technology and COVID seem to have held some students back socially […]. My main plan to slowly incorporate blended learning into my classroom is to tweak existing units and lesson plans to make "pathways" for students rather than release one assignment at a time. Since starting mid-year last year, I have been moving the class together. I have gripes with that process because some students finish fast while others drag behind, but it hadn't even occurred to me that there might be another way. Now that I know the ins and outs of blended learning, I think this might be the solution for those students just sitting around bored.

Another elementary teacher expressed similar sentiments about peer interaction in a BL environment. They stated the following in their reflection of April 2023:

The rotation station model allows me to align various activities to the presented learning goal(s). I can then divide the class into small groups to closely monitor their progress while they actively engage in the content in various ways. This can take a hands-on approach using STEM/STEAM activities inside or outside the classroom. Also, what I like most about this rotation station model is how I can provide real-time, authentic feedback to the students in small group instruction or one-on-one conferences. I am also excited about incorporating more meaningful technology into my lessons and employing peer-to-peer or peer-group learning. There is power in learning with a partner or group.

Another fourth-grade English teacher's reflection from July 2022 included similar ideas:

Starting slow, I would like to train the students to work in two big groups so they can handle switching back and forth with guidance. I would have the first group work with me and the second on an online assignment or program. I would also use a timer so that the

students could get used to using their time wisely and pace themselves. When the timer goes off, I will have the students switch assignments. I want to do this a few times to train the students to switch quickly and effectively. After that, I would expand the groups into 2-3 groups but still guide them as much as possible. Establishing the rules, expectations, and schedule of blended learning is the biggest step, as this determines if it will continue to work in the future, especially with projects or harder assignments. The functionality of the blended learning system is very important to maintaining the maximum benefits of blended learning.

In summary, these teacher quotes and experiences show that teachers' disposition scores increased as they gained more knowledge and confidence in implementing BL in the classroom. Similarly, the reflection data show that teachers increased their data practices after taking professional development. Their confidence levels increased systematically, allowing them to experiment with multiple applications to improve their students' use of data for learning purposes. As teachers discovered new and improved ways of using data to increase student achievement, student engagement and parent involvement also increased.

Moreover, the teacher reflections indicate that personalizing instruction for students was better facilitated after their professional development and exposure to BL strategies. Several teachers indicated that many ideas flourished about personalized instruction for the students. Technology has greatly facilitated such personalization.

Finally, the quotes above elucidate that teachers' ideas of group work changed in favor of it after the BLPD. Therefore, we saw teachers' readiness to interact online to improve their effectiveness with students, parents, and other stakeholders.

Conclusion

While previous studies have addressed aspects of the UTeach program such as its association with student academic achievement (Backes, Goldhaber, Cade, Sullivan, Dodson, 2018; Marder & Hamrock, 2016) and teacher recruitment and retention (Cade, Liu, Vaden-Kiernan, & Dodson, 2019), this study focuses on the BLPD aspect of the UTeach program and its effect on long-term teacher retention. The results of this study provide early evidence of the program's association with teacher retention. They have implications for school and system leaders looking to invest in professional development programs that leverage technology to improve student outcomes and create more student-centered and personalized learning classrooms for all students in Texas.

This evaluation examined the relationship between the UTeach Blended Learning Professional Development (UTeach BLPD) program and long-term teacher retention. This study also analyzed survey data and participants' written reflections to identify which types of programmatic elements were associated with the observed retention rates. Our findings indicate that UTeach BLPD, freely available to educators in Texas, is highly associated with long-term teacher retention and enhancing teachers' engagement with technology to implement BL strategies across classrooms in Texas. This study found that:

- Participation in the UTeach BLPD is highly associated with long-term teacher retention. The evidence shows that teachers who participated in the program had higher retention rates than teachers in the same school who did not participate in the program. The same is true when one reviews the data for those teachers who stayed in education in general.

- Teachers' feelings about integrating technology in their classrooms changed substantially. Teachers were initially concerned about implementing technology in their classrooms, but after participating in the UTeach BLPD, those concerns dissipated substantially. Following participation, teachers also expressed positive beliefs about their 1) attitudes and beliefs toward BL and teaching; 2) ability to make and implement decisions related to selecting when and how to combine online and in-person learning effectively as part of core instruction; 3) ability to use digital tools to monitor student activity and performance to make informed choices about interventions to help all students progress; 4) ability to implement a learning environment that allows for student customization of goals, pacing, and learning path; and 5) ability to facilitate online interactions with and between students.
- Teachers were highly satisfied with their progress in implementing technology in the classroom and felt confident in their ability to implement the strategies learned. Data showed that teachers increased their data practices after taking the UTeach BLPD. Their confidence levels increased systematically, allowing them to experiment with multiple applications to improve their students' use of data for learning purposes. As teachers discovered new and improved ways of using data to increase student achievement, student engagement and parent involvement also increased.
- Teachers become stronger at facilitating differentiated instruction for students. Teachers indicated that many ideas flourished about personalized student instruction and that technology greatly facilitated such personalization.

Overall, the findings indicate that UTeach BLPD provides effective teacher development, significantly strengthening teachers' skills to integrate technology into their classrooms and facilitating retention in the classroom and beyond. The study demonstrated that even modest but significant increases in retention substantially impact teachers' instructional improvement and, thereby, student learning. This study suggests that UTeach BLPD boosts teacher retention and technology engagement and supports teachers' instructional growth with tailored BL strategies, enhancing teaching practices across Texas for an increasingly technology-driven world.

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Appendix A

Presurvey Questions

What concerns do you have about implementing blended learning in your classroom?

- Student access to technology
- School/campus access to technology and resources
- Developing lesson plans
- Time constraints
- Student ability to use and understand standards/TEKS
- Testing
- Logistics
- Student behavior management/monitoring
- My own technology skill level
- Monitoring/measuring student progress
- Implementing correctly into classroom
- Backup plans when technology fails
- Personalized learning
- Giving students control of learning
- Student conferences
- None
- Other (please specify)

Very Low Agreement					Very High Agreement
1	2	3	4	5	6
Disposition					
1. Students learn better when technology allows them to adjust the speed of their own learning.					
2. Online technology is important to ensure that each student has learned the material before moving on to the next lesson.					
3. Online activities can result in learning that would be difficult for students to achieve without technology.					
4. Teachers should explore new teaching strategies that combine in-person and online learning.					
5. Students should use data to guide their own learning progress.					
6. Teachers who regularly use data to inform their teaching will be able to help their students more than those who do not.					
7. Students should gain experience with online collaboration.					

8. Students will have better learning experiences when teachers and students participate in online discussions.

Online Integration
1. Evaluate the strengths and limitations of specific online activities for your students.
2. Find ways to combine online and in-person activities that help students control their own learning (e.g., when, where, and how they learn).
3. Decide when to use computer-based assessments (e.g. online exams and digital projects).
4. Decide when it is better to interact with students in person versus online.
5. Decide if using online activities will improve student learning.
6. Develop steps to submit and manage student work online (e.g., projects, reports, and assignments).
7. Help students manage their online accounts and passwords.
8. Provide clear instructions for moving between online and in-person activities.
9. Develop instructions for how students should find help when they are using online technology.
10. Develop guidelines to help students use their time online well.
11. Provide clear instructions for how students should use devices (e.g., laptops, tablets, and headphones).
Data Practices
1. See patterns in small-group and whole-class learning using online and offline assessments results.
2. Help students see their learning progress using online and offline assessments results.
3. Use technology that organizes and displays student assessment results so you can make decisions about instruction.
4. Use technology tools to check student participation in online activities (e.g., attendance, logins, and time on each activity).
5. Check student progress by using online assessments frequently.
6. Evaluate the effectiveness of instruction for students with disabilities using online and offline assessment results.
7. Decide which groups or individual students need additional help using online assessment results.

8. Improve student learning experiences by using technology to collect information about students (e.g., interests, background, and learning preferences).

Personalizing Instruction
1. Develop a set of online and offline resources to give students choice in how they learn.
2. Combine individual or small-group instruction with educational software to help each student succeed.
3. Use online tools to make sure that students learn material before moving on to the next lesson.
4. Use educational software that adapts how each student progresses through lesson materials.
5. Use technology that lets each of your students adjust the speed of their learning.
6. Use technology that helps students see their progress toward goals that they have set.
7. Use technology that gives students some choice in where they learn.
8. Use technology that lets students choose how they show what they learned.
Online Interactions
1. Teach students how to communicate online respectfully.
2. Communicate online with students while still maintaining professional student–teacher relationships.
3. Help students work well in small groups both online and in person.
4. Help students learn to interact well in online discussions.
5. Help students interact well with guest presenters through video conferencing.
6. Give quick online feedback to students in a variety of ways using text, audio, or video.
7. Use online communication to help strengthen students' feeling that they belong to the class.
8. Give students a chance to help each other using online technology (both inside and outside of class).

Appendix B

Postsurvey Questions

What concerns do you have about implementing blended learning in your classroom? (a check list)

- Student access to technology
- School/campus access to technology and resources
- Developing lesson plans
- Time constraints
- Student ability to use and understand standards/TEKS
- Testing
- Logistics
- Student behavior management/monitoring
- My own technology skill level
- Monitoring/measuring student progress
- Implementing correctly into classroom
- Backup plans when technology fails
- Personalized learning
- Giving students control of learning
- Student conferences
- None
- Other (please specify)

Very Low Agreement					Very High Agreement
1	2	3	4	5	6
Disposition					
1. Students learn better when technology allows them to adjust the speed of their own learning.					
2. Online technology is important to ensure that each student has learned the material before moving on to the next lesson.					
3. Online activities can result in learning that would be difficult for students to achieve without technology.					
4. Teachers should explore new teaching strategies that combine in-person and online learning.					
5. Students should use data to guide their own learning progress.					
6. Teachers who regularly use data to inform their teaching will be able to help their students more than those who do not.					

7. Students should gain experience with online collaboration.
8. Students will have better learning experiences when teachers and students participate in online discussions.
Online Integration
1. Evaluate the strengths and limitations of specific online activities for your students.
2. Find ways to combine online and in-person activities that help students control their own learning (e.g., when, where, and how they learn).
3. Decide when to use computer-based assessments (e.g. online exams and digital projects).
4. Decide when it is better to interact with students in person versus online.
5. Decide if using online activities will improve student learning.
6. Develop steps to submit and manage student work online (e.g., projects, reports, and assignments).
7. Help students manage their online accounts and passwords.
8. Provide clear instructions for moving between online and in-person activities.
9. Develop instructions for how students should find help when they are using online technology.
10. Develop guidelines to help students use their time online well.
11. Provide clear instructions for how students should use devices (e.g., laptops, tablets, and headphones).
Data Practices
1. See patterns in small-group and whole-class learning using online and offline assessments results.
2. Help students see their learning progress using online and offline assessments results.
3. Use technology that organizes and displays student assessment results so you can make decisions about instruction.
4. Use technology tools to check student participation in online activities (e.g., attendance, logins, and time on each activity).
5. Check student progress by using online assessments frequently.
6. Evaluate the effectiveness of instruction for students with disabilities using online and offline assessment results.
7. Decide which groups or individual students need additional help using online assessment results.

8. Improve student learning experiences by using technology to collect information about students (e.g., interests, background, and learning preferences).
Personalizing Instruction
1. Develop a set of online and offline resources to give students choice in how they learn.
2. Combine individual or small-group instruction with educational software to help each student succeed.
3. Use online tools to make sure that students learn material before moving on to the next lesson.
4. Use educational software that adapts how each student progresses through lesson materials.
5. Use technology that lets each of your students adjust the speed of their learning.
6. Use technology that helps students see their progress toward goals that they have set.
7. Use technology that gives students some choice in where they learn.
8. Use technology that lets students choose how they show what they learned.
Online Interactions
1. Teach students how to communicate online respectfully.
2. Communicate online with students while still maintaining professional student–teacher relationships.
3. Help students work well in small groups both online and in person.
4. Help students learn interact well in online discussions.
5. Help students interact well with guest presenters through video conferencing.
6. Give quick online feedback to students in a variety of ways using text, audio, or video.
7. Use online communication to help strengthen students' feeling that they belong to the class.
8. Give students a chance to help each other using online technology (both inside and outside of class).