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Teachers' Preparedness and Professional Learning about Using Educational Technologies During the COVID-19 Pandemic

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The COVID-19 pandemic has impacted education at multiple levels over the last ten months. One common thread that has remained is the online learning and meeting platform for teachers, students, administrators, and families. This study reports on a survey of 560 K-12 educators across one southernmost part of a south-central state who shared their levels of preparedness during the transition to virtual learning in the Spring of 2020/amid the COVID-19 pandemic. Data analysis revealed that educators continued to focus on professional development during the summer of 2020 in preparation for the new academic year. Additional analysis showed that participants' self-efficacy of using technology to teach online remained high. This demonstrated the resiliency and adaptability of K-12 classroom teachers in the face of immediate changes affecting their pre-conceived notions of how a classroom looks and how learning is obtained.

INTRODUCTION

In March 2020, the COVID-19 pandemic affected teachers, administrators, and learners alike in terms of teaching, learning, and environment (Kirshner, 2020; Kim & Asbury, 2020; Winthrop, 2020a; Winthrop, 2020b). According to the World Economic Forum (2020), by April 2020, over one billion learners worldwide were no longer in a traditional in-person classroom, leading to an increase in e-learning and online platforms. Winthrop (2020b) noted, "March 2020 will forever be known in the education community as the month when almost all the world's schools shut their doors" (para 1). Although the literal doors of education shut, teaching and learning did not cease. Alternatives to reaching students and progressing their education were sought immediately, leaving educators the stress of planning, executing, and reflecting on the learning process utilizing a format that may have been virtually unknown to them at the time (Kirshner, 2020). As one participant expressed in Kim and Asbury's (2020) study, "I guess it felt a bit like, you know, you're shown the diagram of how the parachute works and then you're pushed out of the plane" (p. 7). Teachers across the U.S. most certainly felt these sentiments as they quickly transitioned their method of instruction to online learning. Teachers in the field of K-12 education today are increasingly challenged to consider the variety of tools and strategies needed to teach well; this is especially the case when they consider the evidence-based practices for engaging children and families through online virtual learning platforms. Amid a global pandemic, imagine how unprepared teachers felt as they transitioned their teaching and learning processes in an arena where there was and still is uncertainty. In addition, most teacher preparation programs have neglected to provide needed instruction, resources, and modeling of how to teach online during preservice teachers' academic career (U.S. Department of Education, Office of Educational Technology, 2017).

Many questions remain about the reopening of schools and the overall impact of the COVID-19 pandemic. Even as teachers work to provide their current students with academic instruction, they are anxiously preparing to reenter their classrooms with an understanding that there will be various changes to in-person instruction. The learning curve will continue to exist. No longer is it enough to excel teaching in-person; future educators, as well as current ones, will need to also excel using other platforms (Bryans-Bongey & Graziano, 2016). Under these changing circumstances, it is important that we approach teacher education/development by providing teachers with learning opportunities that support the extension of knowledge around virtual teaching and learning. Noting that the research in K-12 teaching and learning virtually is limited, this research sought to answer the following questions:

1. Did professional development in the areas of technology prepare K-12 teachers for instructing their students online?
2. How was teachers' knowledge and skills of technology related to their self-efficacy in teaching K-12 students online?

LITERATURE REVIEW

Several studies that did address online teaching and learning in a K-12 environment during the pandemic concentrated on the platform used for online teaching. Yunus et al. (2020) conducted a study in Nigeria to discover the availability, accessibility, and usefulness of Google, Docebo, Adobe Captive, Class-pulse, E-mail, Buncee, Udemy, White Board, and RCampus platforms. The researchers sent an online Likert scale questionnaire to teachers in all schools across six geo-political zones that was divided into three sections based on these topics. Out of the 500 invitees, 460 participated in the study, and the results were overwhelmingly positive. For each platform evaluated, most of the participants scored it available from as few as 77.8% to 97.8% at most. Regarding accessibility, a minimum of 88.4% of participants scored each platform accessible at frequent or very frequent, and the percentage ranged as high as 91.1 on two platforms. Finally, the usefulness of each platform ranked high with ratings of 80% to 91.1%, as participants agreed or strongly agreed with the usefulness of the platforms.

Another study that focused on a non-traditional learning platform was conducted in the small country of Beliz. All classroom doors closed in March 2020 due to the global pandemic and the country's economics heavily relying on tourism; reaching marginalized learners via the internet became impossible (Kirshner, 2020). A radio platform for broadcasting educational lessons has existed in Belize since its independence in 1981. Therefore, it seemed logical to utilize that platform for continuing education after the pandemic caused the closing of schools. Kirshner's (2020) study included interviews and focus groups consisting of teachers, families, a radio executive, and the Belize Ministry of Education. Respondents participated utilizing e-mails, Facebook messaging, and various other virtual platforms.

Several themes emerged from Kirshner's study, including "the challenge of meeting learners without internet, … teachers' commitment to continue reaching *all* students, the continuous reconstruction of identity that came with challenge of shifting instruction, and the deepening of connections through this experience" (2020, p. 92). Teachers who volunteered to record radio lessons were apprehensive yet energized while facing the challenge of reimagining lessons into an auditory format. One participant expressed, "I wanted to try it, so I can grow as a teacher, so I can learn more

about this technology learning … because we are in this technology era" (Kirshner, 2020, p. 92). Teacher participants learned that more planning was required to create lessons in the radio format, but they also learned how important partnerships were in the process. Participants share, "we learn from each other," "there is a genuine concern for each other," and "the teamwork is really amazing" (Kirshner, 2020, p. 92). The conclusions coming from Kirshner's research revolved around the connections made and how it affected the teachers while designing lessons in a new format. The effectiveness of the radio platform in terms of student achievement had yet to be seen in the small country of Belize.

Yao et al. (2020) examined two different formats for providing online instruction after China embraced the School's Out, but Class's On mentality at the end of 2019 when the pandemic surfaced in their country. Schools in China implemented two different online models: (1) asynchronous using recorded lessons created by the teachers, self-directed study by students, and no communication between teacher and student online, and (2) synchronous with real-time interactions, online guidance from teachers, and live lessons. Yao et al. compared students' academic achievement from each mode to determine the role teachers play in learning in an online environment. High school students were administered a pre-test to determine baseline knowledge. They were then given a post-test after six weeks of online instruction in one of the two models.

Students in the synchronous course scored slightly lower on their pretest versus the students in the asynchronous course. However, the differences were not significant at any level. After the online teaching, the students in the synchronous course exceeded the students in the asynchronous course in both total and average scores in each subject. The difference in post-test scores was significant at $p < 0.001$. The researchers concluded that teachers' involvement related to their teaching efficiency; their role as teacher and feedback provider was still critical to learning. In addition, more online communication between teachers and students positively affected student performance (Yao et al., 2020).

Teaching During the Pandemic

In addition to literature focused on online teaching and learning platforms, one other pertinent study by Korkmaz and Toraman (2020) concentrated on problems associated with teaching during the pandemic. Specifically, the researchers sought to answer seven questions, two of which pertain to this study: (1) problems educators experienced during the pandemic, and (2) changes in educational practices that might be expected after the pandemic. Korkmaz and Toraman sent an online survey to educators in Turkey. The survey consisted of 24 Likert-scale questions regarding

problems in online learning practices and 17 Likert-scale questions pertaining to possible changes in educational practices. Of the 24 questions on problems, 50% or more participants reported problems in 9 areas, and 60% experienced 5 of the 24 problems. The five problems experienced most included: (1) poor interaction between teacher and student; (2) efficiency in teaching of skills (such as listening, drawing, etc.); (3) inappropriateness for teaching all subjects, knowledge, or skills; (4) conduciveness in gaining all learning outcomes; and (5) lower motivation than in face-to-face classes. Of the 17 changes that teachers might expect to occur post-pandemic in education, 60% or more participants expected only three changes. These included: (1) improvement in ability to teach online; (2) more courses about online learning in education programs; and (3) motivation increases after returning to face-to-face.

Archambault and Larson (2015) surveyed K-12 teachers instructing in a virtual environment. The study focused on the needs of the K-12 teachers. In terms of preparation to teach virtually, participants denoted their college courses did not tackle pedagogy for online instruction. In addition, virtual field placements were not the norm. Most knowledge gained in teaching online came from professional development attended after graduation while working as a teacher.

Graziano and Bryans-Bongey (2018) surveyed Deans and Associate Deans from various teacher preparation programs regarding the formal instruction provided to preservice teachers about online teaching. The leaders were instructed to pass the survey on to appropriate personnel if need be. The results showed that 28.4% offered one or more courses in online teaching and learning methods, and 33.5% offered one or more courses in instructional design for online teaching and learning. In addition, 23.7% offered a certificate in online teaching and learning. When asked about the curriculum experiences pertaining to online teaching, nearly half offered experiences in four different areas: hands-on use of a learning management system from an instructor's perspective, opportunity to develop online course content, opportunity to develop online discussions, and opportunity to develop online assessments with rubrics. Barriers to preparing preservice teachers to instruct online were identified, as well. Over half (59.5%) claimed students were already inundated with other required coursework. Falling second and third on the list were lack of experienced faculty and limited funding, respectively.

Summary

In summary, while there is limited research on the study topic, current research did support the importance of discovering online learning platforms'

usefulness. The Nigerian study conducted by Yunus et al. (2020) found that Google, Docebo, Adobe Captive, Class-pulse, E-mail, Buncee, Udemy, White Board, and RCampus were rated highly by teachers for their usefulness in implementing online instruction in a K-12 setting. Kirshner (2020) found that teachers gained a deep sense of teamwork while connecting to learn the nuances of teaching online. During the COVID-19 pandemic, educators around the globe attempted innovative ways to provide effective virtual instruction. Yao et al. (2020) found that synchronous learning and providing immediate feedback and interaction to students proved to be more efficient and effective versus asynchronous instruction. Moving forward to the future of education in K-12 and how to adequately prepare pre-service teachers, Korkmaz and Toraman (2020) found there needed to be marked improvement in the ability to teach online and more courses about online teaching in Educator Preparation Programs. Before the pandemic, Graziano and Bryans-Bongey (2018) found potential barriers to preparing pre-service teachers to instruct online due to an already heavy course load students carried and the lack of experience and funding faculty had to prepare students to teach online.

Research regarding teaching during the COVID-19 pandemic is beginning to increase; however, given the pandemic has only affected education for about a year at the time of this writing, the lack of literature was expected. Two specific areas lacking research currently pertain to teachers' self-efficacy for teaching K-12 students in an online platform and the role, if any, that professional development played in K-12 teachers' preparedness in teaching online. It is important to note that because there is no current research on teacher self-efficacy for online teaching in the K-12 setting, general literature on teacher self-efficacy was not included in the literature review. The authors of this study sought to research these areas by asking questions about types of professional development in the areas of technology that prepared them for teaching K-12 students virtually, knowledge and skills of technology, and self-efficacy in teaching and learning in a virtual environment.

METHODOLOGY

The purpose of this study was to examine K-12 teachers' experiences with technology integration and online instruction prior to and after Spring 2020. This article specifically addresses current teachers' perceptions of how well their educator preparation program and/or professional development prepared them to deliver online instruction during COVID-19 and their self-efficacy for teaching K-12 students in an online environment.

Design

The research was designed to address the following research questions: (1) Did professional development in the areas of technology prepare K-12 teachers for instructing their students online? And (2) How was teachers' knowledge and skills of technology related to their self-efficacy in teaching K-12 students online? A non-experimental design principle was used to compare and evaluate for correlations addressing the research questions.

To collect data for this study, the authors sent an approved e-mail to seven large school districts' superintendents that outlined the study and included a link to the online survey. The online survey was built in Qualtrics cloud-based platform and designed with survey research design principles in mind (Sue & Ritter, 2012). The design of the questions was mostly ex post facto in nature, as participants were asked to answer in retrospect. District administrators sent out the e-mail to all K-12 teachers in their district. Participants were asked to complete a voluntary, anonymous online survey. The online survey (see Appendix) consisted of six questions pertaining to demographics, two questions related to professional development with correlated follow-up questions, and 24 Likert-scale questions focusing on knowledge, skills, and comfort levels with technology.

Subjects

Participants included teachers within seven districts in the southern area of a metropolitan area in a southern region of the United States. Since the district administrators sent the call for participation email with the online survey link to the teachers of record employed in their district, it is unknown how many potential participants were invited. However, given the authors' general knowledge of the districts' demographics, it is estimated that approximately 4000 survey links were sent out on call. A total of 679 responded, 560 of which participated fully in the online survey.

Data Collection and Analysis

For this study, the authors began the preliminary analysis by running descriptive statistics and frequencies on the collected demographics, including ethnicity, gender, age, and number of years teaching. In addition, attendance of college courses preparing for teaching online and how many, and attendance of professional development preparing for teaching K-12 online, when, and how many frequencies were analyzed. During a preliminary analysis, descriptive statistics were conducted on the teachers' self-efficacy, teachers' preparedness, and results on individual Likert-scale questions. Data were then analyzed using Multiple Regression and Pearson Correlations techniques to address the specific research questions. Finally, One-Way, Two-Way, and Multivariate analysis of variance (ANOVA) models were analyzed for cursory purposes. The results of these analyses follow.

RESEARCH FINDINGS

Demographics showed that 69.4% of the participants identified themselves as female, while 29.9% were male, and less than 1% identified themselves as "other." Only 56.2% of participants chose to identify their ethnicity; 35.5% wrote in Hispanic, Chicano, Latino, or some variation; 17.8% wrote Anglo, Caucasian, White, or some variation; Less than 1% identified themselves as African American, Black, or some variation; and 2.2% chose another ethnicity not falling in any other category. The age of participants ranged from under 22 years (0.4%) to over 60 years (5%), with most between 31 to 50 years old (54.6%). Table 1 illustrates the number of years the participants have been teaching in K-12.

Table 1
Years of Teaching in K-12

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than a year	44	6.5	6.9	6.9
	1-5 years	135	19.9	21.1	28.0
	6-10 years	145	21.4	22.7	50.6
	11-15 years	113	16.6	17.7	68.3
	more than 15 years	203	29.9	31.7	100.0
	Total	640	94.3	100.0	
Missing	System	39	5.7		
Total		679	100.0		

When asked if they attended any college courses while seeking a degree that prepared them for teaching K-12 in an online environment, only 24% stated they had. Of those, 43.3% earned more than nine credit hours that assisted in their preparedness. On the other hand, 74.9% attended professional development, preparing them for teaching in a K-12 online environment. Of those, 15.3% attended it prior to Spring 2020, 22.7% attended during Spring 2020, 40.3% in Summer, and 21.7% attended during Fall 2020. Most professional development was required for up to 9 hours, while participants chose to attend self-imposed professional development ranging from 3 hours (21.3 %) to more than 9 hours (13%).

The Likert-scale questions pertaining to preparedness to teach K-12 students online and their self-efficacy for doing so allowed for rankings of fair, good, or excellent. Table 2 provides a summary of responses for the participants self-ratings prior to Spring 2020. Table 3 provides a summary of the responses for after Spring 2020. The mean score participants ranked themselves fell in the fair to good range in overall preparedness prior to

Spring 2020; however, the mean score of participants increased to the good to excellent range after Spring 2020. Likewise, the participants' mean score increased around self-efficacy, from at least fair prior to Spring 2020 to at least good after Spring 2020. Although percentages of participants choosing fair, good, or excellent for prior to Spring 2020 varied from specific question to another, over 60% ranked themselves as good on all the same questions related to after Spring 2020.

Table 2
Survey of Preparedness to Teach K-12 Students Online (Prior to Spring 2020)

Prior to Spring 2020, how would you have rated your knowledge, skills, and comfort levels on the following?						
Questions	Mean	Std Dev	Var	Low-Fair (%)	Good (%)	Excellent (%)
Knowledge of using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)	1.78	0.69	0.47	36.96	48.04	15.00
Knowledge of using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)	1.60	0.68	0.46	50.89	38.04	11.07
Knowledge of learning through online means	1.75	0.67	0.45	37.86	48.93	13.21
Knowledge of teaching through online means	1.54	0.63	0.39	53.04	39.82	7.14
Knowledge of using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)	1.69	0.66	0.44	41.96	46.61	11.43
Knowledge of using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)	1.52	0.64	0.41	55.71	36.25	8.04
Skills in using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)	1.70	0.68	0.46	42.14	45.36	12.50
Skills in using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)	1.56	0.66	0.44	54.11	36.25	9.64
Comfort in learning through online means	1.79	0.69	0.47	36.61	48.21	15.18
Comfort in teaching through online means	1.55	0.64	0.42	53.75	37.86	8.39
Skills in using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)	1.66	0.67	0.45	44.82	43.93	11.25
Skills in using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)	1.55	0.65	0.42	53.39	38.04	8.57

Table 3
Survey of Preparedness to Teach K-12 Students Online (After Spring 2020)

After Spring 2020, how would you rate your knowledge, skills, and comfort levels on the following?						
Questions	Mean	Std Dev	Var	Low-Fair (%)	Good (%)	Excellent (%)
Knowledge of using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)	2.24	0.57	0.33	7.14	61.43	31.43
Knowledge of using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)	2.21	0.58	0.34	8.39	61.79	29.82
Knowledge of learning through online means	2.21	0.56	0.32	7.68	64.11	28.21
Knowledge of teaching through online means	2.13	0.57	0.32	10.54	66.43	23.04
Knowledge of using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)	2.21	0.59	0.34	8.75	61.25	30.00
Knowledge of using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)	2.20	0.60	0.35	9.82	60.71	29.46
Skills in using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)	2.21	0.59	0.35	9.29	60.89	29.82
Skills in using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)	2.17	0.59	0.34	10.00	62.50	27.50
Comfort in learning through online means	2.20	0.58	0.34	9.11	61.79	29.11
Comfort in teaching through online means	2.10	0.60	0.36	13.57	62.68	23.75
Skills in using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)	2.20	0.59	0.35	9.46	61.07	29.46
Skills in using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)	2.18	0.59	0.35	10.18	61.43	28.39

When analyzing the data specifically addressing the impact of professional development on teachers' preparedness for instructing K-12 students online (RQ1), multiple regression and Pearson correlation models were utilized. A multiple regression was used to assess the ability of professional development and/or college coursework to predict the overall preparedness to teach students in a K-12 environment teachers possess. The test was run for predictions prior to Spring 2020, as well as after Spring 2020. Preliminary analyses were conducted to ensure no violation of the assumptions. The data showed no statistical significance in predicting preparedness to teach online by the number of college courses taken or the number of hours attended for professional development. Although the data was not predictive, correlations were present. The relationship between college courses, professional development, and preparedness was investigated using a Pearson product-moment correlation coefficient. No assumptions of normality or linearity were discovered through preliminary analyses. The strength of correlations was determined by Cohen's definitions of small as $r = 0.10$ to 0.29, medium as $r = 0.30$ to 0.49, and large as $r = 0.50$ to 1.00 (1988). A strong correlation existed between prior to Spring 2020 preparedness and after Spring 2020 preparedness with $r = .54$, and statistically significant (0.000) at $p < 0.05$, $n = 560$. A small correlation occurred between courses and professional development attended with $r = .215$. A small correlation was also found between professional development attended and preparedness prior to Spring 2020 with $r = .124$ and statistically significant (0.011) at $p < 0.05$. Prior to Spring 2020, preparedness helps to explain 29% of the variance in participants' scores on preparedness after Spring 2020.

The authors also wanted to test for predictive and correlations to address teachers' self-efficacy (RQ2). A multiple regression was implemented first to assess the level of the teachers' knowledge and skills to predict their self-efficacy in teaching online to their K-12 students. Preliminary analyses ensured no violation of assumptions of normality, homoscedasticity, multicollinearity, and linearity existed. Knowledge and skills explained a 67% variance to teachers' self-efficacy prior to Spring 2020, and that variance increased to 71% for their self-efficacy after Spring 2020. In addition, knowledge and skills predictive value for self-efficacy was statistically significant prior to and after Spring 2020 with 0.000 at $p < 0.05$.

Next, a Pearson correlations model was administered to determine correlations, if any, amongst: (1) knowledge and skills prior to Spring 2020, (2) self-efficacy prior to Spring 2020, (3) knowledge and skills after Spring 2020, and (4) self-efficacy after to Spring 2020. Large correlations were found in four combinations: (1) knowledge and skills prior to Spring 2020 and self-efficacy prior to Spring 2020, (2) self-efficacy prior to Spring 2020 and self-efficacy after to Spring 2020, (3) knowledge and skills after Spring

2020 and self-efficacy after to Spring 2020, and (4) knowledge and skills prior to Spring 2020 and knowledge and skills after Spring 2020. Medium correlations were also found between knowledge and skills prior to Spring 2020 and self-efficacy after to Spring 2020 and between reports of self-efficacy prior to Spring 2020 and knowledge and skills after Spring 2020. Results can be found in the Table 4 below.

Table 4
Correlations

		KS_Prior	SE_ Prior	SE_After	KS_After
KS_Prior	Pearson Correlation	1	.819**	.447**	.531**
	Sig. (2-tailed)		.000	.000	.000
	N	560	560	560	560
SE_ Prior	Pearson Correlation	.819**	1	.540**	.490**
	Sig. (2-tailed)	.000		.000	.000
	N	560	560	560	560
SE_After	Pearson Correlation	.447**	.540**	1	.842**
	Sig. (2-tailed)	.000	.000		.000
	N	560	560	560	560
KS_After	Pearson Correlation	.531**	.490**	.842**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	560	560	560	560

**. Correlation is significant at the 0.01 level (2-tailed).

In addition to descriptive statistics, regressions, and correlation, the authors directed several ANOVA tests on items of data for informational purposes. Two-way ANOVA was conducted to explore the impact of age and number of years teaching to the over preparedness of teaching online. Participants' data were divided into six groups based on age (under 22, 22-30, 31-40, 41-50, 51-60, and over 60). Participants' data were also divided based on number of years teaching in K-12 (as shown in Table 1). The interaction effect between age and number of years teaching was not statistically significant at $p < 0.05$. A two-way ANOVA was also conducted on number of college courses taken preparing for teaching K-12 online, number of hours of professional development for teaching K-12 online, and overall preparedness for teaching in a K-12 online environment. The amount of time spent in professional development was grouped into five ranges (less than three hours, at least three hours, at least six hours, at least nine hours,

more than nine hours). The number of college credit hours also fell into five groups (less than three hours, three to five hours, six to eight hours, nine hours, more than nine hours). Again, no significance was discovered between these factors at $p < 0.05$.

Statistical significance was observed while running a one-way multivariate ANOVA test to investigate the effect of attending college courses and/or professional development on participants' knowledge and skills levels, as well as their self-efficacy. Preliminary assumption testing was performed, and no violations were noted for univariate and multivariate outliers, normality, and linearity. There was a statistically significant difference (0.001) between courses and professional development attended to the combined dependent variables of knowledge and skills and self-efficacy ($F = 5.02, p < 0.05$, Wilks' Lambda = 0.965, partial eta squared = 0.018).

The final ANOVA technique utilized was a one-way ANOVA. The one-way repeated measures ANOVA was performed to compare overall preparedness to teach K-12 online prior to Spring 2020 and after Spring 2020. A statistically significant difference attributed to a large effect from preparedness in Spring 2020 to current. Wilks' Lambda = 0.477, $p < 0.05$, and the multivariate partial eta squared = .523, which suggested a large effect size based on Cohen's definitions of 0.01 = small, 0.06 = moderate, and 0.14 = large (1988). The pairwise comparison also validated earlier determined results that a difference between overall preparedness prior to Spring 2020 and after Spring 2020 existed with a mean difference increase of 6.55. A one-way ANOVA was also conducted to compare self-efficacy prior to Spring 2020 and after Spring 2020. The results of this test also showed significance, statistically (0.000, $p < 0.05$). The self-efficacy scores positively changed from Spring 2020 to after with a mean difference of 0.97 shown in the pairwise comparison. The partial eta squared equaled 0.424, which contributed to a large effect.

Finally, an independent samples t-test was performed to determine if any significance existed between genders and their overall preparedness to teach K-12 students in an online environment. No significant difference in scores for males ($M = 26.85, SD = 6.74$) and females ($M = 26.14, SD = 6.08, t = 1.14$) was found. After conducting various analyses, including Multiple Regression, Pearson Correlations, and One-Way, Two-Way, and Multivariate analysis of variance (ANOVA), on the data collected, several implications were determined.

DISCUSSION

Teacher education programs are designed to prepare teachers to enter the classroom as full-time teachers. However, strategies for teaching during a pandemic are generally not an area of focus. This research concluded that only 24% of teachers had completed coursework that addressed teaching in an online environment during their teacher preparation program. Therefore, teachers felt a need for further professional development during the transition to online learning because of the pandemic. Many of the participants completed professional development hours during the start of the pandemic, while others completed hours during the summer and fall in preparation for the next academic year.

Furthermore, educators are determined to meet the needs of their students whether they are in a traditional classroom or an online learning environment. At the outset of the pandemic, teachers were unprepared as they were thrown into an online learning environment for nearly 18 months. However, their self-efficacy remained high as they learned new strategies through professional development, knowledge of online tools, and strategies to communicate with families. This resiliency demonstrated that teachers could adjust their practice to meet the needs of students. Much of the professional development and experiences that the teachers faced during the pandemic will shape their approach to teaching for years to come.

IMPLICATIONS

The findings of this study reveal that while no amount of professional development for in-service teachers or courses integrating technology for preservice teachers could have prepared them to teach online in the spring of 2020 before a pandemic, the professional development received during the pandemic increased the level teachers felt prepared going into the fall of 2020. Additionally, the results indicate the importance and need for continued, on-going professional development to support good teaching. Teacher education programs must consider how they are preparing teachers to enter the ever-changing field of education. The study results showed the importance self-efficacy plays in teachers' knowledge and skills of content. It is evident that the pandemic did not adversely affect teachers who already had a high level of self-efficacy prior to transitioning to online instruction. This highlights the critical role self-efficacy plays in a teacher's ability to teach in any format or setting. To address this idea, school districts and educator preparation programs should consider periodically administering self-efficacy surveys of teachers' knowledge and skills in technology to ensure students are receiving high-quality instruction.

The way teachers interact, engage, assess, and communicate with students changed when the shift to a virtual learning environment was made. Before the COVID-19 pandemic, teachers around the world were known for their ability to adapt and overcome any myriad of circumstances that would arise in schools. The pandemic proved to be no different as teachers were resilient and adaptable to ensure students' success. However, the findings of this study support the need for more advanced technology professional development for in-service teachers that consider the teacher, school, and different levels within the education system (Liao et al., 2017). As Korkmaz and Toraman (2020) discovered, a strong need for professional development and training in technology, post-pandemic times, is critical.

CONCLUSION

The pandemic has impacted people, schools, our children, and the ways that we interact with one another. While many remain hopeful for a return to normalcy, the field of education will forever be changed. School leadership will continue to consider the needs of their students within the building along with the needs of other resources and materials for online learning options to ensure students' academic success. Like educators in this study, the transition to virtual learning affirmed the dedication, knowledge, and skills teachers possess as they are committed to supporting their students and families. As Jantjies (2020) stated, "COVID-19 has shown that technology is no longer a luxury but an important component of the education process," (para 5). The authors acknowledge the impact that the COVD-19 pandemic has had on the field of education and urge teachers to trust the process as they navigate the various changes, they will continue to experience in the months to come.

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APPENDIX

Survey Questions

- What is your age? (optional)
  - Under 22
  - 22-30
  - 31-40
  - 41-50
  - 51-60
  - Over 60
- What is your ethnicity? (optional)
  - _____
- What is your self-identified gender? (optional)
  - Female
  - Male
  - Other
- How many years have you been teaching in K-12?
  - Less than a year
  - 1-5 years
  - 6-10 years
  - 11-15 years
  - More than 15 years
- In what district do you currently teach?
  - _____
- If you taught during Spring 2020 in XXXXX, in which district did you teach? (leave blank if not applicable)
- Did you attend college course(s) while seeking degree that prepared for teaching K-12 in an online environment?
  - Yes
  - No

- If you did attend college course(s) that prepared for teaching K-12 in an online environment, how many course credit hours did it total?
  - Less than 3 hours
  - 3 hours
  - 6 hours
  - 9 hours
  - More than 9 hours
- Have you attended professional development preparing for teaching K-12 online?
  - Yes
  - No
- If you have attended professional development preparing for teaching K-12 online, how many hours total?
  - Less than 3 hours
  - At least 3 hours
  - At least 6 hours
  - At least 9 hours
  - 10 or more hours
- If you have attended professional development preparing for teaching K-12 online, when was it taken?
  - Prior Spring 2020
  - Spring 2020
  - Summer 2020
  - Fall 2020
- If you have attended professional development preparing for teaching K-12 online, how many hours were required for you to attend?
  - Less than 3 hours
  - At least 3 hours
  - At least 6 hours
  - At least 9 hours
  - More than 9 hours
- If you have attended professional development preparing for teaching K-12 online, how many hours were self-imposed?
  - Less than 3 hours
  - At least 3 hours
  - At least 6 hours
  - At least 9 hours
  - More than 9 hours

Quantitative Likert Scale Questions: (Low/Fair, Good, Excellent)

- Prior to Spring 2020, how would you rate your knowledge, skills, and comfort levels on the following?
  - Knowledge of using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)
  - Knowledge of using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)
  - Knowledge of learning through online means
  - Knowledge of teaching through online means
  - Knowledge of using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)
  - Knowledge of using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)
  - Skills in using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)
  - Skills in using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)
  - Comfort in learning through online means
  - Comfort in teaching through online means
  - Skills in using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)
  - Skills in using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)
- After Spring 2020, how would you rate your knowledge, skills, and comfort levels on the following?
  - Knowledge of using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)
  - Knowledge of using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)
  - Knowledge of learning through online means
  - Knowledge of teaching through online means
  - Knowledge of using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)
  - Knowledge of using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)
  - Skills in using online learning management systems as a student (Blackboard, Google Classroom, Moodle, etc.)

- Skills in using video conferencing tools as a student (Zoom, WebEx, Teams, Skype, etc.)
- Comfort in learning through online means
- Comfort in teaching through online means
- Skills in using online learning management systems as a teacher (Blackboard, Google Classroom, Moodle, etc.)
- Skills in using video conferencing tools as a teacher (Zoom, WebEx, Teams, Skype, etc.)