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Korean Pre-service Teachers' Self-efficacy with Online Micro-Teaching Activities in a Teacher Education Program

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During the 2020 calendar year, teacher education programs were forced to transition courses online because of Covid-19. This situation necessitated the redesign of teacher education programs that used micro-teaching activities to scaffold experiences for pre-service teachers (PSTs). This study focused on how two different delivery designs for online micro-teaching affected PSTs' self-efficacy, outcome expectancy, technology integration knowledge, and reflections. The course format was guided by flipped learning model. A total of 134 pre-survey and post-survey comparisons were used. In addition, 10 participants voluntarily agreed to participate in the interviews at the end of the semester. By implementing a mixed-methods approach, survey and interview data indicate that online delivery does not improve self-efficacy but significantly enhances outcome expectancy, contrary to the literature on face-to-face delivery. In addition, qualitative data revealed that the micro-teaching experience boosted PSTs' knowledge and the future need for technology integration through critical reflection. Finally, several suggestions are provided for effective online micro-teaching activities in the teacher education program.

Keywords: pre-service teachers, online micro-teaching, synchronous and asynchronous micro-teaching, teacher education

INTRODUCTION

Researchers have argued that a practice-based approach to teacher education programs is fundamental to teacher preparation. One of the practice-based approaches is pre-service teachers' micro-teaching. It has become a key practice in teacher education programs for improving pre-service teachers' (PSTs) effective teaching skills (Kourieos, 2016). In addition, studies have shown that micro-teaching experiences can bridge theory and practice to help PSTs improve their pedagogical skills regarding lesson

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planning, implementation, and evaluation (Cinici, 2016). Also, previous studies have documented that assisting PSTs with mastery experiences through micro-teaching is a key factor in increasing teacher self-efficacy (d'Alessio, 2018; Mergler & Tangen, 2010). Many studies have shown that PSTs' micro-teaching experience is closely related to improving their self-efficacy to work with students in the future (Abbitt, 2011). As a result, micro-teaching experience in teacher education programs has become standard coursework in many face-to-face (F2F) teacher preparation courses.

However, as COVID-19 began to spread rapidly worldwide in early 2020, the standard F2F teacher education model was disrupted. Teacher educators and administrators had to confront crucial questions about transitioning courses to an online format (Moorhouse, 2020; Ismaeel & Al-Mulhim, 2022). For many universities worldwide, this disruption occurred in the middle of the semester, leaving no time for online planning and transitioning courses (Ferdig et al., 2020). However, South Korea's relative proximity to the origin of the outbreak and the spring semester system beginning in March, the spike in early February allowed the country a month to transition classes online (Park, 2020). The Ministry of Education in South Korea delayed the start of the semester until the third week in March. It declared that all Korean university classes had to be shifted online to minimize the risk of spreading COVID-19 (Park, 2020). This government mandate created issues for all university faculty, but teacher educators were burdened with creating mastery experiences in an online environment.

Although the literature has examined components of micro-teaching through online platforms, most of the literature has examined the F2F context. Since COVID-19, and other potential pandemics, could have a long-lasting impact on social gatherings in the foreseeable future, there is a gap in the literature on how teacher educators can create online micro-teaching experiences to educate PSTs outside of the F2F context. This study examines how online micro-teaching practice influences PSTs' self-efficacy, technology integration knowledge, and reflections in an online teacher education program.

Literature Review

PSTs' F2F micro-teaching in teacher education programs

Micro-teaching has been defined as a system of controlled practice that makes it possible to practice teaching and concentrate on specified teaching behavior (Bell, 2007; Remesh, 2013). Micro-teaching is a teacher education technique that allows PSTs to apply defined teaching skills to carefully prepare lessons in a planned series of encounters lasting 10 to 20 minutes with a small group of students, often with an opportunity to observe the result on videotape.

Micro-teaching practice consists of one cycle that guides PSTs through the six stages of planning, teaching, critiquing, re-planning, re-teaching, and re-criticizing (Ogeyik, 2009; Saban & Coklar, 2013). PSTs prepare a lesson plan for a defined subject during the planning stage. Then, in the teaching stage, PSTs teach the planned lessons during class time, which are often videotaped. Following the teaching experience, PSTs participate in the critique stage by watching their teaching videos and reflecting upon their session

with scoring rubrics provided by the course instructor. After reflecting upon their previous experience, PSTs engage in the same process: re-planning, re-teaching, and re-criticizing. In the final re-criticizing stage, PSTs evaluate their strength and weaknesses for future teaching purposes.

Throughout the six stages of the micro-teaching cycle, PSTs can reflect upon their teaching by revisiting each stage to make judgments and decisions about improving their teaching. Thus, micro-teaching is considered a positive teaching and learning experience to develop critical awareness in the beginning stages of teacher professional development. This reflective practice in teacher education programs is critical in developing PSTs' self-efficacy (Arsal, 2015; Chesnut & Burley, 2015). It has been suggested that micro-teaching provides a platform for both mastery experiences and vicarious experiences for PSTs, which are elements considered essential for the development of teacher self-efficacy (Arsal, 2015; Chesnut & Burley, 2015).

Teacher self-efficacy and PSTs' micro-teaching experience

The concept of teacher self-efficacy is comprised of two concepts: self-efficacy and outcome expectancy. Self-efficacy is the conviction that one can direct an outcome, whereas outcome expectancy considers the degree to which that outcome transpires (Brown et al., 2014). When measuring PST's self-efficacy, previous studies have based the assessment on Bandura's four sources of self-efficacy expectations (Pfitzner-Eden, 2016), which have reported positive effects of teacher self-efficacy with micro-teaching practice. Research has identified four areas where micro-teaching activities benefit PSTs' self-efficacy. First, micro-teaching boosts PSTs' self-efficacy through lesson planning because it requires PSTs to design and implement lessons with various accommodations, promoting mastery experience fundamental to self-efficacy (d'Alessio, 2018; Mergler & Tangen, 2010; Yerdelen et al., 2019). Second, the social modeling experience is enhanced because PSTs are presented with opportunities to observe peer-teaching demonstrations that can help observers conceptualize different teaching strategies and implement diverse accommodations during future instruction (Arsal, 2015; Chesnut & Burley, 2015; Cinici, 2016). Third, micro-teaching helps PSTs to benefit from verbal persuasion. The feedback stages with micro-teaching allow the PSTs to reflect on missed opportunities and how to capitalize upon these opportunities in future instruction. Feedback meetings with the instructor can positively enhance social and verbal persuasion (Wagler, 2011; Wang et al., 2004). Fourth, the micro-teaching experience can positively influence PSTs' psychological and affective states by reducing teaching anxiety. Previous research reported that before the micro-teaching experience, PSTs experienced heightened anxiety. However, after a micro-teaching experience, teaching anxiety and concerns decreased as self-efficacy assessments increased (Cinici, 2016; d'Alessio, 2018; Mergler & Tangen, 2010). These findings prove that micro-teaching activities may positively influence PSTs' emotional arousal.

Outcome expectancy and micro-teaching experience

Another component researchers have measured with self-efficacy is outcome expectancy, which is the confidence that a particular outcome will occur (Brown et al.,

2014). Multiple studies suggest that outcome expectancy and self-efficacy are independent factors. Several micro-teaching studies have found significantly higher self-efficacy without significant differences in outcome expectancy (Usher & Pajares, 2008; Mergler & Tangen, 2010; Hechter, 2011). Hetcher (2011) suggests that significant findings of self-efficacy may manifest because PSTs may start with a negative perception of their teaching ability. Still, micro-teaching activities and instructor feedback allow PSTs to improve that perception. On the other hand, outcome expectancy might be hindered by the lack of experience in a real-life teaching context. Due to this inexperience, PSTs may find it challenging to be confident that particular outcomes will occur, and this might be magnified through the micro-teaching experience.

Although most researchers do not find significance in outcome expectancy, Bilen (2015) found that PSTs focused on math had significantly higher outcome expectancy and self-efficacy. It could be concluded that teaching math is more structured with a process of steps that must be completed. Therefore, if PSTs master the process and gain some teaching skills from micro-teaching activities, PSTs may feel these skills easily transfer within math, and outcome expectancy is more predictable than in other subjects that are not so process-oriented.

Teacher reflection and micro-teaching experience

There is empirical evidence that micro-teaching can positively influence PSTs' reflective thinking and practices after watching videos, watching peer teaching, and receiving instructor feedback (Fernandez, 2010; Kourieos, 2016; Kusmawan, 2017; Lin, 2016). These practices allow PSTs to have constructive dialogue with instructors and peers to improve future teaching (Baseer et al., 2017; Yesilbursa, 2011). Kourieos (2016) found that reflective feedback on teaching videos positively impacted PSTs' awareness of relevant theory and English language teaching. Through critical reflections, PSTs reconsidered their teaching practices in classroom language, error correction, and student-centered activities. Several studies suggest that incorporating micro-teaching videos for critical thinking and self-reflection could positively enhance PSTs' conceptualization of their teaching abilities (Lin, 2016; Kusmawan, 2017).

Most research measuring self-efficacy, outcome expectancy, technology integration knowledge, and reflective practice has been conducted in F2F environments. Research examining the online context has focused on self-efficacy through virtual simulations (Ledger et al., 2019; Ledger & Fischetti, 2020). Although virtual simulations may be valuable tools, not all teacher educators have the knowledge or tools to deliver such programs. Therefore, this study examines how asynchronous and synchronous feedback influences PSTs' self-efficacy (including outcome expectancy), technology integration knowledge, and reflections when online micro-teaching activities.

Research Questions

RQ1: To what extent do synchronous and asynchronous feedback influence pre-service teachers' self-efficacy and outcome expectations with online micro-teaching experiences?

RQ2: How did pre-service teachers describe their reflections on the online micro-teaching experience?

METHOD

Research context

The current study was conducted in the teacher education program at a private university located in the southwest region of South Korea. The teacher education program includes the educational departments of Korean education, math, special education, and early childhood education. Teaching Methods and Educational Technology was selected for this study since it focuses on teaching methodology and prominent theories in education and includes an educational technology component. This course is mandatory and must be taken in the PST's junior or senior year before starting their field practicum. Completing all mandatory courses allows PSTs to receive a teaching certificate after graduation. Although PSTs took previous mandatory courses in educational psychology, philosophy, and educational curriculum, the educational technology component was the PSTs' first exposure to the teacher education program. Thus, this course is the stand-alone course in the teacher education programs for PSTs to implement various educational technology regarding their disciplines.

For both semesters, this course implemented the flipped learning model (Bergmann & Sams, 2014; Sopamena et al., 2023). Before attending the synchronized Zoom sessions, PSTs were required to watch the instructor's pre-recorded lectures (10-20minutes) and supplementary YouTube videos based on the chapter content. The pre-class videos were connected to a learning management system (LMS) that allowed the instructor to monitor and track each PST's interaction with the materials. In addition, the flipped learning format allowed the instructor to incorporate various team-based activities, such as group discussion, lesson plans for technology integration, online micro-teaching videos, feedback sessions in zoom synchronized breakout rooms, and creating Google classroom for PSTs' LMS construction.

There were critical differences in how the online micro-teaching was implemented between the spring 2020 and fall 2020 semesters. During spring 2020, PSTs were grouped in team-teaching pairs during the online micro-teaching portion of the class (two PSTs in one team). They were required to create a lesson plan, which received feedback from the instructor, and then allowed to make revisions. After revisions, students created online micro-teaching videos and posted them, along with reflections, to the course LMS. After posting videos and reflections, PSTs were required to watch peer teaching videos and provide feedback offline as an asynchronous session. Thus, the instructor's and peers' feedback was received without synchronous interaction.

In the fall of 2020, the process of making a lesson plan and shooting the online micro-teaching video with the team-teaching format was the same. However, in the fall 2020 semester, PSTs had the opportunity to watch peer online micro-teaching videos and provide feedback during a synchronized Zoom class. PSTs used screen sharing with their pre-recorded videos in the synchronous Zoom class. The critical difference between the two semesters was asynchronous viewing and feedback during the spring

2020 semester, whereas all viewing and feedback were given synchronously during the fall 2020 semester. This research was presented to the education department for approval, and informed consent was explained in verbal and written form.

Table 1
Online course format with specific activities

Stages	PSTs' activities	Assessment	Time duration
Pre-class	1. watching the instructor's lecture videos 2. reading chapter materials 3. watching supplementary YouTube resources -	-formal assessment: online quizzes on LMS	30 minutes
In-class	1. group discussion based on preview materials 2. creating a lesson plan that incorporates educational technology 3. creating a Google classroom 4. feedback sessions with peers and the instructor	-informal assessment: class participation -formal assessment: micro-teaching with the rubric	1 hour and 30 minutes
After-class	1. posting reflections 2. online discussion forum on LMS	-informal assessment: online discussion participation	20 minutes

Online micro-teaching implementation based on Bandura's self-efficacy

Before engaging in micro-teaching activities, PSTs were provided with recorded examples from previous semesters to facilitate PSTs' understanding of the process through Bandura's social and vicarious modeling. For the micro-teaching cycle, PSTs were paired with a partner to promote social modeling and counteract the possibility of physiological and affective states of negative arousal from personal uncertainty. During the planning phase, pairs would plan to collaborate on lesson planning in breakout sessions. The course instructor would visit each breakout room and provide feedback aligned with verbal and social persuasion.

Team pairs produced a 10-minute to 15-minute teaching video for the teaching phase uploaded to LMS. The Spring 2020 semester was asynchronous, so PST teams received feedback in discussion rooms. However, the Fall 2020 semester was delivered synchronously, so PST teams received feedback directly from their peers and the instructor after the video. Peer feedback is considered another form of social persuasion.

After completing micro-teaching activities, PSTs were asked to post a three to four-paragraph reflection in an LMS discussion form. Pre-service teachers were provided reflection questions (see Appendix A) and submitted a revised lesson plan through the LMS. Along with the re-teaching and re-criticizing stages, this helped PSTs to develop mastery experience.

Study Participants

160 Korean undergraduate PSTs in the eight classes (spring 2020 and fall 2020). Due to attrition, opting out, and incomplete post-surveys, a total of 134 pre-survey and post-survey comparisons were used. PSTs used a unique identifier (birth month and year) during both surveys to keep track of student assessments before and after the course, which was then matched and compared with all completed surveys. Of the final participants, 47 identified as male and 87 as female. The course was open to all university education majors, including several different majors, such as special education, early childhood education, Korean language education, English language teaching, math education, and physical education. A total of 10 participants voluntarily agreed to participate in the interviews at the end of the semester. Interviews were conducted with PST1 to PST5 at the end of the spring 2020 semester and PST6 to PST10 at the end of the fall 2020 semester.

Table 2
Interview participants

Interview participants	Major	Gender	Age	Previous Field experience
PST1	Physical Education	Male	24	O
PST2	Physical Education	Female	22	X
PST3	Special Education	Male	28	O
PST4	Special Education	Female	24	O
PST5	Math Education	Male	23	X
PST6	Math Education	Female	22	X
PST7	Physical Education	Male	25	X
PST8	Physical Education	Female	22	X
PST9	Early Childhood Education	Female	23	O
PST10	Early Childhood Education	Female	21	X

Data collection and data analysis

This study implemented a mixed-methods approach. The data were collected in the 2020 academic year (from March to December). This study altered the science teaching efficacy belief instrument-B (Bleicher, 2004; Menon & Sadler, 2018) to examine the self-efficacy and outcome expectancy for PSTs. Many studies widely use this measurement to measure teaching self-efficacy and outcome expectancy in pre-service teachers (Bleicher, 2004; Menon & Sadler, 2018). A Korean-English bilingual researcher modified the original survey and translated it into Korean. For example, question two in the original survey science belief instrument B was written as, "I will continually find better ways to teach science." This research question was redesigned to read, "I will continually find better ways to teach." Also, questions related specifically to science were discarded, such as, "I will find it difficult to explain to students why science experiments work." The survey in this research used 20 of the 23 questions from the original survey. The data for this study consisted of the following:

1. four surveys: two pre-surveys (before online micro-teaching) at the beginning of the spring 2020 and fall 2020 semester and two post-surveys (after online micro-teaching) at the end of the spring 2020 and fall 2020 semester,

2. in-depth interviews with 10 PSTs after finishing their online micro-teaching experiences (PST1 to PST 5 at the end of spring 2020 and PST 6 to PST 10 at the end of the fall 2020 semester), and

3. PSTs' reflections after micro-teaching on the course LMS (at the end of spring 2020 and fall 2020 semester) (n=80).

Informed Consent Forms were collected before the pre-surveys at the beginning of each semester. After the course, PSTs were given post-surveys to collect their final thoughts and request volunteers for in-depth interviews at the end of each semester. A graduate assistant in the education department conducted a 30–40-minute interview in Korean with the volunteered PSTs who completed their team teaching. The graduate assistant interviewed five teams (10 PSTs) in total. All interviews were video-recorded through Zoom. Study participation was voluntary, and there was no compensation provided. See Appendix B for interview questions.

Thematic analysis was used to analyze the PSTs' interview and reflection notes (Braun & Clarke, 2006). First, the research team transcribed all interview data. Video recordings for interviews were listened to several times for accurate transcription and saved to a Dropbox folder. Second, the research team developed codes and sub-codes while working through the data. The third step was theme development, where the research team read and reread to identify significant broader patterns of meaning or potential themes. Fourth, several themes were aggregated into small numbers and further reduced to the most frequently referred to categories. Fifth, the research team defined and renamed abstraction and data reduction. In the last step, all data analysis was triangulated to create a final report.

FINDINGS

Prior Knowledge

Levene's test was conducted to evaluate if inferential statistics could be used to determine if the data met the homogeneity standards. The Levene's test results found that neither self-efficacy ($F(1, 132) = 0.234$, $p = 0.629$), nor expected outcomes ($F(1, 132) = 0.009$, $p = 0.923$), showed evidence of heterogeneity between the spring and fall semesters. Therefore, inferential statistics were used to compare the respective outcomes.

Survey results

An ANOVA was conducted on the pre-survey and post-survey results, comparing the spring and fall semesters' self-efficacy and outcome expectancy evaluations. The ANOVA analysis revealed no significant outcomes between the two groups in self-efficacy ($F(1,132) = 0.013$, $p = 0.909$) and outcome expectancy ($F(1,132) = 3.417$, $p = 0.985$).

To measure if there were any significant differences between pre-survey and post-survey within each semester for self-efficacy and outcome expectancy, paired-sample t-tests were conducted to discover any significant differences.

For the spring semester, a Shapiro-Wilk test was conducted on self-efficacy and outcome expectancy to measure the normality of the data. The results indicated that the self-efficacy scores violated normality ($W(61) = 0.914$, $p < 0.001$); while outcome expectancy did not ($W(61) = 0.968$, $p = 0.102$). Thus, a Wilcoxon signed ranked test was performed on the self-efficacy scores, and inferential statistics were used for outcome expectancy. Analysis of the pre and post-test results found no significant differences in teaching efficacy during the spring semester ($Z = 590.00$, $p = 0.264$, $d = 0.18$). However, outcome expectancy ratings were significantly higher in post-survey results ($t(61) = -3.543$, $p < 0.001$, $d = 0.45$).

A Shapiro-Wilk's test on the fall semester's pre-survey and post-survey self-efficacy and outcome expectancy data indicated no violations of normality with self-efficacy ($W(71) = 0.981$, $p = 0.343$) and outcome expectancy (($W(71) = 0.971$, $p = 0.090$). Therefore, inferential statistics were used to analyze self-efficacy and outcome expectancy scores. Analysis of the pre and post-test results in the fall semester found no significant differences with self-efficacy ($t(71) = -1.253$, $p = 0.214$, $d = 0.15$). Still, significant differences were found with outcome expectancy ($t(71) = -2.135$, $p = 0.036$, $d = 0.25$). See Table 3 for all means and standard deviations for the spring and fall semesters.

Table 3
Means and standard deviations of findings by semester

		Self-Efficacy		Expected Outcome	
		Pre-survey	Post-survey	Pre-survey	Post-survey
Semester	N	M(SD)	M(SD)	M(SD)	M(SD)
Spring	62	35.82 (3.08)	36.16 (3.17)	29.71 (3.56)	31.53 (3.22)
Fall	72	35.89 (3.56)	36.58 (3.54)	30.47 (3.41)	31.54 (2.68)

Findings from PSTs' interviews and reflection notes

Similarities among PSTs' online micro-teaching experiences

The PSTs' interviews and reflections analysis showed that online micro-teaching could positively influence their 1) increased outcome expectancy and 2) reflective thinking and practices. After finishing the online micro-teaching experiences, the PSTs highlighted that the experience helped them practice what they learned from the course. In addition, many PSTs wrote in their reflection notes that they felt more prepared for future teaching at the end of the semester than at the beginning. The interview analysis also indicated that PSTs gained self-confidence through team teaching. These findings implied that online micro-teaching could positively impact PSTs' outcome expectancy. Also, PSTs mentioned that instructor feedback helped them re-plan lessons and provide critically effective online education. Here is an example from the PST's reflection note:

Since it was my first time completing online micro-teaching, I learned many things about planning a technology-integrated lesson, making an online micro-teaching video, and making a Google classroom for my own LMS. Thanks to these experiences, I felt more confident teaching my future students than at the beginning of this semester (reflection note, PST 12).

PSTs noted that they learned how to modify traditional lesson plans into flipped or project-based learning. Many PSTs wrote positive perceptions towards flipped learning because they could see how to implement pre-class instructional videos that could benefit future students. The PSTs explained that educational technology and the flipped learning model could create a more student-centered classroom environment.

We learned about project-based and flipped learning from other courses, but this class allowed me to implement these with online micro-teaching videos. This course was practice-based with hands-on activities, not a theory-driven course (reflection note, PST 30).

Further analysis indicated that online micro-teaching could positively influence reflective thinking and practices. After watching their peer teaching videos, online reflections on the micro-teaching experience indicated that PSTs devised how to improve lessons for future instruction. During the interviews, PSTs emphasized the importance of online education but lacked experience with implementing online instructional design for their disciplines. However, with the help of online micro-teaching experiences, they recognized that online education is essential for future students, especially during a pandemic. Also, PSTs mentioned that online education could be an effective medium of teaching and learning in the future. Here is the one transcript from the interviews:

I need to improve myself to become a future teacher who can effectively demonstrate online education. I see why online education is necessary for my future students during the pandemic. The important lesson that I received after the online micro-teaching was that education must go on even in a pandemic situation (Interview transcript from PST 6, math education major).

Differences among PSTs' online micro-teaching experiences

Although similarities were found in PSTs' responses, the analysis further revealed differences from PSTs' online micro-teaching experience based on semesters and their disciplines. For instance, the data analysis showed critical differences between PSTs in the spring 2020 and fall 2020 semesters. In spring 2020, PSTs mentioned that the asynchronous structure of watching micro-teaching sessions could be a limitation of this method, as it is the dissimilar structure of a F2F class. Here is one example from the PSTs' reflection note:

It was a little disappointing because we did not have a chance to observe our classmates' teaching videos and practices together. It would be better to have a F2F meeting while we are all present and complete the micro-teaching sessions on campus (reflection note, PST 30).

On the other hand, in the fall of 2020, PSTs could watch peer teaching videos and provide feedback to each other through synchronous Zoom sessions. Here is one example from the PSTs' interviews:

While observing peer teaching videos, we provided synchronous feedback to each other's micro-teaching videos. It was a unique experience because feedback from peers and the instructor helped me better understand how to do it effectively in the future. If COVID continues, this will be our future class of 2021 again (Interview transcript from PST 10, early childhood education major).

Another critical difference was the implementation of educational technology within different disciplines. For example, special education PSTs mentioned that previous education technology research lacked important aspects to accommodate children with physical or mental difficulties. This finding showed the PSTs contemplated the relevance of educational technology in their field. Here is one example from the PSTs' interviews:

While working on assignments for technology integration, we questioned how we could apply technology integration knowledge to the special education field. We searched the previous literature and found that many studies had focused on the purpose of rehabilitation. So, it was difficult for us to utilize technology integration for future students with learning difficulties (Interview transcript from PST 8, special education major).

Physical education PSTs responded that demonstrating actions and moves through Zoom videos had some limitations in coaching and connecting with their future students. This was because it was difficult for the PSTs to provide movement feedback without interacting with students in actual classrooms. Here is one example from the PSTs' interviews:

The online micro-teaching videos had limitations when I tried to demonstrate certain movements. If I were the teacher now, it would be hard to connect with students and provide feedback on time. I know we have to conduct zoom or online education during the pandemic, but I noticed some limitations about this format (Interview transcript from PST 7, physical education major).

Based on these comments, PSTs could have different experiences based on micro-teaching feedback design and discipline.

DISCUSSIONS

The COVID-19 pandemic created a changing environment that forced universities to explore alternatives to the standard models in teacher training education (Moorhouse, 2020). Recognizing that micro-teaching is primarily practiced in F2F contexts, this research examined how online micro-teaching affected PSTs' self-efficacy and reflections in the teacher education program.

The quantitative data revealed no significant differences between the semesters. However, the pre-survey and post-survey within each semester did find similar

significant outcomes. In both semesters, there were no significant differences in the increase in self-efficacy. However, outcome expectancy was significantly different at the end of each semester. Since outcome expectancy is part of the self-efficacy theory, this study provides evidence that online micro-teaching could positively influence aspects of PSTs' self-efficacy based on Bandura's self-efficacy theory (2006).

The findings of self-efficacy and outcome expectancy in an online environment did not support previous findings from the F2F context (Bleicher, 2004; Cinici, 2016; d'Alessio, 2018). Therefore, the current findings might be due to context, which several scholars have emphasized as the key to influencing PSTs' self-efficacy (Hechter, 2011; Menon & Sadler, 2018; Usher & Pajares, 2008). The online experience provides PSTs with different situations that might not be replicable in a F2F context. Different contexts require different considerations, so in relation to previous experiences in a F2F classroom setting, mastery experience was not sufficiently gained since the online experience was a decontextualized teaching experience.

However, this research does support Bilen's (2015) findings that micro-teaching can increase outcome expectancy. A reasonable explanation for this finding might be the lack of an authentic context may not allow PSTs to fully replicate the teaching experience, which allowed them to assume the degree to which future outcomes would occur. This result would be consistent with Cinici's (2016) suggestion that encountering usual classroom problems and the lack of experience handling them can negatively impact outcome expectancy. However, in this situation, because PSTs did not have the opportunity to encounter normal classroom problems that would expose their inexperience, the PSTs were able to be more confident in outcome expectancies.

The qualitative data analysis suggested connections with Bandura's (2006) sources of self-efficacy. For instance, PSTs expressed more benefits from the synchronous format, allowing them to observe and negotiate in real-time with classmates. However, PSTs in the asynchronous indicated that the lack of interaction in the micro-teaching tasks minimized the potential impact of the experience. This result could suggest that the social modeling experience of self-efficacy could benefit from synchronous delivery.

Lastly, PSTs mentioned they felt anxious and not confident in implementing education technology in their discipline due to the lack of training. However, after the course, many stated their exposure to different educational technology tools relieved some of their teaching anxiety, indicating that online micro-teaching could positively impact PSTs' psychological and affective states.

These study findings align with previous literature that recorded teaching videos and feedback sessions were critical to reflective practices (Henderson et al., 2012; Ledger et al., 2019; Ledger & Fischetti, 2020). The feedback sessions and reflective practices helped PSTs re-plan lessons and critically considered online education an effective learning medium. This result allowed PSTs to connect the practice and theory of teaching and learning in an online environment (Grossman, 2005). In addition, reflective notes indicated that PSTs considered how to use online tools to enhance the online learning experience after their first micro-teaching experience. Therefore, reflections in

the online environment could be similar to F2F findings that suggest micro-teaching is a useful strategy for uncovering and correcting errors and misconceptions held by PSTs (Kourieos, 2016; Kusmawan, 2017; Lin, 2016; Yesilbursa, 2011).

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