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A Systematic Review of the Practicum Experience in Preservice Teacher Education During the COVID-19 Pandemic

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Abstract. As a result of the COVID-19 pandemic, preservice teachers in all education programmes have been affected by the closure of schools. This has forced a shift from in-school preservice teaching experience to an online preservice teaching approach. The aim of the present paper is to provide an overview of research on teaching practicum experience during the COVID-19 pandemic through a systematic review. Out of 51 initially identified publications between March 2020 and December 2020, 26 articles were included for the final synthesis in terms of teaching strategies, methods used for assessing preservice teachers, digital technology tools and challenges that faculties and preservice teachers faced. The results indicate that the most commonly used teaching strategies used in the practicum were demonstration in synchronous sessions, observation/helping associate teachers, micro-teaching, and e-coaching/mentoring. Additionally, the results demonstrated that the main use of digital technology tools was for communication, instruction, collaboration and e-coaching. Additionally, the results present four methods of assessment that education programmes followed: (1) grading preservice teachers' performance in the first weeks of the spring semester; (2) evaluating students' recorded lessons; (3) evaluating prepared virtual classroom presentation; and (4) grading online portfolios. Moreover, the results indicate that faculties and preservice teachers have faced numerous challenges such as a lack of real teaching experience, limited experience in the use of information and communications technology (ICT), and a lack of technological infrastructure, access and support. The conclusions reflect on the importance of including technology integration and teaching and learning in the online environment in courses offered by teacher education programmes, equity issues for students, and the need to strengthen preservice teachers' beliefs in their capacity to deal with the transition to distance modes of education in times of crisis.

Keywords: practicum experience; preservice teachers; systematic review; teacher education; COVID-19 pandemic

1. Introduction

Student teaching is one of the most valuable elements of preservice teacher preparation programmes (Scott, 2015; Ulla, 2016). Future teachers typically gain their most intensive exposure to the teaching profession during the practicum in teacher education programmes. Throughout the practicum, preservice teachers work under the supervision of a mentor, supervisory teachers, or supervisors from a university or college of education (Cohen et al., 2013). During the third week of March 2020, the COVID-19 pandemic radically transformed student teaching experiences at most universities across the world (e.g., Flores & Gago, 2020; Kalloo et al., 2020; Vasinda et al., 2020). As a result, the quality of final teacher preparation experiences was impacted and amended in several ways. Preservice teachers were not able to fulfil the expected practicum experiences in schools. Thus, faculty members and administrators had to quickly re-envision and reimagine usual field experiences in response to the unprecedented situation (Flores & Gago, 2020). Colleges of education attempted to identify a suitable replacement for practicum hours, which had usually involved preservice teachers working side by side with in-service educators in physical classrooms (Ersin et al., 2020; Nasri et al., 2020). The teaching practicum had to be temporarily moved from being a regular experience in a physical classroom to an online setting (remote practicum).

Most colleges of education have mechanisms by which to guide and assess preservice teachers during their teaching practicum experience in real classrooms; however, the sudden shift from in-school to online student teaching, due to the pandemic, may have led to changes in teaching strategies and methods of assessment. The online mode of delivery required certain innovations and modifications in instructional materials, teaching methods and assessment techniques. It is likely that this caused challenges to faculty members and preservice teachers. Thus, there is a need to carry out this review to understand the impact that the COVID-19 pandemic had on the teaching and assessment practicum mechanism. This study systematically examines and discusses how teacher preparation programmes unexpectedly switched from a student teaching experience in schools to an online student teaching approach. It also reports on how these programmes managed to maintain a high standard of instruction for their student teachers even as schools were closing. The purpose of this systematic review of the literature is to offer a snapshot of the teaching practicum during the COVID-19 pandemic by focusing on empirical studies and narrative articles published during 2020. Accordingly, the current review adds to the developed knowledge of teaching practicum practices in higher education contexts, particularly in emergency times. This study reviews the studies on the practicum of preservice teachers in four areas: 1) teaching strategies; 2) methods used for assessing preservice teachers in the remote practicum; 3) digital technology tools; and 4) challenges that faculties and preservice teachers faced. To achieve this, this review focuses on the following research questions:

1- What are the teaching strategies used in the remote practicum?
2- What are the methods used for assessing preservice teachers in the remote practicum?

3- What are the digital technology tools that were used to continue the remote practicum?
4- What are the challenges faced by faculty members and preservice teachers in the remote practicum?

2. Literature Review

Several studies were undertaken during the COVID-19 pandemic to report on lessons learned and how teaching practicum was adapted during this unexpected time. Teaching practicum is considered to be one of the most significant elements of teacher education because it enables preservice teachers to have exposure to real teaching experiences (Trent, 2013). The main goal of conducting the practicum is to provide hands-on teaching experiences and activities for preservice teachers (Ersin et al., 2020), and traditionally, for this to be effective, special training has been conducted in real classrooms. Because of the COVID-19 pandemic, preservice teachers were not able to complete the required practicum experiences in schools. Colleges of education in different universities worked to find acceptable alternatives for practicum hours via online teaching modes.

2.1 Practicum experiences for preservice teacher education during the COVID-19 pandemic

The practicum is considered to be one of the most important aspects of a student teacher's education (Caires et al., 2012). It provides an opportunity for preservice teachers to connect theory with practice in real-world settings (Ersin et al., 2020; Li et al., 2021). It is expected that preservice teachers will be prepared to understand and deal with the complexity of teaching, so they can contribute in educational settings in a competent way once they are qualified (Lawson, 2015). The disruption caused by the pandemic to the professional preparation of preservice teachers around the world has produced a slew of challenges for teacher educators as a result of the emergency closure of universities (Mutton, 2020). Most K–12 schools no longer offered face-to-face instruction, and many teachers were forced to hastily switch to online instruction with no support (Vakil, 2020). Similarly, preservice teachers had to make a sudden shift to online practicum. Different researchers reported that technology played a critical role in the response to the pandemic crisis, which affected the whole world, especially in the education system (Ersin et al., 2020; Flores & Gago, 2020; Kim, 2020). Without technology, teacher educators and preservice teachers would not have been able to participate in appropriate online learning and teaching (Nuland et al., 2020).

2.1.1 Teaching strategies used in the remote practicum

The sudden shift to an online practicum made training more challenging for teacher educators and preservice teachers. The challenge for teacher educators was to create substitute learning experiences online to substitute the experiences of an in-person practicum, and to evaluate preservice teachers to make sure that they were prepared for teaching in real classrooms in the years ahead (Barnes et al., 2020; Cohen, et al, 2013; Flores & Gago, 2020). Therefore, several changes were made to instruction and lesson delivery in order to ensure the continuity of teaching practicum (Ersin et al., 2020; Kim, 2020). Additionally, many educational programmes proposed several strategies for improving teacher competence (Poyo, 2020; Velle et al., 2020). These strategies included support for online

teaching with familiar structures to create a learning community for collective efficacy (Poyo, 2020; Vasinda, 2020). Another strategy was in the creation of online-group discussions and actively engaging with students during online lessons when teaching mathematics (Cirillo et al., 2020). In their study, Cirillo et al. (2020) tested a virtual simulation in which math preservice teachers acted as the teacher in facilitating instruction to student-avatars. Preservice teachers were able to practise lesson planning, discuss the lesson with students, and reflect on the whole process. The use of simulations helped in the development of different practices for math preservice teachers in mathematics education (Lee & Freas, 2020).

Further, Ersin et al. (2020) reported on the application of online micro-teaching sessions and found that e-mentoring was a successful alternative method for preservice English-language teachers to connect with their colleagues in order to ask and receive advice, share experiences and exchange ideas, both with their colleagues and e-mentor, without time and space limitations. Other universities changed the role of preservice teachers from being responsible for teaching to observing and helping their associate teachers (Flores & Gago, 2020).

2.1.2 Assessment strategies used in the remote practicum

A key concern for teacher education has been the completion of the practicum requirements. Some programmes chose to grade preservice teachers based on their performance in the first weeks of the spring semester (when they were teaching in person) and continued to provide them with experiences to fulfil the needs of preservice teachers while maintaining the quality of the practicum (Ersin et al., 2020). Other education programmes assigned different tasks to evaluate preservice teachers, such as watching episodes of *Mr. Rogers' Neighbourhood* (an educational children's television series) and writing personal reflections and critical theoretical analysis of the episodes using Educational Psychology Theory (Schelling & Rausch, 2020). Another way to assess preservice teachers was through engaging them in teaching with their mentor teachers and evaluating them based on their online lesson planning (Barnes et al., 2020).

Further, some programmes assessed preservice teachers by rating their participation in simulated teaching demonstrations in a virtual classroom with English-language learners' avatars. This gave preservice teachers the chance to observe and question differing levels of English learners' proficiency as well as experience in classroom management (Monroe et al., 2020). Other programmes required preservice teachers to produce an electronic portfolio (e-portfolio) as a replacement for practicum hours. Preservice teachers were evaluated based on their capability to create lesson plans, interdisciplinary unit plans involving multiple subjects, and conduct two lessons (Hendrith et al., 2020).

2.1.3 Digital technology tools used in the remote practicum

Several researchers have shown that technology was used by faculties and preservice teachers to continue delivering the teaching practicum for instruction, communication, collaboration and mentoring. Faculties and preservice teachers used different digital tools such as Zoom, YouTube and Nearpod to create lessons and interactive videos (Esrin et al., 2020; Kim, 2020; Vakil, 2020). Additionally,

faculties used Google Meet, emails and Zoom chats to communicate and interact with students. Further, various social media platforms (e.g., Twitter, WhatsApp) supported preservice teachers' engagement and helped to build collective resilience (Pick et al., 2020). Moreover, technology such as Flipgrid, Google Docs and VoiceThread supported collaboration among preservice teachers in online teaching instruction and understanding new concepts. The pandemic proved that faculty members and preservice teachers need to be well trained to properly match technological tools and pedagogical practices in their teaching (Lisa et al., 2021).

2.2 Challenges faculty members and preservice teachers faced in remote practicum experience

Online learning has been shown to be useful during the COVID-19 crisis. The use of technology and various tools has many benefits, and has helped in developing the participation of students as well as teachers (Pick et al., 2020). However, online education has some disadvantages, such as a lack of online teaching abilities among educators and the time-consuming creation of online lesson plans (Nuland et al., 2020). Several researchers reported different challenges that university instructors faced during the pandemic such as a lack of technological training for online teaching and learning and poor internet connectivity (Badaru et al., 2022) and a lack of student engagement (Kalloo et al., 2020). Despite the fact that online teaching skills are very important, especially when preservice instructors find themselves teaching online (Vakil, 2020), researchers have reported that virtual practicum experiences and online teaching skills are not covered in many teachers' education programmes (Sepulveda-Escobar & Morrison, 2020; Vakil, 2020).

Some of the issues that were most detrimental to full training of preservice teachers during the practicum were: 1) access to effective online connectivity and support (Nuland et al., 2020); 2) a lack of preservice teachers' professional development for online learning (Nuland et al., 2020; Vakil, 2020); 3) limited social interaction and engagement (Kalloo et al., 2020); and 4) limited experience or skills for using ICT (Kalloo et al., 2020, Kim, 2020). Additionally, without high-speed internet, preservice teachers and instructors were unable to access materials to support their learning and teaching (Nuland et al., 2020). Similar challenges such as a lack of electricity and lack of resources and ICT skills were also reported by students in various faculties (Mudzingiri et al., 2022). However, the challenges and interruptions occasioned by school and university closures may be regarded as an opportunity to discover and redesign traditional roles and teaching practices (Flores & Gago, 2020). Many educators are using synchronous and asynchronous video capabilities to continue providing high-quality curriculum materials for preservice teacher educators in this historic era of COVID-19 (Besser, 2020).

3. Methodology

This research employed a systematic review method to analyse the research studies published on preservice teachers' practicum experiences during the pandemic. Systematic reviews can be defined as "a review of existing research using explicit, accountable rigorous research methods" (Gough et al., 2017:4). The purpose of a systematic review is to review existing research in order to answer

specific questions, based on explicit and accountable research methods using inclusion and exclusion criteria to determine which research papers to include or exclude (Gough et al., 2017). This systematic review followed the nine step-process identified by Newman and Gough (2020): (1) developing research questions; (2) designing a conceptual framework; (3) constructing selection criteria; (4) developing the search strategy; (5) selecting studies using selection criteria; (6) coding the studies; (7); evaluating the quality of studies; (8) synthesising the results of studies to answer the review questions; and (9) reporting the findings.

3.1 Selection criteria

The review was based on articles providing empirical information on the practicum during a specific period or descriptions of actions in field experiences. The two researchers for this review applied the following selection criteria for articles to be included: published in peer-reviewed articles, based or reported on an empirical study or narrative articles, reporting on teaching practicum during the COVID-19 pandemic, and published between March 2020 and December 2020.

3.2 The search strategy

The initial search and criteria for this systematic review included articles in English, reporting on teaching practicum, and indexed in the following six electronic databases: EBSCOhost, PsycINFO, Google Scholar, Research Gate, Academic Search and Eric. The review focused on the following search terms: field experience, remote student teaching internship, practicum experience, field experience, virtual internship, practicum during COVID-19, preservice teacher education and teacher training. Independent searches were conducted for each of the keywords using selected search engines. Using these search terms, a total of 51 articles were found as of December 30, 2020. However, 25 articles were excluded due to replication across databases, some not being in the field of teacher education, and some being descriptions of other field experience programmes. Additionally, some publications were found to be irrelevant to the research questions after reviewing the title and the abstract. The final selection yielded a total of 26 relevant articles.

3.3 Construction of the database

A total of 26 published studies met the inclusion criteria and were included in the review. The authors then began to extract data using a form in order to extract the required information from the studies. The form for each article included details of: (1) location of study; (2) methodology; (3) sources of data; (4) teaching and assessment strategies; (5) digital tools; (6) challenges faculties faced; and (7) challenges preservice teachers faced. The information is summarised in Tables 1–8. The data extracted through the form (1–3) were used as general information about the articles that were reported. The data extracted through the form (4–7) were synthesised in order to answer the research questions.

4. Results

In this review, a total of 26 articles were identified addressing teaching practicum experiences during the COVID-19 pandemic in education programmes. Based on

the information obtained from the reviewed studies, the following results are presented. In addition, to gain an overview of the nature of the current research conducted, general characteristics of the reviewed studies were analysed according to the location of the research, the methodological approach used and the sources of data.

4.1 Location of studies

Most of the 26 studies that were chosen and published between March and December 2020 were conducted in the USA, and others in Australia, England, Portugal, Chile and Canada. However, by far the largest group of studies were based in the USA (16 – 61.5%) (Table 1).

Table 1: Location of studies

#	Country of Research	Number of Studies
1	USA	16
2	Chile	1
3	Australia	1
4	Trinidad and Tobago	1
5	Portugal	2
6	England	2
7	Israel	1
8	Canada	1
9	Turkey	1
Total		26

4.2 Research methods

The researchers' main interest was to report on practicum practices undertaken during the pandemic which had a clear description of the shift to remote practicum. The three types of methodological approaches were qualitative, quantitative and mixed. Most of the studies used quantitative methods (n = 11) and case study (n = 15) (Table 2).

Table 2: Methodology approach

Quantitative	Case study	Total
11	15	26

4.3 Source of data

In line with the aim of understanding preservice teachers' experiences in the practicum, interviews (n = 8) and observations (n = 9) were the most frequent type of data source (Table 3). The second most frequently used tools included questionaries and surveys (n = 6). The least used data-gathering tools included focus groups for preservice teachers.

Table 3: Sources of data

Type of Data Source	Number of Studies
Questionnaires/ surveys	5
Interviews and survey	1
Interview	7
Observations	9
Focus groups	2
Documents/websites	2
Total	26

4.4 Teaching strategies used in the remote practicum

The data analysis shows that due to the pandemic, preservice teachers' educational faculties used alternative teaching strategies to ensure the continuity of the practicum practice. The authors examined the major teaching strategies embedded in the articles which reported teaching strategies used in the practicum. Analysis revealed that the various teaching strategies were used in the practicum, including synchronous and asynchronous modes of teaching: 1) demonstration in synchronous sessions (e.g., Flores & Gago, 2020; Kalloo et al., 2020; Vasinda et al., 2020); 2) observation/helping associate teachers (e.g., Cirillo, 2020; Flores & Gago, 2020; Nuland et al., 2020; Poyo & Ash, 2020; Sepulveda-Escobar & Morrison, 2020); 3) micro-teaching (e.g., Esrin et al., 2020; Kim, 2020; Vasinda et al., 2020); 4) e-coaching/mentoring (e.g., Ersin et al., 2020; Pike et al., 2020); 5) recorded lectures (e.g., Besser, 2020; Pike et al., 2020); 6) game-based learning (e.g., Kalloo et al., 2020); and 7) teaching via simulation programmes (e.g., Lee & Freas, 2020).

As can be seen in Table 4 most teacher education programmes included at least two teaching methods during the practicum, such as demonstration in synchronous sessions and observation/helping associate teachers (Flores & Gago, 2020); demonstration in synchronous sessions and micro-teaching (Vasinda et al., 2020); e-coaching/mentoring and recorded lessons (Pike et al., 2020); micro-teaching and e-coaching/mentoring (Ersin et al., 2020). Other teacher programmes chose one teaching method such as game-based learning (Kalloo et al., 2020) and teaching via simulation programmes (Lee & Freas, 2020). It is

noticeable that teacher education choice was based on the preservice teachers' majors.

Table 4: Teaching strategies used in the remote practicum

	Teaching Strategies Used in the Remote Practicum	Example of Studies
1	Demonstration in synchronous sessions	Flores and Gago (2020); Kalloo et al. (2020); Vasinda et al. (2020)
2	Observation/helping associate teachers	Cirillo (2020); Flores and Gago (2020); Nuland et al. (2020); Poyo and Ash (2020); Sepulveda-Escobar and Morrison (2020)
3	Micro-teaching	Ersin et al. (2020); Kim (2020); Vasinda et al. (2020)
4	E-coaching/mentoring	Ersin et al. (2020); Pike et al. (2020)
5	Recorded lectures	Besser (2020); Pike et al. (2020)
6	Game-based learning	Kalloo et al. (2020)
7	Teaching via simulation programmes	Lee and Freas (2020)

4.5 The methods used for assessing preservice teachers in the remote practicum

The data analysis illustrates that many countries faced the possibility of school closures throughout 2020, and so faculties offering educator preparation programmes needed to find ways for students to apply their knowledge in online teaching scenarios rather than the traditional classroom. Preservice teachers' education faculty members used different methods to assess students' performance in the remote practicum. The authors found that different programmes dealt with the situation differently as some chose not to evaluate preservice teachers' performance and others evaluated based on: 1) their performance in the first weeks of the spring semester (when they were teaching in person) (e.g., Ersin et al., 2020); 2) watching of episodes (*Mr. Rogers' Neighbourhood*), and writing personal reflections and theoretical analysis of the episodes (e.g., Schelling & Rausch, 2020); 3) evaluation of recorded lessons (Barnes et al., 2020); 4) evaluation of prepared virtual classroom presentations in TeachLivE (Monroe et al., 2020); and 5) online portfolios as a replacement for on-site field experience (Hendrith et al., 2020). The main goal was to assess whether preservice teachers were ready to teach in real classrooms after graduation. As seen in Table 5, different assessment methods were used to assess their performance and ability to link theory with practice in authentic settings in the future.

Table 5: Methods used to assess preservice teachers in the remote practicum

	Methods Used to Assess Preservice Teachers in the Remote Practicum	Example of Studies
1	Grading preservice teachers' performance in the first weeks of the spring semester	Ersin et al. (2020)
2	Observation of episodes and writing personal reflections and theoretical analysis	Schelling & Rausch (2020)
3	Evaluation of recorded lessons	Barnes et al. (2020)

	Methods Used to Assess Preservice Teachers in the Remote Practicum	Example of Studies
4	Evaluation of prepared virtual classroom presentation in TeachLivE	Monroe et al. (2020)
5	Online portfolio as a substitute for on-site field experience	Hendrith et al. (2020)

4.6 The digital technology tools that were used to continue the remote practicum

The data revealed that many educators had to quickly move to online teaching due to the COVID-19 pandemic. In response to this, educator preparation programmes needed to offer preservice teachers meaningful online educational experiences so that they could become better prepared to teach online. Preservice teachers continued to demonstrate their competencies during practicum as a result of their use of a variety of digital technology tools during this crisis. The authors found that digital tools used to support the remote practicum varied. Based on the literature (Pick et al., 2020; Castro, 2019), different faculties used different digital tools, for example, for teaching and learning, communication, collaboration and monitoring progress. The results revealed that the main use was for communication (tools for communication between faculties and preservice teachers, or preservice teachers and preservice teachers, or preservice teachers and associate teachers), instruction (tools used for teaching activities), collaboration (tools to boost collaboration between preservice teachers themselves in tasks and activities), and e-coaching (tools for e-mentoring preservice teachers in online sessions) as shown in Table 6.

Table 6: Digital technology tools that were used to support the remote practicum

	Use	Digital Tools	Example of Studies
1	Communication	Zoom chats, forums, Google Meet, email, WhatsApp, Skype, online office hours, Instagram, Twitter	Donitsa-Scmidt and Ramot (2020); Ersin et al. (2020); Flores and Gago (2020); Kim (2020); Pick et al. (2020)
2	Instruction	Google Hangouts, Zoom, Blackboard Collaborate, whiteboard, Skype, YouTube channels, videos	Ersin et al. (2020); Flores and Gago (2020); Kim (2020); Kidd and Murray (2020); Vasinda et al. (2020)
3	Collaboration	Padlet, Flipgrid, Zoom, Google Docs, Microsoft Teams, gamification, game-based learning, VoiceThread, Pear Deck, Nearpod	Kalloo et al. (2020); Kidd and Murray (2020); Pick et al., (2020); Riggleman (2020); Vakil (2020)
4	E-coaching	VR simulation, Zoom breakout rooms	Cirillo et al. (2020); Sasaki et al. (2020); Lee and Freas (2020)

4.7 The challenges faced by faculty members and preservice teachers in the remote practicum

The authors examined the major challenges faced by faculty members, embedded in the current literature on preservice teacher practicum experience during the COVID-19 pandemic. According to the literature, there are many challenges faced by faculties when using technology and online instruction (Almuqayteeb, 2009;

Sithole, 2019; Zamani, 2016). Six main challenges emerged related to faculties, technology and students as reflected in Table 7.

Table 7: Challenges faced by faculty members in the remote practicum

Category	Challenges		Example of Studies
Faculty	Faculty	Using technology requires more time and effort	Nasri et al. (2020)
		Lack of effective training (professional development)	Nuland et al. (2020); Vakil (2020)
		Limited experience or skills for using ICT	Kalloo et al. (2020); Kim (2020)
	Technology	Lack of technological infrastructure, access and support	Flores & Gago (2020); Nasri et al. (2020); Nuland et al. (2020); Vasinda et al. (2020)
		Security issues and privacy	Ersin et al. (2020)
	Students	Lack of student engagement	Kalloo et al. (2020); Kidd & Murray (2020)

As shown in Table 8, the main challenges that preservice teachers faced were related to the online practicum teaching environment (lack of real teaching experience and thus missing out on collaborative learning with their peers) and technology (access, technical problems and lack of training) challenges.

Table 8: Challenges faced by preservice teachers in the remote practicum

Category	Challenges	Example of Studies
Preservice teachers	Missing collaborative learning	Cirillo (2020); Nasri et al. (2020)
	Engagement frustration	Vasinda et al. (2020)
	Missing the experience of learning from associate teachers (lack of practical experience/real teaching experience)	Donitsa-Scmidt and Ramot (2020); Ersin et al. (2020); Nasri et al. (2020); Nuland et.al (2020)
	Lack of equipment, access and infrastructure	Flores and Gago (2020); Nasri et al. (2020)
	Unexpected technical problems	Ersin et al. (2020)
	Limited experience or skills for using ICT	Kim (2020); Nasri et al. (2020)

5. Discussion

Based on the findings, it appears that several education programmes responded by facilitating a collaborative approach between preservice teachers and their mentor teacher so that the student teacher could practise teaching in the same way as their mentor teachers (Barnes et al., 2020; Cohen et al., 2013; Nuland et al., 2020). An alternative mode of teaching and practicum assessment, which evaluated teacher competencies, had to be implemented for students to complete their practicum experience (Moyo, 2020). In many instances, the role of preservice teachers shifted from being responsible for teaching to being the primary support

for their mentor teachers who were devastated by the ambiguity and vagueness of having to switch to online teaching immediately (Flores & Gago, 2020; Nuland et al., 2020; Poyo & Ash, 2020; Sepulveda-Escobar & Morrison, 2020).

This systematic review has identified how, due to the new situation, different teaching strategies were used to guarantee the continuity of the practicum. It was noticeable that the teaching strategies used were appropriate for teacher education majors. For example, virtual simulation was used in which math preservice teachers acted as the teacher in facilitating instruction to student-avatars. Preservice teachers were able to practise lesson planning, discuss the lesson with students, and reflect on the whole process (Lee & Freas, 2020). Moreover, preservice math teachers worked in online-group discussions and actively engaged with students during online lessons (Cirillo et al., 2020). Further, e-mentoring was employed as a successful substitute approach for preservice English-language teachers to connect with their fellow students in order to ask and receive guidance, share experiences and exchange ideas with both their colleagues and e-mentors without time and space limitations. Ersin et al. (2020) asserted that e-mentoring created a community of practice for preservice English teachers to establish strong bonds and a shared meaning, and to improve their professional skills. Further, creating a learning community contributed to collective efficacy for preservice teachers.

Similarly, Vasinda et al. (2020) reported that learning communities encouraged students to continue to teach online and share their learning experiences with their peers via Flipgrid video reflections, resources and strategies for designing online lesson plans. Additionally, the sudden transition to remote online teaching and practicum proved that using the TPACK model and its elements in response to an immediate need for emergency remote teaching provided support to preservice teachers in the teaching and learning process (Nasri et al., 2020; Vakil, 2020; Vasinda et al., 2020). In order to effectively integrate technology tools and pedagogical approaches, preservice teachers must advance their skills in this area. During the pandemic, the completion of the practicum requirements, especially for those who were close to concluding their programmes, was crucial for teacher education. The researchers examined assessment strategies that were used in the remote practicum to evaluate preservice teachers. Diligent efforts were made to make sure that preservice teachers were able to complete their student teaching and their graduation requirements. Teacher preparation programmes focused on how to provide preservice teachers with the necessary practicum experiences and not to delay their practicum due to the emergency closure of schools. Some programmes chose to grade preservice teachers based on their performance in the first weeks of the spring semester (Ersin et al., 2020). Other education programmes assigned different tasks to evaluate preservice teachers, such as watching episodes of *Mr. Rogers' Neighbourhood* and writing personal reflections and critical theoretical analysis of the episodes, using Educational Psychology Theory (Schelling & Rausch, 2020). Those assessment methods offered a solution to the problem of the continuity of teaching practicum; however, the methods did not address the most important skill set developed through classroom management skills and real interaction and contact with students in real classrooms and that

cannot be practised online. This lack of real experiences and interactions may cause problems in future classrooms.

Another assessment strategy involved evaluating preservice teachers based on their online lesson planning through engaging them in teaching with their mentor teachers (Barnes et al., 2020). This raises concerns regarding the effectiveness of the assessment methods used because each programme includes certain competencies that are aligned with teaching activities and objectives. Faculty members need to carefully examine students' performance to identify the skills which have been impacted and provide support to develop the weak ones. Further, some programmes allowed preservice teachers to fulfil their graduation requirements via participation in simulated instructional presentations in a virtual classroom with English-language learners' avatars (Monroe et al., 2020). This method proved to be effective for giving preservice teachers the opportunity to practise new skills; however, preservice teachers who have no prior virtual classroom experience might be nervous when working with the platform. In addition, using a simulation platform might be too costly for some education programmes. As a substitute for practicum hours, some educational institutions adopted electronic portfolios (e-portfolios). The evaluation criteria for preservice teachers included their capability to design lesson plans, interdisciplinary unit plans involving multiple subjects, and teaching two lessons (Hendrith et al., 2020). Nevertheless, to validate the use of e-portfolios, teacher education preparation programmes should consider the importance of collaboration in learning environments, namely working in teams, to avoid over-burdening professors or supervisors in dealing with change (Hendrith et al., 2020). Furthermore, preservice teachers who only had to provide an e-portfolio missed out on classroom management skills and real interaction and contact with students in real face-to-face classrooms.

In response to the COVID-19 shift solely to distance and online learning, preservice teachers were exposed to different technology, integrating opportunities that were used for instruction. It was found that there is an urgent need for teacher preparation programmes to rapidly develop curricula and courses relevant to teaching and learning in the online environment to better prepare preservice teachers. Future teachers' roles entail not only teaching but also becoming course facilitators, instructional designers and technology coordinators (Vakil, 2020). Preservice teachers could face more barriers when trying to use technology in the classrooms if they are not trained on how to use it effectively (Sepulveda-Escobar & Morrison, 2020). This review reported that the use of technology encouraged engagement, provided feedback, and developed collective flexibility among preservice teachers (Kalloo et al., 2020; Pick et al., 2020).

Regarding technology tools, the researchers for this review identified five categories of technologies. Technology was used mainly by faculty members and preservice teachers for instruction, communication, collaboration, e-coaching and mentoring. It was clear that the quick and innovative use of low-tech and high-tech tools overcame difficulties in maintaining preservice teachers' internship

experiences through remote learning, equitable access and engagement. Faculty members in teacher education programmes used different technology tools such as email, WhatsApp, or Zoom chats to improve communication between faculties and preservice teachers, or preservice teachers and preservice teachers, or preservice teachers and associate teachers (Donitsa-Scmidt & Ramot, 2020; Ersin et al., 2020). Additionally, faculty members and preservice teachers practised using technology tools such as Blackboard Collaborate, whiteboard, Skype, and videos to create lessons (Esrin et al., 2020; Kim, 2020; Vakil, 2020). These technology tools provided instructors with opportunities to integrate instructional technology into pedagogy in meaningful ways instead of giving instruction for a specific tool.

Another finding, technology tools easiness the collaboration in the teaching practicum during the pandemic. For example, preservice teachers used Padlet, Flipgrid, Google Docs and Nearpod to collaborate with their peers in activities and for lesson planning. Preservice teachers need to recognise that integrating technology tools for classroom practices should be relevant and meaningful to students (Lisa et al., 2021; Riggleman, 2020). It is also apparent that using social media platforms supported preservice teachers' engagement and helped to build collective resilience (Pick et al., 2020). Further, the faculties' use of multiple digital tools during the pandemic resulted in preservice teachers gaining continued mastery to ensure that they are technologically literate educators (Pick et al., 2020). Additionally, preservice teachers' pedagogical practices were promoted as well as their ability to reflect, evaluate and develop their technical knowledge and skills more vigorously (Besser, 2020).

The results of this systematic review have demonstrated that university instructors' role was crucial in helping preservice instructors in this uncertain time by building good relationships and empowering teaching and learning practices (Sepulveda-Escobar & Morrison, 2020; Vakil, 2020; Vasinda et al., 2020). Despite the use of different strategies to effectively support preservice teachers' practicum continuity, concerns were raised regarding the missing skills in, for example, classroom management and resulting from a lack of real interaction and contact with learners as a result of differences with face-to-face teaching (Donitsa-Scmidt & Ramot, 2020; Ersin et al., 2020; Nasri et al., 2020; Nuland et al., 2020). Students' engagement is vital to improving their understanding of learning (Romli et al., 2023). Preservice teachers who have less experience in practicing teaching strategies and managing real disciplinary matters in real classrooms might face difficulties later in their future teaching practices. Moreover, in some cases, preservice teachers did not own the equipment they needed, such as laptops or tablets. In addition, there was lack of internet access or there were technical issues. Preservice teachers had to deal with these personal challenges along with those of students who had the same challenges. The new setting of remote instruction and supervision has shown a continuing process of adaptation by all stakeholders including preservice teachers, supervisors, assistant teachers, students and parents (Flores & Gago, 2020). The findings indicate that there is an urgent need to prepare preservice teachers by imparting online teaching skills (Vakil, 2020).

Despite these challenges impacting the preservice final teaching practicum because of the pandemic, teachers believed that the experience had positively improved their teaching preparation to some extent. According to preservice teachers, they had to learn how to handle and cope with extraordinary situations, how to work with various technological platforms that they might need to use in the future, and how to design teaching strategies to reach their future students without meeting them (Sepulveda-Escobar & Morrison, 2020; Monroe et al., 2020; Vasinda et al., 2020).

6. Limitations

Although the current systematic review provided an essential review of the teaching practicum as evidenced by COVID-19 pandemic studies, there were certain limitations that need to be discussed. First, this study concentrated on a specific number of databases to source data, and, as a consequence, the 26 studies identified for analysis represented a very limited sample. Future research could consider a wider range of sources, and both publication types, and articles written in languages other than English to reach new conclusions. Second, the researchers focused only on studies that were published between March 2020 and December 2020 in order to analyse the first available studies regarding teaching practicum during the COVID-19 pandemic; however, this decision may have resulted in certain relevant articles that were published after that date being excluded. Thus, further research could involve later studies that were conducted to further enhance the existing results.

7. Conclusion

This systematic review has highlighted some vital and critical points regarding the teaching practicum during the COVID-19 pandemic. The pandemic resulted in great efforts being made by instructors and teachers in colleges and schools to continue the delivery of instruction in the emergency context. Yet, important issues should be the focus in the future. First, technology integration and teaching and learning in the online environment should be part of all courses. Second, equity issues for students, in terms of access to technology devices, is important and should be considered. Third, technology preparedness, content, pedagogical support and assessment components are needed for a successful transition to distance learning modes. Fourth, preservice teachers should go beyond simply learning the technical abilities needed to be a good teacher in a normal classroom. Teacher education programmes need to strengthen preservice teachers' beliefs in their teaching abilities to deal with times of crisis. Finally, this review found that the COVID-19 pandemic created many opportunities for educators to examine, critique and question the status quo in education and teacher preparation. Education programmes need to be rethought in innovative ways to deliver an education that is more focused on the purpose and meaning of students' learning. In addition, higher education should consider issues related to international students and disabled students who found themselves in difficult situations isolated at home without adequate resources. There is a need to find ways to meet their needs and humanise education.

Further research will need to be conducted on different topics such as technology and related skills that teacher educators and their students will need in the future.

In addition, teacher education programmes need to research how to better support preservice teachers in alternative teaching modes (face-to-face vs online) while still retaining high standards and good practices. Further, the assessment strategies used helped preservice teachers to complete their teaching practicum requirements, yet faculty members should be aware of the changes resulting from online assessment. Therefore, it is vital for training facilities to address the use and impact of different online assessment strategies. There are more issues yet to be investigated with regard to teaching practicum during the pandemic. More in-depth exploration of the teaching practicum might establish new insights into preservice teachers' experiences of the practicum, namely in terms of social collaboration and class management in real face-to-face classrooms.

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