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Journal of Education for Teaching
International research and pedagogy

ISSN: 0260-7476 (Print) 1360-0540 (Online) Journal homepage: www.tandfonline.com/journals/cjet20

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To cite this article: Carmen Carrillo & Maria Assuncao Flores (2023) Online teaching and learning practices in teacher education after COVID-19: lessons learnt from the literature, Journal of Education for Teaching, 49:5, 869-881, DOI: 10.1080/02607476.2022.2153018

To link to this article: https://doi.org/10.1080/02607476.2022.2153018

Published online: 30 Nov 2022.

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JOURNAL OF EDUCATION FOR TEACHING
2023, VOL. 49, NO. 5, 869–881
https://doi.org/10.1080/02607476.2022.2153018

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Online teaching and learning practices in teacher education after COVID-19: lessons learnt from the literature

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ABSTRACT

The COVID-19 pandemic forced higher education institutions and teacher education programmes to transition from face-to-face to remote teaching. In this new educational environment, universities and schools had to make changes to address emerging teaching and learning needs. This literature review study provides an overview of research on teaching and learning practices published after the outbreak of COVID-19 in the context of teacher education. It aims to examine their characteristics after the pandemic and analyse issues that have affected their development. Based on the inclusion criteria, 28 papers were considered in the analysis. Findings point to the social and collaborative dimension of teaching, the caring component and the adoption of a more democratic and inclusive approach to teaching and learning. Personal and contextual factors and the challenges encountered related to poor interaction and difficulties in assessing students' performance are also identified. Implications for rethinking current online teaching and learning practices in the context of teacher education are discussed.

ARTICLE HISTORY
Received 29 August 2021
Accepted 17 November 2022

KEYWORDS
Online learning; teacher education; online practices; COVID-19; practicum

Introduction

The COVID-19 pandemic has indelibly marked education. Albeit online teaching and learning were not new, the closure of higher education institutions and schools has dictated a rapid, forced and global transition from face-to-face to remote mode. The emergence of difficulties and challenges related to such a shift has come as no surprise as there was almost no time for preparation to deal with such scenario from the part of institutions, teachers and students. Issues of lack of equipment, resources and internet access as well as difficulties associated with time and task management, dealing with internal and external distractions and learning loss have been reported in the literature (Aucejo et al. 2020; Flores et al. 2021a, 2021b). Research has also shown that both personal (e.g. self-regulatory and socio-emotional competencies) and contextual factors (e.g. support and guidance) explained students' positive or negative adaptation to online teaching and learning as a result of the closure of higher education institutions (Flores et al. 2021c).

In addition, existing literature has pointed to how institutions and programmes

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adapted to online teaching and learning (e.g. Flores et al. 2020; Quezada, Talbot, and Quezada-Parker 2020) and how students responded and experienced online learning (e.g. Flores et al. 2021b; Osman 2020). The ways in which the various stakeholders responded to the challenges imposed by the COVID-19 pandemic is dependent on policies but also on the specific conditions in which they had to operate. The context and circumstances in which higher education institutions have had to develop online practices are important to understand the particularities of the moment and the decisions made in the transition from the face-to-face to the online format. It is therefore essential to examine how educators have adapted to remote teaching after the outbreak of the pandemic and what are the implications for informing future practices in the context of teacher education. This paper addresses the following research questions:

- What characterises online teaching and learning practices in the context of teacher education after the outbreak of the COVID-19 pandemic?
- What issues have impacted online teaching and learning practices after the outbreak of the pandemic?
- What are the implications of the findings for rethinking existing online teaching and learning practices?

Methods

The purpose of this study is to examine online teaching and learning practices in the context of teacher education after the outbreak of the COVID-19 pandemic through the search of the literature published between April 2020 and April 2021. This study is a follow-up of previous research focused on online teaching and learning practices in the pre-covid time (see Flores and Gago 2020).

A first search in the databases Web of Science (WoS, main collection) and Education Resources Information Centre (ERIC) was performed. Publications whose descriptors responded to the terms 'online learning' (or the terms 'digital learning' or 'e-learning' or 'web-based learning' or 'remote learning' or 'distance learning' or 'virtual learning' or 'digital education' or 'online education' or 'web-based education' or 'remote education' or 'distance education' or 'virtual education') and 'teacher education' (or 'teacher training' or 'teacher preparation') were sought. Despite the different meanings and understandings of such terms, they all were considered relevant for the purpose of this study which aimed at exploring teaching and learning practices mediated by the use of technology in a remote scenario. The first search generated 105 papers in WoS and ERIC, 5 of which were common to both of them. In total, 20 papers fulfilled the inclusion criteria established for this search in terms of the publication source (academic and peer-reviewed journals), the nature of the studies (empirical), and the relevance of the topic (main focus on online teaching and learning practices in the context of teacher education). For example, discarded papers included Trelford (2020) (published in a non-peer reviewed journal), Vesperman (2020) (non-empirical in nature) and Atiles et al. (2021) (focused on online teaching and learning practices in the context of early-childhood education). A manual search of additional papers on the topic through the bibliography of some key papers (Bryman 2012) was carried out in a second phase of the study. This process was guided by the same inclusion criteria and involved a direct search in the special issues on COVID-19 and teacher education published

by some of the most relevant journals in this field after the outbreak of the pandemic (Journal of Education for Teaching, European Journal of Teacher Education and Frontiers in Education – Teacher Education). This search generated eight additional papers.

The selected papers (n = 28) were subject to two types of analysis. First, a descriptive analysis was performed that involved the elaboration of a table summarising the main findings for each of the papers (due to a word limit, the table is not included in this paper). Second, a systematic inductive analysis (Hatch 2002) was carried out that took the researchers to independently read and identify salient domains connected with the first two research questions (characteristics of online teaching and learning practices; issues impacting these practices after the pandemic); to reread the data to refine salient domains (accessibility, authenticity, collaboration, democratisation and personalisation, digital tools used, the practicum, previous knowledge, skills or experience, appropriate infrastructure and support, challenges encountered, the caring component) and confirm if these are supported by the data, and; to agree on the final themes of analysis, which also included discussing how to best organise the salient domains into consistent themes of analysis (e.g. accessibility, authenticity, collaboration, democratisation and personalisation were grouped under the same theme as they were considered key features of successful online teaching and learning practices; on the other hand, previous knowledge, skills or experience and appropriate infrastructure and support were brought together under a new theme called personal and contextual factors for the nature of these aspects and the way how they affected educators and students' adaption to online education after the COVID-19 pandemic). The final themes were established as follows: in relation to the first research question, characteristics connected with key features of online teaching and learning practices (accessibility, authenticity, collaboration, democratisation and personalisation), the most common digital tools used, and the adaptation of practicum; concerning the second research question, personal and contextual factors, the challenges encountered related to interaction, student engagement and assessment, and the caring component of teaching. The third question will be answered in the discussion and conclusion section which also includes the lessons learnt.

Two 'verification' strategies (Creswell 1998) were implemented to confirm the accuracy of the research process. Member checking (Doyle 2007) by the two researchers and co-authors was performed to verify the interpretation of the data. Also, detailed descriptions of the results related to the two research questions were provided (see Findings section) to allow readers to make decisions regarding the transferability of the findings (Erlandson et al. 1993).

Findings

Characteristics of online teaching and learning practices after the outbreak of the COVID-19 pandemic

Accessibility, authenticity, collaboration, democratisation and personalisation

The literature analysed pointed out accessibility, authenticity, collaboration, democratisation and personalisation as important characteristics of online teaching and learning practices after the pandemic.

Accessibility. It included the availability of the teaching materials and a flexible approach to teaching and learning issues (Scull et al. 2020), showed to be an essential prerequisite for the development of online educational practices. Turchi, Bondar, and Aguilar (2020) highlighted that the availability of digital resources through institutional systems of the local public libraries was important to ensure success. In addition, Coolican, Borras, and Strong (2020) and Scull et al. (2020) revealed how flexibility in terms of approaches to teaching and learning (e.g. teaching practices, theories underlying teachers' work) and of the facilitation of educational online experiences through team teaching, was relevant to effectively manage the virtual environment and enhance students' interaction, respectively.

Authenticity. Small-scale discussion boards and digital tools to share ideas and build opportunities for sense-making (O'Brien et al. 2020; Quezada, Talbot, and Quezada-Parker 2020; Turchi, Bondar, and Aguilar 2020; Weaver et al. 2021) contributed to authentic learning and resulted in increased efficiency and engagement. These activities were often preceded by the observation of videos (Ellis, Steadman, and Mao 2020; Kidd and Murray 2020; la Velle et al. 2020; Metscher, Tramantano, and Wong 2021), the engagement with readings about teaching (Metscher, Tramantano, and Wong 2021) or the use of authentic cases in online educational environments (Willems et al. 2021). This contributed with realistic opportunities and challenges to understand course content, support self-regulatory practices and enhance motivation.

Collaboration. Through breakout rooms and other collaborative digital tools (e.g. chat room features, Google docs), participants were able to share ideas and build learning in collaboration with others (Başal and Eryilmaz 2021; O'Brien et al. 2020; Turchi, Bondar, and Aguilar 2020; Weaver et al. 2021). In the context of teacher education programmes, collaboration was also established through community-building activities aimed to promote a sense of belonging among students to deal with issues such as anxiety of loneliness (Metscher, Tramantano, and Wong 2021).

Democratisation. After the outbreak of the pandemic, online teaching and learning practices adopted a more democratic approach that more explicitly acknowledged the role of the student as a crucial element for teachers' development and teaching and learning impact. For example, issues such as regularly asking students for feedback after the lessons (Cutri, Mena, and Whiting 2020; Quezada, Talbot, and Quezada-Parker 2020; Turchi, Bondar, and Aguilar 2020) or experiencing classroom dynamics in which students' technological expertise surpassed educators' (Cutri, Mena, and Whiting 2020) became common situations that contributed to revert traditionally assigned teaching and learning roles.

Personalisation. By connecting more deeply with their students, the use of technology allowed teachers to adopt a more differentiated and personalised education that increased students' motivation (van der Spoel et al. 2020). This view was complemented with data from other studies that showed that just-in-time (i.e. that responds to learners' needs in a timely manner) and relevant content (i.e. precise, concise and built on key essential concepts) contributed to learning and engagement in online environments (Boltz et al. 2021; Scull et al. 2020).

The most common digital tools used

The literature analysed provides examples of digital tools used in both synchronous and asynchronous formats and with different purposes. Video conferencing was the most common medium to articulate online educational practices either through synchronous (live) or asynchronous (recorded) sessions. Additionally, the educators used asynchronous digital tools with purposes that included collaborative learning (e.g. Google Docs, Canvas or Padlet for working collaboratively and sharing documents), communication (e.g. email and WhatsApp for communicating with trainee teachers) and self-directed development (e.g. mini-MOOC for developing specific skills; Google Classroom for sharing additional learning resources for the students) (Başal and Eryilmaz 2021; Boltz et al. 2021; la Velle et al. 2020; Sutiah et al. 2020; Weaver et al. 2021).

Adapting practicum during the pandemic

Student teachers had to rapidly adapt their practicum to the new conditions imposed by the pandemic. Some teacher candidates were able to conduct their practicum virtually, but were required to adapt their strategies and activities (e.g. project design, teaching sequences, interviews, classroom observations, evaluation, and reflection during and post-practicum) to the online modality (Coolican, Borras, and Strong 2020). Other course projects' adaptions included the delivery of a digital portfolio of learning artefacts targeting the required teaching standards (Quezada, Talbot, and Quezada-Parker 2020). This was also accompanied by a more holistic approach to assessment.

With a focus on assessment, Ó Grádaigh et al. (2021) illustrated how emergency virtual observation during the pandemic provided an authentic insight into classroom teaching and was the preferred assessment option. This method also facilitated timely feedback, which provided student teachers with the opportunity to reflect on the class. It is therefore evident that a practicum in the virtual environment required a practice-based approach with a reflective component (Kidd and Murray 2020). The educators depicted in Kidd and Murray's (2020) study accommodated students' learning about practice, even if they were no longer in practice and, in doing so, they demonstrated how the new digital places allowed reflexivity on practice. The new spaces emerged in the absence of the practicum (e.g. the use of Flipgrid to reflect and receive feedback from the educator and their peers after some experiments; the development of a YouTube channel as a resource bank for online teaching demonstrations from the educator, students and other professionals involved in the educational process) allowed meaningful adaptions beyond the initial emergency responses that often exceeded the expectations of the educators.

Table 1 synthesises the main characteristics associated with online teaching and learning practices after the outbreak of the COVID-19 pandemic.

Issues impacting online teaching and learning practices after the pandemic

Personal and contextual factors

The literature analysed pointed out personal and contextual factors affecting the ways in which educators and students adapted to online education after the outbreak of the health crisis. From a personal perspective, previous knowledge, skills or experience in navigating digital tools and online teaching and learning processes influenced the effectiveness with which educators and learners transitioned into the virtual modality (Ghazi-

Table 1. Characteristics of online teaching and learning practices after the outbreak of the pandemic (according to the research literature analysed).

Key features	• Accessibility • Authenticity • Collaboration • Democratisation • Personalisation
Digital tools used	• Facilitating both synchronous (live) and asynchronous (recorded) formats • Including purposes that encompassed collaborative learning, communication and self-directed development
The virtual practicum	• Requiring a practice-based approach • Including a reflective component

Saidi et al. 2020; Turchi, Bondar, and Aguilar 2020; van der Spoel et al. 2020) and the faculty's emotional responses to the crisis situation (Quezada, Talbot, and Quezada-Parker 2020). Limited previous knowledge or expertise related to online education resulted in educators experiencing more difficulties in adapting to the new environment and adopting more teacher-centred pedagogies (Başal and Eryilmaz 2021; Cutri, Mena, and Whiting 2020).

When it comes to contextual factors, appropriate infrastructure including good internet connection or access (Coolican, Borras, and Strong 2020; Ghazi-Saidi et al. 2020; Ozkaral and Bozyigit 2020; Sutiah et al. 2020), equipment (Coolican, Borras, and Strong 2020; Ghazi-Saidi et al. 2020; la Velle et al. 2020; Ozkaral and Bozyigit 2020; Sutiah et al. 2020; Zapata-Garibay et al. 2021), systems (König, Jäger-Biela, and Glutsch 2020; la Velle et al. 2020) and space (Zapata-Garibay et al. 2021) showed to be important to cope with online educational practices. These limitations were particularly evident in public universities (Zapata-Garibay et al. 2021). Also, support from the university in terms of technological assistance and adequate training for their professional development (Coolican, Borras, and Strong 2020; Kalloo, Mitchell, and Kamalodeen 2020; O'Brien et al. 2020; Ozkaral and Bozyigit 2020) was key for succeeding in the new online space. Other factors affecting the adequate development of online practices included certain assumptions by educational institutions (e.g. that university students and professors all have equitable access to the needs of online teaching and learning) (Cutri, Mena, and Whiting 2020) or the limited (or lack of) family's support with the younger children (Dvir and Schatz-Oppenheimer 2020).

Challenges related to communication, student engagement and assessment

Limited communication and engagement was the major challenge identified in relation to online teaching and learning practices in the context of teacher education (e.g. Boltz et al. 2021). Some studies showed the difficulties found by the student teachers in engaging in interactive activities and in staying motivated (Ghazi-Saidi et al. 2020; Kidd and Murray 2020; van der Spoel et al. 2020), particularly when the lessons were conducted in a large group. Despite the availability of better tools for communication, the relationships between educators and students resented the forced adaptions to remote teaching (Zapata-Garibay et al. 2021). This was confirmed by Turchi, Bondar, and Aguilar (2020) and Scull et al. (2020), whose studies highlighted the lack of students' competences to effectively communicate in the online environment despite their fluency in digital tools.

This has made evident that the knowledge of such tools may not be enough for effectively using them in the online environment.

The challenges derived by limited communication and interaction were often exacerbated when student teachers hid behind the cameras, which raised issues of attendance and presence (Turchi, Bondar, and Aguilar 2020). Also, the limitations in terms of interaction in the virtual space raised concerns on how to monitor and assess the learning that was happening in the discussions (Sutiah et al. 2020; Turchi, Bondar, and Aguilar 2020). Educators reported adjustment to new assessment procedures (Kalloo, Mitchell, and Kamalodeen 2020; König, Jäger-Biela, and Glutsch 2020) (e.g. involving or limiting final examinations, respectively). However, in the transition, they also brought to light the need to further learn and use different forms of formative assessments (Cutri, Mena, and Whiting 2020; König, Jäger-Biela, and Glutsch 2020). Instead of focusing on final exams or online proctoring services, these formative assessments (e.g. online quizzes, informal interactions with students) should help them detect student needs regarding distance learning with the purpose to make appropriate pre-instructional decisions. These may prevent social inequality among students (König, Jäger-Biela, and Glutsch 2020) or support their well-being (Cutri, Mena, and Whiting 2020).

The 'caring' component of teaching and learning

The caring component of teaching, exacerbated for the situation that educators and students were experiencing, was naturally embedded in the process of learning to teach and became crucial for thriving at both the emotional and the academic levels (Kidd and Murray 2020; Murray et al. 2020; Quezada, Talbot, and Quezada-Parker 2020). Teacher educators perceived the need to maintain the rigour of their course objectives but felt even more important to deliver a caring yet rigorous course (Cameron-Standerford et al. 2020).

In times of the COVID-19 pandemic, shared vulnerability and uncertainty between the educator and the learner influenced the dynamics of care, control and power inherent in educational relationships (Murray et al. 2020). Instead of just trying to appear professional and in control in the new online space, the teacher educators depicted in this study built human and collaborative relationships with their students. Cutri, Mena, and Whiting (2020) also described experiences of teachers sharing power in their classrooms with students whose technological skills were above their own, thereby gaining a sense of empathy for them.

Figure 1 summarises the main factors impacting online teaching and learning practices after the outbreak of the pandemic.

Discussion and conclusion: lessons learnt

This article has provided a review of the literature on online teaching and learning practices in the context of teacher education after the outbreak of the COVID-19 pandemic. The literature analysed has highlighted the characteristics in terms of key features of online educational practices, most common digital tools used and the development of the practicum during the pandemic (see Table 1). It also points to specific issues that impacted these practices after the outbreak of the SARS-CoV-2 (see Figure 1). The data provided here in relation to the first research question complements our earlier findings (see Flores and Gago 2020) which pointed out that practices that are contextualised,

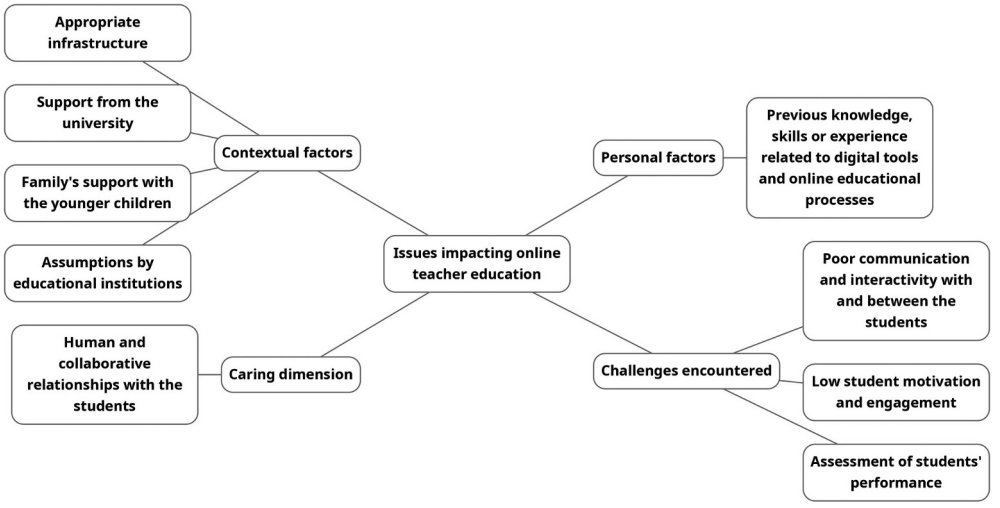


Figure 1. Issues that impact online teacher education (according to the research literature analysed).

personalised, social, formative, and integrated influence the effectiveness of the online teaching and learning process. Table 2 synthesises and integrates both approaches.

The social and collaborative perspective of teaching, which was found central in any online educational process (see also Flores and Gago 2020), was strongly impacted by the uncertainty and vulnerability derived from the health crisis. This exacerbated the caring component and facilitated the transition to a more democratic approach. As a need to address the socio-emotional needs of educators and students, the caring dimension of teaching became a natural part of the teaching and learning process (Metscher, Tramantano, and Wong 2021; O'Brien et al. 2020; Scull et al. 2020). At the time, a more democratic and inclusive perspective to teaching and learning embraced the figure of the learner as a pillar for educational impact and teacher professional development (Cutri, Mena, and Whiting 2020). Also, the use of technology during the pandemic enhanced the personalisation of online teaching and learning. It also highlighted the importance of practices that are accessible, just-in-time and relevant, demonstrating the value of the online learning that helps student teachers tackle the challenges of each particular moment.

In regards to the practicum, this study has stressed the importance of providing a practice-based approach with a reflective component (Kidd and Murray 2020). In addition, the view provided has emphasised its authentic and formative nature, and has contributed with data on both the kinds of activities that facilitate reflexivity on practice (e.g. digital portfolio of learning artefacts accompanied by reflection) and specific issues about how the process should be developed (e.g. timely feedback to enhance reflection after the observation of virtual classrooms). These aspects may be taken into consideration to address part of the limitations that some authors have associated with the emergency virtual practicum (e.g. limited contextualisation; constraints of the mentoring by school teachers; absence of a live teaching experience; lack of direct interaction with the learners) (Flores and Gago 2020; Prata- Linhares et al. 2020; Robinson and Rusznyak 2020; Sepulveda-Escobar and Morrison 2020). In this sense, this paper contends that with the

Table 2. Overview of the characteristics of online teaching and learning practices prior and after the outbreak of the pandemic (according to the research literature analysed).

Appropriate use of digital tools	• Considering the different formats and purposes of online teaching and learning practices
Authentic and contextual learning	• Providing opportunities and challenges for learning based on the day-to-day of the profession
Democratic perspective	• Blurring the dynamics of power between educators and students
Integrated approach	• Encompassing both formal and informal ways of learning
Accessibility	• Ensuring availability of the teaching materials and a flexible approach to teaching and learning
Collaborative learning	• Derived from the interaction with others through sharing ideas and building on one another's comments
Personalised practices	• Considering relevant, just-in-time and self-directed learning resources
Formative approach	• Focusing on the learning process rather than the end product and including a reflective approach

appropriate technology and online pedagogical resources a quality virtual practicum should be possible although it will never replace a face-to-face experience in real classrooms. In addition, this investigation acknowledges that more research is needed to understand how to leverage the affordances of technology (Moyo 2020), as well as the processes and resources needed to rethink traditional practicum practices. One important aspect relates to the interpersonal dimension of teaching and the nature of pedagogical interaction which is key to quality teaching and learning. The online environments challenged usual ways of operating and created opportunities for designing new tools and strategies, but also generated difficulties in the process of teaching and learning in such new scenarios.

This study has confirmed that limitations in terms of appropriate infrastructure or digital literacy, often connected with the social, economic and cultural context (Beaunoyer, Dupéré, and Guitton 2020), impact the development of online educational practices. In addition, it has revealed other contextual and personal factors that affect the success of online teaching and learning experiences. The former relates to the assumption that students and educators have the means to carry out their online practices; the lack of support from educational institutions and families, and; the scarce interaction derived from pupils not showing their faces. The latter is associated with previous knowledge, skills and experience in digital resources. However, it has also been highlighted that previous knowledge of these resources may not be enough to ensure effective online practices. There is a need to embed these practices in a comprehensive pedagogy of online education that considers the pedagogical possibilities of technology and digital tools but also its ethical, political, social and personal dimensions. In other words, the discussion about online teaching and learning practices revolve around not only the what and how – which is evident within a rather instrumental and technical approach – but also the why and for what purposes – which relate to issues of power and control over teaching and learning and of teacher educators and student teachers' roles and identities. This topic deserves further investigation.

This study has several implications for the rethinking of online teaching and learning practices in teacher education. First, it highlights the importance to support educators in developing the socio-emotional competencies required for teaching, particularly in these unprecedented times (Hadar et al. 2020). This may involve initiatives such as investing in

high-quality teacher education programmes, matching educators' current needs with professional learning opportunities, or enhancing collaboration between educators and other professionals involved in teacher education (Darling-Hammond and Hyler 2020). It may focus on the development of competences such as self-regulation, emotional intelligence and resilience to better cope with the uncertainty, complexity and emotional dimension of teaching. Also, it may nurture personal empowerment with the purpose of educating teachers with greater autonomy, judgement and personal responsibility. Second, it puts the accent on the need for a pedagogical approach that considers the suitability and affordances of the different technologies or digital tools to ensure that learners achieve the desired results in the online environment (see also Flores and Gago 2020). This approach should also acknowledge the collaborative, authentic, democratic and personalised nature of the online educational process. Third, it emphasises the importance to move towards a more inclusive approach that considers the needs and rights of the teachers and their students (Kalloo, Mitchell, and Kamalodeen 2020). In order to achieve equity, it is crucial to rely on support mechanisms of higher education institutions in collaboration with governments and organisations (Flores and Gago 2020; Coolican, Borras, and Strong 2020; Sequeira and Dacey 2020). Fourth, it points out the need to understand how to take advantage of the affordances of technology (Moyo 2020) as well as of online assessment possibilities (Osman 2020) to develop online educational experiences that are procedural and formative in nature (e.g. the practicum). Fifth, it reveals some topics (e.g. the democratic approach to teaching and learning in terms of students reverting traditionally assigned roles; the new spaces that emerged in the absence of the practicum that allowed reflexivity on practice) that deserve further research to continue supporting the development of effective online teaching and learning practices in the context of teacher education. Finally, it is essential to acknowledge that teacher education is an iterative and complex process that needs to look 'backwards, forwards, inside-out and outside-in' to respond to the evolving needs of educators (Ling 2017, 562). This study has analysed the adaptions made to teaching and learning practices for one year after the COVID-19 pandemic based on a review of selected papers and has pointed out some issues for the rethinking of existing practices. However, the exceptional circumstances that teachers and students have experienced will certainly continue to impact the progress of online educational experiences, thereby making it necessary to provide new evidence to inform future online educational practices.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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