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Preparing Teachers for Effective K-12 Online Learning in the Age of Disruptions: A Call for Transforming Teacher Education

RESEARCH ARTICLE

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ABSTRACT

In light of current or future pandemics, natural disasters, war, or personal preferences, remote or online learning is becoming increasingly common. This reality means that teachers need to be equipped with the skills necessary to effectively teach online. In this article the authors highlight the importance of preparing teachers with effective online teaching skills and knowledge, and suggest two areas for improvement: (1) research support for scholars to build a knowledge base to better understand effective online teaching, and (2) changes to teacher preparation programmes to better equip teachers for this changing reality. Before presenting these recommendations, a brief discussion of the state of online learning globally at the primary and secondary level (commonly referred to as K-12), as well as the limitations of existing teacher education, prior to the COVID-19 pandemic is provided.

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INTRODUCTION

As noted in the International Commission on the Futures of Education's (2021) *Reimagining our Futures Together: A New Social Contract for Education*, "in the era of COVID-19 we have seen that digital technologies are essential for public health and public education: an indispensable tool for distance education, for contact and vaccine tracing, for reliable information about the virus and more" (p. 37). Both the reality of this sentiment and the urgency in which it needs to occur has been underscored by other international agencies, such as the *European Commission's European Framework for the Digital Competence of Educators* or DigCompEdu (Punie & Redecker, 2017) and UNESCO (2023) through the digital competencies in their *ICT Competency Framework for Teachers* (i.e., ICT = information communications and technology). Globally, teachers need to be prepared to teach online because of the need for students to engage in remote or online learning with increasing frequency due to factors such as the COVID-19 pandemic, natural disasters, war, or personal preference – among other reasons.

However, as Horváth et al. (2022) concluded in their review of teaching and learning in schools in Europe during the COVID-19 pandemic, "many schools were ill-prepared for this unprecedented situation" (p. 3). In this article, we outline the necessity of equipping teachers with the skills to effectively teach in an online environment and provide recommendations for improved teacher preparation for online learning, which consist of two general areas: (1) research directions and supports for scholars, and (2) changes to teacher preparation programs. These recommendations rely on the needed digital infrastructure to support online learning, but a discussion of that infrastructure is beyond the scope of the present paper. Before providing the goals and recommendations, we begin with a discussion of the state of K-12 online learning globally prior to the pandemic.

STATE OF K-12 ONLINE LEARNING PRIOR TO 2020

Prior to the pandemic, K-12 (i.e., primary and secondary level) distance and online learning had a long history in certain jurisdictions. For example, correspondence education has been used in the K-12 environment in places like Australia, Canada, New Zealand, and the United States for over a century (Barbour, 2014; Clark, 2003; Rumble, 1989; Stevens, 1994). Educational radio has been used since the 1940s (Moore & Kearsley, 1996; Stacey & Visser, 2005), and telematics-supported learning has been implemented since the 1980s (Brown et al., 2000; Oliver & Reeves, 1994). Throughout the 1990s and early 2000s, nations on just about every continent began to experiment with K-12 online learning (Barbour, 2018), but the level of K-12 online learning activity varied from nation to nation. There were a small number of jurisdictions, such as South Korea (Cho, 2009; Jang, 2006), where K-12 online learning was prevalent. However, even in countries where K-12 online learning was common, it often only touched 5% to 10% of the overall K-12 student population (Barbour & LaBonte, 2023; Digital Learning Collaborative, 2024). Unfortunately, the examples cited above do not include any examples from Europe, where there has been much less of a focus on virtual schooling (Bergdahl & Hietajärvi, 2022; Jakobsdóttir & Jóhannsdóttir, 2018). Finally, in most cases K-12 online learning only accounted for a very small portion of the overall K-12 education system (Bacsich et al., 2012a, 2012b; Barbour et al., 2011).

While distance education may have a long history in the K-12 system, the use of K-12 online learning was still quite uncommon in most jurisdictions prior to the pandemic. Even in locations where it was more common, few teachers had direct experience with teaching online, and even fewer had been provided specific training as a part of their teacher preparation (e.g. Barbour, 2012). Kennedy and Archambault (2012) found only 1.3% of U.S. teacher education programmes were preparing pre-service teachers for K-12 online learning by providing field experiences in virtual settings. More recently, Archambault et al. (2016) reported an increase to 4.1% of teacher education programmes who prepared pre-service teachers for online learning. Further, Archibald et al. (2020) indicated similar findings when they found 32% of Canadian teacher education programmes offered field experiences in K–12 online programme settings to pre-service or in-service teachers. This problem was compounded by the fact that researchers behind the "Going Virtual" studies into K-12 online teacher professional development found that less than 40% of all K-12 online teachers reported receiving professional development prior to beginning to teach online (Dawley et al., 2010; Rice and Dawley, 2007; Rice et al., 2008). Similar findings have been reported in India (Nautiyal & Sinha, 2015), the United Kingdom (Kidd

& Murray, 2020), and elsewhere (Bacsich et al., 2012a, 2012b). For example, Coyle et al. (2010) found that Spanish teachers were unprepared to engage in digital teaching techniques in their own instruction, while more recently the European Commission (2020a) reported that less than half of teachers had any formal information and communication technology training prior to the pandemic. Despite the important role European Schoolnet (2017) has played in the wider European context, before the pandemic, learning to teach online had not been a focus area.

AN HISTORICAL GAP IN TEACHERS' PREPARATION TO USE TECHNOLOGY TO TEACH

Shulman (1986) proposed the concept that there was a type of knowledge that went "beyond knowledge of subject matter per se to the dimension of subject matter knowledge for teaching" (p. 9). Today pedagogical content knowledge is embedded in most teacher education programmes. Yet more than 15 years after it was first introduced, Mishra and Koehler (2006) proposed expansion of this framework to include technological pedagogical knowledge has not gained similar acceptance within the broader teacher education community. However, the recent sudden and dramatic shift to technology-mediated forms of learning – such as K-12 online learning – have exposed a long known reality. While some pedagogical skills from a standard teacher education programme still apply, many of the necessary online teaching competencies are completely new to even recently licensed or registered teachers (An et al, 2021; Davis & Niederhauser, 2005; Davis & Roblyer, 2005). For example, the European Commission's DigCompEdu framework is an excellent example of the gap that exists (Punie & Redecker, 2017). More recently, researchers are still noting a significant gap in many teachers' skills when it comes to effectively using technology for teaching purposes, and that addressing this gap is an ongoing challenge in teacher education and professional development (Bueno et al., 2023; Ferdig & Pytash, 2021).

An interesting international example of the exposing of this lack of preparation can be found at Monash University in Australia. Out of necessity during the pandemic, the university began to seek out alternative ways for their pre-service teacher education students to be able to undertake the field experience component of their degree (Phillips & McDougall, 2024a). In the post-pandemic examination of this 'virtual school' training opportunity, the university recognised the potential impact that the virtual field experience had on the students' ability to teach with technology (Phillips & McDougall, 2024b), as such the programme was continued and even expanded to include students from an Italian university (Carli et al., 2023). Essentially, the closure of schools worldwide due to the pandemic forced the university to explore alternative solutions to provide their traditional teacher education programming (e.g., Glaser et al., 2021; König et al., 2020; Vu et al., 2021). In doing so, it exposed a gap in teacher's readiness to teach online that was identified by various researchers (Francom et al., 2021; Trust & Whalen, 2021; Zinskie et al., 2023).

This is not to suggest that teacher education programmes are solely to blame for the lack of preparation witnessed since 2020, or even that the problem began with the dramatic shift to remote learning that was caused by the pandemic. For example, Bond et al. (2019) wrote that "issues of educator professional development with technology have been a particularly recurring theme across the past five decades, with institutions at all levels struggling to find the resources to release educators, or to implement sufficient preservice teacher education with technology" (pp. 39–40). More recently, Lahr and Welch (2023) indicated that while "teacher preparation [had] grown to accommodate and consider virtual teaching practices, to a degree, but integration into pre- and in-service teaching preparation [was] nowhere near universal, and the curriculum of teacher preparation for online teaching [was] murky at best" (p. 162). The reality is that even if teacher education programmes had sought to include this knowledge the research in the field is so fragmented "that teacher preparation programmes cannot even determine what future teachers who may be working in an online or blended environment should be exposed to" (Molnar et al., 2021, p. 69).

RECOMMENDATIONS FOR TEACHER PREPARATION

RESEARCH-BASED STANDARDS

To address this lack of research, Hodges et al. (2022) argued that "a validated set of standards would provide accrediting bodies a guide to effective online teaching practices that could

be used to hold teacher education programmes accountable" (p. 206). The International Commission on the Futures of Education (2021) echoed this point, suggesting that one of the main limitations of teacher education programmes in general was the "lack of standards of practice or of standards for teacher preparation institutions" (pp. 22–23). Hodges et al. (2022) also argued that "metrics and instruments must be created or refined to further assess and support growth of [teacher's] knowledge, skills, and attitudes of teaching in K-12 online and blended learning" (p. 205). However, in order to achieve specific goals of research-based standards and validated assessment metrics and instruments, scholars need funded efforts to develop promising practices and frameworks that teacher education programmes can use and be evaluated against. Leaving school technologies to the demands of the free market and commercial interests has been observed to have serious problems (Barbour, 2017; International Commission on the Futures of Education, 2021; Krutka et al., 2021). The need for funded research is an area where national and local authorities can play a role to provide encouragement, direction, and – most importantly – resources to ensure the public interest is at the forefront of this scholarship.

Even without this research-based framework, scholars have started to provide recommendations for teacher education programmes in response to issues observed during the COVID-19 pandemic to better prepare teachers for teaching online. Trust and Whalen (2020) recommended to "provide teachers with the opportunity to develop K-12 online and blended teaching competencies so that they are prepared to teach in different formats, settings, and situations" (p. 193). Lahr and Welch (2023) were more specific with their recommendation, stating that pre-service teachers should have experience through an online teaching practicum. Hodges et al. (2022) offered a more detailed list of objectives to improve global teacher preparation for online and blended teaching. Similarly, in their review of global lessons for education from the COVID-19 pandemic, Vincent-Lancrin et al. (2022) suggested that teacher education programmes had an important role to play in addressing the gap between the possibilities related to digital education and the reality that existed in most jurisdictions. The most important of these, at least with respect to the preparation of teachers to be able to teach online, was to ensure that accrediting bodies and state agencies require that all teacher education programmes have meaningful and useful preparation to deliver online and blended learning.

ACCREDITATION BODIES

According to the American Association of Colleges for Teacher Education (2022), "the importance of accreditation, particularly its role in assuring that the preparation of professional educators ultimately serves the interests and learning of PK-12 students [i.e., a US-term used to describe pre-kindergarten to the final year of secondary school]" (para. 2). While this is an American organisation and example, the same would be true of the national and professional accrediting bodies of any European nation. As Hodges et al. (2022) noted that one of the main reasons why teacher education programmes have "not normalised the preparation of all teachers to teach effectively with technology, including in different modalities such as online and blended learning" is because they haven't been required to do so (p. 207). In fact, often the stated requirements for teacher education are so expansive and onerous that they account for most, if not all of the allocated focus within the teacher preparation programme.

FOCUSED COURSE WORK

Hodges et al. (2022) also recommended that there must be sufficient course work in teacher preparation programmes to give teachers access to knowledge, skills, and attitudes related to K-12 online and blended learning. How to provide that coursework is a matter of debate. Starkey (2020), in a systematic literature review of teacher preparation for the use of digital technologies, found that from 2008–2018 "perspectives ranged from having standalone courses with no link to in school practice to teach generic digital competencies, to a view that programmes should have digital competencies infused across courses" (p. 52). That observed range, from standalone courses to infusion across the teacher preparation curriculum, has been reported by several other scholars (Brush et al., 2001; Foulger et al., 2019; Mehlinger & Powers, 2002), many of whom have noted apparent problems with how the technology infusion approach is often implemented (Clausen, 2022; Wetzel et al., 2014). Regardless, it has

been recommended by some that teacher education programmes should stop the pendulum-like swing between a course and infusion in the middle by including specific coursework and infusion throughout the teacher education programme (Mellon, 1999; Wang & Chen, 2006).

EXPERIENCE AS ONLINE LEARNERS

Further, Hodges et al. (2022) recommended that teacher candidates should have experiences as online learners. It has been long accepted that online teachers should experience online learning as a student. As Zucker and Kozma (2003) indicated, in order to fully appreciate the challenges that students may face, teachers need to first have the experience of being an online student themselves. In fact, one of the first virtual schools in the US built this into its initial teacher induction programme. In order to design an online course or teach an online class, you had to first complete an online course in either effective online course design or effective online teaching (Pape et al., 2005). This model is based on the belief that "teachers teach the way they were taught" (Davis & Rose, 2007, p. 7) – and in order to be able to teach online one must experience being taught online themselves. The authors also suggested it was "important for all online course designers and instructors to have professional development that uses the online media they will be teaching through" (p. 7). Similarly, Cavanaugh (2009) also believed online teachers needed to have experience as students in an online learning setting. Essentially, by having the experience of being an online learner, it would provide e teachers with a sense of empathy for the struggles that their own online students might face – which should enhance student learning (Bouton, 2016; Meyers et al., 2019). Additionally, Akcaoglu and Akcaoglu (2022) wrote that having teachers experience effective online learning would increase their own self-efficacy about teaching online, which according to Correy and Stella (2018) would also lead to greater student success.

FIELD EXPERIENCE

Finally, recommendations have been made for quite some time that pre-service teachers need to be prepared to teach online. For example, Duncan and Barnett (2009) concluded that "future teachers must have the skills and knowledge to teach effectively in online as well as in traditional environments" (p. 373), while König et al. (2020) found there was a need to foster teacher expertise in online teaching and learning both in initial teacher preparation and on-going teacher professional development. Yet despite calls like these, most teacher preparation programmes are not addressing this need (Kennedy & Archambault, 2012; Archambault et al., 2016; Archibald et al., 2020). The COVID-19 pandemic exposed the critical need for all teachers to be prepared to teach online. An important component of this preparation appears to be a field or practicum experience in online teaching. Luo et al. (2017) observed that pre-service teachers being exposed to an online teaching field experience had many benefits, including positive attitudes toward online learning, the possibility of positive relationships between teachers and students online, and their ability to create interactive learning online. More recently, Mohebi and Meda (2021) found that a "virtual field experience was a milestone of achievement for trainee teachers" (p. 1196). These findings should be no surprise as teacher education has routinely included field experiences for in-person teaching for decades (Cruickshank & Armaline, 1986). Thus, teacher education programmes should also include field experiences in online learning (Hodges et al., 2022).

A NEW SOCIAL CONTRACT FOR TEACHER EDUCATION

As the International Commission on the Futures of Education (2021) indicated, "key responsibilities fall to governments whose capacity for the public financing and regulation of education should be strengthened" (p. 4). This sentiment is true not just of the provision of public education, but also in the preparation of the teachers who work in the public education system. As the commission succinctly summarised:

> The continued development of digital technologies in education in directions guided by sustainability, justice, and inclusion will require action from governments, support from civil society, and a broad public commitment to treating education not as an arena for profiteering, but as a space for public investment in sustainable, just, and peaceful futures. (p. 10)

There must be a public investment into research that develops promising practices and frameworks that teacher education programmes can use and be evaluated against. Then teacher education programmes need to use that research to provide teachers with experience in designing, delivering, and facilitating instruction, as well as the opportunity to learn online themselves. In Europe, the European Commission has an important role to play in supporting research and helping member states to develop policies that prepare teachers to harness the potential of digital education (e.g., the European Commission's [2020b] *Digital Education Action Plan*). In fact, Montiel et al. (2021) reported based on their research that international and multi-national organisations – such as the European Commission – are better placed to guide, and even accelerate, the development of educational strategies and initiatives designed to address the gaps exposed by the pandemic (such as this one with respect to teacher preparation).

Widespread readiness for remote online learning prior to COVID-19 was limited by various factors such as funding, infrastructure, and technical capacity. There were, however, warnings that were either unseen or not addressed. For example, the U.S. Department of Education recommended that schools develop continuity of learning plans in response to possible pandemic flu as early as 2006 (U.S. Department of Education, 2006), and as early as 2010 the U.S. Department of Education (2010) had observed that:

> As online learning becomes an increasingly important part of our education system at all levels, this creates both the need and opportunity for educators who are skilled in online instruction and the demand for greater knowledge of the most effective practices. (p. 47)

These warnings were not exclusive to the United States. Other countries have been prepared for alternate delivery of instruction for some time. For example, Singapore has prepared to respond to a pandemic or natural disaster through annual drills for online learning (Barbour et al., 2020). Historically, in 1948 New Zealand employed correspondence education and educational radio during a polio epidemic (German, 2020). More recently, Hong Kong learned valuable lessons from SARS and H1 N1 that were useful during this most recent pandemic (Alpert, 2011; Latchem & Jung, 2009), as did Boliva (Barbour et al., 2011). Finally, in addition to instances of disease or disaster, the preparation to teach online would also help to mitigate the impact on schooling in areas of conflict, such as the one presently occurring in Ukraine.

The world does not need to be caught off guard again with respect to the need to deliver quality education in the time of disaster. In their rather direct assessment, Stracke et al. (2022) remarked:

> The biggest challenge arguably lies in training and upskilling professionals, either collectively or individually. Distance teaching revealed strong disparities with technology abilities that presented a training challenge. The different (and often missing) abilities and competencies of teachers, trainers and support staff to use existing tools or to appropriate new environments, sometimes inadequate or insufficient, led to diverse and complicated solutions. (p. 17)

Our vision is that a new social contract for teacher education includes preparation of all teachers to be able to deliver quality instruction online if needed. Additionally, as Darling-Hammond and Hyler (2020) remind us, this recommendation is not exclusive to students' academic needs. The lack of preparation of teachers to fully engage students in online environments also had impacts on students' social emotional needs, creating greater expectations for teacher education programmes to be able to equip teachers for equity-focused teaching and learning – even in online settings. To achieve this vision governments must provide funding for scholars to develop and disseminate the necessary tools for effective practice and evaluation of online teaching, and teacher education programmes around the globe must reform to incorporate preparation for online teaching, not as a novelty, but as part of the standard course of teacher preparation. As König et al. (2020) concluded, "preparing teachers for the digitalisation in schools can [and should] be regarded as a chance that teacher education should not miss" (p. 12).

CONCLUSIONS

It is often said that you campaign in poetry, but you govern in prose. In *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*, Christensen et al. (2008) predicted that by the end of the next decade that half of all learning in the United States would be done online. The prediction was based on their premise that schools had adapted well to the demands of society and had changed dramatically over time – with the authors citing examples such as (1) the transition from one room schools to larger, industrial-size schools, (2) the desegregation of schools following Brown v. Board of Education, (3) the focus upon mathematics and sciences after the Soviet launch of Sputnik, (4) the broadening of the curriculum (such as Advanced Placement or International Baccalaureate), (5) the expansive testing regimes put in place under the No Child Left Behind legislation, among others. While all of these examples represent change in the education system (at least the US education system), do any of them represent a fundamental change in the nature of schooling?

Would any of these changes have made a difference in what someone would see if they walked into a classroom in the year 2008, as compared to walking into a segregated classroom in the American south in the 1950s? Or into a one-room school in rural Australia in the early 1900s? How about as compared to walking into the University of Bologna, the University of Paris, or the University of Oxford in the 1200s? Or even if that individual were walking the streets of Athens listening to Socrates himself? The fact is that the actual act of teaching and learning that occurs within the classroom hasn't changed all that much since the first "schools" were created (Barbour, 2009). The pandemic-induced worldwide closure of schools and the provision of learning through technology-based remote education was a fundamental change in the nature of schooling. This sudden pivot to remote learning, along with the subsequent calls for fundamental changes to both how we provide formal education and how we prepare those who facilitate that education, invite us to be poets.

The poetry that we wish to write is based on a vision of equipping teachers with the skills to effectively teach in both face-to-face and online learning environments – to allow an education system where the quality of learning is not based on the medium in which that learning occurs. In order to achieve that vision, we propose the following goals for teacher education. (1) While there is an abundance of research to guide teacher education on how to prepare educators for the face-to-face classroom, there needs to be funded efforts to develop promising practices and frameworks that teacher education programmes can use to prepare educators to be effective in the distance and online learning environment. In order to achieve this first goal, (a) validated, research-based standards must be developed and (b) metrics and instruments must be created or refined to assess and support growth of teacher's knowledge, skills, and attitudes for teaching in the distance and online learning environment. (2) While content related to teaching with technology is often included in teacher preparation, teacher education programmes must fundamentally change their focus to include teaching in distance and online environments in the same pervasive manner as teaching in the face-to-face classroom. In order to achieve this second goal, we need (a) accrediting bodies and state agencies to require teacher education to prepare educators to deliver online learning, (b) sufficient course work to give educators the necessary knowledge, skills, and attitudes related to distance and online learning, (c) educators to have experiences as online learners themselves, and (d) the opportunity – even requirement – for educators to undertake field experiences in distance and online learning settings.

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS (CRediT)

Michael Barbour; conceptualization, project administration, resources, supervision, validation, visualization, writing – original draft, writing – review & editing; Charles Hodges; conceptualization, project administration, resources, supervision, validation, visualization, writing – original draft, writing – review & editing;. All authors have read and agreed to the published version of the manuscript.

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REFERENCES

Akcaoglu, M., & **Akcaoglu, M. O.** (2022). Understanding the relationship among self-efficacy, utility value, and the community of inquiry framework in preservice teacher education. *International Review of Research in Open and Distributed Learning, 23*(2), 86–106. https://doi.org/10.19173/irrodl.v23i1.5717

Alpert. (2011). Online education in Hong Kong. In M. K. Barbour, L. Hasler Waters, & J. Hunt (Eds.), *Online and blended learning: Case studies from K-12 schools around the world* (pp. 37–59). International Association for K-12 Online Learning.

American Association of Colleges for Teacher Education. (2022). *High-quality educator preparation*. https://aacte.org/resources/high-quality-educatorpreparation/

An, Y., Kaplan-Rakowski, R., Yang, J., Conan, J., Kinard, W., & **Daughrity, L.** (2021). Examining K-12 teachers' feelings, experiences, and perspectives regarding online teaching during the early stage of the COVID-19 pandemic. *Educational Technology Research and Development, 69*(5), 2589–2613. https://doi.org/10.1007/s11423-021-10008-5

Archambault, L., Kennedy, K., Shelton, C., Dalal, M., McAllister, L., & **Huyett, S.** (2016). Incremental progress: Re-examining field experiences in K-12 online learning contexts in the United States. *Journal of Online Learning Research, 2*(3), 303–326. https://www.learntechlib.org/primary/p/174116/

Archibald, D., Barbour, M. K., Leary, H., Wilson, E. V., & **Ostashewski, N.** (2020). *Teacher education and K-12 online learning*. Canadian eLearning Network. https://k12sotn.ca/wpcontent/uploads/2020/07/k12ol-teacher-ed.pdf

Bacsich, P., Bristow, S. F., Camilleri, A., de Beeck, I. O., Pepler, G., & **Phillips, B.** (2012a). *VISCED handbook – Volume 2 – Virtual schools and colleges – Providing alternatives for successful learning*. ATiT bvba. http://www.virtualschoolsandcolleges.archive.atit.be/sites/default/files/VISCED_Handbook-Volume-2/index.pdf

Bacsich, P., Pepler, G., Phillips, B., Öström, M., & **Reynolds, S.** (2012b). *VISCED handbook – Volume 1 – Virtual schools and colleges – Providing alternatives for successful learning*. ATiT bvba. http://www.virtualschoolsandcolleges.archive.atit.be/sites/default/files/VISCED_Handbook-Volume-1/index.pdf

Barbour, M. K. (2009). Book review of Disrupting class: How disruptive innovation will change the way the world learns. *Education Canada, 49*(5). https://www.edcan.ca/wp-content/uploads/edcan-2009-v49-n5-barbour.pdf

Barbour, M. K. (2012). Training teachers for a virtual school system: A call to action. In D. Polly, C. Mims, & K. Persichitte (Eds)., *Creating technology rich teacher education programs: Key issues* (pp. 499–517). IGI Global. https://doi.org/10.4018/978-1-4666-0014-0.ch032

Barbour, M. K. (2014). A history of international K-12 online and blended instruction. In R. Ferdig & K. Kennedy (Eds.), *Handbook of Research on K-12 Online and Blended Learning* (pp. 25–50). Entertainment Technology Center Press, Carnegie Mellon University. https://press.etc.cmu.edu/books/handbook-research-k-12-online-and-blended-learning

Barbour, M. K. (2017). K-12 online learning and school choice : Growth and expansion in the absence of evidence. In R. A. Fox & N. K. Buchanan (Eds.), *School Choice: A Handbook for Researchers, Practitioners, Policy-Makers and Journalists* (pp. 421–440). John Wiley & Sons Ltd. https://doi.org/10.1002/9781119082361.ch29

Barbour, M. K. (2018). A history of K-12 distance, online, and blended learning worldwide. In K. Kennedy & R. E. Ferdig (Eds.), *Handbook of research on K-12 online and blended learning* (2nd ed., pp. 21–40). Entertainment Technology Center Press, Carnegie Mellon University. https://press.etc.cmu.edu/books/handbook-research-k-12-online-and-blended-learning-second-edition

Barbour, M. K., Brown, R., Hasler Waters, L., Hoey, R., Hunt, J., Kennedy, K., Ounsworth, C., Powell, A., & **Trimm, T.** (2011). *Online and blended learning: A survey of policy and practice from K-12 schools around the world*. International Association for K-12 Online Learning. https://aurora-institute.org/resource/online-and-blended-learning-a-survey-of-policy-and-practice-from-k-12-schools-around-the-world/

Barbour, M. K., & **LaBonte, R.** (2023). *State of the nation study: K-12 e-learning in Canada*. Canadian E-Learning Network. https://k12sotn.ca/wp-content/uploads/2024/01/StateNation23.pdf

Barbour, M. K., LaBonte, R., Kelly, K., Hodges, C., Moore, S., Lockee, B., Trust, T., Bond, A., & **Hill, P.** (2020). *Understanding pandemic pedagogy: Differences between emergency remote, remote, and online teaching*. Canadian eLearning Network. https://k12sotn.ca/wp-content/uploads/2020/12/understanding-pandemic-pedagogy.pdf

Bergdahl, N., & **Hietajärvi, L.** (2022). Social engagement in distance-, remote-, and hybrid learning. *Journal of Online Learning Research, 8*(3), 315–342. https://www.learntechlib.org/primary/p/221444/

Bond, M., Zawacki-Richter, O., & **Nichols, M.** (2019). Revisiting five decades of educational technology research: A content and authorship analysis of the "British Journal of Educational Technology". *British Journal of Educational Technology, 50*(1), 12–63. https://doi.org/10.1111/bjet.12730

Bouton, B. (2016). Empathy research and teacher preparation: Benefits and obstacles. *SRATE Journal, 25*(2), 16–25. https://eric.ed.gov/?id=EJ1113829

Brown, J., Sheppard, B., & **Stevens, K.** (2000). *Effective schooling in a tele-learning environment*. Centre for TeleLearning and Rural Education, Faculty of Education. https://web.archive.org/web/20050105204359/http://www.tellearn.mun.ca/es_report/index.html

Brush, T., Igoe, A., Brinkerhoff, J., Glazewski, K., Heng-Yu, K., & **Colette Smith, T.** (2001). Lessons from the field: Integrating technology into preservice teacher education. *Journal of Computing in Teacher Education, 17*(4), 16–20.

Bueno, R., Niess, M. L., Engin, R. A., Ballejo, C. C., & **Lieban, D.** (2023). Technological pedagogical content knowledge: Exploring new perspectives. *Australasian Journal of Educational Technology, 39*(1), 88–105. https://doi.org/10.14742/ajet.7970

Carli, M., Trevisan, O., Gabelli, L., Lippiello, S., Phillips, M., Gargiso, R., & **Mannix, T.** (2023). Training physics teachers for effective online lessons: A virtual school experience. In *International Technology, Education and Development 2023 Proceedings* (pp. 7156–7165). International Academy of Technology, Education and Development. https://doi.org/10.21125/inted.2023.1963

Cavanaugh, C. (2009). *Getting more learning time online: Distance education in support of expanded learning time in K-12 schools*. Center for American Progress. https://www.americanprogress.org/article/getting-students-more-learning-time-online/

Cho, Y.-S. (2009). *Cyber Home Learning System improves quality of public education*. Advanced Distributed Learning.

Christensen, C. M., Horn, M. B., & **Johnson, C. W.** (2008). *Disrupting class: How disruptive innovation will change the way the world learns*. McGraw Hill.

Clark, T. (2003). Virtual and distance education in American schools. In M. G. Moore & W. G. Anderson (Eds.), *Handbook of distance education* (pp. 673–699). Lawrence Erlbaum Associates, Inc.

Clausen, J. M. (2022). Learning to fly: Development and design of a micro-credentialing system for an educator preparation program in the absence of a required educational technology course. *TechTrends 66*(2), 276–286. https://doi.org/10.1007/s11528-021-00673-x

Corry, M., & **Stella, J.** (2018). Teacher self-efficacy in online education: A review of the literature. *Research in Learning Technology, 26*. https://doi.org/10.25304/rlt.v26.2047

Coyle, Y., Yanez, L., & **Verdu, M.** (2010). The impact of the interactive whiteboard on the teacher and children's language use in an ESL immersion classroom. *System, 38*(4), 614–625. https://doi.org/10.1016/j.system.2010.10.002

Cruickshank, D. R., & **Armaline, W. D.** (1986). Field experiences in teacher education: Considerations and recommendations. *Journal of Teacher Education, 37*(3), 34–40. https://doi.org/10.1177/002248718603700307

Darling-Hammond, L., & **Hyler, M. E.** (2020). Preparing educators for the time of COVID... and beyond. *European Journal of Teacher Education, 43*(4), 457–465. https://doi.org/10.1080/02619768.2020.1816961

Davis, N., & **Niederhauser, D. S.** (2005). Socio-cultural analysis of two cases of distance learning in secondary education. *Education and Information Technologies, 10*(3), 249–262. https://doi.org/10.1007/s10639-005-3006-7

Davis, N., & **Rose, R.** (2007). *Research committee issues brief: Professional development for virtual schooling and online learning*. North American Council for Online Learning. https://aurora-institute.org/resource/professional-development-for-virtual-schooling-and-online-learning/

Davis, N. E., & **Roblyer, M. D.** (2005). Preparing teachers for the "schools that technology built": Evaluation of a program to train teachers for virtual schooling. *Journal of Research on Technology in Education, 37*(4), 399–409. https://doi.org/10.1080/15391523.2005.10782445

Dawley, L., Rice, K., & **Hinck, G.** (2010). *Going virtual! 2010: The status of professional development and unique needs of K-12 online teachers*. Boise State University.

Digital Learning Collaborative. (2024). *Snapshot 2024: The post-pandemic digital learning landscape emerges*. Evergreen Education Group. https://www.digitallearningcollab.com/snapshot-2024

Duncan, H. E., & **Barnett, J.** (2009). Learning to teach online: What works for pre-service teachers. *Journal of Educational Computing Research, 40*(3), 357–376. https://doi.org/10.2190/EC.40.3.f

European Commission. (2020a). *Education and training monitor 2020*. https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/en/

European Commission. (2020b). *Digital education action plan*. https://education.ec.europa.eu/focus-topics/digital-education/action-plan

European Schoolnet. (2017). http://www.eun.org/home

Ferdig, R. E., & **Pytash, K. E.** (Eds.) (2021). *What teacher educators should have learned from 2020*. Association for the Advancement of Computing in Education. https://www.learntechlib.org/p/219088/

Foulger, T. S., Wetzel, K., & **Buss, R. R.** (2019). Moving toward a technology infusion approach: Considerations for teacher preparation programs. *Journal of Digital Learning in Teacher Education, 35*(2), 79–91. https://doi.org/10.1080/21532974.2019.1568325

Francom, G. M., Lee, S. J., & **Pinkney, H.** (2021). Technologies, challenges and needs of K-12 teachers in the transition to distance learning during the COVID-19 pandemic. *TechTrends, 65*(4), 589–601. https://doi.org/10.1007/s11528-021-00625-5

German, E. (2020, September 01). Distance learning has been part of American culture for 100 years. Why can't we get it right? *GEN: Medium*. https://gen.medium.com/distancelearning-has-been-part-of-american-culture-for-almost-100-years-e3c001a05858

Glaser, H., Helmsing, M., Parker, A. K., & **Zenkov, K.** (2021). Adding the "T" to the "PACK" in clinical experiences: How technology shaped our pandemic teacher education pedagogies and partnerships. *The New Educator, 17*(4), 353–374. https://doi.org/10.1080/1547688X.2021.1983097

Hodges, C. B., Barbour, M. K., & **Ferdig, R. E.** (2022). A 2025 vision for building access to K-12 online and blended learning in pre-service teacher education. *Journal of Technology and Teacher Education, 30*(2), 201–216. https://www.learntechlib.org/primary/p/221153/

Horváth, A., Motiejūnaitė-Schulmeister, A., & **Noorani, S.** (2022). *Teaching and learning in schools in Europe during the COVID-19 pandemic*. Publications Office of the European Union. https://www.anefore.lu/wp-content/uploads/2022/09/Eurydice-Brief-Teaching-and-learning-in-schools-in-Europe-during-the-COVID-19-pandemic.pdf

International Commission on the Futures of Education. (2021). *Reimagining our futures together: A new social contract for education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000379707.locale=en

Jang, S.-H. (2006). *Analysis on the effectiveness of Cyber Home Learning System*. South Korea Ministry of Education, Science and Technology.

Jakobsdóttir, S., & **Jóhannsdóttir, T.** (2018). The development of online and blended learning in primary and secondary education in Iceland. In R. Ferdig & K. Kennedy (Eds.), *Handbook of Research on K-12 Online and Blended Learning* (2nd ed., pp. 649–664). Entertainment Technology Center Press, Carnegie Mellon University. https://press.etc.cmu.edu/index.php/product/handbook-of-research-on-k-12-and-blending-learning-second-edition/

Kennedy, K., & **Archambault, L.** (2012). Offering preservice teachers field experiences in K-12 online learning: A national survey of teacher education programs. *Journal of Teacher Education, 63*(3), 185–200. https://doi.org/10.1177/0022487111433651

Kidd, W., & **Murray, J.** (2020). The Covid-19 pandemic and its effects on teacher education in England: how teacher educators moved practicum learning online. *European journal of teacher education*, *43*(4), 542–558. https://doi.org/10.1080/02619768.2020.1820480

König, J., Jäger-Biela, D. J., & **Glutsch, N.** (2020). Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education, 43*(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650

Krutka, D. G., Smits, R. M., & **Willhelm, T. A.** (2021). Don't be evil: Should we use Google in schools? *TechTrends*, *65*, 421–431. https://doi.org/10.1007/s11528-021-00599-4

Lahr, E., & **Welch, S.** (2023). Calling for changes in pre-service teacher education to prepare for more than face-to-face teaching: Learning from the covid-19 pandemic. In A. S. Zimmerman (Ed.), *Research, Practice, and Innovations in Teacher Education During a Virtual Age* (pp. 158–174). IGI Global. https://doi.org/10.4018/978-1-6684-5316-2.ch009

Latchem, C., & **Jung, I.** (2009). *Distance and blended learning in Asia*. Routledge. https://doi.org/10.4324/9780203878774

Luo, T., Hibbard, L., Franklin, T., & **Moore, D. R.** (2017). Preparing teacher candidates for virtual field placements via an exposure to K-12 online teaching. *Journal of Information Technology Education: Research*, *16*, 1–14. http://www.jite.org/documents/Vol16/JITEv16ResearchP001-014Luo3094.pdf. https://doi.org/10.28945/3626

Mehlinger, H. D., & **Powers, S. M.** (2002). *Technology and teacher education: A guide for educators and policymakers*. Houghton Mifflin Co.

Mellon, C. A. (1999). Technology and the great pendulum of education. *Journal of Research on Computing in Education, 32*(1), 28–35. https://doi.org/10.1080/08886504.1999.10782267

Meyers, S., Rowell, K., Wells, M., & **Smith, B. C.** (2019). Teacher empathy: A model of empathy for teaching for student success. *College Teaching, 67*(3), 160–168. https://doi.org/10.1080/87567555.2019.1579699

Mishra, P., & **Koehler, M. J.** (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Mohebi, L., & **Meda, L.** (2021). Trainee teachers' perceptions of online teaching during field experience with young children. *Early Childhood Education Journal, 49*(6), 1189–1198. https://doi.org/10.1007/s10643-021-01235-9

Molnar, A. (Ed.), **Miron, G., Barbour, M. K., Huerta, L., Shafer, S. R., Rice, J. K., Glover, A., Browning, N., Hagle, S.,** & **Boninger, F.** (2021). *Virtual schools in the U.S. 2021*. National Education Policy Center. http://nepc.colorado.edu/publication/virtual-schools-annual-2021

Montiel, H., & **Gomez-Zermeño, M. G.** (2021). Rock the boat! Shaken by the COVID-19 crisis: a review on teachers' competencies in ICT. *Frontiers in Education, 6*. https://doi.org/10.3389/feduc.2021.770442

Moore, M. G., & **Kearsley, G.** (1996). Distance education: A systems view. Belmont, CA: Wadsworth.

Nautiyal, V., & **Sinha, R.** (2015). Teacher education in India: Engagement of student teachers in online learning. *IQSR Journal of Humanities and Social Science (IQSR-JHSS)*, *20*(7), 7–13. https://www.iosrjournals.org/iosr-jhss/papers/Vol20-issue7/Version-3/B020730713.pdf

Oliver, R., & **Reeves, T. C.** (1994). *Telematics in rural education: An investigation of the use of telematics for the delivery of specialist programmes for students in rural schools*. InTech Innovations.

Pape, L., Adams, R., & **Ribeiro, C.** (2005). The virtual high school: Collaboration and online professional development . In Z. L. Berge, & T. Clark, (Eds.), *Virtual schools: Planning for success* (pp. 118–132). Teachers College Press.

Phillips, M., & **McDougall, T.** (2024a). *Monash virtual school: Preparing pre-service teachers to teach online: A scoping review of skills, knowledge, identities, values and epistemological development*. Monash University. https://bridges.monash.edu/ndownloader/files/43960473

Phillips, M., & **McDougall, T.** (2024b). Empowering pre-service teachers: leveraging quantitative ethnography to enhance online education. In *International Technology, Education and Development Conference2024 Proceedings* (pp. 640–647). International Academy of Technology, Education and Development. https://doi.org/10.21125/inted.2024.0229

Punie, Y., & **Redecker, C.** (2017). *European framework for the digital competence of educators: DigCompEdu*. Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC107466

Rice, K., & **Dawley, L.** (2007). *Going virtual! The status of professional development for K-12 online teachers*. Boise State University.

Rice, K., Dawley, L., Gasell, C., & **Florez, C.** (2008). *Going virtual! Unique needs and challenges of K-12 online teachers*. Boise State University.

Rumble, G. (1989). The role of distance education in national and international development: An overview. *Distance Education, 10*(1), 83–107. https://doi.org/10.1080/0158791890100107

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4–14. https://doi.org/10.3102/0013189X015002004

Stacey, E., & **Visser, L.** (2005). The history of distance education in Australia. *Quarterly Review of Distance Education, 6*(3), 253–259.

Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education, 50*(1), 37–56. https://doi.org/10.1080/0305764X.2019.1625867

Stevens, K. (1994). Australian developments in distance education and their implications for rural schools. *Journal of Research and Rural Education, 10*(1), 78–83. https://jrre.psu.edu/sites/default/files/2019-08/10-1_6.pdf

Stracke, C. M., Burgos, D., Santos-Hermosa, G., Bozkurt, A., Sharma, R. C., Swiatek Cassafieres, C., ... & **Truong, V.** (2022). Responding to the initial challenge of the COVID-19 pandemic: Analysis of international responses and impact in school and higher education. *Sustainability, 14*(3), 1876. https://doi.org/10.3390/su14031876

Trust, T., & **Whalen, J.** (2020). Should teachers be trained in emergency remote teaching? Lessons learned from the COVID-19 pandemic. *Journal of Technology and Teacher Education, 28*(2), 189–199. https://www.learntechlib.org/primary/p/215995/

Trust, T., & **Whalen, J.** (2021). K-12 teachers' experiences and challenges with using technology for emergency remote teaching during the COVID-19 pandemic. *Italian Journal of Educational Technology, 29*(2), 10–25. https://doi.org/10.17471/2499-4324/1192

UNESCO. (2023). *UNESCO's ICT competency framework for teachers*. https://www.unesco.org/en/digital-competencies-skills/ict-cft

U.S. Department of Education. (2006). *Pandemic flu: A planning guide for educators*. https://www2.ed.gov/admins/lead/safety/emergencyplan/pandemic/planning-guide/planning-guide.pdf

U.S. Department of Education. (2010). *Transforming American education: Learning powered by technology. National Education Technology Plan 2010*. https://files.eric.ed.gov/fulltext/ED512681.pdf

Van der Spoel, I., Noroozi, O., Schuurink, E., & **van Ginkel, S.** (2020). Teachers' online teaching expectations and experiences during the Covid19-pandemic in the Netherlands. *European journal of teacher education, 43*(4), 623–638. https://doi.org/10.1080/02619768.2020.1821185

Vincent-Lancrin, S., Cobo Romaní, C., & **Reimers, F.** (2022). How learning continued during the COVID-19 pandemic: Global lessons from Initiatives to support learners and teachers. OECD Publishing. https://doi.org/10.1787/bbeca162-en

Vu, P., & **Fisher, C. E.** (2021). Does virtual field experience deliver?: An examination into virtual field experience during the pandemic and its implications for teacher education programs. *Open Praxis, 13*(1), 117–125. https://doi.org/10.5944/openpraxis.13.1.1191

Wang, Y. M., & **Chen, V. D. T.** (2006). Untangling the confounding perceptions regarding the stand-alone IT course. *Journal of Educational Technology Systems, 35*(2), 133–150. https://doi.org/10.2190/V16T-8612-6758-8K31

Wetzel, K., Buss, R., Foulger, T. S., & **Lindsey, L.** (2014) Infusing educational technology in teaching methods courses: Successes and dilemmas. *Journal of Digital Learning in Teacher Education, 30*(3), 89–103. https://doi.org/10.1080/21532974.2014.891877

Zinskie, C. D., Jensen, L. J., & **Downs, E.** (2023). Teacher perceptions of emergency remote teaching during the first year of the COVID-19 pandemic. *Distance Learning, 20*(1). https://www.proquest.com/scholarly-journals/teacher-perceptions-emergency-remote-teaching/docview/2873566881/se-2

Zucker, A., & **Kozma, R.** (2003). *The virtual high school: Teaching generation V*. Teachers College Press.

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