

## The Coming Sea-Change in Teacher Education

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William Shakespeare, *The Tempest*, second stanza of ‘Ariel’s song’:

*Full fathom five thy father lies;  
Of his bones are coral made;  
Those are pearls that were his eyes;  
Nothing of him that doth fade,  
But doth suffer a sea-change  
Into something rich and strange*

All stakeholders in schooling, including teacher educators, are slowly realizing that the pandemic has created a sea-change rather than a temporary discontinuity. The pandemic-as-endemic world is neither a return to pre-pandemic normal nor a new-normal. Instead, we are now in Oz rather than Kansas, and—contrary to what some parents, many politicians, and all technophobes are hoping—no magical red slippers can bring us back to where we were. Understanding why this is the case and what schooling must now become is essential to a “rich and strange” transformation of teacher education to meet new necessities—and opportunities.

## INTRODUCTION

The world is now irreversibly hybrid. The drivers of this sea-change are more complex and profound than simply the pandemic shifting to an endemic. If continuing waves of illness were the only discontinuity, then-similar to past viruses—COVID as an always-present, occasionally morphing threat to health could be handled by a new-normal form of teaching and schooling. Comparable to prior crises like the 1918 Spanish flu outbreak (Atterberry, 2020), robust forms of learning-while-absent could help students too infectious or ill to receive classroom instruction.

However, this is not the future we face: Far more profound impacts on schooling are coming from huge shifts in global civilization. Businesses, civic organizations, entertainment venues, and social relationships that used to be primarily face-to-face are now often or even predominantly online (McKinsey & Company, 2022). These transformations are the source of the true, irreversible sea-change.

The world has become hybrid--and will stay that way because many people and organizations value the new opportunities this presents (Baker, 2021). Most employees who have the option of working from home part or all of the time are delighted by this new flexibility. Many people who accept new jobs far from their current location can now negotiate to avoid relocating by instead working across distance. Businesses that can accommodate remote work find their expenses for physical offices declining, increasing profits by reducing costs. Many workers have shifted to occupations providing remote services that were previously face-to-face, and quite a few find their new form of employment better than their old job. Older people and those with comorbidities to COVID appreciate having their meals and groceries delivered. Politicians, pundits, and entertainers delight in the scope and reach of social media with global impact via enhanced digital infrastructures. Through mobile apps, families can keep close contact with remote friends and relatives.

This hybrid sea-change is irreversible, and our brave new world is rich and strange compared to pre-pandemic life. The extended assault of COVID has forced a global enhancement of technical capacity such that even small cities across the world have high bandwidth communications empowering economic, civic, entertainment, and personal ends (International Telecommunications Union, 2020). Whether a person relishes remote interaction or dislikes it, by necessity almost everyone has become facile in new forms of activity across distance.

From now on, when students leave the shelter of classrooms to interact with the world beyond schooling, they must have skills for adept hybrid per-

formance both face-to-face and across distance. Schools, colleges, regions, and countries that force all teaching and learning to be face-to-face (Klein, 2021) are dooming their graduates to reduced agency in every other aspect of life.

## VISION

But isn't remote learning bad for most students, and what can teacher education do about this challenge? Many stakeholders in schooling see this educational sea change as frightening because mass media relentlessly claim that remote learning is tragically inferior to face-to-face classroom instruction (Almagor, 2021; Faiola, 2021; Newton, 2022). The typical evidence politicians, policymakers, and educators offer for this assertion is based on most students' struggles with academic learning during the first year of the pandemic. The erroneous claim made is that the cause of "learning loss" was the necessity of remote interaction, rather than the combination of unprepared teachers, inadequate technical infrastructure, student trauma, and the false mindset that distance learning is ineffective because it is intrinsically inferior to face-to-face instruction.

Fostering learning and motivation in diverse groups of students is a complex activity, and teachers who are not prepared for a particular context—whether face-to-face or online—struggle to succeed. That said, educators and students who were accustomed to using technology in classrooms quickly pivoted to remote learning and, in the second year of the pandemic, initially unprepared teachers whose capacity was built through professional development rapidly became successful online (Ferdig & Pytash, 2021). Many lessons were learned about personalized ways to help teachers build on what they knew about effective face-to-face teaching while reconceptualizing instructional strategies that work in classrooms to those that are suited for remote interaction.

Beyond unprepared teachers, most schools and homes initially lacked the necessary infrastructure to enable learning across distance. Again, this was most evident in the first year of the pandemic, with investments by schools, communities, and parents subsequently filling the gaps (Salman, 2022). The power and affordability of mobile devices (cellphones, tablets), the increasing availability of broadband internet, and the prevalence of social media have made a huge difference in our collective capacity for interaction across distance. If the pandemic had occurred a decade earlier, the results would have been far more catastrophic.

Beyond human and technical capacity, emotional stress from the pandemic also explains much of why some students have struggled. The issue is not remote learning, but instead financial disruptions, grief for those lost to the disease, and fear of further suffering and sorrow (Huffaker, 2022). The prevalence of student trauma undercutting learning even with the return to face-to-face instruction shows that remote interaction is not the primary cause of educational struggles. Social media were actually a huge help to young people isolated by the pandemic and seeking support from peers.

A final issue is a pervasive belief that distance learning is inferior, despite decades of research documenting that this is not the case (Means et al., 2008). Online learning used well can provide a dynamic digital scaffold for instrumented learning to aid customization, remote collaboration, just-in-time scenarios, continuous assessment, and hybrid interaction (Dede, 2019). In particular, among many other evidence-based strategies, a 2016 MIT report about the potential of online education highlighted *spaced learning* to improve retention, which allows students and teachers to focus on applying that learning to challenging problems, as well as *game-based learning*, which can contextualize abstract concepts and provide data on student challenges back to the teacher (Willcox et al., 2016). In addition, some types of online learning can induce psychological immersion by students, which enables situated learning and transfer to real world applications (Dede, 2014). Similarly, mixed-reality simulations can provide the equivalent of a flight simulator to teachers, by enabling mentored practice with simulated students (Mikeska & Howell, 2020).

Of course, no form of learning is universally best for all people (Dede, 2008). Those opposed to remote learning highlight stories of students who struggled while dismissing accounts of students who benefitted (Kirschner et al., 2021; Schwartz, 2022). It's unfortunate that some politicians, policymakers, and educators are blaming the medium rather than accepting responsibility for their own lack of response to issues of unprepared teachers, inadequate technical infrastructure, student trauma, and false beliefs about the ineffectiveness of distance learning. Given the sea change, stakeholders in education must abandon flawed interpretations of distance learning to focus instead on how best to improve and balance hybrid forms of delivering schooling.

## IMPLEMENTATION

Developing pre-and in-service teachers adept in face-to-face and in on-line instruction (not one or the other) is both a necessity to prepare students

for life in a hybrid world and an opportunity to extend the ecosystem of learning environments and instructional strategies that students experience, enabling personalization to individual needs and preferences. We should not waste a crisis: the pandemic is a terrible human tragedy, but it is also the best opportunity for educational transformation I have seen in my lifetime (Dede, 2020). Teacher education should transform from reinforcing outdated models of schooling to instead enabling lifelong hybrid learning in a global digital economy.

A series of articles and reports have documented educational innovations implemented during the pandemic and foundational for transforming schooling (Bombardieri, 2021; Gallagher & Cottingham, 2020; Gewertz, 2022; Huebeck, 2022; Sparks & Harwin, 2022). Their recommendations have many themes in common, including linking schools to their parents and communities, investing in digital infrastructures for every educational institution and all students, moving beyond standardized summative assessments to value diagnostic/formative trajectories of learning, preparing teachers for online instruction as well as classroom teaching, shifting to “flipped” classes—and retaining hybrid learning rather than moving back to face-to-face instruction only. Teacher education should recenter its focus on these and related themes.

Beyond recommendations, case studies of successful innovation are useful in providing detailed guidance on what role teachers can play and what knowledge, skills, and dispositions they need for success. A source of case studies about digital innovation in teacher education is *Teacher learning in the digital age: Online professional development in STEM education* (Dede et al., 2016). As an example of an insight from these cases, the ways that teachers learn in professional development should emulate the instructional strategies teachers are to use with students—to accomplish this, teacher educators will need extensive capacity building through online learning in order to understand how to create effective online learning experiences for teachers.

Another useful source of technology-related cases is the OECD/World Bank report, *How Learning Continued during the COVID-19 Pandemic: Global Lessons from Initiatives to Support Learners and Teachers* (Vincent-Lancrin et al., 2022). Interestingly, Global South countries often created more innovative models of schooling than Global North countries, as they faced less resistance from the entrenched industrial-era schooling system.

An even richer source of case studies is the Silver Lining for Learning (SLL) series (Dede et al., 2021). SLL is an unfunded, unsponsored, bottom-up initiative that emerged as a direct result of the pandemic. A team

of faculty members from different universities who all had expertise in on-line learning co-founded this series of weekly webcasts (starting mid-March 2020), with more than 100 one-hour episodes to date. SLL is an ongoing conversation on the future of learning with innovative educators and education leaders from across the globe. Many SLL episodes highlight grassroots innovations led by teachers or by teacher educators, providing bottom-up models for transformative innovation that complement top-down initiatives for incremental educational improvement in industrial-era schooling. For example, case studies directly related to teacher education include Episode 35 on the Global Online Academy and Episode 78 on Designing the Next Education Workforce.

An analysis of the cases described above suggests that the following themes (among others) are important in teacher education for 2025:

- Teacher education programs should build on lessons learned from the pandemic about personalized ways to help in-service teachers build on what they know about effective face-to-face teaching while reconceptualizing instructional strategies that work in classrooms to those that are suited for remote interaction (Ferdig & Pytash, 2021).
- Graduates from teacher education programs should understand what types of teaching are best suited to the various levels of technology infrastructure available to them in practice, as well as how to use social media in providing emotional support to remote students. Fishman and Dede's chapter in the *Handbook of Research on Teaching* (5<sup>th</sup> Edition, 2016) provides detailed, evidence-based advice on these topics.
- Teacher education programs should certify that their alumni are adept at classroom-based and online instruction, using warrants from mixed reality simulation systems that can mimic both face-to-face and remote interactions with students (Bondie & Dede, in press).

Teacher education programs should study successful hybrid programs now emerging in districts to develop further evidence-based, detailed cases necessary to understand the preparation teachers need not only to be effective, but also to lead the transformation of schooling. Teacher education must prepare teachers to be active agents of improvement, rather than simple implementers of current best practices.

## QUO VADIS?

In his 1969 book, *The Future of the Future*, John McHale coined this epigram:

*The future of the past is in the future  
The future of the present is in the past  
The future of the future is in the present*

While those who cannot remember the past are condemned to repeat it, the first line indicates that we are constantly reinterpreting history; for example, in many localities Columbus Day has shifted to Indigenous Peoples Day. The second line acknowledges that trends and structures from the past, such as the traditional school curriculum, constrain what we can do in the present. But the third line highlights that we have the power to invent the future, rather than simply see it as an extension of the past and present. In the shadow of the pandemic, which has undercut the dead hand of the past and the compliance mentality of the present, we should seize the opportunity to focus on the future of teacher education through transforming its purpose and methods.

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