Practicing to become a teacher: learning from simulations and roleplays

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ABSTRACT

This paper explores how teachers-in-training can gain crucial experience by taking part in simulations and roleplays. The use of simulations and role plays has been in discussion by teacher trainers for some years, inspired by practices in other highly regulated industries such as health care and nursing, but the same rate of adoption has not been forthcoming. However, this need has become more evident – even urgent – during the COVID-19 pandemic and subsequent school closures, which has result in cancelled placement opportunities on a massive scale.

We argue that although actual classroom experience remains a central component of teacher training, critical skills developed through practice experience can be provided in virtual environments that deconstruct the complex practice of teaching and explicitly make connections to the theories and principles of good teaching. We identify key features to be considered when creating effective simulated teaching and learning experiences. A range of technologies are discussed that support approximations of practice, and we present an experimental example of

a simple interactive video that was created using readily available technologies.

INTRODUCTION

Teacher education, like most other elements of society, has had a difficult 2020 and 2021. The COVID-19 pandemic forced an unexpected and rapid adaptation to online working, teaching and learning – and this has continued as the virus has continued to impact daily life around the globe. This is particularly true in teacher education where disrupted school placements and distance learning have resulted in a varied (and often diminished) experience with teaching students leaving their studies less prepared than pre-COVID graduates. A large body of literature has established the value and impact of simulations in teaching different forms of practice, including via digital platforms. In response, we discuss some promising pedagogies designed to deconstruct the complex and dynamic nature of classroom practice, as well as aligned technologies that offer simulated learning experiences including role plays and serious games. This paper will focus on current literature surrounding these efforts to 'approximate practice' (Grossman et al., 2009) and identify some key features. We argue the need for explicit representations of practice that can be decomposed and analysed, followed by opportunities for practice approximations and feedback through simulation, role play and serious games.

SOCIAL PRACTICE THEORIES

In teacher education, a disconnection exists between what might be deemed 'the practice of teaching' and 'the teaching of practice'. The research tells us that beginning teachers often find it difficult to apply what they learn in their course to their work as teachers. Commonly dubbed 'practice shock', beginning teachers will typically regress from the research-informed things they have learnt in their course to personal understandings developed through their own school experiences (Blomber et al., 2013; Lampert & Ball, 1998). Teacher education, researchers say, needs to be more effective in helping students develop practical knowledge

and skills for the classroom (Cochran-Smith et al., 2017). It needs to shift from a focus on what teachers *know* to what they *do* (Kemmis et al., 2014). This focus on *practicing* presents a particular challenge to teacher education where practical (school-based) and theoretical (university-based) elements are often distinctly different. This means that the complex practices of teaching remain opaque for many teaching students (Miles et al., 2016).

This is where practice theory, which recognises the complexity of teaching as a practice, can shed light. Centred on Grossman's theory of professional practice pedagogy, a practice theoretical approach allows for an emphasis on 'core' teaching practices. Described by Grossman et al. (2009) as "occurring with high frequency in teaching" (p. 277), 'core' or 'high leverage' (Ball & Forzani, 2009) practices like these can be approximated in a range of ways.

Social practice theories provide a way to understand practice in three ways that are helpful for articulating the development of professional (and thus teacher) practice:

- as *practising* – the repeated action and activity, habituation;
- as an organised nexus of actions that hang together, teleologically, through **do-ings –** the bodily actions and activities; **say-ings –** the speech acts**;** and **relatings** – the relating actions between people and between people and the world (Kemmis et al., 2014), and;
- as the actions that are *performed* in a practice of something (i.e. the practice of teaching, of nursing and so on)

Kemmis and colleagues' work in Practice Architectures focuses on the second of these, providing the following definition of practice:

> A practice is a socially established cooperative human activity in which characteristic arrangements of actions and activities (doings) are comprehensible in terms of arrangements of relevant ideas in characteristic discourses (sayings), and when the people and objects involved are distributed in characteristic arrangements of relationships (relatings), and

> when this complex of sayings, doings and relatings 'hangs together' in a distinctive social project. (Kemmis et al., 2014, p. 31)

In drawing these notions of practice together, a professional practice is a collection of activities that involve the performance and repetition of *doing* things, *saying* things and *relating* things that hang together as a distinct practice. Practices however are also nebulous, always incomplete and ever-changing in-the-moment being formed, re-formed and transformed through the (re)interpretations of the carriers of a practice (Reckwitz, 2001). Further, while a 'practice' is performed through individual actions, practices are collectively and historically constituted. This provides a philosophical grounding for looking at practices as the bodily movement, behaviours, and speech acts, actualised through the nexus of sayings and doings that are performed as actions in the world. These sayings and doings underlie the construction of habits, pre-dispositions, life conditions and subjectivities (Schatzki, 1996).

TEACHING AS UNNATURAL PRACTICE

The practices of teaching are different to the everyday 'teaching' that we naturally undertake in explaining, questioning, and sharing with colleagues, friends or family. Such teaching practices can be summarised as ***unnatural*** practice They include the minutiae of specific knowledges and activities that teachers are required to know and do in facilitating student learning (Ball, 2009). If these unnatural practices are not explicitly taught, then novice teachers' theoretical knowledge remains inert where it "can be retrieved when required, but it does not guide their classroom practice" (Blomberg et al., 2013, p. 91). When pre-service teachers are learning the embodied and emplaced practice of teaching through *practising*, they become actors in the practice of teaching. School placements are seen as opportunities for students to *enact* their theoretical and practical knowledge but vary considerably in the quality of experience. This is not unique to teacher education. Wyllie et al.'s (2020) research on the experiences of nursing students provides a similar critique. The nursing students they worked with suggest that to be well supported by their lecturers, theory should be bolstered by simulation in a safe environment that provides "students the chance to assess, analyse, consider, react and

reflect on their own experiences in a safe environment … [and] allows students to repeat, evaluate and reflect on their learning, based on feedback" (p. 22).

SIMULATED LEARNING

Pedagogies of enactment according to Grossman et al. (2009) define the use of interactive materials created to support practice-based teacher education as the "decomposition" of the practice of teaching into components that can be separately role played, reflected upon and refined. Given that "much of what teachers need to know to be successful is invisible to lay observers" (Darling-Hammond, 2006, p. 300), this would involve explicitly identifying and targeting such elements of the profession for "the enactment of knowledge, beliefs, and dispositions through strategies, routines, and moves that can be unpacked and learned by teachers" (Grossman & Dean, 2019, p. 158).

Although the literature includes all aspects of teaching as benefitting from simulated learning experiences, Edwards-Groves (2018) identifies the enactment of core dialogic practices such as communicating, listening and interacting with students in classrooms as essential. These aspects of teaching, they claim, are critical in the development of what Forzani (2014) describe as "core practices" in teacher education: "Because 'teaching' is now more widely understood as interactional, improvisational work in which students' ideas and beliefs are critical resources, the practices that are viewed as important for novices to master include eliciting and interpreting student thinking, leading class discussions, and facilitating small group work, to name some examples" (Forzani, 2014, p. 365). Kaufman and Ireland (2016, p. 261) warn however that "adopting simulations for teacher education is challenging". Effective simulations, they claim, are not only based in a strong theoretical foundation, but also on a clear understanding of the behaviours to be practiced or assessed, a valid simulation model, enough realism to engage users and mechanisms for evaluation, feedback and debriefing (Kaufman & Ireland, 2016, p. 267).

This notion of evaluation, feedback and debriefing is further emphasised in reflective practice research where researchers observe that when teacher

candidates are provided opportunities to reflect upon and discuss classroom practices, their understanding of the teaching process deepens (Brookfield, 1995; Hughes & Mapes, 2012; Lee & Young, 2010; Matthew et al., 2009). When processed with student teachers in a manner similar to what Baird et al. (1999) describe as 'structured reflections', and simulation researchers label the 'after-action-review process' (Straub et al., 2014), simulated experiences can generate deeper levels of understanding about "specific aspects of instruction, such as questioning, responding, and use of wait-time, or commentary regarding more qualitative aspects of teaching" (Berg & Dieker, 2017, p. 2059). When simulated learning experiences include the opportunity for both individual decision-making and shared analysis and reflection, it is thought that pre-service teachers can move from theory into action, more effectively (Dotger, 2015).

While teacher preparation and practice experiences necessarily occur in real classrooms, advocates of simulated experiences claim the simulated experience can afford student teachers the opportunity to experience varying degrees of complexity, unlike actual classrooms where so many uncontrolled factors can potentially overwhelm them. Since pre-service teachers are yet to develop the rudimentary skills of teaching, by reducing the distractions they are able to focus on specific aspects and processes (Berg et al., 2017). Simulated learning experiences can leverage this sense of 'tunnel vision' by foregrounding a sub-set of skills, while more difficult challenges are dampened or removed (Berg et al., 2017); an advantage identified by Grossman (2011) as a precursor to engaging in more complex practice. Since "one of the well-documented problems of learning from experience is knowing what to look for, or how to interpret what is observed" (Grossman et al., 2009, p. 2069), simulated learning experiences can direct the focus in order to more deeply analyse and understand each of the constituent parts. Simulated 'approximations' also provide the opportunity for specific and targeted feedback (Grossman, 2011) followed by the opportunity to replay the simulation. Here digital technologies are more widely used as they offer the opportunity to replay the experience many times (Kauffman & Ireland, 2016). Naming component parts of teaching practice (Hauser & Kavanagh, 2019) and offering the opportunity to practice them in a low risk environment, provides for what Schön's earlier (1983) work on teacher education identified as essential to novice

learning. Low risk environments can encourage critical skills development, allowing students "to encounter problem situations, try decisions and actions, experience the results and modify their behaviour without risking harm to themselves or others (Kaufman & Ireland, 2016, p. 261). Carrington et al. (2011) point out this low-risk environment is particularly relevant when working with vulnerable students.

Another element, described by many authors as critical in simulated learning, is the authenticity of the learning context (Bridges et al., 2016). Kaufman and Ireland (2016, p. 267) describe effective simulations as having "enough realism to engage learners". The closer the context and responses to those interactions, the more effective the learning experience is thought to be. Not all researchers agree however. Hopwood (2017) for example asserts the very nature and asset of the simulation is unreal and "by embracing the unreal, and the fluid play between real and imaginary…a pedagogically rich moment can unfold and be exploited for all its unreal, fake, and fictional qualities" (p. 78). In this way authenticity is an outcome of the generative dialogue between the concepts and concrete actions the simulation elicits and inspires. The real value of pedagogies of enactment is realised when "theory bolstered by simulation provides students the chance to assess, analyse, consider, react and reflect on their own experiences in a safe environment … [and] allows students to repeat, evaluate and reflect on their learning, based on feedback" (Wyllie et al., 2020, p. 22).

TECHNOLOGY AND THE SIMULATED LEARNING EXPERIENCE

Although teacher education has not adopted technology-mediated role plays and simulations with the same gusto as disciplines like health care, it is catching up "as technology-supported teaching simulations become more sophisticated, more easily implemented, and more widely used" (Kaufman & Ireland, 2016, p. 265). In doing so, teacher education can draw on fields that have long looked to media technologies to create simulated learning experiences in line with education technology pioneer Seymour Papert's (1980) concept of Microworlds: "a subset of reality or a constructed reality whose structure matches that of a given cognitive mechanism so

as to provide an environment where the latter can operate effectively" (p. 204).

Early approaches involved the use of analogue video and audio recording and playback, which continued until the early 2000s (Wearne, 2004). At the same time, computer simulations began to be used for student simulations from the 1980s (Ives, 1990), with professions such as health care, engineering, law and information technology recognising their potential to help students develop their interpersonal and situational skills. Skills like these have commonly been called 'soft skills' (Hegland, 1981; Kroning, 2015; Maier, 2007), which can refer to everything from social skills to 'self-efficacy, stresscoping, and motivation' (Maschuw et al., 2011, p. 480). And increasingly, educators have turned to computer-based platforms to teach them. A 2014 definition of 'Immersive Education' (The Immersive Education Laboratory, cited in Gardner & Elliott, 2014) is resonant with Seymour Papert's ideas: of giving "participants a sense of 'being there' even when attending a class or training session in person isn't possible, practical, or desirable, which in turn provides educators and students with the ability to connect and communicate in a way that greatly enhances the learning experience" (p. 2). In health care education in particular, the increasing sophistication and affordability of virtual environments has led to an upsurge of interest in their use (Saxena et al., 2016; Falah et al., 2014; Maschuw et al., 2011; Abshier, 2012).

The emergence of the World Wide Web in the early 1990s further boosted this trend. It eventually led to online role plays (Maier, 2007), as well as editable multi-user virtual worlds such as Second Life. Online platforms also offered new potential for the creation of branching 'decision trees' that allowed students to learn about complex scenarios requiring nuanced contextual awareness instead of a single 'correct' response. In the 2010s, the increasing profile of Serious Games (or games with an educational, health or social purpose) saw the development of initiatives such as the European Union-funded Serious Game Mechanics Framework project to better understand the pedagogical affordances of game-based learning (Arnab et al., 2015).

VIRTUAL TEACHER PRACTICES

As soon as accessible online platforms like Second Life began to emerge in the 2000s, teacher educators began to explore their potential. The term 'virtual worlds', otherwise known as Multi-user Virtual Environments (MUVEs), was used to describe a diverse number of these platforms, whose core affordance of "scenarios, simulations and role-plays" (Savin-Baden et al., 2010, p. 131) proved promising for teacher educators. In 2009 the Australia and New Zealand Virtual Worlds Working Group (VWWG) was founded and saw over 200 tertiary educators sharing their practices and publishing through a series of conference papers from 2011 to 2016 in the proceedings of the e-learning conference Ascilite. This annual series of conference papers both highlighted innovative virtual practices in teacher education and other areas, and outlined the technical, resourcing and bureaucratic obstacles involved in their implementation (Gregory et al., 2015). Projects highlighted included a virtual environment "designed to provide pre-service teachers with opportunities to undertake situated role play that enabled them to gain classroom management skills, lesson design and implementation experience." (Gregory et al., 2016, p. 246), and the Sim-on-a-Stick (SoaS) platform that allowed students to create environments and avatars in "a safe, closed environment where work can be transferred to an online space so that the pre-service teacher can visit and explore the spaces" (Gregory et al., 2016, p. 249).

Researchers have pointed to the suitability of digital simulations for student teachers due to their "low-stakes environment", with participants able to "experiment without the risk of consequences they might normally face if their classroom decision takes an ineffectual or even chaotic turn viewed by a university supervisor or cooperating teacher" (Manberg et al., 2007, p. 132). Simulations allow "preservice teachers to practice and reflect in a relatively consequence-free environment before assuming responsibilities in a live classroom" (Manberg et al., 2007, p. 149). In Manberg et al's study, this was seen to lead to positive attributions including "self-efficacy, emerging professional identity, empathy, leadership, knowledge base, collaboration, ethics, and critical thinking" (p. 128).

Recent years have seen an increasing sophistication of online, subscription-based tools such as Labster in STEM education (https://www.labster.com/), with the COVID-19 pandemic proving additional impetus for their adoption (Wlodkowic, 2021; Harland, 2021). These platforms have made it possible for educators to create sophisticated and scalable simulated experiences without the need to invest in the development and maintenance of custom software.

ROLE PLAYS

Role plays have been a feature of many simulated student experiences, as seen in the VWWG's reporting of projects. Participants took part in role plays by operating avatars or virtual characters. They were used to "demonstrate a point or concept and many were unscripted providing a transformative learning experience. Students had to participate in the role-play requiring them to reframe the knowledge gained from their training." (Gregory et al., 2016, p. 248). Indeed, role plays (albeit non-virtual ones) have long been recognised as effective by educators in a number of disciplines (Hegland, 1981; Wearne, 2004), and have involved either role playing with peers or hiring trained actors. This is known in medical and healthcare parlance as 'standardised patients' (Bosse et al., 2015). Hiring actors, however, is expensive (Bosse et al., 2015). Even peer-based face to face role plays, though framed as more cost-effective than those using actors (Bosse et al., 2015), tend to generate large resourcing overheads due to the need to coordinate activities during an era of increasing student to staff ratios (Maier, 2007; Bosse et al., 2015).

Financial and resourcing factors have long played a role in both inhibiting and promoting the use of digital simulation platforms in education – but this aspect is sometimes overlooked in research. The need to maintain and troubleshoot custom software, installation, hosting and IT support difficulties, and licensing costs have all played their part in discouraging educators from relying on such platforms in the longer term (Gregory et al., 2015; Schutt & Linegar, 2013). However, in recent years the scalability and increased sophistication of some digital platforms and the growth of supported, relatively low-cost subscription-based online platforms (such as SimSchool) have countered this trend. Some areas of tertiary education

have invested heavily in their own platforms, realising the scalability potential of taking students through otherwise expensive technical processes in highly specialised facilities. One example is the Pharmatopia platform, a collaborative international project involving multiple universities and pharmaceutical industry partners, which created a simulated pharmaceutical pill-making learning environment used by students globally.

SERIOUS GAMES

In recent years, dedicated simulation platforms for teacher education have begun to appear on the education market as well as platforms developed for in-house use by university faculties of education such as ClassSim (Ferry et al., 2010), Cook School District (Girod & Girod, 2006) and Teach ME (Bautista & Boone, 2017). Kaufmann and Ireland (2016) describe three overlapping types of situational simulations: scenario/role play simulations; simulations with standardised students; and computer-based simulations. A number of mixed-reality', game-like products can be seen as all three, with participant student teachers interacting with virtual student avatars in what Sweeney et al. (2018, p. 670) call "virtual field experiences" within a classroom. The aim of such products is for future teachers to practice their teaching skills without putting classroom students, themselves or their institutions at risk (Hughes et al., 2005).

One of the best known is SimSchool which is powered by an "artificial intelligence model {that} uses a hill-climbing algorithm to mimic how learners adjust and adapt themselves to meet the physical, emotional, and cognitive requirements of a task. The adjustment process takes place in a multidimensional space for each virtual student and evolves during each class session depending on what you, the player, do as a teacher" (Bush & Hall, 2013, p. 2550). SimSchool is described as inexpensive, scalable and a safe way for students to practice and learn in a range of situations (Kruse & Gibson, 2011), but has generated mixed reports about its effectiveness (Badiee & Kaufman, 2015). Bush and Hall (2013, p. 2550) make the point that SimSchool (and digital simulations in general) are not able "to completely replicate the target environment", with oversimplification "losing a key factor of a complex situation". A counter-argument, however,

is that simulations do not intend to replicate this complexity, but rather key elements of it, or as approximations or "metaphors" (Wilson, 1995, p. 25) that create a space for learning through trial and error and/or conceptual consolidation of theoretical material.

Another mixed-reality platform along similar lines to SimSchool is TeachLivE, developed by the University of Central Florida. Again, its premise is a participant teacher in charge of a classroom of avatars who "can display inappropriate behaviors, such as an attention-seeking student who is quite happy to respond repeatedly to more difficult challenges such as aggressive power and revenge-type behaviors, and passive fear of failure behaviors" (Berg & Dieker, 2017, p. 2060). Behaviour/challenge levels can be adjusted in advance by teacher educators. As a contrast, a different, and less technically complex, platform is LessonSketch, a simple and free online tool developed by the University of Michigan School of Education that allows teacher educators to create cartoon strip-like 'sketches' of classroom scenarios to use with student teachers as a conduit for discussion and reflection on teacher practice. Designed specifically for mathematics teachings, LessonSketch shows that simulation doesn't always need to be 'high-tech' or elaborate to be an effective tool for educators. Chazan et al. (2018, p. 201) describe the role of LessonSketch in devising experiences for student mathematics teachers and deploy "Grossman's pedagogies of practice to explore how with the materials they are creating teacher educators are representing practice, decomposing it, and providing opportunities for their students to approximate practice through the curricular artifacts that they are creating". However, LessonSketch provided an unintentional lesson in late 2020 when it was discontinued, due to being built on the now-unsupported Adobe Flash platform. Its users learned that proprietary digital platforms can change or be discontinued without warning, and so cannot always be relied upon in the longer term.

BRINGING IT ALL TOGETHER: A SIMULATION EXPERIMENT

Applying the principles of practice theory as a nexus of actions, and acknowledging the unnatural practice of teaching, we now present an experimental virtual simulation project. As a response to the deterioration

in mental health and wellbeing of Australian students, as exacerbated by the COVID-19 era lockdowns (Ivbijaro et al., 2020), mental health organisations are increasingly charging teachers with addressing the rising suicide rate amongst our youth (Atkins et al., 2010). One of the recommended approaches in suicide prevention is for trusted teachers who have developed a positive relationship with a student to openly talk to a student about their thoughts and feelings (Rishel, 2006). There is a natural fear and reticence in teachers to have these conversations as they feel underprepared, lack confidence in their ability to 'say the right thing' and fear a sense of responsibility should a suicide attempt be made after the conversation. Research however continues to emphasise the benefits of a conversation about suicidal thoughts as prevention, and reports that students tend to interpret the lack of willingness to talk about their obvious distress as a lack of care in the adults around them (Rishel, 2006). A simulated interactive video experience was therefore developed to rehearse a conversation with a young person about their suicidal thoughts in a low risk, low stakes virtual environment. This experience involved students watching an 8-minute video of the young person speaking, interspersed with text-based multiple choice response options at crucial points, with responses dependent on the choices made. The program was set on a loop where students were able to repeat their conversation multiple times to practice the preferred responses after reading their written feedback.

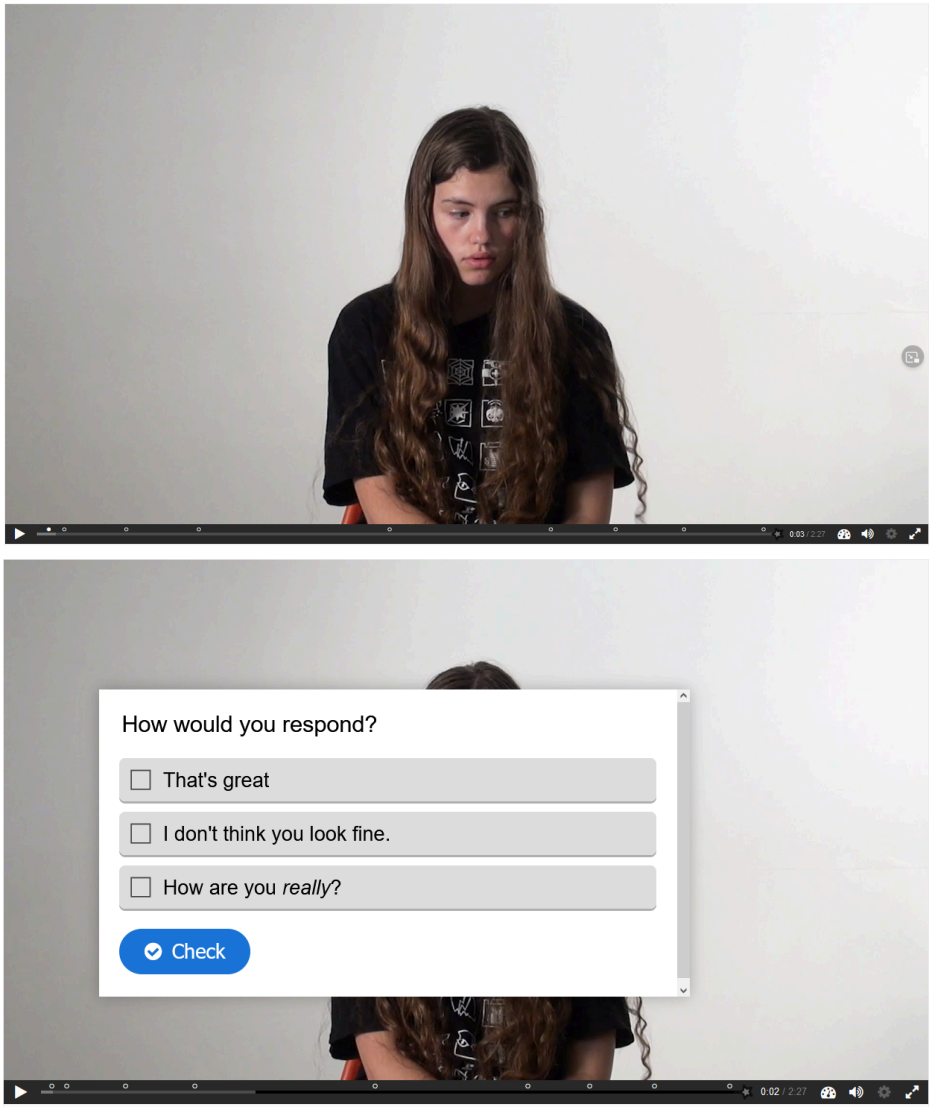

Image 1.1 and 1.2: Screenshot of 'suicide conversation' pilot simulation

Several practice concepts were deliberately incorporated into the design informed by the literature. The first was a desire to present a valid simulation model with enough realism to engage users (Kaufman & Ireland, 2016, p. 267). A young actor was employed to play a student who looked directly into the camera with her scripted responses. This provided a

realistic approximation for a one-on-one conversation a teacher might have with a student. The H5P platform was chosen because it was available to the host university staff for no cost, was supported by university IT staff and could be easily embedded within the university's learning management system Moodle. H5P's interactive video tool could be set up to allow for participant decision making and multiple repetitions for practice both considered central to develop the skills involved in this kind of relational interaction (Grossman et al., 2009). Relevant literature was searched for best practice examples of the decomposition of the conversation and the preferred responses (Beyond Blue, n.d) to inform the automatic feedback for self-evaluation. These principles were applied with the aim of encouraging pre-service teachers to move from knowledge about the importance of such a conversation into the action of actually initiating one (Dotger, 2015).

CONCLUSION

In the era of the COVID-19 pandemic, the accelerated use of, and reliance on, technology has necessarily provoked thinking about its possibilities for teacher education. This paper returns to practice theory to identify high leverage practices suitable for embedding in virtual environments. Whereas teaching placements can be variable and contingent, and often overwhelming for the novice, custom simulations can be carefully designed to bridge the theory-practice divide, be based on a sound theoretical foundation, and enable students to hone specific aspects of their practice, deepening their understanding. Simulations that enable the deconstruction, analysis and reflection on the complex work of teachers in a low-risk environment can provide effective alternatives to some face-to-face experiences and designs. The interactive video described was the first, low-key attempt to explore these possibilities. Further experimentation and research will better help educators understand the impact of virtual environments of all kinds and the possibilities they offer for initial teacher education.

As a final thought, it is important to note the practical considerations when developing technology-based simulations and role plays, regardless of the discipline. Developing and maintaining bespoke software is resource-

intensive and requires commitment by the organisation implementing it. Issues include ongoing maintenance, hosting, support and the obsolescence of technology platforms on which such solutions are built (Schutt & Linegar, 2013). As Crawford et al. (2019, p. ix) point out, "the development of impactful simulation experiences requires an operational team with extensive knowledge in simulation hardware, audiovisual systems, information technology integration, moulage, theatrics, adult learning theories, management, and more". Here, the recent growth of free or cheaper subscription-based online technologies of the type mentioned above offer new possibilities for the relatively inexpensive creation of scalable simulated experiences, including ones that do not need to be technologically complex to be effective.

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