



Simulation in Teacher Preparation

3

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Overview

This chapter reviews the use of simulation in teacher education. Teacher trainers and practitioners acknowledge the virtues of simulation in other areas, outside teacher training, such as business, nursing, law, engineering or economics. Many publications have suggested that simulation as a pedagogical strategy helps improve a wide range of professional skills, such as decision-making, critical thinking, dialogic skills, interpersonal competence and communication. In this chapter, I review simulation applications in teacher education. I also introduce simulation methodology and outline a prototype simulation cycle.

Keywords

Simulation · Teacher training · Teacher education · Active learning · Dialogic learning

Learning Objectives

By the end of this chapter, readers should be able to:

- understand some basics of simulation methodology;
- be familiar with the traditional simulation cycle and understand how simulation is applied in teacher education;
- be familiar with recent research on simulation in teacher education;
- use simulation in their own teacher training.

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3.1 Simulation in Teacher Education

We have already learned in Chaps. 1 and 2 about the multiple benefits of simulation in areas distinct from teacher education. In this chapter, we discuss simulation in schools of education, with the purpose of showing how simulation may complement teacher training. Schools of education are experiencing rapid change in their approaches to preparing teachers for today's demands, with the increasingly widespread use of active methodologies, digital literacy, multicultural classrooms and inclusiveness, to mention only a few. Educational institutions demand that professionals have solid educational instruction.

Back in 2002, Hoban claimed that most teacher education courses still represented a fragmented view of learning. He argued that teacher instruction had an enormous potential to structure and prevent pre-service teachers from becoming progressive practitioners. He referred to the difficulties that pre-service teachers found in dealing with life in the classroom. Other authors also observed that pre-service teachers were often unable to retrieve essential knowledge when they needed it most (Kervin & Turbill, 2003; Stronge, 2002; Danielson, 1996; Entwistle, Entwistle & Tait, 1993).

Now, two decades later, the situation has little changed. In an ideal setting, pre-service teachers would have an array of opportunities to experience quality classroom episodes that progressively develop their classroom practice. However, a number of barriers still need to be overcome, such as the cost of the practicum experience, school needs, school availability and university course requirements.

Yet, it is fair to say that, despite limited research conducted on in-school teacher practice, some effort has been made to optimize teacher training. Teacher preparation has gone through a change from classroom lecture and discussion to individual analysis of group roles and individual and group decision-making. This shift is built on the basis of critical-dialogical pedagogies (Kohli et al., 2015) as pre-service teachers are exposed to theoretical scaffolds and real-world situations along with debriefing activities in various forms (Fraser et al., 2018; Crookall, Chap. 6). Active methodologies, such as case studies, lesson studies or simulations, have gradually started to be developed in teacher preparation, and positive applications are finally being disseminated.

With regard to simulation, specifically, some early research by Thompson and Dass (2000), for example, shows that pre-service teachers who participated in classroom simulations did better in terms of self-efficacy than they did through only analysing and discussing isolated cases. Brozik and Zapalska (2002, 2003) and Sottile and Broznik (2004) used simulation in their teacher training as a result of their need to find a teaching approach that replicated real classroom situations. The purpose of their simulation implementation was to explore decision-making techniques. They also found that through simulation they provided an environment to work collectively with students and refine their communication skills. Probably, the most outstanding discovery was that through a non-conventional learning environment, the participants found the opportunity to develop their creativity and apply their knowledge to solve educational problems.

Ferry et al. (2004) designed a computerized simulation in an attempt to help pre-service teachers learn how pupils acquire and develop literacy skills in primary school. Pre-service teachers were assisted by a computer and were required to make a series of decisions about the management of a classroom, the pupils and classroom events. At other times, they were required to make decisions about a teaching sequence (such as how to introduce a lesson, transition activities and pre-actual-post-teaching activities). Some of the most relevant findings were that many pre-service teachers were able to make connections between their own school experience and the situations presented in the simulation. Some were also able to link the theory presented in their pre-service teacher education training to the educational challenges in the simulation scenario.

In line with virtual simulations, some popular software programmes have gained ground in teacher training, such as SimTeacher and SimSchool. SimTeacher is an online simulation for teacher education in which pre-service teachers become SimTeachers in a virtual school. They have the opportunity to apply concepts that they are learning in their teaching degrees to simulation scenarios. They are presented with virtual schools that contain fictional yet interactive pupils. SimTeachers may perform daily tasks, such as roll calling or designing lesson plans. Similarly, SimSchool is a web-based virtual classroom environment with SimStudents who have artificial emotional intelligence. They react as if they were real humans by smiling, crying, becoming frustrated, raising their hands, seeking attention and showing signs of stress. SimSchool provides pre-service teachers with significant classroom experience (Fischler, 2007).

Grossman (2009) argued that, in teacher education, attention to pedagogy was critical and that neither the research literature nor the US education reform reports of the 1980s had much to say about how prospective teachers should be taught. The author carried out a thorough literature review on how prospective teachers were taught and on how various approaches used by teacher educators might affect what teachers learn about teaching, including what they came to know or believed about teaching, as well as how they got engaged in the practice of teaching itself. She highlighted the potential of computer simulation in teacher training, which coincided with Fischler's findings. Later on, Dotger (2011) claimed that simulation as a pedagogical strategy effectively helped bridge teacher preparation and practice. Teacher trainers and researchers have thus paved the way to a more enlightened conception of simulation in teacher education.

3.2 Current Research

In less than a decade, between the years 2014–2021, several studies have been published that extolled the virtues of simulation in teacher education. The general advantage is that more emphasis is placed on the active role of pre-service teachers, who thereby are able to gain insights into the nature of the process being simulated (Bradley & Kendall, 2014; Gibson et al., 2014; Speed et al., 2015, among others).

Voices in favour of simulation in teacher preparation such as Gibson et al. (2014) or Badiee and Kaufman (2015) argue that the conventional practicum commonly assigned to pre-service teachers to collect data about their teaching practice does not always meet instructors' expectations. An obvious question comes to mind: how can pre-service teachers gain sufficient practice and awareness of the full variety of real classroom situations during their preparation? Teaching practice is the key to gaining insight and is the core of any teacher degree programme. However, this depends largely on the school mentors, the pre-service teachers' initiatives and the time spent in the school to help tackle different situations. More often than not, the practicum becomes a repository of experience more inclined to meet degree requirements than to reflect thoroughly on what actually happens in the real classroom (La Paro et al., 2018; Larsen & Searle, 2017; Sjølie & Østern, 2021).

However, some studies are little by little shaking schools of education out of their complacency by highlighting more revolutionary ideas to address the practicum gaps. The incorporation of well-designed simulations to augment the practicum has come into the spotlight, according to Finn et al. (2020), Gibson et al. (2014), Mukhtar et al. (2018), Sasaki et al. (2020), and Levin & Flavian (2022). Gibson et al. (2014), for example, urge schools of education to "get serious about simulation in teacher education" (p2). In their handbook, the authors highlight the importance of developing a broad understanding of educational situations through the study of simulation scenarios and active participation in simulations. In this way, pre-service teachers are able to delve into a thorough multi-step process. This would start with research into the problems or cases presented in the scenario and end with interaction among participants in the simulation. So far, the adoption of simulation for teacher education seems to be based on the personal initiative on the part of the teacher trainer. This may just be the initial link in a chain of events. This in turn leads to the question of what is necessary to make the use of simulation longer-lasting, to make it evidence-driven and to attract others in a process of collective design?

We may venture that teacher initiative alone is not enough. Heads of departments and Deans of schools of education should work together to ensure that sufficient practice is possible in a low-risk educational setting. This includes adopting active learning methodologies, such as simulation to foster true-to-life practice, supporting faculty research and encouraging the participation of pre-service teachers in forums, virtual exchanges and national and international virtual mobilities, in which educational issues are addressed. Most importantly, commitment must be obtained from the institutional level to guarantee training and continuity in trainers' initiatives to promote more active and realistic teacher methods of preparation.

Gibson et al. (2014, p. 4) identify three main areas to fuel simulation in schools of education: "leadership, incentives and support". Schools of education should experience a programme transformation by providing pre-service teachers opportunities of real and simulated teaching practice. This transformation involves changes in beliefs about the potential of technologies, skilful action in hiring and

supporting talented innovators and establishing an environment where risk taking and collaboration lead to transdisciplinary research, teaching and service.

Likewise, incentives must include recognizing and rewarding teacher trainers' initiatives to use their classrooms as laboratories and to try out methodological innovations under the scope of design-based research. Support has to do with providing the necessary framework for setting up and funding ongoing transdisciplinary research, teaching and the consolidation of design teams.

In addition, McGarr (2021) also introduces simulation when dealing with high levels of stress during school teaching practice. For some pre-service teachers, their lack of experience in classroom management, for instance, may be a real challenge. Simulation, however, may pave the way to real classroom practice. In this way, pre-service teachers could experience aspects of disruptive pupil behaviour in less demanding environments. They could benefit from opportunities of making mistakes without fear of negative repercussions on their academic progression. Thus, the use of simulations is increasingly considered as an opportunity to experience examples of classroom life in a worry-free environment. Research, dialogic learning among peers, teacher trainers, school mentors and decision-making stand as some of the most relevant and rewarding aspects of simulation in teacher preparation.

As our intention in this chapter is to introduce simulation as a complementary strategy in teacher training in particular, we will proceed to unfold the complex, but enriching, operative framework of simulation.

3.3 Simulation Methodology

In simulation-based training, simulations are divided into three main phases (Garcia-Carbonell et al., 2012; Kolbe et al., 2015).

Briefing (Phase I) consists of preparing the simulation. The facilitator must provide all necessary information and rules that pave the way for Action (Phase II). The briefing sessions are prior to the simulation action, and in which participants analyse topics related to the simulation scenario. It is important to highlight the value of research in this phase. Participants should document and investigate about the different topics or situations to be discussed in the scenario. They will thus be more content and linguistically prepared to interact during the simulation. The specific profiles can be strategically given to the participants after they have analysed the scenario situations from different profile perspectives. In this phase, the general objectives of the simulation are presented. The facilitator makes the teams and later assigns the profile roles to each of the members of the teams.

Action (Phase II) is where the simulation takes place. All participants have goals and responsibilities that are clearly specified in their profiles. The team leader may start the activity by thanking members for being there and addressing the problems that need solutions. Debate, discussions, negotiations and decision-making are expected.

Debriefing (Phase III) takes place after the action. All participants (intra- or inter-group) reflect on the experience, their roles and their learning process. This is the phase of reflection, sharing and evaluation at the individual and group level, where participants analyse the different tasks and results of the previous phases.

So, what are the affordances of using simulation in teacher education? Several authors have attempted to identify the potential of simulations under the scope of learning.

According to Crookall et al. (1987), Crookall and Thorngate (2009), Garcia Carbonell et al. (2012), Hoban (2002), Jones (2013), and Klabbers (2009), the simulation does not dissect knowledge or communicative skills, but rather fosters professional competence through a global cognitive process, which optimizes the results and justifies the full integration of simulation into the curriculum design. Authors such as McCrary and Mazur (2010) and Murphy and Cook (2020) have indicated that dialogic learning can be achieved by integrating simulations into education. Dialogue is central in classroom simulations. It leads to new understandings and new knowledge. This exploration through simulation, where pre-service teachers construct meanings through dialogue, rather than meanings being imposed from the outside, leads to powerful learning. Most importantly, learning through dialogue leads, not only to content knowledge, but also to improved language, thinking skills and intercultural awareness (Scarcella & Crookall, 1990; Woodhouse, 2011; Burke & Mancuso, 2012; Michelson & Dupuy, 2014; Ranchhod et al., 2014; Angelini & García-Carbonell, 2019). These scholars agree that simulations provide greater exposure to the target language, more purposeful interaction, more comprehensible input for learners, a reduced affective filter and lower anxiety in language learning.

Moreover, considering that simulations are inspired by reality, pre-service teachers will have had some experience of the educational challenges and the problems described in the scenario prior to the dialogues. This helps to foster the development of critical thinking skills. Starting with a logical organization of information, future teachers are subsequently encouraged to develop their creativity for finding adequate solutions to the problems presented in the scenario, to assume responsibilities to take up a role and finally to develop metacognitive abilities to reflect upon their own learning process (Angelini, 2016, 2021; Daniel et al., 2005).

Last but not least, another challenge, of which facilitators should be aware, is the development of social skills. Simulations fit well with Vygotsky's social learning theory, where students first engage in learning on a social or group level and then on an individual level. Students progress through stages, from what they can do on their own to what they can do with help and to what they are unable to do. Students cannot progress through the zones of proximal development (ZPD) without social interaction and collaboration with educators and peers (Vygotsky, 1978). During a simulation, pre-service teachers assimilate knowledge of their specific discipline and develop social skills that they may transfer to professional settings (Havnes et al., 2016; Kourgiantakis et al., 2019; Levin & Flavian, 2022; Levin & Muchnik-Rozanov, 2023).

3.4 Summary

This chapter focuses on simulation in teacher education. Simulation events constitute a forum to apply previous knowledge and practice skills, develop a broader understanding of educational issues and gain new knowledge. Simulation should be conceived as critical-dialogical pedagogy that seeks the construction of knowledge through critical reasoning, enquiry and the search for answers. Moreover, simulation through its phases facilitates opportunities to link knowledge and theory into application. Thus, Schools of Education are the ideal environment for instilling a real theoretical and practical amalgam, as opposed to a place for the rote reproduction of content.

Some Questions:

How can simulation complement teacher practices?
What benefits can be drawn from using simulation in teacher education?
When would be suitable or more recommendable to introduce simulation in teacher degrees?

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