7.1 Bridging the theory-practice gap in teacher education: The design and construction of simulation-based learning environments

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Clinical simulations have recently been presented as a promising instructional strategy to overcome the theory-practice gap in teacher education. Taking this into account, this chapter aims to enhance insight into the core ideas underlying the design and construction of simulation-based learning environments. For this purpose, this chapter first presents a general design framework. Next, the construction process and two prototypes of simulation-based learning environments in the context of parent-teacher communication — an online and a face-to-face prototype — are described. A pilot implementation of the prototypes reflects a positive student appreciation with a slightly higher appreciation for the face-to-face prototype. The chapter concludes by discussing implications for future teacher education programs and research.

Introduction

One of the major and enduring problems in teacher education is the theory-practice gap. This gap refers to the discrepancy novice teachers encounter between the nature of their teacher preparation program and their experiences as licensed professionals (Korthagen, 2001; Korthagen & Kessels, 1999). Furthermore, the theory-practice gap is often linked to a technical rationality approach in teacher education. This points to the assumption that the mastery of general or propositional (declarative) knowledge will automatically lead to its application. In this sense, knowledge is considered to be of value for its own sake, independent of its potential relevance in professional contexts (see e.g., Kielhofner, 2005).

To overcome this problem, clinical simulations have recently been put forward as a promising instructional approach in the field of teacher education (Dotger, 2013; Grossman, 2010). Clinical simulations offer “clinically rich learning opportunities where all participating (student) teachers experience, practice, reflect on, and build from discrete professional experiences that closely approximate realistic problems of practice” (Dotger, 2013, p. 9). In essence, simulations are designed settings in which the transfer of knowledge into
Professional action is enhanced by providing the student teacher with authentic learning opportunities to actively practice and develop their professional competency (Dotger, 2013).

Although clinical simulations are new and innovative in the context of teacher education, they have been used as an educational tool in disciplines such as aviation, the military, medicine, and nursing for many years (see e.g., Aper, 2015; Boril, Leuchter, Smrz, & Blasch, 2015; de Oliveira et al., 2015; Drews & Backdash, 2013; Lateef, 2010). In these disciplines, simulations are used to replace or amplify real-world practice, which, otherwise, can be too risky, unethical, costly, or difficult to organize. Similarly, the educational literature started to point at the advantages of using clinical simulations in the context of teacher education, such as incorporating immediate feedback and advice, providing scenarios that are ethically or logistically difficult to create in the real-world, allowing mistakes to be made without harming others, giving the opportunity to pause or repeat, enabling students to collaborate and share experiences, and viewing the effects of decisions from multiple perspectives (Badiee & Kaufmann, 2015; Dotger, 2013; Ferry, Kervin, Cambourne, Turbill, & Puglise, 2004; Gibson, Knezek, Redmond, & Bradley, 2014).

However, in order to realize the potential of a simulation in the context of teacher education, they must be both cleverly designed and embedded in a supportive learning environment (see e.g., Badiee & Kaufman, 2015; Dieker, Rodriguez, Lignugaris/Kraft, Hynes, & Hughes, 2014; Dotger, 2013; Ferry, Kervin, & Carrington, 2009; Ferry et al., 2004). As such, this chapter puts forward the term “simulation-based learning environments”, which can be described as supportive learning environments where clinical simulations are embedded and combined with effective instructional strategies in order to support the student teachers’ learning process. Accordingly, the following research question is explored in this chapter: how to design and construct simulation-based learning environments in the context of teacher education?

In view of this research question, this chapter first presents a theoretical framework in which the core ideas underpinning the design of simulation-based learning environments in teacher education are explored. This section starts by addressing the current competence-based approach toward teacher education programs, and, accordingly, puts forward four critical design principles. Next, the chapter — through the description of two prototypes of simulation-based learning environments focusing on parent-teacher communication — illustrates how these design ideas can be operationalized. The following section then further explores how these newly developed prototypes are perceived by student teachers. Finally, implications for future teacher education programs and future research are discussed.
Toward a framework underpinning the design of simulation-based learning environments in teacher education

Currently, teacher education programs are increasingly based on competence frameworks describing the key competences needed to become a high-quality teacher (European Commission, 2013). Competences are usually approached as complex combinations of knowledge, skills, understanding, values, attitudes, and desire, leading to effective action in particular situations (Caena, 2014; Deakin Crick, 2008). Teacher education programs, accordingly, are expected to help student teachers to attain the teacher competences included in the teacher competence frameworks.

In view of this competence-based approach, Blömeke, Gustafsson and Shavelson (2015) recently presented a conceptual model. Building on a literature review, they argue that competences and competence development should be viewed along a continuum. On the left side of the continuum, Blömeke et al. (2015) state that competences represent dispositions. These dispositions cover both cognitive and affective-motivational components. On the right side of the continuum, competences represent performance as observable behavior. Hence, competences are conceptualized as cognitive and affective-motivational dispositions that will, eventually, affect future performance as observable behavior. In view of this process, Blömeke et al. (2015) draw attention to the importance of situation-specific skills as these skills link both sides of the continuum. Put differently, competence development evolves through three interconnected processes that become active when being confronted with complex situations: (1) perceiving particular events or identifying what is important in a setting, (2) interpreting these perceived events, and (3) decision-making as a response to the event. The focus on these so-called PID-skills reappears in various frameworks about teacher competences, capacities, and abilities; see, for example, the reflection framework of Korthagen (2004), teacher efficacy models (Tschannen-Moran, Hoy, & Hoy, 1998), pedagogical thoughts models (Shavelson & Stern, 1981), and approaches stressing differences between novice and expert teachers (Borko & Livingston, 1989; Westerman, 1991).

The competence-based approach to teacher education programs also has clear implications for the design of simulation-based learning environments. This approach suggests that the design of simulation-based learning environments in teacher education should be directed toward the development of student teachers’ dispositions (i.e., cognition and affect-motivation), situation-specific skills, and performance. As such, four critical principles underpinning the design of simulation-based learning environments in teacher education can be put forward: (1) build on a structured theoretical background, (2) engage students in real-
world learning contexts, (3) invoke a cyclical process including concrete simulation-based experiences, feedback, and reflection, and (4) foster collaborative participation. The design principles are grounded in key theories on learning, cognition, and emotion. They especially build on previous studies focusing on clinical simulations in the context of teacher education (Badiee & Kaufman, 2015; Dieker et al., 2014; Dotger, 2013; Gartmeier et al., 2015; Jeffries, Rodgers, & Adamson, 2015) as well as in theories developed in the context of nursing and medical educational simulations (see e.g., Issenberg, McGaghie, Petrusa, Gordon, & Scalese, 2005; Jeffries, Rodgers, & Adamson, 2015). Furthermore, the design principles are inspired by theories concerning teachers’ professional development (Merchie, Tuytens, Devos, & Vanderlinde, 2016) and by the insights from expert-novice studies (see e.g., Borko & Livingston, 1989).

(1) Provide teachers with a structured theoretical background
Simulation-based learning environments should draw from a structured theoretical background (see e.g., Gartmeier et al., 2015). Put differently, simulation-based learning environments should be designed toward clear learning objectives or a set of performance targets that are believed to be crucial for the competence area at stake (Dieker et al., 2014; Issenberg et al., 2005; Jeffries, Rodgers, & Adamson, 2015). This theoretical background provides student teachers with a common lens for feedback and supervision, and, as such, increases the consistency of the learning program (Ferry et al., 2009; Gartmeier et al., 2015; Grossman, 2010). Ultimately, this supports the construction of student teachers’ cognitive schemata or so-called mental models that guide their actions when confronted with new situations. Expert-novice research has shown that expert teachers possess, to a larger extent, such cognitive schemata (e.g., Berliner, 2001; König & Kramer, 2016).

(2) Engage students in a real-world learning context
Several theories emphasize the importance of involving learners in authentic learning contexts, for example, the experiential learning theory (Kolb, 1984), the social cognitive theory (Bandura, 1977; 1997), and situated cognition (Brown, Collins, & Duguid, 1989). Accordingly, this design principle stresses that simulation-based learning environments should be structured around authentic, relevant, and real-world tasks and scenarios that are both of interest to the learners and respond to their actual competence level at that time (see e.g., Dotger, 2013; Gibson et al., 2014; Herrington, Oliver, & Reeves, 2003). Moreover, student teachers should believe that learning experiences are realistic as this triggers their feelings of personal responsibility (Dieker et al., 2014).
(3) Provide a cyclic process including concrete simulation-based experiences, feedback, and reflection
Simulation-based learning environments represent an experience-based type of learning. Following Kolb’s (1984) experiential learning theory, this suggests being involved in four phases: (1) having a concrete experience followed by (2) observation of and reflection on that experience, which leads to (3) the formation of abstract concepts and generalizations that are then used for (4) experiments in future situations, resulting in new experiences. Learners need multiple iterations of this experiential learning cycle until their competence level has reached a sufficient level. In line with this approach, researchers in both medical/nursing education (e.g., Fanning & Gaba, 2007; Issenberg et al., 2005) and teacher education (e.g., Badiiee & Kaufman, 2015; Dieker et al., 2014; Dotger, 2013) support that simulation-based learning environments should invoke a cyclic interaction between concrete experiences, feedback, and reflection (e.g., Badiiee & Kaufman, 2015; Dieker et al., 2014; Dotger, 2013).

(4) Engage students in collaborative participation
Finally, grounded in social cognitive theory (Bandura, 1977; 1997), the zone of proximal development and scaffolding (Vygotsky, 1978), and situated learning (Lave & Wenger, 1991), the fourth design principle stresses the need to engage students in collaborative learning opportunities (see also Merchie et al., 2016). Student teachers should get the opportunity to share their experiences as reflected in the cyclic process of having concrete experiences, getting/giving feedback, and invoking reflection.

From theory to practice: Toward two prototypes of simulation-based learning environments in teacher education
To illustrate how the design framework presented above influences the construction of simulation-based learning environments in teacher education, this section describes the creation of two prototypes of simulation-based learning environments. The central aim of these prototypes is to enhance student teachers’ preparation for parent-teacher communication, as the theory-practice gap is particularly visible in this competence area (see e.g., de Bruïne et al., Willemsme, D’Haem, Griswold, Vloeberghs & van Fynde, 2014; Epstein & Sanders, 2006; EVALO, 2012; Evans, 2013). Also, research shows that student teachers get limited opportunities to engage and practice the competences needed to communicate successfully with parents or their so-called parent-teacher communication competences (PTCC) (De Coninck, Vanderlinde, & Valcke,
Whereas lectures and reading are mostly adopted as instructional formats, active and authentic learning opportunities remain scarce in this domain (de Bruïne et al., 2014; Epstein & Sanders, 2006; Evans, 2013; Shartrand et al., 1997). As a result, student teachers’ PTCC are not developed to a sufficient level by the time they graduate (e.g., EVALO, 2012). This explains why simulation-based learning environments are a promising way forward in this domain (see e.g., Dotger, Harris, & Hansel, 2008; Gartmeier et al., 2015).

As presented in Figure 1, the construction of the two prototypes of simulation-based learning environments supporting the development of student teachers’ PTCC, was built on the design framework presented above. Figure 1 illustrates in detail how the four design principles were operationalized. During this process, and following the guidelines of educational design research (McKenney & Reeves, 2012), both practitioners (i.e., teacher educators) and stakeholders (i.e., teachers, parents, student teachers) were consulted.

First of all, figure 1 illustrates how the first design principle – providing student teachers with a structured theoretical background – was operationalized by focusing the prototype design on the PTCC model (De Coninck et al., 2018) based on work by Walker and Dotger (2012) and Gartmeier, Bauer, Fischer, Karsten and Prenzel (2011). The PTCC model represents a conceptual understanding of what constitutes successful parent-teacher communication (see figure 2). This theoretical background helps determine the goals or performance targets directing the prototype design, but also offers a theoretical framework
that directs the way student teachers will understand their competence-related development. Importantly, the PTCC model is presented to the student teachers during a brief introductory session.

<table>
<thead>
<tr>
<th>(1) Sequencing of an effective parent-teacher conference</th>
<th>(2) Psychological structures of an effective parent-teacher conference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive opening</td>
<td>Accepting parents’ emotions</td>
</tr>
<tr>
<td>Teacher immediately establishes a context for the conversation by (1) greeting the parent in a friendly manner, and (2) clarifying the goals of the parent-teacher conference.</td>
<td>Teacher accepts the emotions of parents by (1) recognizing emotions and letting parents vent their feelings, and (2) expressing empathy for parents’ emotional state.</td>
</tr>
<tr>
<td>Gathering information</td>
<td>Maintaining a positive relationship</td>
</tr>
<tr>
<td>Teacher gathers pertinent information from the parent by (1) asking questions and (2) listening actively.</td>
<td>Teacher maintains a positive interpersonal relationship with parents by (1) being friendly and encouraging – regardless of the parent’s behavior – and (2) showing interest in and understanding of the situation.</td>
</tr>
<tr>
<td>Sharing information</td>
<td></td>
</tr>
<tr>
<td>Teacher explains the situation from his/her point of view by (1) giving concrete information and examples, and (2) communicating in a way that the parent can understand.</td>
<td></td>
</tr>
<tr>
<td>Reaching agreement</td>
<td></td>
</tr>
<tr>
<td>Teacher reaches agreement on a promising course of action by (1) suggesting potential solutions to the situation and (2) incorporating parents’ ideas if possible.</td>
<td></td>
</tr>
<tr>
<td>Positive closing</td>
<td></td>
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<tr>
<td>Teacher closes the conversation in a positive way by (1) agreeing on how to monitor progress and to cooperate further, and (2) saying goodbye to the parent in a friendly manner.</td>
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</tbody>
</table>

As illustrated in figure 2, the PTCC model conceptualizes successful parent-teacher communication following two dimensions: (1) being able to follow a successful sequence in a parent-teacher conference, and (2) adopting supportive
psychological structures. The first sequencing-dimension describes subsequent steps teachers can follow in order to communicate successfully with parents. These steps can be divided into two phases: (1a) sequencing in the initial phase, in which the central steps are a positive opening, gathering information, and sharing information, and (1b) sequencing in the final phase, in which reaching an agreement and a positive closing are important steps. The second dimension, related to the adoption of psychological structures, stresses the importance of maintaining a positive interpersonal relationship between teachers and parents and accepting parents’ emotions. At a meta-level, the PTCC model acknowledges the importance of managing the flow of both the sequencing and the psychological structure of parent-teacher conferences.

Next, figure 2 shows how the second design principle – offering an engaging real-world learning context – was operationalized by creating both online and face-to-face simulations representing authentic and realistic learning environments in which student teachers can actively practice their PTCC. The simulations were based on nine authentic cases. All cases represent realistic scenarios concerning parent-teacher communication and were taken from the literature about parent-teacher communication, the analysis of student teacher portfolios about their field experiences, observations of real-life parent-teacher conferences, and interviews with parents, teachers, and teacher educators. Some cases were adapted from Dotger (2013). The simulations cover a range of common topics and themes concerning parent-teacher communication. Furthermore, each case focuses on a particular phase or dimension of the PTCC model. Three cases are particularly challenging with regard to the sequencing of a parent-teacher conference in the initial phase, three cases are particularly challenging with regard to the sequencing of a parent-teacher conference in the final phase, and three cases are particularly challenging with regard to the psychological structures of a parent-teacher conference. To guarantee that the simulations were within student teachers’ zone of proximal development, the cases vary in their difficulty level and, therefore, should be implemented following this order.

An online simulation followed a clear scenario: (1) reading an online introduction to the case, and (2) watching a related, frequently paused video clip showing a simulated parent-teacher conference. At each pause, participants are requested to write down what they would do or say at that particular moment. Hence, to construct these online simulations, both written introductions and video clips were developed and, accordingly, implemented in an online learning environment. It is important to note that a turning moment was built into each online simulation. This turning moment reflects the phase or dimension of the PTCC model on which the simulation focuses (i.e. sequencing in the initial
phase, sequencing in the final phase, or psychological structures). Depending on participants’ (re)actions at this particular moment, different video clips follow. If a participant gives a desirable answer, video clips follow in which parents/pupils are rather willing to cooperate and the conference consequently ends positively. If a participant gives a less desirable answer, video clips follow in which parents/pupils are less willing to cooperate and the conference ends in a rather negative way.

A face-to-face simulation included (1) reading an introduction to the case and (2) engaging with standardized individuals in a real-time simulated parent-teacher conference. To construct these face-to-face simulations, Dotger’s (2013) guidelines were followed. As such, introductions or so-called student teacher protocols were developed. Besides, actors were recruited and trained to play the role of a standardized parent or pupil. The role of the parents was played by carefully trained (semi)professional actors. The term “standardized individuals” denotes that individuals were carefully trained to portray their role in an established, standard manner that closely adheres to a case-based interaction protocol. This ensures that all student teachers encounter similar situations. When applicable, the role of the pupils was played by carefully trained undergraduate educational sciences students. As in the online simulations, a turning moment – reflecting the phase or dimension of the PTCC model on which the simulation focuses – was built into each face-to-face simulation. In this respect, actors were given clear guidelines on how to trigger participants and how to respond to their (re)actions. Hence, the roles of the parents/pupils were designed in such a way that they reflected particular challenges related to the phase or dimension of the PTCC model on which the simulation focused. Actors were trained to be more cooperative if participants responded well to the key challenges incorporated in the simulation, and to offer more resistance if participants’ (re)actions were less desirable.

Finally, figure 1 illustrates how the third and fourth design principle – invoking a cyclic process including concrete experiences, feedback, and reflection, and fostering collaborative participation – were covered by combining the online and face-to-face simulations with a training session and a reflection session. During a training session, three student teachers collaborated by sharing their personal simulation-based experiences, including their feedback. Each student teacher actively practices his/her PTCC during an online or face-to-face simulation. This performance is observed and evaluated by two of their peers whom they receive feedback from. Alternately, each student teacher observes and evaluates the performance of two peers during an online or face-to-face simulation and gives feedback to them. In order to structure this feedback process, student teachers are provided with a rubric representing the PTCC
model. Taking into account that one training session encompasses three simulation-based experiences – one active experience and two second-hand experiences – student teachers experience three different cases. Interestingly, each case focuses on a different phase or dimension of the PTCC model: A case focusing on the sequencing of an effective parent-teacher conference in the initial phase, a case focusing on the sequencing of an effective parent-teacher conference in the final phase, and a case focusing on the psychological structures of an effective parent-teacher conference. As such, this training session addresses all essential features of the PTCC model. It is important to note that the training sessions including online simulations, and the training sessions including face-to-face simulations, are set up in a similar way. The main difference between them is the format of the training session: online versus face-to-face. When it comes to feedback, student teachers participating in online training sessions receive standardized feedback after submitting answers, whereas, in the face-to-face training sessions, student teachers receive additional feedback from the actors.

Next, each training session is followed by a reflection session in which nine student teachers (three groups of three students who took part in the training session) reflect together about their experiences during the training session. This process is guided by a coach who carefully triggers a discussion about what they perceived during the training sessions, how they interpreted this, and what decisions they consequently made (cf. PID-skills). Furthermore, the coach encourages student teachers to link their experiences and reflections to the PTCC model and clarifies the simulations’ central topics and themes. Additional background information and further reading are also provided. As such, the formation of abstract schemata and a deeper understanding are stimulated. This fits with the theoretical approach toward competence development as explained earlier.

Is it worth the effort? Exploring student teachers’ perceptions of simulation-based learning environments

After completing the design and construction process, the newly developed prototypes of simulation-based learning environments were implemented and tested in the context of a Flemish teacher education program (Belgium). In total, 323 student teachers participated in the study. Respectively, 233 and 99 were randomly assigned to either the online simulation prototype or the face-to-face simulation prototype. The total sample of student teachers included 64.6% female participants and 35.4% male participants. The average age was 23.9 years, vary-
ing from 19 to 56 years. Most student teachers had no prior experiences with parent-teacher communication (55.6%), whereas others did have some prior experiences outside (34.2%) or within (10.2%) an educational setting.

In order to gain insight into the extent to which the newly developed prototypes were experienced as well-designed simulation-based learning environments and how they can be improved, participants were asked to rate several statements on a Likert scale ranging from 0 = completely disagree to 5 = completely agree. Participants were asked to rate statements concerning (a) the authenticity and engagement of the prototypes (e. g., “I think the learning environment was realistic”), (b) the training value of the simulation experience (e. g., “I think it was instructive to participate in a simulated parent-teacher conference”), (c) the added-value of the reflection sessions (e. g., “I think that the reflection sessions triggered me to reflect about my own behavior during the simulations”), and (d) their general appreciation of learning in the simulation-based learning environment (e. g., “I think that simulation-based learning environments should be used more often in the context of teacher education”).

For each aspect or cluster, sum scores were calculated. Next, these sum scores were standardized in order to calculate Independent-Samples T-test in view of comparing the scores from participants in both prototype conditions. In addition, participants got the opportunity to clarify their ratings by writing additional comments. Together, this data set was helpful to understand how participants perceived both prototypes and how future prototypes can be improved.

In general, the descriptive results indicated that both prototypes were positively evaluated as all average statement scores and standardized average cluster scores were above three. This suggests that both prototypes represent well-designed simulation-based learning environments offering a rich learning context. A detailed overview of descriptive results is provided in the online appendix.

When comparing student teacher responses after working in different prototype conditions, results showed that student teachers involved in the face-to-face prototype were usually more positive, compared to those involved in the online prototype. First of all, (a) the authenticity and engaging nature of the face-to-face prototype was rated significantly higher ($M = 3.97$, $SD = .69$) than the online prototype ($M = 3.81$, $SD = .66$); $d = 0.24$, $t(302) = -1.99$, $p = 0.05$. Furthermore, significant differences were found with regard to (b) perceived training value and (d) the general appreciation of learning in simulation-based learning environments. Participants involved in the face-to-face prototype were more positive about the training sessions ($M = 4.3$, $SD = .61$), than those involved in the online prototype ($M = 3.5$, $SD = .72$); $d = 1.01$, $t(302) = -9.1$, $p < .01$. Besides, the face-to-face prototype were generally higher appreciated ($M = 4.21$, $SD = .65$),
SD = .85) than the online prototype ($M = 3.24, SD = 1.04$); $d = .99, t(220) = -9.61, p < .01$.

In their written comments, participants of the face-to-face prototype often explained that they experienced the face-to-face simulations as a realistic opportunity to practice their PTCC because “you really had to react as you will have to do in reality”. Apparently, this high sense of reality or authenticity during practice was decisive for student teachers. They considered the face-to-face simulations to be very instructive and a good preparation for their future practice. Interestingly, student teachers valued the reactions of the actors during face-to-face simulations as the most instructive feedback: “The actors’ reactions were instructive because you sometimes don’t know how others interpret your actions. The reactions gave me insight into how it feels to sit on the other side of the table as a parent”. Participants in the online simulations often mentioned that the online simulations triggered their reflective thinking processes. However, they also mentioned that the online simulations felt less realistic: “Through the online simulations I could think more thoroughly about how to handle the conversation. Maybe you think more than when you immediately have to react, like in reality. In real-life you obviously do not have this opportunity, but because we are still learning I believe that this extra time to think about your actions is very good”. As such, some student teachers suggested that, in addition to the online simulations, real practice is still needed in order to be fully prepared: “After a couple of online simulations, I would have liked more direct interactivity, such as actually conducting a real-life parent-teacher conference”. Finally, it is important to note that, in both prototypes, student teachers acknowledged that it was very instructive to observe others conducting a parent-teacher conference: “By observing how others dealt with particular situations, I had the feeling that I could expand my ideas and approaches”.

Although the face-to-face prototype was usually valued more positively as compared to the online prototype, this did not hold for student teacher perceptions about (c) the added value of the reflection sessions. The results showed that students who interacted with the online prototype rated the reflection sessions significantly higher ($M = 3.87, SD = .88$), than those in the face-to-face prototype ($M = 3.40, SD = 1.11$); $d = -.49, t(151) = 3.65, p = .00$. Although these sessions were set up in a similar way, participants involved in the online prototype explained that the reflection sessions were “very much needed in addition to the training sessions”. In contrast, participants in the face-to-face simulations considered the reflection sessions less valuable because they already learned a lot during the actual training sessions; including the immediate feedback from students and actors.
Discussion and conclusion

Taking into account that simulation-based learning environments can help bridge the theory-practice gap in teacher education, this chapter explored the core ideas underpinning their design and construction. First, a general design framework was presented. This theoretically grounded design framework can be considered as the first important step toward a more comprehensive theoretical basis underlying the design and evaluation of simulation-based learning environments in the context of teacher education. Thereafter, grounded in the framework’s design ideas, the construction of two prototypes of simulation-based learning environments supporting the development of student teachers’ PTCC was described. This section exemplified how the design framework can be used to construct simulation-based learning environments in the context of parent-teacher communication. In addition, building on student teachers’ positive evaluation of both prototypes, the chapter provided the first empirical underpinning of the design framework and its operationalization. Hence, this chapter offers interesting perspectives for both practitioners and researchers in the field of teacher education.

This chapter might inspire teacher educators to design and construct new simulation-based learning environments supporting student teachers’ competence development. Teacher educators can adapt the design framework to construct new prototypes of simulation-based learning environments and they can implement their simulation-based learning environments in their own practice, and, as such, help bridge the theory-practice gap in teacher education.

However, the theoretical and empirical basis underlying the use of simulation-based learning environments in the context of teacher education is still in its infancy. More research concerning the design, construction, and impact of simulation-based learning environments in the context of teacher education is needed in order to reach its full potential. Taking this into account, this chapter can be considered as a first step. In particular, the design framework presented in this chapter represents an interesting theoretical basis for setting up future intervention studies following a pre-test/post-test design. Such intervention studies are needed to gain empirical insights into the impact of simulation-based learning environments on the development of student teachers’ competences. In turn, these empirical findings can be used to refine, optimize, and strengthen the proposed design framework. Hence, in line with the guidelines of educational design research (McKenny & Reeves, 2012), this will, again, result in the construction of new and better prototypes.

Against this background, the prototypes presented in this chapter have already been incorporated into a teacher education intervention to study their im-
Impact on student teachers’ PTCC development. Preliminary results indicate that both prototypes positively influence student teachers’ self-efficacy beliefs as well as PID-skills and that their general beliefs remain stable. Future studies will report thoroughly on the results of this study.

Literature


Table 1: Student teachers’ perceptions of the newly developed prototypes of simulation-based learning environments supporting their PTCC

<table>
<thead>
<tr>
<th>Statements</th>
<th>Prototype including online simulations (mean, [SD])</th>
<th>Prototype including face-to-face simulation (mean, [SD])</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(a) Authentic and engaging learning contexts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think the learning environment was realistic.</td>
<td>3.72 [1.00]</td>
<td>4.13 [.81]</td>
</tr>
<tr>
<td>I think the content of the cases was recognisable.</td>
<td>4.00 [.90]</td>
<td>3.84 [.84]</td>
</tr>
<tr>
<td>I think that the simulations prepared me well for what will be expected from me in my future practice as a teacher.</td>
<td>3.45 [.99]</td>
<td>4.16 [.84]</td>
</tr>
<tr>
<td>I think that the simulations’ difficulty level aligned what I could handle at that certain moment.</td>
<td>4.05 [.91]</td>
<td>3.76 [1.09]</td>
</tr>
<tr>
<td><strong>(b) Training sessions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think it was instructive to actively participate in a simulated parent-teacher conference.</td>
<td>3.89 [1.01]</td>
<td>4.62 [.64]</td>
</tr>
<tr>
<td>I think the simulations prepared me well for what will be expected from me as a future teacher.</td>
<td>3.45 [1.00]</td>
<td>4.16 [.84]</td>
</tr>
<tr>
<td>I think it was instructive to receive feedback from peers.</td>
<td>3.13 [1.21]</td>
<td>4.11 [.94]</td>
</tr>
<tr>
<td>I think it was instructive to receive standardized feedback (online) feedback from the actors (face-to-face).</td>
<td>3.51 [1.14]</td>
<td>4.33 [.82]</td>
</tr>
<tr>
<td>I think the reactions of the parents (and pupils) during the simulated parent-teacher conference were also a kind of feedback.</td>
<td>3.36 [1.27]</td>
<td>4.59 [.69]</td>
</tr>
<tr>
<td>I think it was instructive to observe simulated parent-teacher conferences</td>
<td>4.04 [.91]</td>
<td>4.36 [.96]</td>
</tr>
<tr>
<td>I think it was instructive to give my peers feedback with the help of a rubric.</td>
<td>3.16 [1.33]</td>
<td>3.82 [1.19]</td>
</tr>
<tr>
<td><strong>(c) Reflection sessions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think that the reflection sessions triggered me to reflect about my own behaviour during the simulations.</td>
<td>3.82 [1.02]</td>
<td>3.25 [1.26]</td>
</tr>
<tr>
<td>I think that I have come to more profound understandings of parent-teacher collaboration and communication through the reflection sessions.</td>
<td>3.86 [1.00]</td>
<td>3.27 [1.29]</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean [SD]</th>
<th>Median [SD]</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think that the reflection sessions provided sufficient tips and tricks</td>
<td>3.94 [1.01]</td>
<td>3.68 [1.06]</td>
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<td>which I can use in my future practice.</td>
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<td>(d) General</td>
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<tr>
<td>I think that simulation-based learning environments are a suitable strategy</td>
<td>3.35 [1.13]</td>
<td>4.44 [0.81]</td>
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<td>to learn how to communicate successfully with parents.</td>
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<td>I think that simulation-based learning environments should be used more</td>
<td>3.12 [1.29]</td>
<td>4.20 [1.04]</td>
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<tr>
<td>often in the context of teacher education.</td>
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</tbody>
</table>