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A Pilot Feasibility Study on The Use of Virtual Reality Simulation Training for Parent-Teacher Consultations to Enhance Self-Efficacy in Pre-Service Teachers

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Abstract
A barrier to teacher retainment is the lack of professional preparedness. Limitations with live, hands-on teacher training can contribute to inadequate preparedness, particularly in home-school collaboration. This pilot feasibility study explored using virtual reality simulation (VRS) technology with ninety-seven pre-service teachers in Norway, embedded within a flipped learning design session. Results from the qualitative post session interviews describe how the VRS training supported pre-service teachers in feeling better prepared with conducting parent-teacher consultations. This is supported by quantitative self-efficacy assessments. Thus, using VRS for supporting niche areas such as parent-teacher consultations can support better preparedness for teachers if it cannot be experienced first-hand.

Key Words: Teacher Education, Virtual Reality, Self-efficacy

Introduction

Teacher education programs aim to cultivate high-quality educators who derive satisfaction and longevity from their careers. However, despite entering the profession with altruistic motivations and aspirations to impact student learning and society (Kyriacou et al., 2010), many novice teachers face significant challenges that lead to a disparity between their expectations and the realities of teaching. Notably, a substantial portion of newly graduated pre-service teachers (PSTs) never transition into the teaching profession (Lund et al., 2017; Weinstein et al., 1988; Pendergast et al., 2011). Those who do often struggle with the shift from academic to professional settings, compounded by their experiences not meeting their personal expectations and increased stress from diverse classroom demands and external pressures (Turner et al., 2004). This adjustment can provoke strong affective responses such as anxiety and a sense of incompetence, although some view this cognitive dissonance as a necessary phase for developing professional maturity (Treacy et al., 2023). In Norway, the attrition rate is particularly high, with one-third of new teachers leaving within five years,

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highlighting the critical issues of recruitment and retention (Lund et al., 2017; Tiplic et al., 2014; Rots et al., 2007). Furthermore, Pendergast et al. (2011) noted that new teachers often overestimate their self-efficacy (SE) early in their careers, contributing to a "let down" as they adjust to the real conditions of the teaching environment. Beyond overestimating their capabilities, employers often find that newly graduated teachers lack essential skills and knowledge for the job (Turner et al., 2004). A 2012 report from the Norwegian Ministry of Education highlighted that approximately 9,000 school employees had inadequate qualifications or subject knowledge (Det kongelige kunnskapsdepartment, 2012). To address this, practical experiences such as practicums were recommended to better integrate theoretical learning with practical skills (Turner et al., 2004; Ulvik et al., 2017). However, a study by Malikebu et al. (2024) revealed that PSTs often harbour misconceptions about their ability to transition seamlessly from theory to practice, and mentors frequently fall short in maintaining the necessary standards for effective teacher preparation. This raises a pivotal question in teacher education policy about whether merely assigning a fixed practicum duration is sufficient or if setting specific conditions like mentor feedback and additional technological training is necessary (Cohen et al., 2020). Despite the practicum opportunities provided during bachelor studies, they do not fully encompass all aspects of real-life teaching and management, underscoring the inherent limitations in teacher education to fully prepare students for all career scenarios (Simsek-Rackelmann et al., 2017). The limited scope of real-life practicum experiences not only hinders PST transitions but also affects their anxiety levels, job performance, satisfaction, retention, identity formation, SE, self-esteem, and sense of belonging (Mackenzie-Davey & Arnold, 2000; Turner et al., 2004).

Learning effectively involves creating educational environments that approximate the real-world contexts where skills will be applied, presenting relevant and challenging experiences (Hulsbergen et al., 2023). Practice-based teacher education (PBTE) advocates for frequent opportunities for candidates to apply classroom techniques and participate in classroom scenarios (Cohen et al., 2020). Common methods in academic training include using professional actors and role-play among PSTs to simulate classroom interactions (Berkhof et al., 2011; Deveugele et al., 2005). These simulations allow PSTs to receive expert feedback in a controlled setting (Ghousseini & Herbst, 2016; Lampert et al., 2013). However, drawbacks exist, such as the high costs of professional actors, typically reserved for assessments, and the less effective use of role-play among PSTs due to their familiarity with each other, potentially limiting immersion and understanding of complex emotional dynamics. Alternatively, technology offers a solution by simulating professional experiences and providing diverse training options. Studies indicate that while traditional knowledge of classroom management and assessment is often insufficient for practice change, enhanced feedback and practice in realistic or simulated settings can improve teaching practice (Cohen

& Wiseman, 2019; Cohen et al., 2020; Sims et al., 2023). Virtual simulation environments align with PBTE by allowing multiple practice attempts and varying scenarios, thereby increasing PSTs' SE in handling professional teaching demands.

SE is considered a crucial factor in the preparation and success of a new teacher. Perceived SE is the personal belief in one's capabilities to organise and execute the courses of action required to produce given attainments (Bandura, 1997). Empirical studies have shown that professional development formats that include mastery experience combined with verbal persuasion and feedback lead to increased levels of teacher SE (Morris & Usher, 2011; Tschannen-Moran & McMaster, 2009). It is the belief in one's ability related to the feeling of being in control, enabling the individual to direct their thinking, take initiative, to persevere and to succeed at a given task that may assist the PST with adapting to the classroom (Turner et. al., 2004, Bandura, 1997). To better understand PSTs' perceptions of preparedness for the classroom environment and teaching, Turner et. al, (2004) gathered data using a teaching SE scale as well as self-reported senses of competency and preparedness: PSTs felt better prepared for classroom activities (structuring lessons and developing student learning) than general duties as a teacher outside the classroom In particular, PSTs felt the least prepared for home-school collaboration including building relationships with parents as well as assisting with special needs, components that are crucial in the role of a teacher (Turner et. al., 2004). In addition, during the practicum periods, the opportunity for PSTs to experience parent-teacher consultations (PTCs) are limited. Thus, this niche area of practicum learning can provide challenges for PSTs to gain the necessary skill sets in developing relationships with parents and home-school collaboration.

To address this niche area of home-school collaboration, Norwegian PSTs are required to take a training course on the professional responsibilities of a teacher which includes learning about the home-school relationship and specifically PTCs. The learning is largely theoretical as most PSTs do not receive the opportunity to observe or practise an actual PTC during their practicum. To address the wish of PSTs to have teaching practice opportunities in ´real´ learning situations as part of their training (Rots et al., 2007), we identified a need to utilise alternative options. As a result, our pilot study focused on the feasibility of providing targeted training using VRS to boost the teacher PSTs' SE beliefs in this professional area of PTCs.

VRS has become an increasingly utilised tool for training purposes when opportunities in ''real'' life are not available. For example, in Hedman et. al., 2014, VRS was provided as an alternative to traditional instruction for training medical students in developing their psychomotor skills and increasing their SE with specific patients. Results from the pilot study found: (i) VRS to be a helpful interactive scenario-based educational tool; and (ii) that SE increased significantly (Hedman et. al., 2014). Another example suggesting the benefit of VRS in education and training was related to negotiation (Ding et. al., 2020). University students were randomised to receive either

the virtual training or remain on a waitlist (no VRS) while they participated in a four-phase study: pre-training, training VRS or waitlist, post-training and follow up training (Ding et. al., 2020). Results from the study suggested that training with VRS had a considerable effect in increasing both SE and knowledge about negotiation (Ding et. al., 2020). The use of VRS for PSTs could assist them with learning how to successfully manage PTCs and increase their SE to adapt to the challenges they may face.

Rationale for pilot feasibility study

The objective of this pilot study was to explore the feasibility and potential benefits of using VRS training to enhance the SE of PSTs when conducting PTCs. Mastery experiences involve the achievement of goals through direct, personal action within the behavioural domain (Morris et al., 2017). As most of the PSTs who participated in our pilot feasibility study had not experienced a PTC before, this niche area lacking in real-life would be provided by VRS experience instead. Thus, we postulated the following research questions:

RQ1) - To what extent does VRS training with PTCs promote SE in PSTs?
RQ2) - How do PSTs perceive that the VRS training promotes their SE and preparedness with conducting PTCs?

These questions were addressed with a two-part multiple methods approach to research that includes both *pre* and *post work* online questionnaires, and semi-structured group interviews. The interviews followed the qualitative phenomenology design structure as we wished to understand what the VRS experience meant for the PSTs (Grossoehme, 2014) As noted, emotional arousal before or during task involvement can weaken SE beliefs (Henson, 2001). To increase teacher SE beliefs in our study, we incorporated reflection before, during and after the VR scenario training to ensure that the PSTs were able to discuss and process their physiological activation, emotional reactions, and that they understood that these should not be attributed to vulnerability or incompetence (Bandura, 1997). Our rationale for study design places a substantive stance on Bandura's theoretical concept of SE (Greene, 2007). This research design focuses primarily on qualitative interviews with quantitative SE assessments to explore the research data collected and gain more holistic insights not available through separate implementations of either method (Greene, 2007, p. 103). Whilst respecting the integrity of the paradigms, the study seeks to utilise their diverse ways of knowing to understand how the VRS supports PSTs' SE with conducting PTCs. Therefore, concepts that are founded on both post-positivism and the social constructionist approaches were included in this research design of this pilot feasibility study (Kuckartz, 2014).

Theoretical Framework

Psychological theory of SE and basis for use as a behavioural measurement

SE is a component of social cognitive theory, describing causal contributions of individuals to their own psychosocial functioning through mechanisms of personal agency enabling them to exercise influence over their life (Bandura, 1997; Lazarides & Warner, 2020; Zee &Koomen, 2016). These personal beliefs can influence an individual's course of action including: 1) what they wish to pursue, 2) how much effort they will put towards a given endeavour, 3) how long they will persevere given present obstacles or failures, 4) their resilience in the face of that adversity, 5) whether the individual's thought processes are supportive or hindering, 6) how much stress and/or depression is experienced while coping with challenging environments and/or demands; and 7) the amount of accomplishment the individual perceives from it (Bandura, 1997).

The literature discusses four approaches in building SE (Bandura, 1997): (i) Mastery experiences, where goals are achieved through direct action within specific behavioural domains (in this case PTCs), strengthen SE when attributed to personal effort and ability (Morris et al., 2017). (ii) Vicarious learning: In our study, we focused on PTCs via VRSs, where novice PSTs observed and learned from others' experiences, enhancing their SE (Zee & Koomen, 2016). (iii) receiving encouragement & feedback: Effective supervision and coaching from more experienced others (Teachers and facilitators) further developed SE by providing feedback and encouragement in these challenging scenarios (Goddard et al., 2004). (iv) reflecting and dealing with one's physiological and emotional state: we addressed physiological and emotional responses, such as excitement or anxiety, through structured reflection sessions, helping PSTs interpret these responses constructively rather than as indicators of incompetence (Henson, 2001; Bandura, 1997).

These four approaches in building SE guided our planning of the sessions and were also considered in the analysis of the data to better understand the extent and ways in which the VRS prepares PSTs to conduct PTCs.

Methodology

Pilot VRS training Session

Ninety-seven second year PSTs in primary and lower secondary education programs at a university in Norway were invited to participate in a one-day training session on PTCs as part of their required curriculum course entitled, "The professional teacher". Instead of having a traditional lecture on PTCs, we implemented a holistic flipped learning design approach, with three study phases: *pre-work, in- class work/ VRS,* and *post-work*. This study was embedded in part of the curriculum and while participation in the training was obligatory, it was made clear to the PSTs that participation in the research (pre and post work online questionnaires, and semi-structured

group interviews) was voluntary, and they had the right to refuse participation without penalty.

Pre-work phase of VR training session - During the *pre-work phase* of the VR training session, PSTs listened to a Podcast about what to expect during the PTC VRS and on communication theory related to PTCs and read the case study planned for the VRS scenario entitled; *"A PTC with Emilie and her father"*. The case study described the student, Emilie, as a quiet student who had challenges both in social studies and in her friendships with some of her classmates. This provided the PSTs with relevant background for the PTC to help them to feel more prepared for their scenario training.

In-class work/VRS phase that was conducted in three key steps - In step one, the whole class had an introduction session led by a teacher, followed by small group guided reflections on the pre-work subject material conducted by two student facilitators per group. These facilitators were in their fourth year of the trainee teacher program and had received training on how to conduct the in-class work/VRS. This reflection session was overseen by two researchers of the team. In step two, small group (six PSTs in each group) training in the VRS was led by two facilitators/group. The VRS scenario was designed by the research team and in collaboration with a local company who provided the technical development. The PTC scenario was set in a classroom with two characters, Emilie and her father (see Figure 1). Using a virtual dialogue simulator, the scenarios were "played" as each participant engaged in an interaction with the virtual avatars. Based on what was said by the participant the facilitators selected the direction of the scenario.

Figure 1. VRS illustration

Each pre-service teacher received two sessions in the VRS to allow PSTs to develop their sense of mastery in this domain (Morris, Usher & Chen, 2017). The VRS provided multiple themes (See Figure 2) and three levels of difficulty (See Figure 3) of the scenario. These scenario variations included options when the father became more confrontational and when Emilie became emotionally upset.

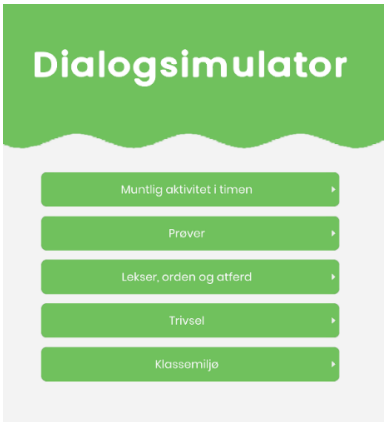

Figure 2. VDS themes

Figure 2. VDS levels of difficulty

All themed scenarios were tested across the small groups with one student in the simulation and the other five as observers. In the first session of the simulation, each student had a scenario that was the lowest level of difficulty e.g. both Emilie and father are happy with the school. In the second session each student had the option to choose a different scenario theme and level of difficulty e.g. the father is unhappy with the school, or Emilie becomes distressed during the conversation.

Following each simulation session, the PSTs were encouraged to discuss briefly with their fellow PSTs how they felt the conversation went with Emilie and her father, and to get observational feedback from their peers and the facilitator. This observation of others and the reflection process was intended to raise expectations and contribute to the promotion of SE (Bandura, 1977). In step three, a whole class plenary session, guided by a member of the research team, concluded the session and provided opportunities to answer PSTs' questions regarding the VRS training and research.

The post-work phase of the VRS training: class discussions and written reflections - All PSTs participated in the class discussions and written reflections during the *post-work phase* of the training. The focus in the p*ost-work phase* was to explore their experiences of the VRS training, their assessments of what they learned, what challenges they had and their perceptions of what they could anticipate in the 'real' world. The reflection process was an integral part of the entire training day to ensure that the PSTs were able to understand their experiences, and build SE (Bandura, 1997). Those who chose to participate in the research were invited to join focus group interviews which took place either directly after the session or the next day.

Method for part one - RQ1: To what extent does VRS training with PTCs promote SE in PSTs?

RQ1 was addressed using an SE scale to measure the PSTs' SE from the VRS that were completed during the *pre-work* and post-work phases. The *pre-work* and

post-work questionnaires included a two item 7-point Likert SE scale (from strongly agree to strongly disagree), *"I feel that I am able to conduct a parent teacher consultation"* and *"I feel that I am able to collaborate with parents/guardians"*. Questionnaire data was collected using the university authorised online date processor *Nettskjema.* Participants were sent a link to the questionnaire. Written consent was collected for participation with a self-created identifier code for which we gave them a prescribed recipe. All data was tested for normality and non-parametric analyses were used for non-normal distributions. Alpha levels (α) are set to .05. The data was analysed using the JASP v 16.0.0 statistical program.

Method for part two - RQ2: How do PSTs perceive that the VRS training promotes their SE and preparedness with conducting PTCs?

RQ2 was addressed using a naturalistic field experiment design. Data was collected in the participants' everyday environment, the classroom (Coolican, 2019). This exploratory qualitative research approach focused on the PST´s nuanced experiences and perspectives (Howitt, 2019; Lin, 2012). By using focus groups, we encouraged relaxed discussions with a focus on the PSTs' experiences with the VRS training on conducting PTCs and how this training potentially promoted new knowledge and SE (Howitt, 2019). Questions included for example: 1*) How did you experience the VRS training? 2) What did you experience as positive during the VRS training?, and 3) What did you experience as challenging during the VRS training?*

Written informed consent was given by the participants. The interviews, lasting 30-40 minutes, were conducted in Norwegian and recorded using the authorised secure app by *Nettskjema*. The interviews were anonymised, transcribed and translated into English by the authors. Interviews were analysed using thematic qualitative text analysis with an inductive and semantic approach to identify themes which we set into context with the above discussed theory and literature background using NVivo 10 (Kuckartz, 2014).

Findings

To what extent does VRS training with PTCs promote SE in PSTs?

Ninety-seven second year PSTs were invited to participate in the study during a scheduled class, 85 completed the *pre-work* questionnaire and 72 completed the *post-work* questionnaires for part one of the study. The SE scale was designed as a continuous measure ranging from 1 (low SE) to 7 (high). As visualised in Figure 1, the mean (SD) SE *pre-work* value was 4.36 (1.20) compared to an average value of 5.49 (.92) during the *post-work* SE evaluation. Aggregated totals for *pre-work* and *post-work* values for SE were compared. The extent of which VRS training promoted SE in PSTs when conducting PTCs was analysed using a paired samples T-test. The Shapiro-Wilk test of normality suggested that all variables were not normally distributed (*Pre-work*= 0.959, p=0.009; Post-work=0.944, p=0.003), therefore, non-parametric analyses

were reported. The Wilcoxon signed-rank paired T-test for SE indicated a large effect size and significant differences between the pre-work and post-work SE of the PSTs ($W=56.6$, $p<0.001$, RBC = .918).

How do PSTs perceive that the VRS training promotes their SE and preparedness with conducting PTCs?

We analysed the PSTs' phenomenological interview sessions to understand the PSTs' perspectives on how the VRS promoted perceptions of increased SE and preparedness. The PSTs reflected that they felt less prepared for PTCs prior to the VRS compared to after its completion. The reasoning in the change of SE beliefs was attributed to the realistic nature of the VRS primarily from the PSTs' perceived ability to authentically engage physiologically, emotionally, and cognitively. These experiences were categorized by the PSTs as relevant and highly insightful/teachable moments, as valuable and a great practice opportunity that positively affected the PSTs' SE. Having this overview of the PSTs' perspectives on how the VRS training supported their feelings of increased preparedness, we next investigated the themes that emerged during the data analysis of the interviews.

Three themes emerged:

- The demands of the teacher-parent consultation.
- The evaluation of VRS as a practice and learning tool.
- The need for practical teaching and how our VRS training addressed that.

The demands of the teacher-parent consultation

The literature highlighted both the issues with new teachers' unrealistic expectations regarding work challenges, and the overestimation in their own capabilities to deal with such difficulties (e.g. Pendergast et al 2022, Turner et al 2004). A course on teacher-parent consultation, therefore, should give teacher-PSTs the opportunity to gain a better understanding of the demands of such a conversation. This theme, in general, incorporated various challenges the PSTs identified with conducting the teacher-parent consultation, and summarised three categories.

In the *first category*, the PSTs discussed the demands of conversing and interacting in the role of the teacher with a parent and student. They described the challenge of balancing "thinking about what to say" and "hearing what the other is saying". This challenge was further elaborated in the contexts of receiving "the answers that you didn't expect at all"; when "the person you are talking to hears something different from what you mean to say"; and when "it is difficult to understand" one another possibly due to "multilingual classrooms", thus, parents (and possibly children) who are still learning Norwegian. Here the PSTs stressed the need to "adjust yourself according to the response", and "being flexible". One student circled back to the first mentioned challenge of balancing both paying attention to what "is on the agenda", and hearing

"what the others said", and said that they rather "try to understand a little more than what you try to convey sometimes".

The *second category* of this theme on the demands of teacher-parent consultations was about the systemic versus the unique aspects of such meetings, and the uncertainty that arose for one's own practice. One student said:

> *"everyone has different ways of having these development conversations...uh... that all the teachers have different ways and when I was in practice, my school and now in ours (...) then they said they had what I tried, they had development talks and they said that it was very difficult to somehow have a common frame work for it because everyone did it so different ways and it was very reassuring when she said that was ok."*

The PSTs discussed this in relation to the need to be "present and prepared for anything" during the PTC. They expressed a need for some external structure ("have an agenda then, I think that one has based on form requirements and what the school has decided and so on"), which can be adapted to "the context of that student", and to the "unpredictability in relation to the fact that there are parties you may not know" during the meeting. One participant puts this need in the following terms: "a system framework around it, and then you have the student's unique story, which we must include in that particular conversation."

The *third category* was the required professionalism demanded of teacher-parent consultations: (i) reflection on the answer(s) to the following demand of one student: "We need to know what triggers us and how we react"; (ii) "Try[ing] to disconnect other things that you have going on at home or in life or whatever"; (iii) being able to "deal with your own feelings". In agreement, the PSTs explained these needs by realising that such teacher-parent consultations were "a complex situation" which "requires a lot from you". It became clear that the PSTs did not expect this, at least not to this extent ("But what strikes me is how demanding it really is."), and specify the demand, by saying "you have to be so (intensely) focused" and "this is a challenge for all of us", and "it's not that it's not feasible, but it takes a huge amount of energy". They expressed their astonishment about the extent of these demands and following the training adjusted their understanding of the challenges for conducting parent-teacher conversations, and how to cope with them.

The benefit and need of the VR intervention a practice-oriented learning tool

This study further builds on the literature which claims/identifies the need for PSTs to gain practical training (e.g. Franke & Dahlgren, 1996; Rots et al., 2007; Zanting, Verloop, Vermunt, & Van Driel, 1998). In this context, the interviews revealed two themes: (1) VR as a training tool; (2) the need for practical teaching and how our course addressed that need.

The first themes included three categories, which were discussed as linearly affecting each other: The PSTs reported that (i) the use of VR was helpful and realistic, which meant (ii) it was challenging, triggered various feelings, and was engaging, which in turn (iii) was evaluated as a valuable experience in preparation for being a ´real-life´ professional.

This described relationship between VR and real life was particularly important, since VRS has become an increasingly utilised tool for training purposes when opportunities in real life were not available. Furthermore, the purpose for our VR training was built on the identified need for practical training with the assumption that VR could support in fulfilling this need. The insights from this theme, indicate that the VRS met this need, thus, could be a feasible alternative, if real life practice opportunities were not available, or wanted to be substituted to better prepare PSTs. Following this conclusion, the elaborations of the categories of this theme were targeted to address the phase two research question on the ways in which the VRS training could promote the development of SE.

The *first category* of this subtheme, on the evaluation of VR as a practice-oriented learning tool, combined PSTs' statements along the lines of "it was very realistic", and beneficial. The appreciation with this kind of training was consistently conveyed through the habitus of the PSTs during the training session and the interview. However, we focused on the semantic analysis. One student stated: "It was nice considering that it was training", while other PSTs, said "it was nice. [Other student] Yes, agreed.", "I think that it was positive", "it was a good experience", and "I wanted to do it more". All these reflections indicate that the PSTs found their VRS training positive and beneficial. That PSTs found the VRS to be realistic which was conveyed explicitly with statements such as the one above ("it was very realistic"), and implicitly. The latter is seen in PSTs stating their reflections such as, "even though it was completely synthetic and it was an animation and all that", or "even though they were some figures", or "despite the fact that there were a few cartoon characters", they then elaborated on various feelings and effects of the VRS which they associated with real life experiences such as the statement "it was easy to get into it and forget that it was". This suggests that PSTs were able to focus on the task and become emersed in the experience.

The *second category* of this subtheme combined the PSTs' reflections about the effect of the "realistic" VRS on their feelings. The PSTs seemed surprised about the "quite natural feelings that come" when using VRS and mentioned multiple times the different "feelings you get in your body". At the beginning of the VRS, PSTs were generally curious to use VR while simultaneously having mixed feelings, including nervousness, excitement, and hesitancy. One student said, "I've never tried VR glasses, so "oh what's this" and it actually got a lot like that, so I hid it a bit", and another student felt "happy and thought it was fun to do something new and then felt a bit of performance anxiety, pressure of expectations or, but ehhh but you quickly forgot that

when you first sat there with the glasses on". One student stated being "a bit scared at the start, so it wasn't as scary as it was expected", while another reflected that it is a "vulnerable situation in a way […] But I felt safe then too". This indicates the PSTs reacted to both the new training method of utilising VRS, and the VR scenario itself.

During the VR scenario, in general, the PSTs stated, "you can become sad or angry so easily", "stressed", and/or "feel a bit of uncertainty or helplessness or whatever it is" when confronted with the PTC scenario. In response to the VRS challenges, the PSTs' experienced physiological and more widely emotional reactions, such as: "I felt my heart beating faster, my head getting hot, my skin tingling a little and it became difficult to think clearly". Another student described their experience as "high pulse and got hot when the father started to shave [them]", while another student "felt that [they] went a bit like that in freeze, a bit in fight and a bit in freeze". Yet another student said they felt "very taken aback by a comment from a parent". To cope with these feelings, one student explained "[they] tried to be calm and breath", and another talked about their rather unconscious physical stimulation of their thumbs ("when the father got extra angry, then I did some things with my thumbs").

With regards to the VR scenario, they reflected that "it was easy to get into", and "you were very carried away, yes". Moreover, they reported that the "realness of the situation" in the VRS caused them to feel "very engaged" and "responsible for the conversation and how it should go". Other PSTs reported "I got really hung up on the case", and "really notice that I was triggered by that", which all together illustrated that the PTC scenario, even in a VR environment, affected the participants' feelings and mental state.

The *third category* of this subtheme summarised the PSTs' summative evaluation of the VRS training for their learning: "we are taking a step into our education". In general, PSTs expressed "that [the practice] was positive", and that they "wanted to do it more". They highlighted some of the training's features such as "that it's okay to make mistakes", that the VRS gave them a taste "of what we will do in the future", and "through this you get a small taste, and you can discuss and share experiences". Here the aspect of "it's very nice to have practiced, so it doesn't happen for the first time in a [real] parent/teacher consultation" is accompanied by the role of reflection which is later elaborated within an independent subcategory of the theme.

One student stated that through the VR-based course they were able to "practice communicating and being in charge and perhaps leading a conversation with the PSTs and parents and sort of getting a feel for how it feels". Other PSTs stated that "the way it was done in the VRS is not the way I would have done it personally even if I had a parent/teacher consultation but it's a nice practice for that because then you get to test what actually works, what doesn't". Adding on to these experiences, one student summarised: "That in a way it is good training that we can do this here at the college because it was...I think it was very realistic, it was like I put on those glasses and I kind

of felt that then I was there then I had responsibility." Through the interviews, they further reflected that "it was a good experience to sit there even if I was a bit scared at the start", and how much improvement they already observed within themselves after the first trial (or two): "It was a good experience to try it again, it went much better the second time, and it makes me think that if these are real conversations how unlucky those who are first in line can be". This personal reflection and positive situational awareness from practicing ("it struck me then that it went so much better the second time. Why that, I had practiced and such") was not only accompanied by the wish "to do it more" but also by the need for further practice and training.

The second theme on the need for active learning approaches is presented in the following four categories: (i) the relevance of practice over and above theoretical learning, over (ii) the shortage of practical experience, to (iii) the effects of practical training through VRS, and (iv) the nature of practice and the role of reflection. For the *first category*, the PSTs agreed among themselves that "you learn a lot more by seeing" and "I really agree with what [name of student] also says in that it felt a little more valuable...eh...sometimes the studying can feel a bit...eh...or it's normal then tired, but it felt like it's the first time you do something like...that you feel so close to what you're going to do in reality then...uh...uh or with practice."), and expressed "Yes, make the education more practical and relevant actually." And "no matter how much we read about perspectives, we have to practice and do it in practice". Even more explicitly and in relation to the second subcategory of this theme, one student said: "It is something that many people say they feel they lacked when they went on teacher training."

Describing this issue of a shortage in practical training in their own words, and how our intervention addressed this is well represented with the following statement of a student: "You are thrown into it and then suddenly you have to deal with many of the other actors, i.e. parents, and you have no training in that before you stand there, but through this you get a small taste, and you can discuss and share experiences." The need for new ways of providing PSTs practical training is represented in the following students point of view: "To test out a situation that we don't necessarily get to test out ehh we get to be there even in real life. You don't get to take part in it in practice if you're not super lucky."

The *third category* illustrated that through the intervention, the PSTs "have gained a greater understanding", concluding "I think that when I get out, there is not so much stress with those conversations", "it's a way to practise or...er...that you have become... that yes it is a way to become more confident in oneself perhaps", and "not come out and be completely blank and nervous and disgusting, just before you are to have your first development interview with a parent, that you have, in a way, had that kind of trial."

The *fourth category* was concerned with (a) the nature of training, thus, being able to test things out (examples from previous quotes: "kind of trial"; "getting a feel for

how it feels"; "trial and error more"), and (b) the role of reflection (example from previous quote: "you get a small taste and you can discuss and share experiences"). The former aspect in contrast to theoretical learning, accentuated the PSTs' perceptions that the practical training was highly valuable and desirable to utilise it in addition to the more traditional theoretical teaching approaches, as previously noted in the theme's first subcategory. The latter aspect was discussed among the PSTs during the interview and included the three components: (a) peer-support, (b) moderated post-reflection, and (c) evaluation of the exercise. One student highlighted the importance that "you can discuss and share experiences" among each other, which is along the same line of another student's statement, remembering "we had talked to each other about our experiences on the various topics and given each other input on what we did, or should I have done something differently and then I will be safer the second time". Already concerned with learning for the future, one student thought that "a bit of debriefing between calls (understood to be referring to VRS sessions) might also help on the next call (understood to be referring to VRS sessions)".

In addition to these peer-support aspects of post-reflection in our intervention, some moderation of this process has been deemed supportive by the PSTs ("I thought more about it when I was done. Then I sat and we talked with open and closed questions and things like that. It came a bit more afterwards...yeah...not so much along the way in a way."). One student remembered "it was positive when I got concrete feedback from the moderator or the facilitator, for example when the father got extra angry, then I did some things with my thumbs and it was very nice to get or that someone could observe so carefully then, concrete things like that thing." Another student "wanted to know what [they] did well and what was a blunder, because [they] wanted to learn how to do it better". In the end, all three aspects of reflection were discussed as "hugely important […]. Because it's about the fact that we have to be able to control [our physiological and emotional reactions during teacher-parent conversations] in some way. That it is part of becoming a professional", and "[Because] We need to know what triggers us and how we react […] then we can perhaps be prepared that it is something we have to deal with when it comes."

Through all these statements clustered around the theme on the need for practical teaching and how our VRS training addressed that need, PSTs expressed awareness of the need for practical training as an addition to theoretical knowledge in order to increase their SE. From this it showed the PSTs' appreciation of the value for having been provided this VRS training opportunity and their wish "to do it more".

Discussion

The implementation of VRS provided PSTs with essential experience in conducting PTCs, a component often missing in Norwegian teacher training. Such experiences are crucial as SE is a key factor in preparing new teachers to take initiative, persevere,

and succeed in tasks (Turner et al., 2004). Enhanced SE from VRS training has shown potential benefits in increasing job preparedness, satisfaction, and resilience within the teaching profession. PSTs reported significant increases in SE post-VRS training, reflecting its effectiveness.

During interviews, PSTs emphasised the value of VRS in enhancing their SE through four key aspects: mastery experience, vicarious learning, receiving encouragement and feedback, and managing physiological and emotional states. Each component played a distinct role in promoting SE, with the reflection component particularly helpful in preparing for diverse PTC demands (Bandura, 1997). The PSTs acknowledged the need for more practice within the VRS environment to further experiment and face trial-and-error situations, enhancing their SE (Zee & Koomen, 2016).

The desire for extended VRS training underscores a metacognitive recognition of the importance of ongoing training to bolster SE, acknowledging gaps that cannot be filled by real-life practicums or with theoretical knowledge alone. This aligns with Bandura's (1997) framework, suggesting that integrating SE theory into training design can effectively enhance PSTs' confidence in their professional capabilities. The positive reflections from the PSTs indicate strong support for the VRS training approach, affirming its role in building foundational SE beliefs. Data from this pilot study suggests VRS training can provide a feasible option for supporting students' SE with conducting and handling PTCs, which is one of their future professional responsibilities (e.g.; Rots et al., 2007; Zanting, et al., 1998). Pre- and post-test SE comparison as well as the PSTs' reflections from the interviews, supported the postulation that the VRS training was beneficial with providing needed training in this niche teaching area, heightened metacognition and personal reflection and understanding on how the PSTs handled emotionally charged experiences during these sessions. However, we are not claiming that VRS itself promoted the increase in SE since this cannot be seen in isolation from the whole training session (i.e. pre-work, in- class work/VRS, and post-work). But in congruence with PBTE theory, VRS can support the enhancement of additional training experience through a simulated environment. In addition, VRS allows student teachers to experience niche areas such as PTCs that have limited availability in real-life but can be experienced in simulations with multiple variations of possible experiences (i.e., calm to more challenging conference experiences). Furthermore, the efficaciousness of VRS in comparison to the existing traditional lecture-based approach or to a more traditional role-play approach to scenario training may require more rigorous studies to determine the effectiveness of the VRS for SE and resilience of the PSTs (i.e. randomised control trial research design)(Berkhof et al., 2011; Deveugele et al., 2005). This study used global SE measurements, but future studies should include SE measurements that target all four of Bandura's SE dimensions (1997).

Conclusion

In conclusion, this pilot feasibility study suggested that VRS can be utilised as a training enhancement tool in combination with real-life practicum experiences (Cohen et.al., 2020). Furthermore, simulation sessions can be made available to all PSTs and thus the delivery of training would remain consistent both in content of training lessons and frequency (Cohen et. al., 2020). Thus, VRS is beneficial and should be considered as an alternate training source for experience and skill set building in niche areas that are difficult to experience in real-life such as PTCs.

More empirical research and evidence is needed for policy makers and teaching programs alike for making strategic choices about the nature, structure, and sequence of practice opportunities especially as a mixed method (real-life complemented with technology/virtual/augmented reality environments) (Cohen et.al, 2020). Future VRS could provide more behavioural response variations from both parents and PSTs as well as different student performance challenges that would support PSTs with obtaining increased exposure to the challenges that come up in "real life". These additional VRS could support improvements in student teachers' social cognition and professionalism in handling the social dynamics of the profession. In addition, as our survey data was not normally distributed, this suggested the possibility that the questions presented did not provide enough range or variation in responses received. Therefore, future studies could be designed to prevent ceiling effects from responses in order to effectively address and support the PSTs' professional development needs.

Finally, longitudinal studies assessing the use of VRS training for PSTs and following them into their professional careers to learn if VRS training helped them long-term in reducing stress and burn-out in the early years of their careers are highlighted in the literature (Lazarides & Warner, 2020; Zee & Koomen, 2016). Building from our pilot feasibility study regarding the extent and ways in which VRS training for teacher-parent consultations can develop PSTs' SE, it would be important to investigate in a longitudinal study how VRSs, if at all, support newly graduated teachers with their teaching experiences in real life and prevent from leaving within five years.

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