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Preservice Special Educators’ Relational Competence in Virtual Simulations with Avatars

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ABSTRACT
Research shows that relational competence is essential in teacher education, including special education teacher training. It also shows that virtual simulations using avatars are useful for developing teacher competencies. However, there is a research gap regarding how virtual simulations can be utilized to develop relational competences. The present study has two purposes: (1) to explore preservice special educators’ (PSEs) relational competence in an avatar context, and (2) to delineate research-based guidelines for using avatars to enhance relational competence. The data comprise video observations of virtual simulations and interviews with PSEs. The results show that PSEs perceive relational competence as a pedagogical approach and, mainly, as an organization of interaction. Furthermore, relational competence is manifested by different degrees of communication attunement. The guidelines suggest that teacher educators should direct PSEs toward the pedagogical approach and a high degree of attunement. Overall, avatar simulations are useful for training teachers in relational competence.

Introduction
Theoretically, this article is based on relational pedagogy, an approach that considers relationships as a basic fact of human existence, and education as relational processes. From a relational standpoint, educational situations are interactions and connections between teachers and students where caring, trustworthy, and respectful relationships are built (Aspelin & Persson, 2011; Hickey & Riddle, 2023; Sidorkin, 2022). Research from the last three decades has shown that positive and supportive teacher-student relationships are a prerequisite for students’ social and academic development in school (Roorda et al., 2017). Researchers have also become increasingly interested in how relational models of professional development can be implemented in teacher education (Hughes, 2012). Sabol and Pianta (2012) state that “Although most relationally-focused professional development opportunities are typically implemented during in-service, pre-service programs may be a particularly important place for relational training” (p. 226). Our study aims to contribute to the field by exploring teachers’ interpersonal skills in the context of special education teacher preparation. It uses an innovative method:
virtual simulations with avatars. In this section, we introduce the study’s purpose, paving the way for subsequent sections wherein a more comprehensive literature review is presented.

Although a positive teacher-student relationship is important for all students, it is particularly important for students with special educational needs (Feldman et al., 2019; Wubbels et al., 2012). Murray and Pianta (2007) state that these students are a particularly vulnerable group in the school milieu, compared to typical students; for example, they more frequently experience additional difficulties and have higher dropout rates. Many students require explicit and direct support from caring adults (Murray & Pianta, 2007). For example, in a research review, Ewe (2019) asserts that students with ADHD are at an increased risk for conflicts and negative relationships with their teachers. Claudia et al. (2021) argue that interactions between teachers and students with special educational needs should be both academically and emotionally supportive.

Sabol and Pianta (2012) suggest that to improve teacher-student relationships, one should primarily strengthen teachers’ interpersonal skills. In Scandinavia, these skills are often referred to as relational competencies (Aspelin & Jonsson, 2019; Nordenbo et al., 2008; Skibsted & Matthiesen, 2016). In their extensive research review, Nordenbo et al. (2008) concluded that relational competence, defined as the capability to build teacher-student relationships characterized by respect, tolerance, and empathy, is fundamental to teachers’ professionalism, along with didactic/instructional and classroom management/leadership competencies. In the last decade, researchers in Sweden and Denmark explored relational competence in different educational settings (e.g., Gidlund, 2020; Jensen et al., 2015; Skibsted & Matthiesen, 2016; Wiklund-Engblom, 2018). A Danish research and development project, that took place over four years, revealed that PSEs’ attentive presence and empathy could be developed with support from mental and communicative practices (Skibsted & Matthiesen, 2016). Recently, several research projects from [anonymized for review] university have demonstrated that both in-service and preservice teachers’ relational competence can be developed through small-scale interventions, such as video-based reflection (Aspelin et al., 2021; Aspelin & Jonsson, 2019; Ewe, 2020, 2022), and more recently, through the use of the avatar technique.

Virtual simulations have emerged as an innovative approach to enhance teaching and learning (Levin & Flavian, 2020). Virtual simulations with avatars could promote preservice teachers’ and preservice special educators’ (PSEs) competencies (Ersozlu et al., 2021). In such settings, participants interact with virtual students coordinated by a human, the so-called simulation specialist. Thus, prospective teachers have opportunities to practice teaching in a controlled and safe environment, without the risk of affecting real students (Dieker et al., 2014; Howell & Mikeska, 2021; McGarr, 2021). In authentic classroom settings, teachers’ mistakes can damage teacher-student relationships, while this is not the case in virtual simulations (Dieker et al., 2014). Virtual simulations develop both preservice teachers’ and PSEs’ skills (Ersozlu et al., 2021). An advantage of the technique is that it provides opportunities to practice and develop skills in managing high-intensity behaviors through repeated teaching experiences (Hudson et al., 2019). The technique might be particularly relevant for special education teacher training (SETT), as it prepares participants for diverse student behaviors.
To conclude, relational competence is an important part of teacher professionalism, particularly in teacher education, including SETT. Virtual simulation with avatars is a useful tool for developing teacher competencies, and it is utilized for various purposes, such as enhancing content knowledge, and classroom management. However, according to a recent research review (Lindberg & Jönsson, 2023), few studies have examined the combination of relational competence and virtual simulation with avatars (cf. Theelen et al., 2019). Consequently, there is a lack of guidance for teacher educators on how to work with virtual simulations to improve preservice teachers’ relational competence. The present study sheds light on this largely unexplored area of education.

This study has two specific purposes. First, it explores four groups of PSEs’ relational competence in the avatar context. The following research questions (RQs) are explored:

- RQ 1: How do PSEs perceive their relational competence, as manifested in their interactions with avatars?
- RQ 2: How is the relational competence of PSEs manifested in their interactions with avatars?

The second purpose is to delineate research-based guidelines for using avatars in SETT to enhance relational competence and, more specifically, what to focus on when using the avatar technique in this context.

**Special education teacher training in Sweden**

In Sweden, SETT is a supplementary education program for teachers, comprising 90 European Credit Transfer System (ECTS). It requires a teacher’s degree and at least three years of teaching experience. SETT has evolved from a focus on students with disabilities—for example, students with an intellectual disability, students with hearing loss, or students with a visual impairment—to a focus on the school’s capacity to meet all students’ academic and social differences. The Swedish Education Act (Skollagen 2010, p. 800) defines the purpose of education as multidimensional, encompassing students’ knowledge development, social development, and personal development. This implies that teacher education and SETT should aim to educate educators who are competent in instruction, leadership, and relationships (cf. Nordenbo et al., 2008).

Two occupational groups work with special education needs in Sweden: special needs teachers (SNTs) and special education teachers (SETs) (Aspelin et al., 2021; Göransson et al., 2015). The program for SNTs offers six specializations: (1) language, writing, and reading; (2) mathematics; (3) intellectual disabilities; (4) visual impairment; (5) hearing impairment; and (6) severe language impairment. While SNTs specialize in working with students and supervising teachers, SETs specialize in supervising colleagues and school development. Here, we refer to both groups as SETs.

Studies in the Nordic context (Göransson et al., 2015; Takala et al., 2020) have shown that SET is multifaceted, and the current policy document lacks specific guidelines for professionals. A systematic review (Stark et al., 2022) noted similar tendencies from an international perspective, showing the complex working conditions for the profession. Courses have changed from having a strict focus on students with disabilities to a more
comprehensive program covering topics such as school development, leadership, supervision, and inclusive practices (Göransson et al., 2015).

In case studies on PSEs, social relationships are emphasized (Möllås et al., 2017). Building and maintaining interpersonal relationships with and between various actors in schools is a central strategy. A study interviewing experienced SETs \(n=21\) shows that the participants perceive positive and supportive relationships with students as fundamental, and relational competence as particularly important in their profession (Aspelin et al., 2020). By contrast, an analysis of course syllabi \(n=142\) in SETT at 11 Swedish universities indicated that relational competence is a highly overlooked subject (Aspelin & Östlund, 2020).

**Virtual simulations**

According to previous research (e.g., Kaufman & Ireland, 2016; Magen-Nagar & Steinberger, 2022; McGarr, 2021), virtual environments can improve preservice teachers’ pedagogical and content knowledge. Virtual simulations with avatars enable preservice teachers to adjust their actions in safe environments, instead of making mistakes with real students (Dieker et al., 2014). They are described as tools for augmenting practical experience and are often used with a cycle of practice, feedback, reflection, and repeated practice (Kaufman & Ireland, 2016). Virtual simulations could also be highly effective in developing teachers’ and preservice teachers’ behaviors and classroom management skills (McGarr, 2021; Samuelsson et al., 2022). A systematic review of a mixed-reality simulated classroom technology, called TeachLivE™ (Ersozlu et al., 2021), suggests that this tool is suitable to prepare preservice teachers and PSEs for classroom contexts and promote instructional skills. The review concludes that TeachLivE™ is a genuine alternative for preparing preservice teachers for real-life classroom contexts. In addition, it states that avatar-technology offers preservice teachers a controlled environment to practice and refine their teaching skills (Ersozlu et al., 2021).

In the realm of mixed-reality in teacher education, Dieker et al. (2023) highlight key themes: simulation design by educators, the influence of feedback, and the safe, reflective space that simulations offer to teachers. This aligns with previous findings by Dieker et al. (2019), whose study illustrated the efficacy of utilizing a virtual reality simulator to enhance the teaching skills, demonstrating that virtual reality simulators effectively enhance pre-service science teachers’ abilities by increasing self-efficacy, pedagogical knowledge, and classroom management skills. Similarly, Dawson and Lignugaris/Kraft (2017) underscored the value of simulation-based interventions, emphasizing the transferability of acquired skills from simulated environments to real classrooms. Nevertheless, TeachLivE™ interventions’ social validity remained high, praised for their realism and relevance in practicing teaching skills in a controlled setting (Dawson & Lignugaris/Kraft, 2017). These studies collectively highlight how educational virtual simulations impact teacher development, emphasizing their role in enhancing skills and the complexities involved in transferring these skills to real classroom contexts.

However, as noted in the introduction, there is a lack of knowledge about how virtual simulations can be used to develop teacher-student relationships (Theelen et al., 2019). This was confirmed through a systematic literature review of teacher competencies and
virtual simulations, which found a research gap concerning relational competence and virtual simulations (Lindberg & Jönsson, 2023). The studies in this review (Lindberg & Jönsson, 2023) almost exclusively focused on classroom management competence, such as providing structure and establishing rules for pedagogical work in the classroom, whereas only one study (Driver et al., 2018) focused on relational competence/interpersonal skills. Driver et al. (2018) explored preservice teachers’ ability to effectively communicate in collaborative partnerships. Preservice teachers practiced relational competence in, for example, effective communication, and a respectful attitude toward students. The results showed that their communication skills improved after using virtual simulations and they felt more prepared to work collaboratively.

**Relational competence**

During the last decade, Scandinavian researchers have studied teachers’ relational competence, and how it can be developed within teacher education (Aspelin & Jonsson, 2019; Skibsted & Matthiesen, 2016). Relational competence conceptualizes teachers’ capabilities to build positive and supportive relationships with students and others (Aspelin & Jonsson, 2019). The concept is understood not as a personality trait, but as competence that can be taught and developed (Jensen et al., 2015). For instance, studies have investigated the challenges regarding relational competence that preservice teachers face during their initial years in teacher education, where they seem to understand the relational aspects of the profession in terms of classroom management, rather than as a responsibility for teacher-student relationships (Herskind et al., 2014). Moreover, researchers have explored how PSEs’ relational competence can be developed with the support of video-based reflections (Aspelin & Jonsson, 2019). Another study (Aspelin et al., 2021) focused on how PSEs’ \((N = 74)\) understanding of relational competence could be improved through the same method. The results show that the PSEs’ focus shifted from teaching strategies and learning environment to the interaction between teacher and student, and teachers’ management of problematic student behaviors to teacher-student relationships and student participation. In these studies, the relational competence model (RCM) explores the participants’ perceptions and interactions. Other projects, such as Ewe (2022) investigated how teachers’ relational competence can be developed in terms of the RCM.

RCM consists of three sub-concepts of relational competence: (1) **communicative competence** labels the teacher’s capability to communicate verbally and nonverbally to achieve a high degree of mutual understanding and respect with students; (2) **differentiation competence** refers to a teacher’s capability to regulate the degree of closeness and distance in relation to students; and (3) **socio-emotional competence** denotes a teacher’s capability to cope with emotional indicators of ongoing relationships, both their own and those of students (Aspelin et al., 2021). The RCM explores relational competence as manifested in ongoing interactive processes.

Teachers’ relational competence in online teaching has gained attention in recent years, particularly in connection with the COVID-19 pandemic. Wiklund-Engblom (2018) defines digital relational competence as an empathetic approach to the student and as the teacher’s capability to be sensitive and responsive to their needs in the
distance education context. The quality of the relationship between teachers and students has proven crucial, regardless of whether teaching takes place in a physical or online setting (Segerby, 2022; Vagos & Carvalhais, 2022). However, its conditions also differ; online teaching implies limited opportunities for interaction, especially nonverbal communication such as eye contact, smiles, and physical distance (Song et al., 2016; Wiklund-Engblom, 2018). These limitations, which also apply to virtual simulations, are pedagogical challenges because nonverbal communication is fundamental to guiding teachers when interacting with students. Sensitivity and responsiveness to students’ needs are key factors of teachers’ interpersonal capability (Rimm-Kaufman et al., 2003), but online technology often makes it difficult for the teacher to read students’ behavior (Wiklund-Engblom, 2018). Despite these limitations, both verbal and nonverbal communication are important aspects of supportive relationships in online settings (Segerby, 2022).

**Methods**

In this study, qualitative thematic analysis (Clarke & Braun, 2017) has been used in relation to both video observations of virtual simulations and subsequent focus-group interviews with PSEs, making it an interactional study as well as an interview study. This research design has been used in several other studies focusing on virtual simulations with avatars (see e.g., Dalinger et al., 2020; Gundel & Piro, 2021; Wernick et al., 2021). Both the virtual simulations and the focus-group interviews (conducted online) were video recorded and transcribed verbatim.

Before the virtual simulations and focus-group interviews, the PSEs were divided into four groups with approximately 10 participants in each group. The same groups were used during both the virtual simulations and the focus-group interviews. Each group participated in a simulation lasting approximately one hour. The focus group interviews also lasted approximately one hour. Data consisted of four video recordings of interactions between PSEs and avatars, including PSEs’ conversations about these interactions during breaks in the simulation (in total 3 h and 49 min). Data also consisted of four focus group interviews with the PSEs (in total 5 h and 41 min). 41 PSEs participated in the simulations, and 28 in the focus group interviews.

**Context and participants**

The participants were recruited from the SETT at [Kristianstad University] University which is a regional university in [Sweden]. At the university, mainly teachers, nurses, and economists are educated. The teacher education programs are the largest ones and SETT is found among these. [anonymized for review] offers both SNT training and SET training. The SNT education offers specializations in literacy, mathematics development, and intellectual disability. At SETT, approximately 150 students are accepted per year. The PSEs complete their training as part time studies alongside working as general education teachers or preschool teachers. As mentioned above, SETT is supplementary education for teachers in Sweden, which means that all PSEs have a teacher education degree and at least three years of teaching experience. The virtual simulations were part
of a course called *Special Education Perspectives on Learning and Development in a School for All Students*, which was held in the first year of the program. The course aimed to develop knowledge about the work and assignments of SETs, concerning children and students in need of support. The virtual simulations were incorporated into the course for the two groups participating in this study and were part of a module called *The special education field and associated professions*.

The participants in this study had recently started their first year of SETT and were part of a group of approximately 150 students. The PSEs were placed in groups with a mix of SNTs and SETs. Within each group, there were different special education specializations (i.e., mathematics, language, or intellectual disability), and variation regarding the educational levels where the PSEs worked, spanning from preschool to adult education. In total, there were 7 groups in the course. Two of the groups were selected randomly for this study, and all PSEs in these groups were asked to participate. The sample consisted of 41 PSEs. Everyone who was asked chose to participate. All 41 PSEs participated in the simulations, but there was a dropout during the interviews, resulting in the participation of 28 PSEs.

**Procedure**

There are different kinds of simulations, and in this study all the virtual simulations were conducted online, and focused on the PSEs’ relational competence. The PSEs planned a school dance with their avatars. PSEs were allowed to meet diverse students in need of support and reflect on the challenges that arose. Before the simulations, the PSEs were divided into four groups of approximately 10 participants each. Within each group, three PSEs (on average) interacted with the avatar students, whereas the others participated as observers. The PSE who interacted could pause the simulation at any time and discuss the approach with colleagues or ask for their advice and support. On average, the simulations for each group lasted one hour, and three PSEs took a turn in the simulation during each session.

In the beginning of the simulations, the PSEs met the (avatar) principal, and asked him about the class. The principal informed the PSEs that the class consisted of five students (avatars): Jasmine, Ethan, Savannah, Ava, and Dev. He described Jasmine (who this study focused on, see below) as shy, that she finds it difficult to assert herself, and that she had been discussed in the student health team.

Because interaction is fundamental when practicing relational competence, human-in-the-loop (HIL) simulations were used in this project. This means that digital avatars are controlled by a simulation specialist in real time. The simulation specialist was trained to work in the simulator and uses several technical aids, such as voice modulation and preconfigured movements, for example, hand raising. HIL simulations enable users to behave as they would in a real-life scenario. The PSEs had tested the virtual simulations once before, a month earlier, to become acquainted with this technique.

Focus group interviews were conducted one week after the simulations. The participating PSEs were divided into four equal-sized groups. Those who interacted with the avatars, as well as those who observed the interactions, participated in these interviews. The interviews were semi-structured and followed a protocol of six questions. The first
question in the interviews, which all participants answered, was how the PSEs experienced the virtual simulations. The interviews took on a conversational tone, where the PSEs responded to the interviewer’s questions and commented on their colleagues’ answers. All PSEs were active in the interviews and participated equally. In the interviews, questions were asked about the relational aspects of teaching, such as communication, emotions, and closeness. Both those who had interacted with the avatars, and those who only had been observers, were asked the same questions. The questions included the following themes: (i) challenges in interactions with avatars, (ii) similarities and differences between avatars and real students, and (iii) similarities and differences in promoting a positive relationship digitally, compared to a physical meeting (for more information about the questions, see Appendix A).

**Ethics**

Preparations for PSEs’ future professions should be provided in ways that promote their competencies without negatively affecting students. This idea directed the project, particularly the choice to use the avatar technique. The study was conducted in accordance with the ethical research principles in Sweden, including informed consent, confidentiality, avoidance of risks, and retention and archiving of materials (Vetenskapsrådet, 2017). In line with these guidelines, no data apart from what was needed to serve the purpose of the study was collected, including the participants’ personal information. Ethical review and approval were not required, following Swedish legislation and institutional requirements. All participants provided written informed consent.

**Analysis**

The analysis was performed in two main steps: The first step focused on the conversations about interactions. This step included data from breaks in the simulations and focus-group interviews. This analysis aimed to identify variations in PSEs’ perceptions of relational competence in the avatar context.

The second step focused on the interactions between the PSEs and avatars, particularly Jasmine. As indicated, Jasmine’s behavior profile is empathetic and introvert. She avoids conflicts, seeks acceptance, and often adds “Right?” or “You know?” at the ends of her sentences to seek confirmation. All verbal interactions involving Jasmine were examined in detail. A reason for this selection was that the previous session (where the technique was tested) revealed that Jasmine was highly neglected by PSEs. Another (more obvious) reason was that the empirical material was rich in content and some kind of selection was needed, given the scope of the article. Transcripts regarding the interaction included a total of 27 sequences, ranging from 4 to 52 lines, where the PSEs interacted with Jasmine. This step aimed to identify variations in the PSEs’ interactions with Jasmine.

In the analysis of both the interaction and interview data, we used qualitative thematic analysis, mainly based on the procedures recommended by Clarke and Braun (2017). Thematic analysis is a method for identifying, analyzing, and reporting patterns based on the content and meaning of qualitative data (Braun & Clarke, 2006;
Willig, 2013). It is commonly conducted inductively, such that patterns are chiseled out from the empirical material. It should be noted that in such an approach, the researcher plays an active role in identifying and choosing which themes to report, which means that there is no aspiration to reach a single or objective representation of reality. On the contrary, Braun and Clarke (2022) explicitly advise against providing interrater reliability estimates, as this implies that there exists a single or objective analysis outcome. Instead of aiming for a single interpretation of the data, we tried to broaden the analysis by working iteratively with the data and involving the entire research group in the process, even if two of the researchers took the main responsibility for the coding.

The analysis was conducted in the following phases:

1. Initially, all video data from both focus-group interviews and interactions between the PSEs and the avatars were transcribed, and a compilation was made of all the sequences where the PSEs discussed or interacted with Jasmine.
2. The first phase involved familiarization with transcriptions of verbal data by repeated reading in search of preliminary categories.
3. In the second phase, the initial codes were manually and systematically generated using the dataset.
4. The third phase involved searching for themes within the coded data. We analyzed the codes and considered how they could be combined to form overarching themes. The first draft of the analysis was discussed by the entire research group, and we agreed on the categorization of themes.
5. In the fourth phase, we reviewed the themes and divided the extracts into groups based on the identified patterns. In-depth analyses of data from interviews and interactions were then read and discussed in the research group to increase consensus. Together, we selected illustrative quotes for each pattern.
6. The fifth phase defines and terms the themes. Several discussions with the research group resulted in the themes presented below. We initially organized the data from the interactions in terms of interpersonal connections between PSEs and Jasmine. We found that Scheff’s (1990) concept of attunement helped specify themes (see below).
7. In the sixth phase, data extracts were presented to demonstrate the prevalence of themes, and the extracts were embedded within an analytic narrative of the data.
8. The descriptions of the themes and extracts were translated into English by the researchers.

In the second part of the Results section, we use the concept of attunement to explore RQ2. According to Scheff (1990), strong social bonds are built through communication with high degrees of mutual understanding and deference/respect. When people meet face-to-face, a certain degree of attunement occurs that has implications for bond status. Scheff (1990) states that the connection between attunement and relationships is not obvious, because “each new situation becomes an arena for an exploration of the nature and degree of the bond” (p. 9). Attunement highlights ongoing interaction processes and the temporary and situational nature of teacher-student
relationships. It helps clarify the meanings of teachers’ relational competence in the current context.

Results
The results are first presented based on how the PSEs perceive relational competence as manifested in their interaction with avatars (RQ1) and then based on how the PSEs’ relational competence is manifested in their interaction with avatars (RQ2). The quotes illustrate the main themes and sub-themes developed in the analysis.

**How do PSEs perceive their relational competence, as manifested in their interactions with avatars?**

The analysis showed that PSEs focused on two different aspects of relational competence in their conversations about simulation. We label the first aspect as *organization of the interaction*, since it concerns the form or structure of the interaction, and the second aspect as *pedagogical approach*, since it concerns the quality of the interaction.

**Theme 1: PSEs’ focus on the organization of the interaction**

PSEs discuss how pedagogical interactions are and should be organized. This pattern was most prevalent in the interview materials (10 of 15 conversations discussed Jasmine).

PSEs repeatedly said that Jasmine should be given space for conversation, that is, time to think and speak: “It was also important to give her time to think. ‘Yes, there is no stress; just think: It doesn’t matter if it takes you a little longer … your answer is important’” (Episode 3, File 3).

The PSEs stated that it is sometimes necessary to limit the speaking time for other students so that insecure students, such as Jasmine, are not neglected.

However, we also stopped students who could not stop themselves and otherwise took up most of the speaking space. It is difficult to limit the number of students who have many ideas. However, they often take discussion time from those who do not assert themselves (Episode 3, File 3).

Furthermore, the PSEs suggested that Jasmine should be given space to talk individually with them (as teachers), as well as with her peers, in pairs or small groups. For example, a PSE pauses the simulation and suggests that she could talk to Jasmine in private: “If I start so that the others kind of talk to each other a little, then I can talk to her” (Episode 3, File 1a). PSEs frequently said that Jasmine could become more involved in the conversation if she was given opportunities to talk with her peers, and not in front of the whole class: “I thought maybe she should talk to someone else a bit first. (…) Now they are not so many, but a smaller group.” (Episode 2, File 1). They also discussed how another placement in the classroom could be beneficial for Jasmine, for example, students could be placed so that they could see each other better: “So, I’m thinking of the placement here. It maybe would have been easier to include … the quiet Jasmine (…)” (Episodes 1, File 3).
To summarize: PSEs perceive relational competence as manifested by organizing classroom interactions, where Jasmine is given space for conversation and by limiting the space for other students. They suggested that conversations should be offered to Jasmine individually, in pairs, or small groups. The organization of interaction here also concerns placement in the classroom, that is, relational competence is regarded as a matter of physical arrangements. Overall, the organization of interaction can be understood as an adaptation of the learning environment to create favorable conditions for interaction and relationships.

**Theme 2: PSEs’ focus on pedagogical approach**

In some cases, the PSEs discuss their pedagogical approaches with students (4 of 15 conversations regarding Jasmine). They describe the need to acknowledge the students’ abilities and support them when they show signs of uncertainty: “I thought we also validated the students when they didn’t trust their own abilities” (Episode 3, File 3). PSEs also discuss how they can assist Jasmine; for instance, the importance of listening, validating her, and asking questions in certain ways. In many cases, PSEs discuss how Jasmine can be encouraged to participate in the school dance planning. One suggestion that often arose was to stimulate Jasmine’s interest in music: “She seemed slightly insecure. Perhaps, this validates her in her music. She was interested in music. Perhaps ask her more about this” (Episode 2, File 1).

The PSEs also describe the importance of being present with Jasmine and respecting her integrity: “Yes, there I thought about this Jasmine. I felt that she … her integrity or so, that I needed a bit more distance maybe” (Episode 4, File 3). They also talk about the need to be empathetic and understanding in interaction with her: “That we were empathetic and understanding but still didn’t latch onto her by saying something like ‘you should do this or that’ (…).” (Episodes 2, File 4). However, the PSEs also talk about the importance of challenging Jasmine and do not treat her as a victim of circumstances. For instance, one participant comments on the session and says that when Jasmine expressed difficulties, the PSEs acknowledged her situation: “We pushed a little bit, but then we stopped it in a proper manner when we noticed that it was getting too much for her” (Episode 4, File 4).

To summarize: PSEs perceive relational competence as manifested by a pedagogical approach characterized by listening, confirming, asking questions, and showing empathy. The pedagogical approach they advocate is also characterized by a balancing act between encouraging and supporting students. From the PSEs’ viewpoint, relational competence is manifested in face-to-face encounters.

**How is the relational competence of PSEs manifested in their interactions with avatars?**

The analysis showed a clear variation in the PSEs’ interactions and connections with avatars. We used the concept of attunement (Scheff, 1990) to thematize the patterns found in the preliminary analysis. Specifically, we organized the data into the following three aspects.
Low degree of attunement: Communication is characterized by PSEs inviting Jasmine to dialogue, but where feedback is sparsely provided.

Moderate degree of attunement: Communication is characterized by PSEs inviting Jasmine to dialogue and feedback is provided, but in ways that mutual understanding and respect are not accomplished.

High degree of attunement: Communication is characterized by the PSEs inviting Jasmine to dialogue, and feedback is provided in ways that accomplish mutual understanding and respect.

**Theme 1: Low degree of attunement**

Several extracts were categorized as having a low degree of attunement. This pattern was the most prevalent in the material (10 out of 19 excerpts). In these episodes, Jasmine is invited to converse by the PSEs asking her questions, and Jasmine responds in confirmation, but the PSEs do not follow her response. Consequently, the interaction stops, and her needs are neglected:

PSE: Mm Jasmine?
Jasmine: I say the same. I agree with Ava.

PSE: Thank you, so it suits you, too. Ethan? (Episode 8, File 2).

Jasmine typically expressed that she was unsure of what she thought and wanted. Before the following conversation, the PSE asked Jasmine if she had any suggestions for a school dance activity. Jasmine briefly answers “No.” Subsequently, the following occurs:

PSE: Not so?
Jasmine: No, don’t really know what … music.

PSE: No, but then we will come back to … think a little Jasmine, and then we will come back to you. Thus, raise your hand when you come up with your suggestions. Ava then? (Episode 5, File 1).

In the excerpt above, the PSE asks Jasmine a question, followed by a brief, confusing answer. The PSE does not acknowledge her confusion and insecurity but moves on to another student. In some examples, PSEs try to initiate a collaboration between Jasmine and a stereotypically dominant student called Ethan. In these situations, Jasmine is not heard but is treated as an appendage to her peer, as in the following example:

PSE: Jasmine, do you get it?
Jasmine: Yes, shall it be? Wait, should I …? Should I send …? I do not get it. Should I send more than five songs, then, right?

PSE: Yes, I think like this … Ethan is good at this (…).

Jasmine: Mmm.

PSE: Or you can send them (…).

Ethan: No, it will be great. (…) I will fix it, Jasmine.

PSE: Yes (Episode 3, File 2).
To summarize: a low degree of attunement is made visible by PSEs initiating dialogue with Jasmine, but without following up on her responses. We categorized these examples as having a low degree of attunement because there was a lack of mutual understanding and respect for the interaction.

**Theme 2: Moderate degree of attunement**

Some of the interactions were categorized as having a moderate degree of attunement because the PSEs invited Jasmine for dialogue and provided feedback, but in ways that mutual understanding and respect are only partially achieved. This was the least prevalent pattern in the material (3 out of 19 excerpts).

In several examples, PSEs ask questions and there is a dialogue (a transmission of words), but there also seems to be misunderstandings, and Jasmine’s position is not respected:

- PSE: Do you want to tell?
  - Jasmine: What to say?
  - PSE: Yes, tell me… What do you think is fun?
  - Jasmine: Or … fun? I do not know, but I like music very much.
  - PSE: Music? Yes, do you like rap music too?
  - Jasmine: No, I cannot say this. (Episode 1, File 1).

In the example above, the PSE asks questions that Jasmine does not seem to understand or relate to. For example, instead of asking Jasmine what kind of music she likes (when she says, “I like music very much”), the PSE asks her if she likes rap music, which she does not. This type of interrupted relational connection is also described below:

- PSE: Where are we supposed to be?
  - Jasmine: The gym they said, huh?
  - PSE: Yes.
  - Jasmine: And maybe … I know that [inaudible 1:13:03]. Or, maybe I do not really understand it.
  - PSE: How would you decorate it? Should you use balloons or streamers? What kind of experience are you going to create?
  - Jasmine: I don’t know.
  - PSE: What does Savanna say? You have not said much about this. (Episode 4, File 1).

In this example, Jasmine shows signs of uncertainty, and she says that she does not “really understand.” Instead of acknowledging her situation, the PSE asked a battery of questions that seemed to confuse her. The PSE also quickly moves on to another student, with Jasmine’s line “I don’t know” hanging in the air.

To summarize: a moderate degree of attunement was made visible by PSEs inviting Jasmine to dialogue and providing feedback. However, the feedback was insufficient, because the degree of mutual understanding and respect was incomplete.
**Theme 3: High degree of attunement**

Several episodes were categorized as having a high degree of attunement. In these interactions, PSEs invite Jasmine into the dialogue and provide feedback in such a way that mutual understanding and respect are possible. This pattern was the second most prevalent in the material (6 out of 19 excerpts).

In one episode, the PSE encourages Jasmine to speak, and when Jasmine shows signs of uncertainty, the PSE asks the following questions:

PSE: Jasmine, have you come up with anything yet?

Jasmine: Ouch. Yes, maybe it goes without saying it by the way … no, it was nothing.

PSE: Well, try. What were you going to say?

Jasmine: No, but music is important … Well, maybe everyone understands that, and so on. But we have not discussed what music we should have. (Episode 2, File 1a).

In another example, a PSE initiated a collaboration between Jasmine and Ethan. The PSE seems unsure of how Jasmine perceives this collaboration and therefore arranges a private conversation with her. Jasmine is then allowed to express her thoughts and feelings:

PSE: Ethan is offering to help you share this music list. How do you feel about this?

Jasmine: Yes, I agree. Yes, I get so unsure of how it shall be done, and I do not know much about how to do it. However, I really want to do this with Ethan. That's fine.

PSE: Yes, do you feel this is acceptable? [Jasmine nods her head]. Yes, but that's good. Sometimes certain new things are a bit difficult, and you do not know how to do them. It is acceptable to feel that way, I think.

Jasmine: Yes, that's good, yes, but then because it's acceptable to me, it is. (Episode 3, file 1b).

In some interactions, the PSEs mute other students, so Jasmine can speak. For example, below, where Ethan is about to take the initiative away from Jasmine:

Jasmine: But we have not discussed what music we should have.

Ethan: Well, it's cool. I have a playlist that will work; it can just be played there [inaudible 0:13:03].

PSE: Ethan, calm down. Take it easy. Jasmine is currently discussing this issue.

Ethan: Okay.

PSE: So, some music, we say Jasmine. And we will have slightly different genres, then slightly different types of music, right?

Jasmine: Yes, it is important to note the different styles. However, it is uncertain whether my list is accurate. (Episode 2, File 1a).

In the following episode, Jasmine is asked about a possible area of responsibility for her, and PSE encourages her to take the initiative. The PSE also asked questions to ensure that Jasmine found her area of responsibility acceptable:

PSE: Jasmine do you want to start? What would you like to take responsibility for?

Jasmine: Does one have to be responsible for something?
PSE: No, you may not need to be directly responsible, but you may need to be the person who holds together and gathers everything around the area. (…).

Jasmine: (…) I do not think I can really handle it (…). I know only a little about music … it.

PSE: Music? You feel more comfortable with that?
Jasmine: Yes, or well, everyone has Spotify, but I think … No, it was nothing.

PSE: Although I think it sounds like a great idea. Do you feel that you can use Spotify and create playlists, for example, based on the wishes of others?
Jasmine: Yes, but maybe not alone. (Episode 6, File 1).

In another episode, Jasmine answers the PSE in a typically conforming way for her. However, the PSE managed the situation by redirecting the question to Jasmine and supporting her in providing a personal answer:

PSE: Jasmine: What do you think? Is one month sufficient time to prepare?
Jasmine: But the others said it was, didn’t they?
PSE: But now I am asking you and want to hear how you feel about it.
Jasmine: If … it sounded a bit … yes.
PSE: What did you think, it sounded a bit … ?
Jasmine: Yes, maybe it will be short of time. (Episode 8, file 1).

To summarize: a high degree of attunement occurred when the PSEs invited Jasmine to dialogue and provided feedback with mutual understanding and respect. The PSEs gave Jasmine the space to make her voice heard and express how she thinks and feels. The PSEs also supported Jasmine when she showed signs of insecurity by asking her follow-up questions and encouraging and confirming her answers.

Discussion

Thus far, we have examined the article’s first purpose, which was to explore preservice special educators’ relational competence in an avatar context. Below, we summarize and discuss the findings. Subsequently, we address the second purpose, which is to delineate guidelines for using avatar techniques to enhance relational competence in SETT.

Relational competence in the avatar context

The existing literature shows that it is important to support the development of relational competence in teacher education and SETT (e.g. Aspelin et al., 2021; Skibsted & Matthiesen, 2016). Virtual simulation with avatars can enhance different teacher competencies (e.g. Levin & Flavian, 2020), not least in SETT (Hudson et al., 2019). Moreover, the literature section highlighted a knowledge gap regarding virtual simulations and teacher-student relationships (Theelen et al., 2019). There is thus a need for research that connects the two areas, focusing on relational competence in the avatar context (Lindberg & Jönsson, 2023). The present explorative study contributed in-depth knowledge of PSE perceptions, as well as how relational competence is manifested in
pedagogical practice. We argue that this knowledge is useful for teacher educators who intend to use the avatar technique to support the development of PSEs’ and preservice teachers’ relational competence. This recommendation aligns with Driver et al. (2018), who argue for using virtual simulations to improve preservice teachers’ communication skills. They noted an improvement in this area, that the participants felt more prepared to work in collaborative settings after using virtual simulations. Our study confirms that the avatar technique is useful for training preservice teachers’ communicative practice. However, our study focused on PSEs’ relational competence with (avatar) students.

In the introduction, we formulated two research questions, where the first concerned PSEs’ perceptions of their relational competence, and the other concerned PSEs’ interactions with the avatars.

Regarding the first RQ, we found that the PSEs focused on two aspects of relational competence: the pedagogical approach and the organization of interaction. The latter aspect was the most prominent. PSEs perceived relational competence in terms of structures or environments that could enhance student participation. This result aligned with previous research on relational competence (Aspelin & Jonsson, 2019; Herskind et al., 2014) Specifically, the PSEs discussed how to give students space to talk individually with their teacher, peers, or in small groups. Nevertheless, the PSEs also discussed pedagogical approaches, for instance, in terms of respect, empathy, and encouragement, and acknowledged the students’ positions in the interaction. These aspects are essential in the literature on teachers’ relational competence (see e.g. Nordenbo et al., 2008; Skibsted & Matthiesen, 2016), and, more specifically, in the RCM model (Aspelin et al., 2021). Virtual simulations can enhance teachers’ instructional skills (Ersozlu et al., 2021), pedagogical and content knowledge, and classroom management skills (Kaufman & Ireland, 2016; McGarr, 2021; Samuelsson et al., 2022). Although the present study does not explicitly develop teacher competencies, it confirms that the avatar technique is a promising method for encouraging PSEs’ reflections on their relational competence.

In response to the second RQ, the study revealed that the relational competence of PSEs was manifested in different degrees of attunement (Scheff, 1990) during avatar interactions. We identified three degrees of attunement, where the themes of a high and moderate degree of attunement were approximately as prominent (9 excerpts) as the theme low degree of attunement (10 excerpts). In many episodes, the PSEs encountered Jasmine in ways that supported her. The PSEs, at least temporarily, demonstrated a sensitive and responsive attitude (Rimm-Kaufman et al., 2003) toward the avatar student. In other words, they manifested digital relational competence (Wiklund-Engblom, 2018) or, to use a concept from the RCM model (Aspelin et al., 2021), communicative competence. To a significant extent, they promoted mutual understanding and respect with students. This result was somewhat surprising, partly because the interaction in this setting was artificial and partly because the PSEs hardly had any experience with virtual simulations. Driver et al. (2018) indicated that virtual simulations are useful for developing communication skills in difficult social situations, and their findings are supported by those of the present study, with a focus on different aspects of attunement. Subsequently, we turn to the study’s implications for teacher education.
Research-based guidelines

This study elucidated how relational competence manifests in an avatar context. The results section includes examples that teacher educators can use to model relational competence. It also illustrates different aspects of competence that can be developed. The question is what teacher educators should focus on in SETT when preparing and conducting a program on relational competence using the avatar technique.

The starting point for the discussion below is that there is a course in SETT where PSEs “teach” avatars online or on campus. Opportunities will be provided during the simulations for the PSEs to communicate with their teacher educators and fellow students, both during and after the simulations. We also assume that the PSEs are prepared for the simulations through lectures and discussions on the concept of teachers’ relational competence. Moreover, PSEs were informed about the possibilities and obstacles presented by the technique, for example, to pause simulations and converse with fellow students, and shift between teaching in the whole class, small groups, and one-to-one conversations. Relational processes are multifaceted and open to interpretation. Hence, it is constructive for participants to discuss what occurs in the interactions, and sometimes say stop when situations become too challenging.

Based on this study, we propose the following three guidelines to support PSEs’ relational competence before, during, and after the simulations.

The teacher educator primarily directs the PSEs’ focus toward a pedagogical approach

Questions regarding the organization of interactions seem to be what PSEs associate with when they talk about relational competence. Organization is a relevant aspect of relational competence regarding how to structure caring and respectful interactions. It should be included in the educational program. However, we suggest that teacher educators focus primarily on the pedagogical approaches of PSEs. Encounters between teachers and individual students and the teacher’s attitude are the core of relational competence, in contrast to other teacher competencies, such as leadership or classroom management (Nordenbo et al., 2008). Specifically, teachers’ relational competence concerns the tempo and timing of teaching, improvization, and readiness for unexpected events. Therefore, the PSEs’ approach to ongoing relational processes, their practice-in-motion so to speak, should be the main target for practice.

In this context, we suggest that the teacher educator and the PSEs discuss different relational risks that could accompany “organization” and “approach.” One such risk is that PSEs focus excessively on the interaction order and/or methods for structuring interactions. This may reduce students’ individual needs and PSEs’ relational responsibilities. However, the opposite risk is that PSEs focus too much on ongoing interactions with individual students, such as emotions, nonverbal communication, and relationship statuses. Therefore, the needs of other students and those of the entire group might be neglected. As we saw in the Results section, Jasmine was insecure and a conformist. The PSEs discussed how to validate Jasmine’s situation. They also found that they should avoid overly affirming their attitudes. This suggestion was informative for the first guideline: a productive educational relationship is about accepting students, and about challenging them and supporting them in dealing with challenges.
The teacher educator directs the PSEs’ focus toward interpersonal communication and a high degree of attunement

The degree of attunement varied significantly between the PSEs and avatars. Considering these results, the teacher educator, as part of the preparation for simulations, can exemplify different attunement levels (Scheff, 1990), and discuss implications for students’ participation. For instance, teacher educators can show episodes from video films on teaching, with avatars or regular teaching, and interpret interactions in terms of attunement. Specifically, we suggest that the teacher educator should draw PSEs’ attention to a high degree of attunement, where teachers invite students to converse in dialogue and provide feedback to ensure that they feel understood and respected. The teacher educator can illustrate a high degree of attunement (e.g., from video films) with turn-taking, such as the following: (1) a teacher asks a question, (2) a student (seems to) understand, (3) the student responds, and (4) the teacher listens carefully and, in turn, (5) responds in a way that (6) the student seemingly understands. Additionally, the teacher educator can demonstrate how to ask follow-up questions if students do not understand (in turn 2 above).

The teacher educator directs PSEs’ focus toward the student’s participation

The findings illustrate that PSEs should pay attention to the variety of student behaviors in the classroom and ensure that all students are relationally included. This guideline includes preparing PSEs for avatars’ different stereotypical behaviors. It brings up the issue of balance, partly between individual students’ needs, and partly between individuals and the group. In the simulations we observed, the dominant avatars often took over the speaking space from others, while some tended to be forgotten. The simulation aimed to provide students with opportunities to express personal opinions. PSEs were tested by Jasmine, who exhibited distinctly uncertain and conforming behaviors. During such situations, PSEs can be asked to encourage Jasmine to take a personal stance, as demonstrated in the session where Jasmine said: “But the others said…,” and the PSE responded: “But now I am asking you.”

As part of this guideline, ethical issues can be discussed, such as the benefits of using avatars to practice communicative competence with students in vulnerable learning situations. Simulations can strengthen the readiness of PSEs to face challenging student behaviors. We propose that virtual simulations with avatars are useful for training pedagogical interactions in fragile and unstable relationships. However, these simulations cannot be based on checklists, specific methods, or strategies. The strategy that the PSEs sometimes use to fill silent moments by asking questions seems to distress students even more, as demonstrated by Jasmine. When encountering an unresponsive student, the PSEs need to practice pedagogical judgment, not by implementing standards, but by adjusting their behavior to the student’s current behavior. Such situational judgment is what PSEs ultimately need to acquire in courses on relational competence, both with typical and atypical student behaviors.

Conclusion

This exploratory study has contributed in-depth knowledge of PSEs’ perceptions and manifestations of relational competence within the context of virtual simulations with
avatars. There is a spectrum of diversity and variation in the data, encompassing nuances of how PSEs perceive relational competence, as well as intricate ways in which this competence is manifested during avatar interactions. Hence, the study suggested that employing virtual simulation with avatars is useful for supporting the development of relational competence in the realm of teacher education. The guidelines derived from this research propose that PSEs focus on three aspects: (1) teachers’ pedagogical approach; (2) a high level of attunement in teacher-student interaction; and (3) students’ participation.

**Limitations**

This study had the following important limitations. First, the sample was small, which prevents us from making any claims about how PSEs’ relational competence would manifest more widely. Further research is required to substantiate these findings. This is a qualitative study, which means that the findings cannot be validated or generalized in a statistical sense. However, they can be used to share experiences that may inform both the field of research and associated professions, as well as to raise questions for future research. Second, the purpose of this study concerned PSEs’ relational competence in certain virtual simulations. Consequently, no claims can be made regarding how PSEs would act in real-life situations, or, for that matter, in other virtual situations.

When we discuss the present project with colleagues from relational pedagogy, we are asked if it is meaningful or even possible to study relational competence using the avatar technique. We answer that it is certainly difficult and perhaps impossible to obtain deeper experiences of interhuman relationships by participating in virtual simulations. However, we suggest that the contact between humans and avatars has many similarities to real interpersonal contact. Avatars in the TeachLivE™ classroom are quite realistic; they (via the simulation specialist) speak and move in ways that resemble authentic individuals. After the sessions in our project, we asked the PSEs how they experienced their relationships with the avatars compared to real-life relationships. They stated that the two relational contexts differed in various ways, but often found themselves involved in interactions that almost made them forget how these were virtual situations. At least momentarily, they experienced authentic relationships with their avatars. As researchers in this project, we sometimes found ourselves discussing events in the simulations as if they were from regular teaching situations. For instance, we temporarily forgot that Jasmine was an avatar and not a real student. These statements and experiences confirm our overall impression that it is meaningful to practice relational competence with the support of the avatar technique, although its limitations should be considered.

**Suggestions for further research**

As noted, teachers’ relational competence with avatars is unexplored, and this field merits expansion. One possibility is to document a project in which teacher educators and PSEs work more systematically, inspired by the guidelines here. Thus, researchers could contribute consolidated knowledge about the possibilities and obstacles of using this technique for competency training. A second suggestion would be to conduct intervention studies where theoretical models, like the RCM, are applied to train PSEs in
relational practices, and investigate how access to explicit criteria for relational competence could enhance PSEs’ communication with avatars (cf. Aspelin et al., 2021). A third suggestion is to explore the transfer of knowledge and competencies by following PSEs from virtual simulations to special education practices and discuss whether the simulations have prepared them for in-service work. A fourth suggestion is to study how the avatar technique could train PSEs in relational competence. In the next phase of our project, we will explore PSEs’ relational competence with avatars that exhibit behaviors considered typical of students with neurodevelopmental disorders (cf. Ewe, 2022).

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References


Appendix A: Interview protocol

1. How did you experience interacting and/or observing virtual simulations?
2. What challenges did you experience in the interaction with the avatars, and how did you deal with them?
3. What did you do to get all the avatars involved in the interaction? Were the avatars sometimes excluded in the interaction? If so, how did you try to involve them?
4. How did you perceive your relationships in the interaction with the avatars (communication, closeness and distance, emotions)?
5. What do you think about similarities and differences in fostering a positive relationship with an avatar compared to students?
6. What do you think about similarities and differences in promoting a positive relationship digitally compared to a physical meeting?