

## Mixed-reality simulations as a tool to enhance parent-teacher conferencing in initial teacher education

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Communicating effectively with parents and carers is an important skill for pre-service teachers to develop. However, they often graduate underprepared due to limited opportunities for parent interaction during their course. When engaging with parents, pre-service teachers must be able to confidently articulate their pedagogical choices, provide examples of what students will do and justify why these choices have been made. One solution lies in providing opportunities for pre-service teachers to practise parent-teacher conferencing using mixed-reality simulation technology. In this study, differentiated instruction served as the context, and reflective practice, teacher self-efficacy theory and experiential learning theory were employed as the theoretical frameworks to build on an existing parent-teacher conferencing model developed by Dotger et al. (2008) to develop a new model for use with pre-service teachers. The model uses mixed-reality simulation technology and incorporates standardised parents and students, peer observation and opportunities for feedback and reflection. The model was developed and trialled with pre-service teachers in a core unit in an initial teacher education course at an Australian university. Results indicated that the pre-service teachers felt more prepared for parent-teacher conferencing after the technology-enhanced role-play experience.

### *Implications for practice or policy:*

- Mixed-reality simulation technology can be a valuable tool for authentic role-play experiences for pre-service teachers when preparing for parent-teacher conferencing.
- Simulation technologies can provide opportunities for pre-service teachers to practise aspects of teaching, such as parent-teacher conferencing, in a safe and low-stakes environment.
- Simulation technologies can provide powerful opportunities for pre-service teachers to reflect and learn from peers through peer observation and reflection.

*Keywords:* parent-teacher conferencing, mixed-reality simulation, experiential learning, reflective practice, initial teacher education, role play, qualitative

## Introduction

Engaging with parents is an important aspect of a teacher's role, and in increasingly diverse classrooms, teachers may often be required to explain or justify their inclusive teaching practices, including differentiation. Differentiated instruction, in which a teacher purposefully and proactively plans to meet the needs of diverse learners, results in modifications to lesson content, process, product and the learning environment to ensure that opportunities for success are available to all students (Tomlinson, 2017). With the inclusion of differentiated instruction in the Australian Professional Standards for Teachers (2011), Australian pre-service teachers (PSTs) are expected to understand and implement strategies for differentiation to meet the specific learning needs of students across a full range of abilities and to justify their approach to colleagues and parents. This requires PSTs to be able to clearly and confidently articulate differentiation, provide explicit examples of how it is implemented and justify its use as an inclusive practice.

Thus, communicating effectively with parents and guardians is a fundamental skill for PSTs to develop; however, it is widely acknowledged that PSTs often feel underprepared (Dotger et al., 2011; Fredericks & Rasinski, 1990; Mehlig & Shumow, 2013; Walker & Dotger, 2012). Adequate preparation of PSTs to competently communicate with parents about their child continues to be a challenge for initial teacher education (ITE) programmes (Dotger et al., 2008) because of limited opportunities for interaction with parents during school-based professional placements (Dotger et al., 2011). Similarly, PSTs also feel underprepared to facilitate formal parent-teacher conferencing (Mehlig & Shumow, 2013; Saltmarsh et al.,

2015). To seek to address this gap, ITE providers may incorporate role-play and micro-teaching scenarios which are usually conducted with peers during tutorials. Engaging in teacher-parent role-play scenarios allows PSTs to build their skills as a reflective practitioner and provides opportunities for instant feedback from peers and lecturers in the areas of communication and body language and can serve to highlight “nuances of effective parent communication” (Mehlig & Shumow, 2013, p. 184).

An emerging field is the use of mixed-reality simulation technology as a role-play tool within ITE programmes. However, this technology has tended to be used primarily for role-playing the teaching of short lessons to virtual students in a micro-teaching context (Ledger et al., 2019). With evidence beginning to emerge to indicate that mixed-reality simulation technology can improve self-efficacy of PSTs in specific areas of teaching, such as science teaching (Bautista & Boone 2015; Ledger et al., 2019), it is important to investigate how it can be used in different ways in ITE to prepare them for other aspects of their professional role as a teacher, including parent-teacher conferencing. This article discusses an extension to the work of Dotger et al. (2008) on parent-conferencing simulations, which uses an actor to role-play a standardised role of a parent. The model presented in this article, the parent-teacher conferencing model for mixed-reality environments (PCM-MR), introduces mixed-reality puppeteering in which PSTs engage in technology-enhanced role plays.

## **Theoretical framework**

This paper suggests a combined theoretical framework of experiential learning theory (Kolb, 1984), self-efficacy theory (Bandura, 1997) and reflective practice (Schön, 1983), as these offer potential to improve the effectiveness of parent-teacher conferencing role play in ITE. The first pillar of the theoretical framework, experiential learning theory, posits that learners progress through four stages in a learning cycle: concrete experience, reflective observation, abstract conceptualisation and active experimentation (Kolb, 1984). Providing PSTs with concrete experiences, such as simulated role play used in this study, provides opportunities to learn about how to conduct parent-teacher conferencing by role-playing one using simulation technology. Kolb described experiential learning theory as “the process whereby knowledge is created through the transformation of experience” (1984, p. 41). Reflective observation occurs when learners observe and think about the experience, and abstract conceptualisation involves making conclusions and learning from the experience at a conceptual level. Finally, the learner will apply what they have learnt in what Kolb (1984) referred to as the active experimentation stage in another concrete experience.

Self-efficacy, as one aspect of Bandura’s (1997) social cognitive theory, is the second pillar of the theoretical framework employed in this study. Self-efficacy is defined as a person’s belief in their capability to impact future behaviour, tasks and actions, and it is important that PSTs and teachers feel confident that they can have a positive impact when conferencing with parents. Self-efficacy in those training to be teachers has been linked to their future intentions, effort, persistence, classroom management and instructional practice and in some cases students’ results (Bandura, 1997). Bandura (1977) identified that there are four sources which influence a teacher’s self-efficacy: mastery experiences, vicarious experiences, verbal persuasion and physiological and affective experiences. Mastery experiences are the most powerful source of self-efficacy, with positive experiences building self-efficacy and unsuccessful experiences undermining it. Vicarious experiences involve observing mentors or other teachers modelling the instruction. Here, the PSTs’ perceptions of the success of the implementation will either build or undermine their self-efficacy. Verbal or social persuasion can involve feedback from mentors, university lecturers, or peers who may promote or be critical of the instructional strategy and talk about the ease or difficulty of its implementation. This feedback will also impact a teacher’s self-efficacy. Lastly, Bandura (1977) identified that affective experience is the least influential source of self-efficacy. This relates to the physical and emotional state that is experienced by a teacher in response to their perceived capacity to implement a particular aspect of teaching. While all four of the sources impact a teacher’s self-efficacy beliefs, it is the teacher’s interpretation of their experiences that tends to have the greatest impact on their future behaviour and action. Given that teacher self-efficacy is most malleable in PSTs (Bandura, 1977), it is important to provide opportunities during both coursework and school practicum experiences to promote high self-efficacy beliefs in PSTs for inclusive pedagogical approaches including differentiation (Scarpapolo & Subban, 2021). Self-efficacy theory is emerging as a relevant theoretical framework in mixed-reality simulation research (Gundel et al., 2019), and PSTs’ self-efficacy has recently been shown to increase when mixed-reality simulation technology is used in teaching where role play is utilised (Ledger et al., 2019).

The third pillar of the theoretical framework, reflective practice, is particularly applicable to role-play environments as it enables PSTs to revisit lessons and identify skills and strategies that need strengthening (Peterson-Ahmad, 2018). This use of role play supports Schön's (1983) reflective practitioner ideals by fostering ongoing professional growth and promoting the concepts of reflection-in-action and reflection-on-action (Schön, 1988). For example, a lecturer may pose questions which require PSTs to reflect on their use of jargon, tone, body language and whether they dominated the conversation by not allowing the parent an opportunity to speak or respond (Fredericks & Rasinski, 1990). Dieker et al. (2014) highlighted that for this to be effective, it needs to be a structured process to allow PSTs to explain what they would change about a teaching experience (reflection-on-action), and that they should be afforded the opportunity to try again. In technology-enhanced role-play scenarios, the option to reflect on recorded teaching episodes has been found to be a powerful reflective tool for teachers in training (Thompson et al., 2019).

## Parent-teacher conferencing simulations

With a focus on role-playing and practising communication skills, medical researcher Barrows developed a standardised patient model in 1963 to support medical students to practise diagnosing, interacting and communicating with patients (Barrows, 1987). Barrows' clinical simulation model and standardised patient pedagogy included the use of cases that were based on real patients. Barrows' cases for simulations were chosen and written based on four tenets that he developed – “prevalence, clinical importance/impact, social impact and instructional importance” (Dotger et al., 2008, p. 340). Here people were trained by medical professionals to present the case in a standard way during each simulation to allow medical students to practise their skills in a safe and supportive environment, and to provide a bridge between learning at medical school and transitioning to the profession.

Dotger et al. (2008) recognised that Barrow's (1987) standardised patient pedagogy may be suitable to address a similar need in ITE; more specifically, preparing PSTs to interact and communicate with parents as this is an area where PSTs are reported to be underprepared. Consequently, they adapted the standardised patient model for use in ITE where a standardised parent (SP) is used in simulations to provide PSTs with opportunities to practise, refine, reflect and develop their skills for interacting and communicating with parents using cases that are written using Barrow's four tenets for case development. Like Barrow's model, Dotger's (2008) parent- or caregiver-conferencing model (PCM) included trained actors to play the SP in a consistent manner for all participants in a simulation. The actors were provided with case-specific SP profiles that involved “distinct phrases, questions and comments” that should be included in each parent-teacher case conference (Dotger et al., 2008, p. 341). This was designed to enable PSTs to experience a comparable parent interaction based on the same variables which were addressed during the same common scenario. The pilot of the PCM by Dotger et al. (2008) included six PSTs as participants (in their final year of study) and six cases incorporating an SP (see Dotger et al., 2008, p. 344, for the cases) and all PSTs started with the first case, where the focus was on conducting a parent-teacher conference with a young parent, Jenny Burton (SP). All simulations were recorded and used in briefing sessions after each simulation, where they were prompted to reflect and develop an action plan for improving aspects of their communication for the next simulation (e.g., Case 2). Since Dotger's initial pilot of the PCM, it has been implemented in different ways with larger sample sizes (Dotger et al., 2008; Dotger et al., 2010), and overall, PSTs have reported the simulations to be authentic and valuable preparation for interacting and communicating with parents.

Dotger et al. (2010) further developed the PCM (Dotger et al., 2008), to create another model, the simulated interaction model (SIM), which included the original six cases from the PCM and another seven cases with standardised individuals for use by school leaders and teachers to reflect common professional problems, such as management of student behaviour and meetings with colleagues (Dotger et al., 2010). Both the PCM (Dotger et al., 2008) and SIM (Dotger et al. 2010) include role play with standardised individuals and cases in a face-to-face context (one-on-one) with an element of reflection after each simulation.

## Technology-enhanced role play

In recent years, simulated environments have been developed that create new possibilities for more realistic role-play experiences (Delamarre et al., 2021; Ke et al., 2021). Simulation technologies, including virtual reality, are now being used in different ways as a tool for providing learners with experiences and opportunities to practise skills in a safe learning environment where there are opportunities to reflect and act on feedback in preparation for the real task. For example, Delamarre et al. recently built a virtual reality platform, known as the interactive virtual training for teachers, as a tool to provide early career teachers with an opportunity to practise classroom behaviour management skills in a 3D classroom simulator. Other simulation platforms, such as OpenSimulator, have been used as a tool that allows multiple users “to interact synchronously with each other and with simulated students in the teaching simulation” (Ke et al., 2021, p. 835) to support new university teaching staff to practise their teaching skills, including elements such as scaffolding student learning. Although mixed-reality is now being explored as a tool to prepare PSTs in ITE programmes, Milgram and Kishino (1994) discussed mixed reality over 25 years ago when they presented a virtuality continuum and defined mixed-reality as an environment “in which real world and virtual world objects are presented together within a single display” (p. 1322). Role plays delivered through simulation technologies assist PSTs to develop their skills in managing diverse students (Kaufman & Ireland, 2016) and provide realistic teaching scenarios (Diana, 2013). Teaching simulations help bridge the gap between experiencing the role of a teacher and “merely learning about the ideas of being a teacher” (Calandra & Puvirajah, 2014, p. 30). A recent study by Ledger et al. (2019) found that mixed-reality simulated teaching environments, such as TeachLivE™, help to prepare PSTs for real life classroom contexts and provide unique opportunities to rehearse teaching in a way that has “only ever been addressed, valued or measured during real classroom experiences” (p. 14). Ledger et al. noted that TeachLivE™ (also known as SimLab™ in Australia) has been recognised as being effective in assisting teaching graduates to translate theory into practice and reported that the technology is an effective tool for developing self-efficacy in PSTs.

TeachLivE™ (SimLab™), used in this research study, is a “virtual classroom used to supplement traditional didactic instruction and field experiences in teacher preparation programs” (Dawson & Lignugaris/Kraft, 2017, p. 26). The concept was developed by the University of Central Florida and uses mixed-reality human loop digital puppetry and a puppeteer to control up to five avatars (student or parent characters). PSTs engage with the avatars in a simulated classroom where the puppeteer, avatars and PSTs are connected over a synchronous computer network (Nagendran et al., 2014), enabling real-time teacher-student or teacher-parent interactions to occur (see Ledger & Fischetti, 2020). The human loop puppetry provides scope for the avatar student(s), or avatar parent to assume a wide range of behaviours, target specific concepts or skills and repeat scenarios. This enables PSTs to trial choices and actions, experience difficult situations or conversations and modify their own approaches without risking harm to real students (Kaufman & Ireland, 2016) or alienate real parents, and can serve as technology-enhanced role play. Incorporating mixed-reality simulation technology, such as SimLab™, in ITE is emerging in the research as a signature pedagogy to provide alternative ways to practise, rehearse and reflect on different aspects of a teacher’s role. Currently, most of the research focuses on reporting the effect of using mixed-reality simulation technology where PSTs teach child avatars (Gundel et al., 2019). However, a recent study by Thompson et al. (2019) reported on the use of mixed-reality simulation technology to role-play parent-teacher conferencing where the focus of the meeting was on discussing the parent’s concerns regarding the teacher’s provision for their child. The current study builds on the existing research on the use of mixed-reality simulation technology in ITE by proposing a new model for parent-teacher conferencing for use with PSTs.

## Aims and research questions

The focus of this study was on PSTs’ preparedness for parent-teacher conferencing, with a specific focus on the parent questioning the teachers’ practices regarding differentiation. The PSTs (in the role of the teacher) conducted a simulated parent-teacher conference in which they answered questions from the (simulated) SP related to their understanding of differentiated instruction and how this was being implemented with the parent’s child, the SS. This study builds upon the parent-teacher conferencing work of Dotger et al. (2008), mixed-reality research of Ledger et al. (2019) and Thompson et al. (2019) and aims to investigate how mixed-reality simulations can be used to increase PSTs preparation for parent-teacher conferencing. This study is unique in this field in three ways. First, PSTs assumed the role of the teacher in

a parent-teacher conference with cases that involved SPs and standardised students (SSs). Second, it employed technology-enhanced role play in parent-teacher conferencing as a new PCM option. Third, it introduces a new PCM-MR, which includes peer observation and opportunities for individual and group reflection and feedback.

This study sought to investigate whether technology-enhanced role play can improve PSTs' preparedness, for parent-teacher conferencing, specifically in terms of explaining differentiated teaching to parents. To address this aim, the following research question guided this research: How can mixed-reality role-play simulations be used to enhance PSTs' preparation for parent-teacher conferencing?

## Methodology

This qualitative study is positioned with an interpretivist paradigm (Creswell & Poth, 2018) as the focus was on hearing the perspectives of PSTs on their experience of simulated parent-teacher conferencing. Institutional ethics was approved prior to any data collection. Purposive and convenience sampling was used to invite PSTs studying a core unit on educational diversity in the Master of Teaching Secondary course in their second year at an Australian university. The technology-enhanced role plays (using SimLab™) were scheduled during the regular tutorial time, and participation in the research was voluntary. The simulations were run as part of the tutorial on differentiated instruction and parent communication to provide an opportunity to practise explaining and justifying their pedagogy and practice to a parent. If the PSTs chose not to participate in the study, they were still able to observe the simulations during the tutorial and participate in the reflection and discussion.

The new model included peer observations as an additional component of the role-play simulations. This was influenced by the theoretical frameworks identified earlier and it was included to make the parent-teacher conference simulation experience a more powerful learning experience for all PSTs, not just those participating in the study or those in the role-play simulation. This resulted in the whole tutorial group participating; either through mastery experience and/or vicariously (Bandura, 1997), and in the concrete experience, reflective observation, abstract conceptualisation (Kolb, 1984) and discussion both individually, with peers and the PSTs' lecturer.

All students enrolled in the core unit (85 students) were invited to participate in two ways: by participating in a simulated role play of a parent-teacher conference and two focus groups and/or participating by observing the simulations and providing feedback using an observational tool. The PSTs in this unit who volunteered to participate in the role-play simulation ( $n = 9$ ) were studying different curriculum specialisations; however, six of the participants were studying Science as their curriculum specialisation (Table 1). Each role-play simulation ran for approximately 10 minutes. The focus groups were conducted by the second author (who was not known to the participants) with the PSTs who participated in the simulation ( $n = 9$ ) immediately before and after the tutorial to minimise inconvenience for the PSTs. Each focus group was audio-recorded (for transcription purposes) and the average time of each focus group was 25 minutes. The interview questions were generated from the relevant literature, especially pertaining to parent-teacher communication. Before the simulation, the questions focused on asking how much prior experience PSTs had talking to parents, and after the simulation the questions focused on determining the PSTs' perspectives of the simulation experience. The students who participated directly in the simulations also provided feedback using the observational tool ( $n = 28$ ).

Table 1  
*Pseudonyms and demographic data of participants in the focus groups (and role-play simulations)*

| PSTs      | Gender | Curriculum specialisation      | Focus group |
|-----------|--------|--------------------------------|-------------|
| David     | Male   | Humanities and Social Sciences | 1           |
| Josephine | Female | Languages                      | 1           |
| Emma      | Female | Science                        | 1           |
| Keira     | Female | Science                        | 1           |
| Isabella  | Female | Science                        | 1           |
| Bronte    | Female | Science                        | 2           |
| Aubin     | Male   | Science                        | 2           |
| Nate      | Male   | Science                        | 2           |
| Avani     | Female | English                        | 1           |

During each of the simulated role plays (using SimLab™), participants who were observing were asked to record what they observed using an innovative digital observation tool that was developed for this research (see Figure 1). The observation tool used the heat map function in Qualtrics, an online survey programme, which required PSTs to tap differentiation elements depicted on the screen (see Table 2) when they noticed them occurring during the role play. Table 2 lists the nine observational elements related to the components of differentiated practice that were being observed during the simulation. These included the principles of differentiation, application of differentiation, philosophy, instructional strategies, relevant terminology, assessment and integration of differentiation with the mandated teaching standards. The observation tool was delivered to PSTs via their own mobile devices and included nine observation elements relevant to differentiation. The tool recorded data according to the number of times each element was tapped and resulted in the colours changing on the screen to quickly identify high occurrences (hotter colours) and low occurrences (cooler colours) of differentiation elements observed by the whole tutorial group. This ensured an interactive user experience which encouraged active observation by class members and served to provide PSTs with a focus for reflection and as a prompt to provide their peers with feedback after the parent-teacher conferencing simulation.

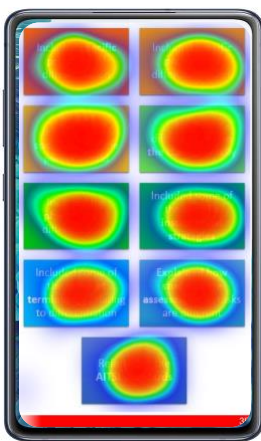


Figure 1. Observation tool heat map of nine differentiation elements delivered on student mobile device

## Research design

We contacted the interactors 2 weeks prior to the scheduled SimLab™ tutorial to provide them with information about the focus of the parent-teacher conferences. At that time, we provided a standardised set of parent questions to the SimLab™ interactors, as well as the instruction that a medium level of parent intensity was required from the adult avatars during each simulation; this involved the adult avatars to portray attitude and to challenge the PSTs' responses (Murdoch University, n.d.). At the same time, the PSTs were provided with information regarding the profiles of the two parents, Linda and Max (SPs) and their respective children (Jasmine and Ethan) as SSs provided in the SimLab™ information pack (Murdoch University, n.d.) as outlined in Table 2. Providing the case information to PSTs prior to the simulation was also part of the PCM (Dotger et al., 2008) to allow time for preparation. PSTs who had volunteered to participate in the simulated role play as the teacher were able to choose the SS and SP for their parent-teacher conference. They were briefed to prepare for the parent-teacher conferencing role play in their curriculum specialisation and to refer to the student specifically and differentiation practices generally during the role play. The PSTs were also provided with some literature regarding how to explain differentiation to parents.

Table 2  
Case details for SPs and SSs

| Case | SP    | SSs     | Case  | Information provided to the interactors for the SP   |
|------|-------|---------|---|--|
| 1.   | Linda | Jasmine | “Jasmine is an intuitive learner who likes to look at big ideas and patterns and understand relationships. She tends to engage in topics based on her interest or passion. Her favourite subjects are science and history, and she is passionate about animal rights”. (Murdoch University, n.d., p. 8)   | Why does my child seem to be getting a choice of activities to complete?<br>What if my child always chooses the easier option? Why does my child sometimes have different activities than other students?<br>How will my child be graded if they are sometimes doing different activities?<br>Will my child still cover the necessary curriculum if differentiation is taking place?<br>Will my child be prepared for the end of unit tests?<br>What are the research basis, policies or guidelines for differentiation?<br>How do you manage the classroom when the students are all doing different activities?<br>Is the strategy of differentiation adopted school-wide? |
| 2.   | Max   | Ethan   | “Ethan is an adventurous learner, willing to step out of his comfort zone and to understand new perspectives. Personally, Ethan is an extrovert, who loves to make others’ laugh and approaches almost anything with a high level of energy. His favourite subject is language arts, and he loves playing soccer and video games in his spare time”. (Murdoch University, n.d., p. 8) |  |

Both cases involved the parent questioning the teacher as to why their child was coming home and talking about being able to choose which task they completed, how they worked and how they were being asked to demonstrate their learning which are elements of differentiated instruction to meet the needs of diverse learners. The cases for this study were developed based on Barrows’ (1987) four tenets of “prevalence, clinical importance/impact, social impact and instructional importance” (Dotger et al., 2008, p. 340). Each case in the current study focused on parents’ concerns about the pedagogical practices of the teacher, and more specifically differentiation. Parents often ask their child’s teachers questions about how they teach and therefore this meets Barrow’s (1987) first principle for case development, prevalence, as this is a situation that PSTs will likely encounter in the future. The cases also had social impact as PSTs were challenged to “think about how they will foster productive and inclusive, right to belong, classrooms that support each individual within the larger classroom community” (Dotger et al., 2008, p. 341). Differentiated instruction requires the teacher to balance the affective and cognitive needs of all learners in an inclusive, safe and supportive learning environment and parents may question how their child’s teacher is going to manage this. The cases used in this study also had clinical importance and instructional importance, as teachers have been reported to have concerns about parental resistance to differentiation (Gaitas, 2016; Heng & Song, 2020). This can influence teachers’ implementation of differentiated instruction and will ultimately mean that not all students’ needs are addressed and supported. Therefore, it is important that PSTs develop the skill of clearly and confidently explaining differentiated instruction to parents as it is of both instructional and clinical importance, and hence the case and its focus and inclusion in this study. On the day of the simulations, the PSTs in the simulation conducted the parent-teacher conference either sitting or standing in front of the screen (Figure 2) while their peers sat behind and observed. After each simulation, the first author facilitated a whole-group reflection and debrief to provide all the PSTs with an opportunity to learn from each simulation experience. The observational tool was used as a prompt for reflection and feedback during the discussion.

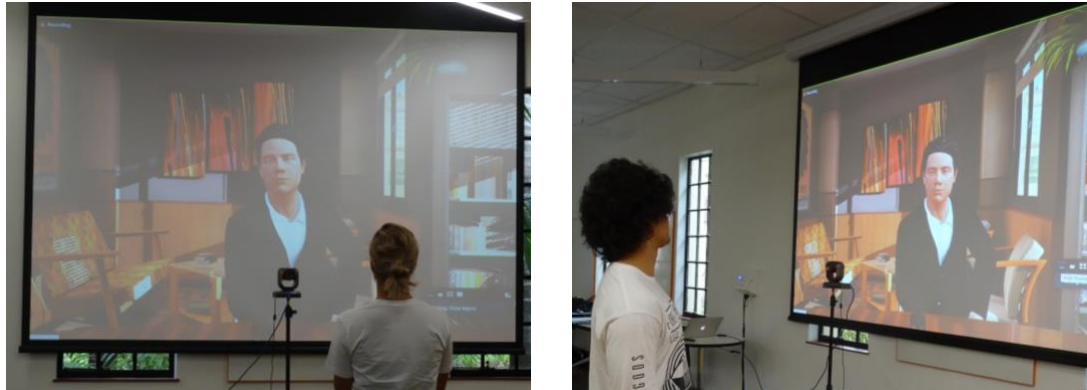


Figure 2. Mixed-reality simulated parent-teacher conferencing with PSTs. Photographs shared with permission.

## Results

The participants ( $n = 28$ ) observing the simulations recorded what they observed on an interactive observational tool, the heat map function in Qualtrics, for each of the nine parent-teacher conferencing simulations. The PSTs accessed the tool on their mobile phones or tablets via a QR code. A total of 124 responses were recorded and combined to provide an overall depiction of what the PSTs observed overall. Observational elements 3 and 4 were observed the most during the nine simulations, and elements 8 and 9 were observed the least (Table 3).

Table 3

*Observational heat map results*

| Region | Observational element   | % of responses |
|--------|---|----------------|
| 1.     | Included specific principles of differentiation                       | 11.03%         |
| 2.     | Included specific practices of differentiation                        | 11.03%         |
| 3.     | Related differentiation specifically to the parent’s child            | 13.78%         |
| 4.     | Related differentiation to the class generally                        | 13.03%         |
| 5.     | Included the philosophy of differentiation                            | 12.28%         |
| 6.     | Included some of the specific instructional strategies                | 10.40%         |
| 7.     | Included some of the relevant terminology relating to differentiation | 9.65%          |
| 8.     | Explained how students are assessed when tasks are different          | 9.40%          |
| 9.     | Referred to the AITSL standards                                       | 9.40%          |
| Total  |   | 100%           |

Two focus group discussions took place pre and post the simulations, with each discussion lasting on average of 25 minutes. The focus groups were recorded, transcribed verbatim and analysed in NVivo using inductive analysis and thematic coding. Each participant in the focus group was assigned a pseudonym to ensure anonymity. Three major themes emerged from the qualitative analysis: preparedness, reflective practice and vicarious experience.

PSTs identified that participation in the simulated parent-teacher conferences led to them feeling more prepared to talk to parents generally. Prior to the simulations, eight of the nine participants identified that they had no experience with talking to parents. Josephine had some prior teaching experience in another country and therefore she had some experience talking to parents. The PSTs’ responses from the focus group discussion provided evidence that they felt more prepared to talk to parents after the simulation experience. Overall, the confidence of the PSTs increased in relation to both talking to parents generally and explaining differentiation, with Keira saying, “It was valuable because ... it was the first time that I really felt like I actually had to practice my skills in real life, other than prac ... and that’s a real situation which we’ll come across”, and David saying:



You can do a role play, you can write an ideal response but at the end of the day you might have a parent that is like Max, or you might have parents getting aggressive so you need to perhaps be exposed to that in any way that you can whether it be a realistic situation, with like a face time call and an actor or whether it be a SimLab™ situation. (David)

The PSTs recognised that the simulation experience was quite different to role-playing parent-teacher conferencing with their peers during a tutorial as they typically have the same content knowledge as their peers, and therefore, it is not an authentic activity or as valuable in terms of learning. Bronte commented, “When we teach our peers, it is a little bit difficult to be in character all the time, you know, for the peers as well...this is more realistic”.

The simulated parent-teacher conferences provided the participants with a valuable vicarious experience. The PSTs interviewed recognised that they learnt a lot from observing their peers in the simulation. One pre-service teacher said that they were taking notes about how to explain differentiation to parents in terms of the language used and the specific examples that were given by the PSTs in the simulation. One pre-service teacher, the only pre-service teacher in the focus groups who had some previous teaching experience, said that she did not think that the simulation would be beneficial in preparing them to explain differentiation to parents (pre-simulation). However, post-simulation, she acknowledged that she found listening to her peers explain differentiation to the parent avatar to be very beneficial in terms of what differentiation means and gained insight into how to explain it more clearly to parents. Another PST reflected that they learnt a lot from watching the simulation where the parent was more challenging, as they were able to rethink the way that they were going to explain differentiation to the parent when it was their turn.

There are parent personalities like that, and he is quite an opinionated person and I think that he wants to be listened to, so I thought okay I’m not going to try and defend myself so much. I am just going to listen to whatever he has to say and then I’ll try and come in that way. (Josephine)

The simulated parent-teacher conferencing experience provided the PSTs with the opportunity to reflect on what they know and understand about differentiation as well as reflecting on how they communicate differentiation to parents. The PSTs responded that they were reflecting both during their simulation experience and after; identifying that they would explain things differently if they had the opportunity again, including more specific responses regarding assessment and the student’s work to support their explanation. Some of the PSTs reflected that after the simulation they recognised that they were more knowledgeable about differentiation than they realised and that they were able to explain it confidently and clearly to the parent avatar. Participating in the role-play simulations increased the participants’ self-efficacy for explaining differentiation to parents. Post-simulation, the participants all stated that their self-efficacy for explaining differentiation to parents had increased. PSTs also reported that they were able to explain differentiation better than what they initially thought and that this made them feel more prepared and confident to explain it to parents in the future. Keira commented, “I feel more confident in how well I understand differentiation and how well I can explain it to other people now than what I could beforehand”. Isabella went on to explain:

I think I related the explanation of differentiation to the student of the parent well and it made it personal and... how I was catering to their specific child’s needs. Next time I would talk about how I was doing it for the class, not just for that one child, but how I do it for everyone so that I give more of a global perspective on it. Yeah, I think that I said that I wasn’t confident and all that, but now that I’ve done it, I feel like I can. (Isabella)

Avani articulated in the following quote how she was reflecting during the simulation experience in light of the parent’s responses, “I noticed I was reflecting and thinking [post-simulation]”. She stated that she was listening carefully to the parent and then making changes to her explanations in terms of the vocabulary or the specific examples that she was providing. Avani also reflected that she realised that she was talking faster when she was trying to justify herself to the parent. Similarly, Emma reflected on how she responded when she realised that the parent had misunderstood what she had said and how she changed her approach and explained differentiation differently. Once she realised that she was able to do this successfully, she found this to be a confidence boost and a good learning experience. David, who found the simulation to be

quite challenging, still thought that it was a valuable experience as it was an opportunity to reflect on what he would do differently next time. He also said that he was aware that he was actively reflecting during the simulation and consequently realised he was interrupting the parent. David then explained how he tried to stop this and slow the conversation down to a pace that was more conducive to a parent-teacher conference, so that the parent has their questions answered. Isabella expressed a similar sentiment post-simulation by saying, “You reflect on the things that didn’t go so well and then you fix them for the future, so I think that there are only positives, either way that it goes”.

Several PSTs suggested that it would be valuable to video-record each simulation so that they could use it as a reflective tool to improve future practice. They also suggested that it would be beneficial to share other PSTs’ simulation experiences for reflective practice activities so that they could learn from their peers and provide constructive feedback. Another suggestion was that a bank of these videos could be made available to students to watch and critique as part of an authentic assessment task in a unit, either to check for understanding of differentiation or implement a reflective practice framework. Another suggestion made by Keira was to provide each PST with the opportunity to retake the simulation, either with the same parent, or a different parent with a different focus, and put into practice the feedback given by their peers and university lecturer as well as their own reflections from the first simulation experience. Keira also explained that, “To have the same conversation and then be able to compare and contrast and then reflect personally on how that went, I think that that would be really helpful”.

## **Discussion**

The simulations provided an opportunity for PSTs to practise and observe a parent-teacher conference and practise explaining differentiation to parents. However, there were many additional benefits than first considered. The participants in this study had very little or no prior experience talking to parents, and this is reflective of the literature in this area (Dotger et al., 2008; Dotger et al., 2011; Mehlig & Shumow, 2013). The PSTs in this study found the simulations to be authentic experiences, which was also reported in a recent study with undergraduate PSTs who also participated in mixed-reality simulation parent-teacher conferencing (Thompson et al., 2019). The PSTs reported to find the simulation to be more valuable than traditional role-play experiences. They also revealed that they were nervous about talking to parents due to their inexperience and the lack of advice and guidance they had received to that point. However, despite their nerves, they saw the value in the experience, both as a participant in the simulation and as an observer. The PSTs also found the role-play experience to be valuable in terms of preparing them for future parent-teacher conferencing conversations and more specifically in terms of increasing their self-efficacy for explaining differentiation to parents.

Mixed-reality simulation technology, such as SimLab™, offers ITE providers a platform for PSTs to practise common teaching practices, such as parent-teacher conferencing with avatar students, parents or principals (Gundel et al., 2019; Ledger et al., 2019; Ledger & Fischetti, 2020; Thompson et al., 2019). This technology-enhanced role-play experience was identified by the PSTs in this study as a low-stakes environment where they could make mistakes, reflect on their experience, both in action and on action, (Shön, 1983) and seek feedback from peers observing and the lecturer. Therefore, in an ITE context, mixed-reality simulation experiences, such as the ones provided through SimLab™, could be considered an effective way to provide PSTs with experience and practice in a relatively authentic way to prepare them to facilitate parent-teacher conferencing. Feedback was provided to the PST during the tutorial by the PSTs’ lecturer who also checked for understanding. In addition, data from the observational tool was used by the lecturer to drive PST discussion and reflection, and to inform the teaching of subsequent tutorials. The observational tool identified that the PSTs were readily able to relate differentiation to the specific child in the case (for the simulation) and talking about differentiation generally. These results from the observational tool provided some evidence that the PSTs had prepared for the role-play by carefully thinking about the information provided for the SSs and the SP.

### **PSTs in the role of the teacher**

The technology-enhanced role-play experience provided the PSTs who directly participated in the simulation with the four sources that influence self-efficacy as identified by Bandura (1977). The PSTs participating in the role play had the opportunity for mastery experience (through their participation in the simulation in the role of the teacher), vicarious experience (through observation of their peers), verbal

persuasion (from the feedback from their peers who were observing as well as feedback from the university lecturer), as well as affective experience (which was evidenced by their own reports of their personal physical and emotional responses to the experience). Furthermore, experience within this simulated parent-teacher conference helped to provide PSTs with a relatively authentic experience where they were challenged to think on their feet as they actively made changes in their responses to improve their explanation and justification of differentiation to the parent. This reflection-in-action (Schön, 1983) during the simulation was identified by the PSTs as a valuable part of the experience. Reflection-on-action (Schön, 1983) was also part of this experience as evidenced by their comments in the focus group discussions. The simulation presented a fairly realistic representation of how some parent-teacher conferences may occur and therefore it was a valuable concrete experience (Kolb, 1984) for PSTs to connect theory to practice (De Conink et al., 2019). It was evident from the focus group discussions that the PSTs' self-efficacy beliefs relating to explaining differentiation to parents was positively influenced after their participation in the simulation. This finding supports the results from two recent studies (Ledger et al., 2019; Ledger & Fischetti, 2020), which reported that SimLab™ provided a unique context for PSTs to develop their self-efficacy and reflective practice.

### **PSTs observing the simulations**

The PSTs who were observing the simulations had the opportunity to experience two sources of self-efficacy influence: vicarious experiences and verbal persuasion (Bandura, 1997). PSTs observing the simulations had the opportunity to learn from their peers by watching each parent-teacher conference simulation. While mastery experience is the most powerful source of self-efficacy, vicarious experience is the second (Bandura, 1997). PSTs were also able to engage in reflective observation (Kolb, 1984) as they actively observed each simulation and used the observational tool to record what was included in the parent-teacher conference. Verbal persuasion was also a source of influencing self-efficacy (Bandura, 1997) for the PSTs observing the simulations as they saw how successful their peers were with explaining differentiation to the parents and how they were able to confidently respond to the parents. Given that studies have reported the benefits of peers learning from each other with simulation technology (Bautista & Boone, 2015; Gundel et al., 2019; Thompson et al., 2019), the inclusion of peer observation and reflection in real-time was an important inclusion in this model.

### **After each simulation**

After each simulation, all PSTs were engaged in both reflection-on-action (Schön, 1983) and abstract conceptualisation (Kolb, 1984). This whole-group discussion, which was led by the PSTs' lecturer, was designed to elicit verbal and social persuasion (Bandura, 1977) and to promote active reflection. Feedback was constructive, targeted and timely and included encouragement and reinforcement of positive aspects of the interaction, with a focus on their clarity of their explanation of differentiation and their explanation of their approach to differentiating in the specific curriculum area for the student. The immediacy of the feedback, provided by both the lecturer and the PSTs' peers, and the reflective nature of the discussion after each simulation created a meaningful learning opportunity. The group discussion that followed each simulation provided the opportunity for active experimentation (Kolb, 1984) as the next PST involved in the simulation was able to use the feedback in their role-play (concrete experience) simulation (Kolb, 1984). There were opportunities for all PSTs to learn from their peers; they could learn from their peers by listening to the reflection from the PST who participated in the simulation, and by listening to their peers who used the observational tool to prompt discussion and provide feedback. It was not unusual for PSTs to provide considered constructive feedback similar to this example:

I noticed that you made six specific references to the parent's child in the parent-teacher conference, and I think the fact that you used their name really made a difference as it was more personal, and the parent seemed to respond positively to this.

This real-time feedback promoted reflection and provided a complete feedback loop where all PSTs, including those in the role of the teacher, had the opportunity to participate.

### New parent-teacher conferencing model

This study aimed to address some of the gaps in the literature with regards to the use of simulation technology and to enhance PSTs' preparedness for parent-teacher conferencing. The procedure was adapted from the PCM (Dotger et al., 2008), with the inclusion of five new elements to create a new model, the PCM-MR, for use with PSTs in ITE. The additional elements to the PCM include SSs as well as SPs; mixed-reality simulation; simulation in front of a whole tutorial group; whole tutorial reflection after each simulation; and an interactive mobile observational tool for observer participation in terms of providing feedback (Figure 3).

We propose that this model can be used in ITE courses with PSTs to rehearse a wide range of parent-teacher conferencing scenarios, which might include talking to parents about strategies used in pedagogy, delivering content and assessment and catering for diversity. Rehearsing such scenarios can also provide opportunities for PSTs to practice addressing a range of parental concerns related to student progress, behaviour and achievement. ITE providers can create SPs and student cases to target specific areas of PSTs' identified needs regarding parent-teacher conferencing preparation, which is an identified gap in traditional ITE preparation (Dotger et al., 2008; Ledger et al., 2019; Walker & Dotger, 2012).

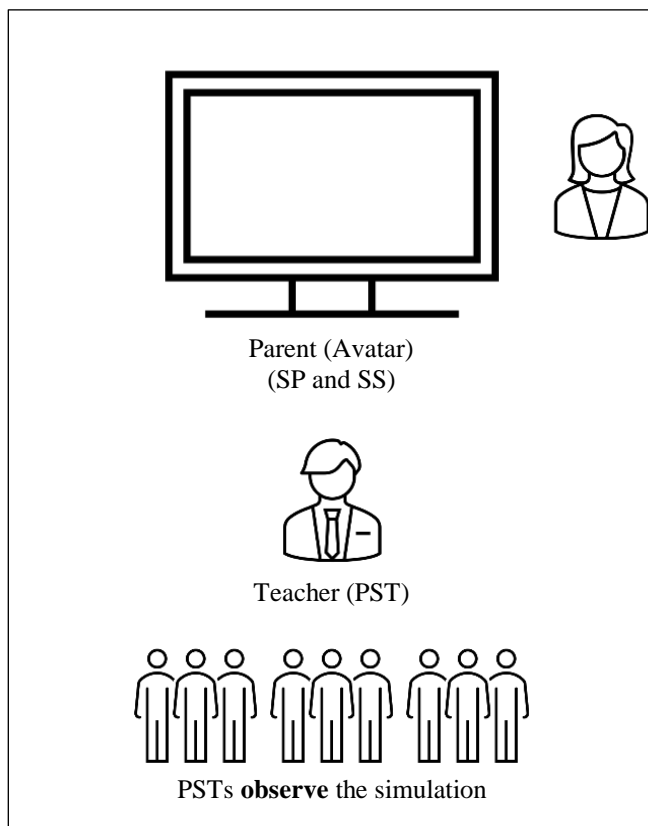


Figure 3. PCM-MR

One of the limitations of this study relates to the small sample size at one Australian university. Therefore, the results may not be reflective of a larger sample. Even though SPs were used in this study, there was some unavoidable variability of the interactors' responses from one simulation to the next according to the PSTs' responses. Dotger et al. (2008, p. 347) also noted this in the original pilot of the PCM and recognised that these variations in responses from the SP can "significantly shape the simulations". However, this variation also afforded the PSTs with valuable learning and opportunities for rich reflection and discussion. Furthermore, the cost of engaging the interactors and the licence cost of SimLab™ may be limitations to replicating this study with larger PST cohorts. It would be beneficial to replicate this study using the proposed model with a larger sample size with PSTs studying other teaching qualifications, including undergraduates.

## Conclusion

Communicating effectively with parents is part of a teacher's role; however, it is challenging for ITE courses to prepare PSTs for this, given that they may not always observe these interactions during school placements. Although traditional role-plays in tutorials are worthwhile to rehearse these interactions, simulation technologies, such as SimLab™, can be regarded as a valuable tool to provide a more realistic and authentic opportunity to practise, rehearse, reflect, learn from peers and get real-time feedback to learn how to communicate with parents. The findings of this study suggest that it would be valuable to include mixed-reality simulation experiences in ITE programmes to prepare PSTs for different aspects of teaching, as recent studies have also reported positive results (Gundel et al., 2019; Ledger et al., 2019; Ledger & Fischetti, 2020; Thompson et al., 2019) in ITE contexts. Although further investigation is warranted, the new model employed in this study allowed PSTs to practise parent-teacher conferencing in a safe, controlled and low-stakes environment, with opportunities for reflection and opportunities to learn from peers. This model also provided opportunities for the lecturer to teach in a situated context and check for understanding of unit content. The implementation of the PCM-MR, introduced in this paper, provided PSTs with the opportunity to increase their preparedness for explaining differentiation to parents. This research and PCM-MR can be adapted to other parent-teacher conferencing scenarios and has the potential to benefit ITE preparation in varied contexts.

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