

Understanding pre-service teachers' experiences of a mixed reality simulation environment: An analysis of pre-service teachers' perspectives on communicating with a simulated parent avatar

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The integration of simulation platforms in the Initial Teacher Education (ITE) programs enables pre-service teachers (PSTs) to experience a range of teaching scenarios that they might not otherwise encounter in real-world practicum contexts. Understanding PSTs' perspectives of their experiences of these new learning spaces is critical in determining the role played by simulation platforms in the preparation for placements, their specific affordances for learning and how these platforms can be effectively integrated to support PSTs' practices. This paper reports on a pilot study of PSTs' participation in a simulated parent conference session with a parent avatar in SIMLab™, a mixed reality simulation environment. SIMLab™ allows the facilitation of synchronous responses by a human interactor playing a virtual reality avatar to enhance the authenticity of the experience for PSTs. Based on data drawn from a cross-sectional survey design, the paper provides an analysis of PSTs' perspectives on six possible affordances of SIMLab™ and describes emergent themes gleaned from PSTs' comments on their learning experiences within and in relation to SIMLab™. The findings inform the design and implementation of the simulation experience in ITE programs.

Keywords: mixed reality, simulation, initial teacher education

Introduction

In mixed reality settings, real-world and virtual objects are juxtaposed within an environment where a real-world setting is virtually augmented or a virtual setting is augmented by real-world interactions (Milgram & Kishino, 1994). At present, there are no clearly defined configurations of real and virtual elements, but the intention is for these elements to be integrated in ways that present users with the best possible simulated or enhanced experience of a real-world context. With advances in this field, mixed reality simulation platforms such as Teachlive™, Mursion™ and SimLab™ (Dawson & Lignugaris/Kraft, 2017; Dieker, Hughes, Hynes, Straub, 2017; Ledger, Ersozlu, & Fischetti, 2019) have made some headway in the Initial Teacher Education (ITE) programs. These mixed reality simulation platforms allow the facilitation of synchronous responses by human interactors playing virtual reality avatars within the virtual space as they interact with users; a functionality referred to as "human in the loop" (Dieker, Lignugaris-Kraft, Hynes & Hughes, 2016). A key affordance of these simulations in ITE is that pre-service teachers (PSTs) are able to experience a range of teaching scenarios that they might not otherwise encounter in real-world practicum contexts (Ledger & Fishchetti, 2019) and the "human in the loop" functionality enhances the authenticity of the experience. This paper reports on a pilot study of PSTs' perspectives on their experience of conducting a simulated parent conference session with a parent avatar controlled by a human interactor. It provides an overview of significant effects in relation to PSTs' perspectives on six possible affordances of a mixed reality simulation platform known as SIMLab™ and describes emergent themes gleaned from PSTs' comments on their learning experiences within and in relation to SIMLab™. The findings inform the design and implementation of the simulation experience in ITE programs.

Methodology

The aim of the study was to explore the affordances of mixed reality simulation environments for learning and practice in the ITE context. The simulation experience involved Year 4 PSTs in the ITE program at a university in Western Australia. The simulation experience was embedded within an experiential learning cycle (Kolb, 1984) which included PSTs interacting with an avatar playing the role of a parent of one of their students, followed by a coaching session with a tutor to help them reflect on their words and actions during the simulation experience and consider strategies for managing discussions with a parent. This was then followed by with a second interaction with the parent avatar for PSTs to enact the strategies discussed with the tutor. The study employed a cross-sectional survey design. The questionnaire was issued immediately before the first simulation experience to

establish a baseline and immediately after the second simulation experience in order (i) to compare the attitudes of the group towards the simulation experience pre- and post-intervention and (ii) to evaluate the program (Creswell, 2012). There were 101 respondents in the pre-intervention survey and 57 in the post-intervention survey. The online survey was voluntary and anonymous. Quantitative analysis of the data was based on the component of the questionnaire comprising a 4-point Likert scale related to possible affordances of mixed reality simulation platforms, that is, building self-confidence, planning for diverse parents/families, handling difficult situations, asking good questions, accepting critical feedback and self-reflecting. Qualitative analysis of the data was based on the participants' comments in open-ended sections on their experience of the simulation platform. Constant comparative analysis was employed to generate categories reflecting participants' attitudes towards the simulation experience through systematic comparison of specific incidents in the data (Strauss & Corbin, 1990).

Findings

Survey data results

To test the hypothesis that the post-intervention group (n=57) would be associated with significantly different perspectives on the affordances of SIMLab™ for learning how to interact with a parent compared to the pre-intervention group (n=101), an independent samples t-test was performed. The test compared the scores for six possible affordances of SimLab™ for the pre-intervention and post-intervention group. Scores for four of the six affordances showed a statistically significant difference between the pre- and post-intervention groups.

- Building self-confidence for the pre-intervention group ($M=3.03$, $SD=.467$) and post-intervention group ($M=3.38$, $SD=.491$); $t(112) = 1.98$, $p = 0.000032$
- Handling difficult situations for the pre-intervention group ($M=3.06$, $SD=.552$) and post-intervention group ($M=3.56$, $SD=.501$); $t(126) = 1.97$, $p=0.000000075$
- Accepting critical feedback for the pre-intervention group ($M=3.12$, $SD=0.503$) and post-intervention group ($M=3.42$, $SD=0.565$); $t(105) = 1.98$, $p=0.0015$
- Self-reflecting for the pre-intervention group ($M=3.21$, $SD=0.593$) and post-intervention group ($M=3.49$, $SD=0.504$); $t(132) = 1.97$, $p=0.0026$.

The results indicate that the SIMLab™ experience surpassed PSTs' initial expectations before they participated in the intervention. PSTs found that the learning process situated within and around the simulation experience productive in terms of shaping their perceptions of their own capacity and building their capacity to manage and to reflect on challenging scenarios during parent-teacher meetings.

The two affordances which showed no significant difference for the pre- and post-intervention groups were asking good questions and planning for diverse parents/ families difference.

- Planning for diverse parents/ families difference for the pre-intervention group ($M=3.06$, $SD=.552$) and post-intervention group ($M=3.19$, $SD=.666$); $t(99) = 1.98$, $p=0.237$.
- Asking good questions for the pre-intervention group ($M=3.10$, $SD=.488$) and post-intervention group ($M=3.28$, $SD=.559$); $t(104) = 1.98$, $p=0.055$.

The results for asking good questions might be due to PSTs not considering the practice of asking good questions a strategy to better understand parents' concerns or not having the skills to ask good questions of the parent avatar and, hence, finding that the simulation experience did not support the practice of asking good questions. With regard to engaging with parents/ families from diverse backgrounds, it is plausible that the number of scenarios PSTs experienced being limited to two was the reason for this result or there was possibly a lack of shared understanding of what "diversity" in relation to parents and families encompasses.

Emergent themes

This section describes the emergent themes identified from PSTs' comments about their experience with the SIMLab™. The perspectives reflected in these themes were consistent with findings yielded by quantitative analysis of the survey data in the previous section.

Developing greater awareness of initial actions and reactions. Acknowledging the difficulty they had coping with a given scenario was a good starting point for some PSTs during their initial experience within the SIMLab™.

They accounted for their response in terms of cause-effect interactions, realised specific aspects about themselves or their responses that they needed to work on or found wisdom in their initial actions.

I found it hard to think on the spot. The parent was rude and I needed to take control of the situation, outline the actions in place.

The first time round I stuttered and stammered, and didn't know where to lead the conversation.

I think I need more practice on handling difficult situations. Because this was my first time and I did not know what to expect, I was really stressed. Although I had planned the way I was going to introduce myself and thank the parent for coming, I started the interview by trying to solve the problem straight away.

In the first interview, I was unable to speak very much but I think that was a good thing. It allowed me to realise the importance of initially, letting parents say what they want and be heard. That way, when you try to work with them to come up with a solution, they are more likely to be calm and want to work with you.

Building confidence within a safe environment. PSTs observed that the process of managing challenging scenarios helped to build their confidence in their ability to engage with parents. That confidence was tied to their awareness that there were no real-world repercussions for failure which made the simulation environment a safe space for them.

You are able to build your confidence with handling difficult situations and trial de-escalation strategies in a safe learning environment.

Building confidence in myself to ask questions and help parents.

It was very overwhelming at first, but toward the end I became more confident and managed the situation to the best of my abilities.

To respond and acquire feedback in a safe space, rather than the first time we are expected to speak to parents as teachers about a students[sic] progress.

Trialing strategies. Following the initial simulation experience, PSTs had a feedback cum coaching session with a lecturer/tutor before their second simulation experience. PSTs found that they benefitted from this session as they were armed with a structured approach such as Situation Action Outcome (SAO) or Inform/Inspire, Show/Share, Try/Transfer, Apply/Action, Review/Revise (iStar) that they could then deploy during their second simulation experience. This structured approach enabled students to plan their responses and stay focused on the task at hand rather than react to the parent avatar's words and behavior.

I had a debrief with [lecturer/tutor] and we discussed the Situation Action Outcome framework for my next attempt. I thought about Max's perspective as a parent and what information I could provide him about his child Ethan and how to reassure him that I am monitoring his child's academic and social development and will maintain communication with him in regards to this.

It was really noticeable to me how my responses differed between reactive initially and proactive when armed with some strategies to address yhe[sic] parenr[sic] character.

It allows you to trial your ability to respond in real life situations with parents and also helped me to compare the scenario when a more structured approach to the parent was used through implementing the istar model. Highly recommend this experience to all students.

Learning through the coaching, reflection and practice cycle. The learning process within which the simulation experience was embedded ensured that PSTs received coaching and feedback that was relevant and timely and that they had the opportunity to reflect on the advice and feedback they received to improve their practice during the second simulation experience.

This experience allowed me to make mistakes the first time, be coached and to practice again a second time to practice immediately what I just learned - it was great.

I think its[sic] really wonderful to have [lecturer/tutor] there to provide some pointers for how to handle the situation. The advise[sic] she gave was really useful and then being able to implement it straight away was also really helpful.

[D]oing the simlab twice was really good for reflection and implementing new strategies that could assist the outcome of the meeting.

The initial interview was quite confronting, however on pausing to reflect on different strategies to use when engaging with irate parents/carers the second interview went a lot smoother.

Discussion

The findings shed light on PSTs' perspectives regarding the affordances of SIMLab™ in relation to how it helps to build their confidence in their capacity to conduct the conference sessions with parents and manage challenging scenarios. They also highlight how much PSTs value the opportunity to practise their strategies in an environment free of real-world repercussions and on the multiple opportunities to trial and practise different strategies with parents of different students with different learning needs in order to build a knowledge bank of situation-specific strategies that would be of use to them in future. While the simulation itself did not afford opportunity for feedback, coaching and reflection, it provided students with a hitherto unexperienced scenario which they could draw on to consider possible strategies for effectively engaging parents in conversations about their children.

The findings also revealed the importance of strategic integration of a simulation within the learning process. It was the immediate follow-up in terms of feedback and coaching by the lecturer/tutor and reflection on the PSTs' part between their enactments within the simulated environment and the opportunity to immediately put into practice what they had just learnt through coaching and reflection that PSTs found most beneficial to their professional growth. PSTs also observed that just-in-time information from a knowledgeable other (Vygotsky, 1978) in the form of a structured approach or strategies such as Situation Action Outcome (SAO) or Inform/Inspire, Show/Share, Try/Transfer, Apply/Action, Review/Revise (iStar) helped guide their development and application of strategies for communicating with parents.

Implications

The survey data illustrates PSTs' favourable perceptions of their SIMLab™ experience and the affordances of the SIMLab™ for learning how best to interact with parents during parent-teacher conference sessions. While there are limitations to this study in that the data are drawn from PSTs' experience of one simulation platform, the goal of this pilot study is not for PSTs to place their faith in a specific technology or in simulated experiences in general but for them to build their capacity to manage a range of scenarios revolving around parent-teacher interactions. To this end, the most pertinent implications for integrating mixed reality simulation platforms in ITE relate to the extent to which it supports practice and reflections on practice.

For practice within SIMLab™ to inform PSTs' learning, a degree of verisimilitude is required. Given that anthropomorphized avatars are better able to establish social presence (Blascovich, Loomis, Beall, Swinth, Hoyt & Bailenson (2002), the "human-in-the-loop" functionality affords anthropomorphizing of avatars through human interactors, who control the avatars, ensuring that the dialogue is consistent with real-world interactions and portraying human-like traits. However, more in-depth studies on the nature of verisimilitude that facilitates PSTs' immersion in practice needs to be examined. Beyond interactional verisimilitude, other contextual aspects which usually inform parent-teacher conference sessions need to be considered as these help enhance the authenticity of the simulation experience. For example, some PSTs suggested that more details on the scenario such as time of the year, the child's grades and background information on child and family would help them prepare for the simulation experience in the same way that teachers prepare for their meetings with parents. Ultimately, the aim is to delineate clearly the configurations of virtual and real elements that would support effective enactment of and engagement in practice.

Rodgers (2002) distilled four criteria characterising John Dewey's concept of reflection that can inform the use of the SIMLab™ as a means to support reflections on practice. The SIMLab™ experience aligns with these four criteria to varying degrees. First, PSTs were engaged in a meaning-making process about their actions and reactions (which over time become habitual practices) in parent-teacher interactions. More scaffolding in the reflection process is needed to guide PSTs towards using this greater awareness as a first step towards understanding their own motivations and how these are shaped by prior experiences and their own ideas or

expectations about parent–teacher interactions. Second, PSTs were provided with models they could use to engage in reflection systematically. There is, nevertheless, room for more rigorous engagement in reflection as the quality of the reflections across the cohort varied. Third, PSTs’ reflections were supported by their interactions with a more knowledgeable other. On top of that, opportunities to discuss their reflections with other PSTs could help PSTs view their experience through a different lens. Finally, PSTs acknowledged the professional growth they experienced from the SIMLab™ experience. A broadening of PSTs’ reflection focus would facilitate considerations of personal and intellectual growth.

The current pilot study and its findings have shed light on PSTs’ initial perspectives on their experience of using a mixed reality simulation platform and have highlighted important considerations in terms of how such platforms can be effectively integrated in the learning process to support practice and reflections on practice. Planned analyses in future will focus on the discourse of PSTs to provide insights into how the strategies that PSTs talk about are enacted in-situ.

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Please cite as: Rappa, N. (2019). Understanding pre-service teachers' experiences of a mixed reality simulation environment: An analysis of pre-service teachers’ perspectives on communicating with a simulated parent avatar. In Y. W. Chew, K. M. Chan, and A. Alphonso (Eds.), *Personalised Learning. Diverse Goals. One Heart. ASCILITE 2019 Singapore* (pp. 531-535).