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"Let's try this again"
Exploring the Potential of Virtual Reality in Providing Effective Practice Cycles

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Aller au sommaire du numéro

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Résumé de l'article

The demanding initiation into the teaching profession contributes significantly to attrition rates among teachers. Virtual reality (VR), a tool proven to be effective in other professions, offers a controlled and safe environment for developing teaching expertise, potentially mitigating attrition. The Teaching English as a Second Language (TESL) program and the Lab for Innovation in Teaching and Learning (LITL) at Concordia University have created a proof-of-concept Minimal Viable Product (MVP) VR tool for teacher education, piloting it with student teachers from diverse programs and partner universities. The MVP immerses participants in a post-observation meeting scenario that is typically loaded with interpersonal and emotional challenges. Initial testing indicated VR's potential to evoke the emotional and cognitive engagement necessary for effective deliberate practice cycles. We present our journey so far and highlight the design dilemmas and challenges. The overarching goal of our project is to foster innovation in teacher education while establishing a network of professionals motivated to reduce attrition rates by facilitating teacher training and better equipping student teachers for their initiation in the profession.

“Let’s try this again”

Exploring the Potential of Virtual Reality in Providing Effective Practice Cycles

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The demanding initiation into the teaching profession contributes significantly to attrition rates among teachers. Virtual reality (VR), a tool proven to be effective in other professions, offers a controlled and safe environment for developing teaching expertise, potentially mitigating attrition. The Teaching English as a Second Language (TESL) program and the Lab for Innovation in Teaching and Learning (LITL) at Concordia University have created a proof-of-concept Minimal Viable Product (MVP) VR tool for teacher education, piloting it with student teachers from diverse programs and partner universities. The MVP immerses participants in a post-observation meeting scenario that is typically loaded with interpersonal and emotional challenges. Initial testing indicated VR’s potential to evoke the emotional and cognitive engagement necessary for effective deliberate practice cycles. We present our journey so far and highlight the design dilemmas and challenges. The overarching goal of our project is to foster innovation in teacher education while establishing a network of professionals motivated to reduce attrition rates by facilitating teacher training and better equipping student teachers for their initiation in the profession.

The "sink or swim" induction process into the teaching profession may account for the elevated attrition rates in the early stages of teachers' careers (Kutsyuruba et al., 2014). Although "learning by immersion" may be unavoidable (Tomlinson, 1999, p. 409), these alarming attrition rates may be reduced by increasing job satisfaction in those critical initial years. Given that one of the factors affecting job satisfaction is teaching expertise (Kelly & Northrop, 2015), most teacher education programs offer practical experience in real classrooms within their unidirectional theory-into-practice framework (Russell & Dillon, 2012). However, teacher expertise does not result from mere accumulation practice, but from the time spent in activities intentionally designed to enhance performance (Boot & Ericsson, 2013). The complexities of a real classroom, compounded with the added elements of performance evaluation, are not conducive to effective deliberate practice. Instead, low-stake learning environments are required to retrieve personal cause-effect theories, problematize them, as well as develop and test alternatives. Given that deliberate practice hinges on four essential elements–well-defined goals, immediate feedback in response to the practice, reflection on both feedback and practice to inform subsequent deliberate practice efforts, and the repetition of cycles of deliberate practice over time (Grant, 2022)–they are very difficult, if not unrealistic, to imagine happening in real classrooms.

Considering that deliberate practice plays a pivotal role in the emergence of teaching expertise, increasing job satisfaction and consequently decreasing attrition rates, it is imperative for teacher education programs to establish learning environments that foster the presence of deliberate practice. Virtual Reality (VR) has emerged as a promising solution for ensuring the presence of deliberate practice cycles in teacher education programs. VR technology has been shown to be an effective tool for job-related skill training in other professions (See Bonnin et al. 2023 for clinical education). VR technology offers an environment that bridges the gap between real-world scenarios and a secure, controlled setting that resembles real-world challenges (Xie et al., 2021) and has shown potential in offering student teachers a low-stakes learning environment in which to develop their teaching expertise (Stavroulia & Lanitis, 2017).

Based on deliberate practice theory (Ericsson, 2008) and the premises of the reflective practitioner (Adler, 1991 ; Schön, 2017), the TESL program and the Lab for Innovation in Teaching and Learning (LITL) at Concordia University embarked on an ambitious project to develop a series of VR scenarios to help student teachers engage in deliberate practice. In this article, we share some of our journey and highlight some of the challenges and lessons learned as we continue to strive to empower student teachers and combat attrition in the profession.

1. The process of building a VR Minimal Viable Product and proof-of-concept.

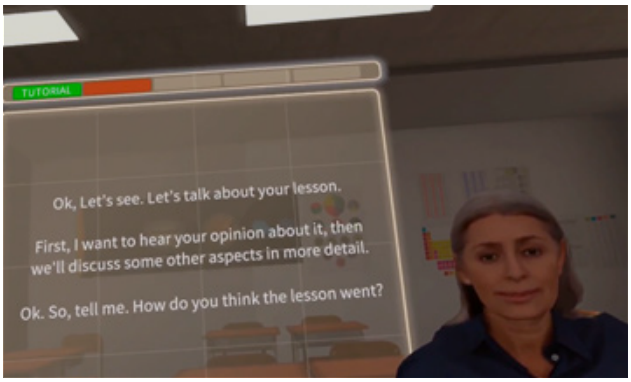
The inspiration for creating immersive experiences in teacher education originates from observing pilots, doctors, and other professionals using simulators to develop skills without compromising the safety of those involved. Leveraging the promise of VR to build simulators for safe and controlled deliberate practice environments, we approached the Lab for Innovation in Teaching and Learning at Concordia University and their positive reaction led to gathering a team, articulating our goals and outcomes, and hiring a production partner (KnowledgeOne).

The expected outcome was to create an immersive experience, enabling the recall of past experiences that are part of deliberate practice cycles (Beauchamp, 2015). While the realism of visual outputs in VR experiences does not automatically ensure immersion, VR seems to facilitate a spatial reference for the recall of past events (Fernandez-Alvarez et al., 2021). Additionally, immersion is facilitated by shutting out cues from the physical world to lose oneself in the digital environment (Witmer & Singer, 1998), fostering mental and emotional engagement (Fox et al., 2009). In addition, the immersivity of VR leads to experiencing an event with one's own eyes, thus forcing the recall of an experience from a first-person perspective. Compared to other media, exposure to realistic and personally significant VR scenarios enhances the intensity of elicited emotions, thereby elevating the quality of recalled memories (Colombo et al., 2021).

We designed a Minimally Viable Product (MVP)—a rudimentary preliminary, yet functional version that includes only essential elements while foregoing embellishments–and we did so with a deliberate iterative approach. The VR scenario selected for the MVP was a post-observation meeting, in which a student teacher receives positive and corrective feedback from a supervisor after having been observed teaching. University supervisors evaluate the performance of the student teacher according to set of descriptors presented in the evaluation form, as well as provide support by offering ideas or fostering self-reflection towards ways of improving performance. We chose this as our initial scenario, as it was relatively easier to develop in VR, allowing us to rapidly test its viability while soliciting crucial feedback from stakeholders. In addition, the post-observation meeting represents a pivotal and stressful moment in the student–teacher's learning journey. During this encounter, student teachers are tasked not only with

demonstrating an understanding of teaching techniques but also their ability to engage in self-reflection, making the post-observation meeting an extremely challenging situation, which must be navigated with a considerable amount of tact and interpersonal skills (Copland & Donaghue, 2019). For a successful outcome, the student teacher must receive feedback while engaging with it while having an open and positive attitude (Copland 2010). Unfortunately, promising student teachers often struggle to navigate the complexities of the social and emotional demands of this encounter. The fact that it is a scenario relatively easy to develop in VR, coupled with the stress-inducive and challenging nature of the encounter it depicts, made it ideal choice for our proof-of concept VR scenario.

In the MVP scenario, the user is the student teacher, and they engage in conversation with the virtual supervisor avatar, prompting the student teacher to self-evaluate their teaching. They engage in an exchange with four conversational turns. The supervisor poses a question, the student teacher then has three options to choose from and must select the most appropriate response. The two answers presented are less-than-ideal options, although they are not entirely incorrect. The three possible answers were constructed using knowledge in the field of receiving feedback in post-observation meetings (see Match Education, 2020[3]). Upon selecting a response, the user receives positive or corrective feedback. If the selection contains a less-than-ideal response, the user is invited to try again. Upon successful completion of the experience, the participants could opt to repeat the experience or exit.



The MVP underwent continuous testing with end-users, in this case student teachers, through rapid development and testing feedback loops, shaping the subsequent development steps. Since personally significant VR scenarios enhance the intensity of elicited emotions and elevate the quality of recalled memories (Colombo et al., 2021), we primarily included student teachers who had already had an internship and their own post-observation meetings in our playtesting sessions.

After feedback from some early play-testing sessions, we drastically simplified our initial approach. The original concept comprised a dynamic, interactive, and responsive branching system, a "choose your own adventure" framework, which is incompatible with the swift turnaround required for proof-of-concept testing. Another playtesting-informed modification was the addition of gamification elements, such as a visual progression bar, showing the user's evolution through the four stages of the conversation and a visual endpoint. This progression bar gives the user a clear sense of where they are in the experience, how they did, and how much they have to go. This was a very useful addition, giving the user a sense of control, which in turn increased their engagement with the tool.

Throughout our project, a persistent challenge was to find a delicate equilibrium between offering a controlled practice environment and avoiding a behavioristic framework of practice. Should the learning path be meticulously controlled by the designer, or should users be granted the agency to shape their own experience through personal and meaningful choices ? This balance is critical in offering a guided learning journey but also in fostering a sense of ownership and autonomy in the experience. We continue to address this dilemma.

En bref

L'entrée initiale dans la profession enseignante contribue significativement aux taux d'abandon auxquels est confrontée la profession enseignante. La réalité virtuelle (RV), un outil jugé comme efficace dans d'autres professions, offre un environnement contrôlé et sécurisé pour le développement d'une expertise en pédagogie. Cette approche aurait des effets positifs sur les taux d'abandon. Le programme Teaching English as a Second Language (TESL) et le Laboratoire d'Innovation en Enseignement et Apprentissage (LITL) de l'Université Concordia ont créé un prototype minimal viable (PMV), basé sur la réalité virtuelle pour le développement professionnel des enseignants, tout en le pilotant avec des étudiants-enseignants de divers programmes et d'universités partenaires. Le PMV immerge les participants dans un scénario d'une réunion tenue à la suite d'observations orientées vers les défis interpersonnels et émotionnels. Les premières données ont indiqué le potentiel de la réalité virtuelle à encourager un engagement émotionnel et cognitif nécessaire pour une pratique efficace. Nous présentons notre parcours jusqu'à présent et mettons en évidence les dilemmes et les défis de conception du projet. L'objectif principal de notre projet est de favoriser l'innovation dans la formation des enseignants tout en mettant sur pied un réseau de professionnels motivés à réduire les taux d'abandon, en facilitant la formation des enseignants et en outillant les étudiants enseignants pour leur entrée dans la profession.

Along with our goal of fostering deliberate practice, reflection is also a crucial component (Grant, 2022). We initially chose to record the participants' VR experiences for subsequent visualization and analysis by the participants. Nevertheless, our iterative process revealed that this approach did not optimize time effectively when compared to an in-group reflective discussion. We found that engaging in discussions with other participants was more beneficial than individually reviewing one's own process. Looking ahead, we hope to explore the potential benefits of adopting a third-person perspective when observing one's progression through VR experience in future iterations.

As we continued to develop our MVP, we also established a straightforward protocol for playtesting and data collection. The protocol included a tutorial with technical information for a more seamless onboarding process. Afterwards, the participants (all 2nd or 3rd year student teachers) engaged in a warm-up activity consisting of sharing thoughts and emotions from previous post-observation meetings. Participants then responded to a questionnaire assessing their sense of self-efficacy with regards to this type of encounter. They then put on the headsets for the VR experience. Afterwards, participants were guided in a group discussion, exploring both the most appropriate and less-than-ideal answers to the supervisor avatar's questions. Data collection was completed with a second questionnaire re-assessing the participants' sense of self-efficacy and asking for their reflections on the VR experience.

2. Piloting results

As part of the evaluation process of our proof-of-concept MVP, we collected several pieces of information. On the one hand, we collected quantitative data from two questionnaires, pre- and post-experience. We also collected metrics on the individual paths through the VRexperience, with selected choices and timestamped actions. Although we acknowledge the possibility of a novelty effect or excitement surrounding VR teacher training, the anecdotal feedback collected during the piloting of the MVP shows great potential. Our focus on reflective discussion raised questions about whether similar outcomes could be achieved with regular 2D video. However, the feedback gathered alluded to the superior effectiveness of VR in honing job skills (e.g. ability to take constructive feedback, ability to reflect on one's practice, etc.). Some participants even reported attempting to interact with the VR environment by placing objects on a virtual table. This kind of immersion indicates the creation of memories tied to physicality and emotions, fostering deeper learning that other media may not achieve. These preliminary conclusions are in line with research conducted in other areas of knowledge (e.g., Bonnin et al., 2023 ; Concannon et al., 2019).

3. Where to go from here

Encouraged by the positive feedback received thus far, we are considering expanding the scope of this study. Some of the original options were temporarily shelved. One option involves dynamic questioning using AI. The ability to dynamically generate questions based on individual learners' needs and responses is a promising avenue for personalized learning experiences. Similarly, the notion of incorporating natural language processing and spoken answers has been set aside for the time being. This approach holds great promise in enhancing accessibility and engagement. While these options are currently in use, we remain attentive to advancements in AI, natural language processing,

and related fields. As these technologies mature and become more seamlessly integrated into educational contexts, they may be revisited.

In the next phase of our project, we implement a co-creation and cross-disciplinary approach. The focus extends beyond mere cost considerations to a holistic evaluation of value and expected results, ensuring that investment in the process aligns with overarching pedagogical aims. We have expanded our research and co-creation team and enlisted newly graduated teachers, seasoned teachers, documentarians, narrative storytelling experts, qualitative interview specialists, and student co-researchers. Their unique skills will contribute to the depth and richness of our outcomes, capturing much-needed nuanced aspects of effective deliberate practice cycles leading to teacher expertise.

Conclusion

Investing in teacher education is paramount, especially when considering the transformative potential of new technologies. However, effective integration of these technologies necessitates thoughtful investment and strategic planning to ensure optimal outcomes. In the pursuit of effective teaching using new technologies, there are inherent challenges related to design. The evolving landscape of teacher education demands strategic investment, a forward-looking approach to technology, and commitment to innovation through collaborative efforts within the research process.

[1] https://www.matchminis.org/videos/for-coaches/57/reducing-fixed-mindset-behaviors/

5 – 5

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