Immersive Education in Practice: Pedagogical Considerations for Designing Deep and Meaningful Immersive Learning Experiences

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Abstract. Modern teaching and training practices can be enhanced by engaging students in immersive experiences that are multi-sensory, interactive, and authentic. When augmented with social-emotional elements, these immersive experiences can facilitate deep meaningful learning (DML). Our panel will present three distinct case studies of DML in practice: 1) fostering historical thinking in undergraduate students through narrative immersion and game-based learning (GBL); 2) training adolescents' attention through virtual reality (VR) meditation and mindfulness activities; 3) building clinical reasoning capabilities in new graduate nurses through VR training scenarios. Each presenter will share practical insights and empirical evidence from their research on integrating immersive technologies and immersive storytelling to facilitate DML, highlighting the impact on learning outcomes and engagement. The case studies examine the role of VR and GBL in supporting reflective practice, critical thinking, and the development of interpersonal and intrapersonal skills among students and professionals. The panel aims to provide effective pedagogical strategies for designing immersive learning experiences, balancing the needs of diverse learners with technical capabilities, within authentic educational settings such as academic institutions and healthcare training environments.

Keywords: Immersive Learning, Game-Based Learning, Deep Learning, Meaningful Learning, Training Attention, Mindfulness, Clinical Reasoning.

1   Introduction and Relevance

Deep meaningful learning (DML) embodies a pedagogical approach that combines higher-order thinking skills with active engagement and reflection to facilitate meaning-making and knowledge construction. According to Mystakidis [1], DML can be defined as "inquiry, critical thinking, creative thinking, problem-solving, and metacognitive skills," which are essential for achieving "excellence in teaching and learning at all levels of education" (p. 988). DML is distinguished by the purposeful application of knowledge through authentic and meaningful tasks. When DML is integrated with immersive education, it can effectively foster the development of skills, attitudes, and competencies that are transferable across various contexts. Our panel will share findings and recommendations from three applied case studies of DML:

1) Fostering historical thinking in undergraduate students through narrative immersion and GBL.
2) Training adolescents' attention through virtual reality (VR) meditation and mindfulness activities.
3) Building clinical reasoning capabilities in new graduate nurses through VR training scenarios.

Each case study aims to support personal or professional growth within the disciplines of history education for preservice teachers, mindfulness training for adolescents, and continuing professional development for new graduate nurses. Through the applied case studies, we provide the iLRN community with tangible examples of immersive training and teaching methods that are authentically connected to content-specific learning outcomes. Additionally, the panel aims to provoke discussion about innovative and effective strategies for fostering DML and skill acquisition within immersive learning environments.

2   Case Studies

2.1   Fostering Historical Thinking in Undergraduate Students Through Narrative Immersion

Markowitz et al. [2] stated, "Mediated experiences, particularly involving games … allow people to dynamically learn through 'doing and being' rather than [merely] perceiving information in a lecture format." This form of learning allows for a type of psychological engagement that builds an attachment to the content not afforded in passive learning environments. Scholars including [2,3] advocate for using immersive learning experiences, especially exploring their potential to contribute to DML in areas such as the arts and humanities. GBL offers an evidence-based learning experience that can be applied in both classrooms and professional settings, affording diverse groups of participants unique DML opportunities [1,4].

   In this case study, the game *Homesteaders,* designed by Dr. Benjamin Hoy, challenges players to think like early Canadian settlers of various backgrounds and ethnicities while being immersed in the experience of living during early European settlement in Canada (Fig. 2). Eighty pre-service teachers played the game in two education courses at the University of Saskatchewan (data collection is ongoing with five additional classes playing the game to enhance reliability of findings). The data gathered through observations, field notes, and surveys showed that GBL and narrative immersion are valuable tools for teaching historical content and supporting deeper, more meaningful perspectives on humanity in challenging times throughout history.

Fig. 1. Homesteaders: **Lead Designer**: B. Hoy; **Character Design:** J. L. Sass and B. Hoy; **Research Assistants**: K. Leggo-Henderson and C. Woloschuk; **Educational Design and Development**: J. Jaunzems Fernuk, P. MacDowell, and J. Clifford.

Homesteaders is a game that helps the player embody the human experience of settlement in Saskatchewan in the early 1900s. It is eventful, interactive, and informative, and it encourages deep reflection, decision-making, and empathy that can be vital to survival in the game. The pre-service teachers who played the game describe it as an eye-opening experience that is not matched by lecture alone. The game is immersive, exciting, and provides an *experiencing of history* that facilitates DML [1].

   Key themes from an analysis of data collected (qualitative and quantitative) revolve around critical acts of decision-making and how difficult settling and farming could be in Western Canada, particularly for Indigenous peoples or minority families in the early twentieth century. Other themes highlighted an awakening experience for students in understanding their privilege. A significant 94% of students who completed survey data (n = 70) felt the game gave them a deeper understanding of the impact of the human experience of settlement in Saskatchewan in the early 1900s; 92% described the game as authentic; 89% were engaged throughout; and 85% felt it was more impactful than a traditional lecture. The game developed and used critical thinking skills and taught much about the difficulties, inequalities, and hardships faced by families on the prairies. One pre-service teacher described the immersive narrative experience as follows:

   I think games like these are a vital tool to support lectures. It brings a level of interactivity that class discussions cannot match. It also effectively engages students with sensitive topics that they may feel too shy to engage in during class discussions. This is done by forcing everybody to live in the shoes of the advantaged and disadvantaged as characters in a game. Therefore, personal thoughts on the past are experienced through the game design.

One of the most pressing educational challenges is humanizing history [5]. When studying the teaching of history through human-centered or environmental education, Markowitz et al. [2] suggest that the inability to witness environmental changes and challenges firsthand contributes to uncertainty and indecision toward present-day applications of knowledge and action. This dissonance is known as psychological distance, where individuals perceive issues as remote or unrelated to their actions, and it can be a barrier to improving knowledge and changing attitudes toward action. Offering students immersive historical experiences can help bridge this gap. For example, games about climate change can provide DML experiences, allowing individuals to learn through doing and being rather than through passive information consumption. Experiential teaching methods can evoke an emotional response, facilitating DML experiences that are more impactful than mere exposure to the information.

It was evident from the pre-service teacher's reflections (during early rounds of gameplay in the Fall of 2023) that history can be effectively taught and learned using gameplay. *Homesteaders* had a high level of engagement and encouraged students to work together, develop empathy, and solve problems based on real-life circumstances. As one player reflected: "Settlement was a complex historical process populated by equally complex historical actors and events." The choices people had to make about survival in the past versus the "live your best life" scenarios most Canadians experience today helped the students who played this game gain an intimate knowledge of hardship and hope, in addition to historical knowledge. The pre-service teachers communicated an overwhelmingly emotional and engaging experience of playing the game, and many said that they would likely use games like *Homesteaders* to teach – not just history – but life lessons that people might find difficult to connect to without the experience GBL offers. *Homesteaders* offered a transformative experience for the learners, based on a narrative game that both teaches and immerses players in the *experiencing of history*.

2.2   Training Adolescents' Attention and Focus Through VR Meditation

During adolescence, many children and youth become more aware of the circumstances fighting against them, such as broken homes, discrimination, and poverty, making life more daunting [6]. After the COVID-19 pandemic, educators saw an increase in mental health disorders such as anxiety and depression, which have hindered adolescents' success across various life domains by impacting their neurocognitive skills, particularly their concentration and attention span [7]. Meditation, recognized for fostering mindfulness, has shown promise for increasing focus in adolescents [8]. Concurrently, VR has emerged as an influential educational tool that can engage students in DML experiences [9, 10]. However, the impact of VR meditation on training attention of adolescents remains underexplored in the research literature.

This study was designed to evaluate the effectiveness of VR meditation in supporting mental health awareness and improving focus among adolescents, within the context of today's fast-paced classrooms. Through a qualitative approach, the research seeks to understand adolescents' experiences with VR meditation and its impact on their ability to focus attention. The study engaged 11 participants aged 13 to 17 from Humboldt, Saskatchewan, Canada, in five VR meditation sessions using the Maloka VR application via the Meta Quest 2 headset. The data collection methods included concentration activities, pre-post surveys, and in-depth interviews to capture the adolescents' feedback and experiences with VR meditation. Maloka VR stands out due to its affordability, youth-oriented design, and engaging environment where the participants can escape reality to their private island and use immersive mandalas to help free them from distractions; these design features support DML [1] (Fig. 2).

Initial findings indicate that VR meditation offers unique benefits in fostering mental health awareness and combating the declining attention spans amongst adolescents. The results, set to be presented during our iLRN 2024 panel, will report rich and thick descriptions of:

- Adolescents' feedback and experiences with VR meditation.
- The impact of VR meditation practices on the attention spans of adolescents.
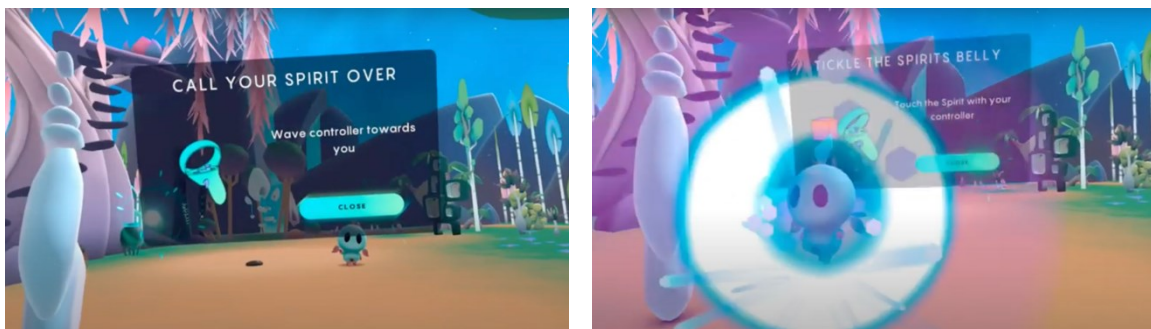

Fig. 2. Meditation activities in Maloka VR: "Call your spirit over" and "Tickle the spirit's belly."

2.3 Building Clinical Reasoning in New Graduate Nurses through VR Training Scenarios

New graduate nurses (NGNs) face a challenging nursing environment, including learning gaps due to the COVID-19 pandemic, increasingly complex patient care needs, and high rates of attrition [11]. NGNs require sound knowledge, skills, and clinical reasoning to provide safe, high-quality care. Clinical reasoning improves nursing quality by fostering confidence, autonomy, readiness for practice, and minimizing patient safety events [12]. Clinical reasoning is a complex and iterative cognitive process whereby nurses apply knowledge and experience to a clinical situation [13]. During clinical reasoning, nurses will collate discipline-specific knowledge and patient data, analyze the importance of this data, and prioritize interventions. Clinical reasoning includes the metacognitive process where the nurse reflects on their thinking process [12]. The development of NGNs metacognitive skills and reflective practice requires high-quality DML experiences (e.g., beyond surface approaches to learning) [1].

Immersive VR is an innovative technology being used for teaching clinical reasoning to undergraduate nursing students [14]. The adoption of VR in nursing education offers several advantages, including cost reduction, minimal spatial and equipment requirements, and increased flexibility for nurses to independently access and repeat training scenarios [15, 16]. While the impact of VR training to support clinical reasoning has been studied with nursing students [17], there remains a research gap in understanding whether VR is effective to support NGN's clinical reasoning in continuing professional development settings.

To address this research gap, qualitative and quantitative data are currently being collected from 20 NGNs, selected through convenience sampling. The study aims to examine NGNs experiences with a VR training scenario for continuing professional development and assess VR's effectiveness in developing their clinical reasoning. Conducted at the Queen Elizabeth II Health Sciences Center in Halifax, Nova Scotia, Canada, this research utilizes the Edify VR platform and HP Reverb headset to simulate a clinical environment. In the VR training scenario, NGSs interact with a virtual patient to gather information and develop a plan of care. The VR training scenario provides prompts and questions to support the NGNs' clinical reasoning, with opportunities for users to pause the patient interaction to review background knowledge before resuming. Data collection occurs at the pre-test, immediate post-test, and distant post-test phases using surveys and qualitative interviews. The findings from this study will be presented during the panel, including the following:

- NGNs feedback and user experience with the VR training scenario.
- The level of cybersickness reported by NGNs during the VR training scenario.
- The impact of the VR training scenario on the development of clinical reasoning in NGNs.
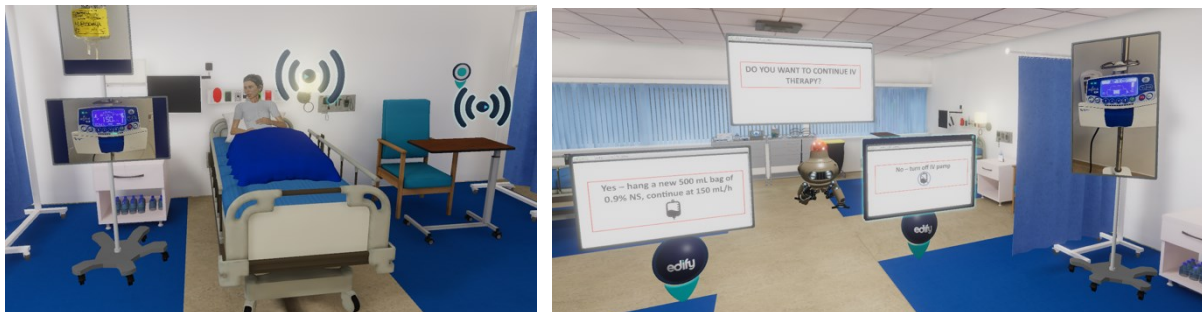

Fig. 3. Clinical Reasoning VR training scenario built using Edify VR platform. NGNs interact with the patient to gather data and use this information to make clinical decisions.

3 Panel Contribution

The panel will offer lessons learned from implementing immersive learning experiences for students and professionals in VR-enhanced or GBL environments. Each case study aligns with the iLRN 2024 theme *Tech4Good*, highlighting the ethical and responsible use of immersive learning to improve the quality of educational and training standards. We aim to ignite dialogue around the opportunities and challenges of utilizing immersive technologies and immersive storytelling to support DML. Key discussion questions include:

1. How can immersive education support DML within various educational and professional settings?
2. What are the benefits and limitations of immersive technologies in facilitating the development of essential human skills (e.g., interpersonal and intrapersonal competencies)?
3. What are potential avenues for extending our case study findings into broader immersive teaching and training frameworks, thereby supporting DML experiences for students and professionals?

Based on the insights from the three described case studies and the broader literature on immersive learning experiences, GBL, and DML, recommendations will be made for discussion. Keeping in mind the sample size makes no claim of generalizability from our findings, the results suggest key learning affordances highlighting the potential of immersive experiences in three categories: 1) continued integration of experiential learning for topics that are challenging to teach, while evaluating their potential; 2) continued exploration of immersive learning environments to address well-being; 3) continuing professional development, including reflective practice around the integration of immersive experiences for DML.

These recommendations include suggestions for integrating GBL and VR into various disciplines to enhance student engagement and foster authentic learning opportunities. The panel will also discuss future directions for research and practice in the field of GBL and VR, exploring the use of emerging technologies, refining pedagogical approaches, and the importance of fostering collaborations between educators, researchers, and game developers to advance the field.

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