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Literature Review

Seeing the Past or Reasoning About It? Virtual Reality in History Education

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ABSTRACT

History teaching has been through long-standing criticisms of forcing students to memorize facts and dates, and history's associations as a set body of knowledge that is not useful or relevant. History teaching that is informed by historical thinking has been established by educational research that supports the approach of learning history as making historical judgments from historical evidence, context, and perspective. The compelling qualities of VR technologies are seen as promising educational affordances for history education. This study investigates the potential of VR for use in history education by examining it through a historical thinking lens. This qualitative, conceptual, analytical investigation, based on a literature-based inquiry rather than empirical data collection, provides an overview of the existing literature on historical thinking and the current state of the art in VR-based research in history education. The results describe how VR might be well-suited to historical thinking as an interdisciplinary practice and identify possible affordances in terms of contextualization, historical empathy, historical causation, and evidence-based inquiry. Idealizing is followed by unavoidable risk associated with three things: simplistic reconstitutions of the past, uncritical acceptance of virtual reconstitutions of the past, and novelty overtaking the rigor of a historical investigation. Situated in a history of theories of teaching and learning, we argue that engaging VR can be regarded as an affordance for a disciplined form of historical thinking.

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1. INTRODUCTION

The history teaching problem has been balancing the memorization of history with learning history. For more than 100 years, critics have lamented that students view history as nothing more than a boring, unchanging list of names and dates to be memorized (Cox, 2018). One pervasive method was for the teacher to give a long lecture with grimly uninteresting slides, to read from a single textbook, or to use these techniques together. History also comes to be seen as memorizing endless lists of dates (Wesley, 1916), and is removed from personal relevance, leading to a lack of emotional and intellectual engagement for students in the classroom.

Wineburg (2001) has said that "historical thinking" is "unnatural" and that history teaching is about achieving "disciplinary reasoning" in such areas as using evidence and developing interpretations, not

gaining content knowledge. Wineburg adds that other skills include employing "historical empathy" to understand how others may have thought and felt in their own culture.

Virtual reality can be used to recreate the past for educational purposes in every subject (Kanvaria & Yadav, 2024). It allows the user to experience the immersion required to believe they are present in the past, experience a 3D historical environment optimized for a more engaging experience than a textbook (Schott & Marshall, 2018). This "embodied learning" means students can do and move within a virtual space (Bonsu et al., 2025). In addition, by situating students in a historical context, VR spaces have the potential to turn "inert" facts, or information that is forgotten, into knowledge that can be manipulated to solve historical problems in real time.

However, the existing literature on the use of VR in history education is fraught with limitations. A systematic literature search found that most of the research that has been conducted has focused on the students' attitudes towards VR technology, rather than the effects of using VR as a learning tool for academic learning or disciplinary reasoning (Villena-Taranilla & Diago, 2025). There is more focus on the "wow factor" and remembering first-order facts than on the development of higher-order historical thinking skills.

This study investigates how virtual reality (VR) supports the development of historical thinking in history education, while also critically examining the limitations and pedagogical risks associated with its use. This paper intends to explore the potential of virtual reality as a technology for easing certain domains of historical thinking in history education. To this end, we provide a conceptual analytical review of the literature on how far the technology is able to support historical thinking, where its limitations may lie, and what pedagogical risks it holds. In doing so, the paper will contribute a conceptually anchored perspective on the use of engaging technologies in the field of history education. To systematically address these aims, this paper is guided by the following research questions:

RQ1: How does virtual reality (VR) support the development of historical thinking in history education?

RQ2: What limitations and pedagogical risks are associated with the use of virtual reality (VR) in history education?

2. METHOD

2.1. Research design

This study adopts a qualitative, conceptual, and analytical research design, grounded in a literature-based qualitative inquiry. According to Creswell and Poth (2006), qualitative research is appropriate when the aim is to develop an in-depth understanding of a phenomenon through the interpretation of meanings, concepts, and patterns rather than through measurement or experimentation. Conceptual analytical approach aims to examine, interpret, and synthesize existing knowledge to generate new insights. In the present study, the phenomenon under examination is the pedagogical use of virtual reality (VR) in history teaching, with specific attention to its relationship with historical thinking.

In conceptual analytical research, a systematic literature review is the main source of research data. Literature is not a mere backdrop but is actively analysed, compared, and synthesized in light of the research problem at hand (Torraco, 2005). Because of the relative early stage of these education technologies and the fragmented state of research, this study seeks to provide a structured understanding of the potential and limitations of VR for history teaching and learning by highlighting its relevant aspects.

2.2. Literature search strategy

To identify the literature included in this study, a focused and iterative search was performed on Google Scholar, ERIC, ResearchGate, and other databases selected to broadly index interdisciplinary literature within the fields of education, educational technology, and social sciences. Search terms included variations of "virtual reality in education", "VR in history education", "historical thinking", "immersive learning", and other relevant terms, while Boolean operators were employed for narrowing or broadening the search results as needed.

To be thorough, the search strategy used systematic and flexible approaches to capture both seminal works as well as some of the newest research available. Following the guidelines of Torraco (2005), backward and forward search strategies were employed to identify key studies that may have been missed in the keyword searches. The iterative approach allowed for the inclusion of both theoretical texts and contemporary empirical and conceptual work, ensuring the resulting literature base was both thorough and relevant.

2.3. Literature selection criteria

The literature was identified according to specific inclusion and exclusion criteria that ensure its relevance and conceptual rigor. The criteria consisted of peer-reviewed journal articles, chapters in peer-reviewed academic books, and key theoretical articles that addressed either (a) the concept of historical

thinking or (b) the use of virtual reality and immersive technologies in educational contexts. Particular emphasis was placed on studies that engaged with higher-order cognitive processes, disciplinary reasoning, or pedagogical implications, rather than merely reporting technological features.

However, if the literature focused on a part of VR of a technical or engineering nature without any relationship to its application in education, or simply reported a VR technology without any pedagogical considerations, it was excluded from the review. The time limitation was applied to select articles published from 2000 to 2024. Some pioneering articles on historical thinking were included to provide a solid relevant foundation. This process ensures transparency and ensures that the literature considered contributes to achieve the objective of the analysis within this study (Torraco, 2005). Based on these inclusions and exclusions, a total of 26 studies were included in this review.

2.4. Literature screening process

The literature was then screened initially for title and abstract for adherence with research questions and proximity to the study topic. This was followed by a full text review stage for articles that passed title/abstract screening, to identify the conceptual contribution of the article and its relevance to the study objectives. To ensure systematic refinement of the literature, a multi-stage literature screening process was implemented.

Following the application of inclusion and exclusion criteria, the search and screening process resulted in a final corpus of 26 studies, which were subjected to detailed conceptual analysis. From this corpus, a subset of 17 studies was drawn upon more extensively in the Results and Discussion section, as these studies directly engaged with the relationship between virtual reality and key dimensions of historical thinking. This approach is consistent with conceptual analytical research, where not all selected literature is discussed with equal depth.

2.5. Analytical approach

The selected literature was analysed using a conceptual analysis approach, focusing on the identification and interpretation of key ideas, relationships, and patterns across studies. Conceptual analysis goes beyond descriptive summarization to examine how different studies construct, relate, and problematize core concepts. This is particularly important when dealing with complex constructs such as historical thinking, which involve multiple interrelated dimensions.

The analytical process involved iterative reading, comparison, and interpretation of selected texts to identify patterns and conceptual linkages. Studies were examined relationally rather than in isolation, allowing for a deeper understanding of convergences and divergences within the literature. This approach is grounded in the principle that theoretical development relies on logical coherence and conceptual reasoning (Whetten, 1989).

2.6. Synthesis strategy

Following the analysis, a conceptual synthesis strategy was employed to integrate insights across the literature. Synthesis involved combining findings from multiple studies to construct a unified understanding of how VR supports or constrains historical thinking. This process resulted in a conceptually grounded interpretation of VR's pedagogical role in history education. The conceptual synthesis was used to move from fragmented findings toward a more coherent framework that highlights both the affordances and limitations of VR (Torraco, 2005).

3. RESULTS AND DISCUSSION

In this section, the literature that emerges on the use of VR in history education is explored from a historical thinking perspective. The analysis presented in this section draws on a range of selected and relevant studies (N = 17) examining the use of virtual reality (VR) in history and social science education. These studies include empirical, conceptual, and review-based research conducted across diverse educational and geographical contexts, reflecting a variety of methodological approaches such as experimental, mixed-methods, and conceptual analyses. As opposed to studies with experimental findings, the purpose of this section is to reveal the conceptual commitments for engaging technologies when being integrated into the teaching of history. Collectively, this body of literature provides the basis for examining how VR relates to key dimensions of historical thinking. It identifies the key dimensions of historical thinking as historical contexts, perspectives, causes, and evidence, and explores how VR technology can support and inhibit each one.

3.1. Virtual reality and historical contextualization

Learners should be able to place past events and actors in their social, cultural, political and chronological contexts, and not to judge the past in the present anachronistically (Wineburg, 2001; Seixas et al., 2013). Rebuilding and showing the look of historical sites could also be a use of virtual reality. A virtual space can provide an engaging experience and knowledge of ancient cities, industrial workshops, colonial plantations, or other physical environments to students in terms of space and materials relevant to the actions of historical actors (Burke et al., 2020; Cecotti et al., 2024).

The epistemological question of contextualization through VR is that higher fidelity recreations are assumed to be complete or definitive accounts of the past, while in fact they are selective and interpretative reconstructions of the past. (Villena-Taranilla & Diago, 2025). Immersion can project contemporary meaning into the virtual world or, conversely, obscure historical contingencies. Without critical framing, immersion risks merely the false familiarity of unthinking acceptance over disciplined contextualization. VR is therefore contextually most appropriate when used as a representational aid, rather than a replacement for customary historical interpretation.

3.2. Virtual reality and historical empathy / perspective-taking

Historical empathy may be defined as the ability to understand the ideas, values, and motives of actors in the past in their milieu, without attempting to force the past into the mould of the present empathic experience (Wineburg, 2001). The use of VR environments may ease access to material culture, space, and everyday life, embedded in situated learning and learner situational awareness. (Barbara, 2022; Hutson, 2023).

Relevant cases also include judging past contexts according to contemporary moral standards and inferring psychological continuity across time and distance, where context-specific reasoning is more salient (Harris et al., 2025; Hicks et al., 2025). Decisions also apply to which practice will be included or excluded in the narratives presented in a VR experience, which may entail privileging dominant perspectives (Horváth et al., 2024). Thus, VR may support historical empathy when students give a critical account of the virtual environment concerning perspective, representation, and absence rather than assuming that immersion means understanding.

3.3. Virtual reality and causal reasoning

Causal analysis in history identifies the causes of historical events through the interactions among factors such as human agency and structural conditions, and unintended effects (Wineburg, 2001; Seixas et al., 2013). Although VR has the potential to visualize history as a process, prior research has shown that many VR applications for history education failed to achieve this (Serrano-Ausejo & Mozelius, 2024).

Engaging simulations may distract students from socio-economic, political or social structures shaping history, as individual actors and events become the focus of attention (Bonsu et al., 2025; Mulders et al., 2025). Fixed or linear VR narratives also limit the viewer's potential response, since the illusion of contingency and alternative possibilities breaks (Kazlauskaitė, 2022). However, immersion in VR may not mean a better sense of the underlying causality. Causal learning in VR needs the instruction to encourage learners to ask about the order of causes, to weigh multiple causes, and to consider other counterfactuals not contained in the virtual storytelling experience.

3.4. Virtual reality and the use of historical evidence

When using evidence to present an historical argument, learners need to analyze the evidence, evaluate the sources, and corroborate and contextualize knowledge (Wineburg, 2001; Seixas et al., 2013). However, in VR worlds, evidence usually connects in ways beyond the resemblance of customary primary sources (Neamtu et al., 2012; Horváth et al., 2024).

This distinction raises pedagogical issues whereby students may misinterpret VR simulations as authentic historical representations but also risk overlooking the VR model behind the simulation with all its design choices, evidential absences, and cultural assumptions (Hutson, 2023; MacDowell et al., 2024). Visual realism may support recall and recognition, but VR must be considered as an object under investigation in its own right before it can inductively or deductively establish a basis for reasoning with evidence. Students were invited to think through how the simulation was built, what data were collected, what was left out, and how the simulation's claims compared to primary and secondary sources of history (Mulders et al., 2025).

Across dimensions, VR has potential for historical learning, especially in building spatial understanding of the past and improving contextualization and engagement. The educational value of VR is dependent on coherence with the principles of historical practice. As such, VR runs the risk of producing presentism, narrative determinism, and unquestioned authority. When VR is understood not as the endpoint of experience but as an interpretive text, it can provide a productive site for inquiry and historical reasoning.

3.5. Pedagogical design principles for integrating Virtual Reality into history teaching

These analytical insights provide the basis for articulating pedagogical implications for the use of virtual reality in history teaching, which are outlined in the following section.

3.5.1. VR as a tool to support inquiry, not the final source of knowledge

When we develop virtual versions of the past, it may be useful to think of them as interpretative constructions that can be critically interrogated, rather than as ultimately objective representations. Indeed, historical thinking has been described as an "unnatural act" (Wineburg, 2001). In this space, VR can offer scaffolding to learners, bridging the conceptual distance between present-day viewpoints and historically situated worldviews of the given episode.

To prevent students viewing VR simulations as a transparent window into the past, VR experiences should be situated within an inquiry sequence: this might include foregrounding the interpretive and evidential choices within the simulation in order to encourage students to view the virtual environment as a representation of the past rather than as if it were real. Thus seen, VR can be regarded as a source for research and questioning, rather than a substitute or a rival for other fields.

3.5.2. Focusing on reliable evidence

While high visual realism can create a sense of presence for the learner, it can also support uncritical belief in the simulation as reality. Sound pedagogical design must foreground the principle of sourcing and corroboration, and prompt learners to ask who made the simulation, on what basis, and for what purpose.

Digital artifacts in VR environments, such as the reconstructed objects and rendered environments, should make clear their relationships to history and sources so as to discourage inference without evidence. It is important to note that meaningful use of VR also depends on the outcome of claims made through simulations being connected back to primary and secondary sources to add depth to the interpretation.

3.5.3. Avoiding presentism by encouraging historically grounded perspective-taking

While virtual reality is often seen as a way to create empathy, engaging first-person simulations may end up evoking present-day emotions, norms, value judgments, and attitudes towards historical actors, collapsing space, time, and social distance and moving away from disciplined perspective taking.

Thus, pedagogical design toward historical understanding, not emotional identification, can be supported by the perspective of VR because participants can analyse restrictions placed on historical actors. When immersion is not regarded as identification or an appeal to realism, VR can be helpful in discouraging presentist interpretations and promoting reasoning with historical situatedness, that is, consideration of the historical context.

3.5.4. Showing multiple causes instead of one fixed narrative

If causal reasoning of history focuses on multiple interacting and interdependent factors that shape the course of historical events, including the role of human agency as well as structure and context (Zhu et al., 2025), VR environments that depict history as linear and predetermined may lead to a deterministic perspective.

In order to avoid this bias, VR scenarios should not only depict complexity of causality in social situations and perspectives of the past, but also aim to raise problem-oriented tasks, helping students understand the interplay of political, economic and cultural circumstances over time. Contingency and alternative history, which present possible and unrealized outcomes, can provide additional evidence supporting the view that history is based on choice rather than inevitability.

3.5.1. Teacher guidance throughout immersive learning experiences

The effectiveness of VR in history education depends on sustained pedagogical mediation rather than on immersion alone. In addition, teachers are at a distance to what really happens during immersion due to the immersiveness, therefore pre- and post-engaging activities have to be considered.

They can set the historical context and inquiry questions before the experience and ease discussion, reflection, and source analysis afterward. This would create opportunities for students to build their historical knowledge and argumentation skills and ensure that VR learning experiences are not shallow or entail memorizing facts about the past.

4. LIMITATIONS

Conceptual analytical approach relies heavily on the researcher's judgment in selecting and interpreting studies. This can introduce bias in which studies are included and how findings are synthesized. This study does not aim to provide an exhaustive or systematic account of all available literature; it is subject to certain limitations. The selection of sources may reflect inherent biases related to database access, keyword selection, and the author's interpretive lens. In addition, the emphasis on conceptually significant studies may privilege certain conceptual positions over others. Nevertheless, efforts were made to include a diverse and representative range of studies to ensure a balanced and critical analysis.

5. CONCLUSION

Ultimately, Virtual Reality can turn history from a collection of dry facts into an interactive way to experience it, immersing the user in a particular time period, although just to immerse does not guarantee that they will understand. Students must be encouraged to view virtual worlds, along with all other information, as constructed, and the represented pedagogical role of the teacher is important to help students maintain focus on inquiry, rather than becoming distracted by the technology or the events depicted.

Because this research is limited to a conceptual analytical exploration, research into this topic in the future would be an extension of the framework laid out here, even though there are no measurements of grades or VR experiments in the classroom currently available. The information here should be viewed as examples of the potential of the VR technology, rather than definitive proofs. At some point, we will need to look not only at whether students are excited when we do this, but whether it enables them to think critically.

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The authors declare that no generative artificial intelligence (AI) tools were used in the preparation, analysis, or writing of this manuscript.

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