Virtual Reality Experience for Digital Literacy: Identifying Extremist Symbolism in Social Media

Mario Schwarz, Fahimah Ulfat and Gerrit Meixner
UniTyLab, Heilbronn, Germany

mario.schwarz@hs-heilbronn.de
fahimah.ulfat@uni-muenster.de
gerrit.meixner@hs-heilbronn.de

Abstract: This paper explores the development and usability of a hand-tracking-based Virtual Reality (VR) application designed to enhance digital literacy by teaching users to recognize extremist symbolism on social media. Given the increasing prevalence of covert extremist content online, immersive educational tools are essential to equip users with critical analytical skills. A mixed-methods usability study was conducted with 15 participants (average age 30; mostly male) evaluating general usability, immersion, engagement, interaction quality (especially related to hand-tracking) and acceptance of AI-generated voices. The VR application achieved a high usability rating (System Usability Scale score: 80.17). The perceived engagement and fun using the hand-tracking was shown to have a strong correlation with the perceived control of using the hand-tracking ($r = 0.898$, $p < 0.001$, regression analysis: $\beta = 0.424$, $R^2 = 0.806$), showcasing the need for intuitive and robust controls, as well as the importance of usability considerations. A notable finding was the unexpected negative correlation ($r = -0.76$, $p = 0.00095$, regression analysis: $p = 0.001$, $\beta = -0.68$ and -0.85, $R^2 = 0.58$) between the perceived quality of Artificial Intelligence (AI)-generated voices and motion sickness, suggesting that voice naturalness might either mitigate discomfort or that motion sickness could negatively affect voice perception. Qualitative feedback emphasized the importance of intuitive interactions, clear guidance, gesture precision and richer educational content. Additionally, users identified interaction consistency and detailed tutorial elements as important factors for a positive user experience. The study concludes that well-designed VR applications using precise hand-tracking and clear instructions contribute effectively to an engaging and otherwise well received learning experience in the educational environment. Key areas for further research include the relationship between voice quality and motion sickness or general user comfort, long-term retention of digital literacy skills, as well as comparing the learning effects of a more expansive, rich environment with traditional teaching methods.

Keywords: Virtual Reality; Digital Literacy; Hand-Tracking; User Engagement; Usability; Social Media

1. Introduction

Social media platforms play a significant role in shaping the public opinion. Unfortunately, they are also used to spread hate speech and extremist ideologies, often through subtle cues and coded symbols that may not be obvious to the average user (Yesmen, Naha and Sharmin, 2023). Extremist groups take advantage of this environment by using coded language and symbols to communicate messages covertly. For example, the number *88* is a commonly used extremist symbol and acts as a shorthand for the infamous phrase *"Heil Hitler"* (with the 8 standing for the eighth letter of the alphabet, *H*). A hidden reference that can circulate on social media undetected by those unfamiliar with it (Michael, 2009). Such examples underscore the need for improved digital literacy so that individuals can recognise these signs of extremist content, before they participate in accidentally spreading such symbols.

Educational interventions are needed to raise awareness of extremist symbolism and help users critically evaluate online content. Traditional approaches to digital literacy, like lectures or text-based guides, may not fully engage learners, especially when confronting abstract concepts like covert symbols. However, recent advances in immersive VR-technology opens new possibilities by offering the potential to improve learning engagement and effectiveness in various domains (Conrad, Kablitz and Schumann, 2024). VR can simulate realistic scenarios and allow for active, experiential learning, which may be particularly useful for practicing how to identify and respond to problematic online content. By placing users inside an environment that is the embodiment of a metaphor for social media algorithms, a VR application can provide a safe, yet memorable space to encounter extremist cues and learn to spot them.

This research explores how a hand-tracking based VR application can be developed to enhance digital literacy education by increasing user engagement in the context of identifying extremist symbols on social media. The work addresses the following main question:

"How can a hand-tracking-based Virtual Reality application be developed to enhance digital literacy education by increasing user enjoyment and engagement?"

To investigate this, the VR experience “Down the Rabbit Hole” was developed and user-tested. This paper summarises the development of the VR application, the methodology of the user study, and the key findings from the evaluation. The results offer insights into the benefits and challenges of using VR as a tool to increase engagement in education, particularly involving social media literacy, and are discussed with respect to future improvements and the broader implications for digital literacy initiatives.

2. Literature Review

The existing literature underscores that VR is not only an effective educational tool, offering rich interactivity and immersive storytelling, but also a technology with inherent challenges. These include issues related to user comfort, usability, and the ethical presentation of sensitive content. Research on digital misinformation further illustrates the complexity of countering false narratives, particularly as social media continues to shape perceptions of history and contemporary events. By integrating insights from VR-based educational design, HCI principles (including hand-tracking and AI voice usage) and misinformation research, this paper seeks to offer a novel perspective on how immersive experiences can engage users while raising awareness of the impacts of misinformation.

2.1 Virtual Reality Overview

VR is a technology that creates simulated environments, enabling users to immerse themselves in digital worlds that can either replicate or radically differ from reality. Originating from early flight simulators and experimental research in the middle of the 20th century, VR has rapidly evolved due to advances in computer graphics, sensor technology, and display systems. Modern VR systems, such as the Oculus Quest series and HTC Vive, integrate Head-Mounted Displays (HMDs), motion tracking, and haptic feedback to deliver a high degree of presence and interactivity. These technological improvements have broadened VR’s application across education, training, therapy, and entertainment, making it a versatile tool for both experiential learning and immersive storytelling.

2.2 Virtual Reality in Education

VR has been widely adopted in educational contexts because of its potential for immersion, engagement, and experiential learning. Research suggests that VR learning environments promote higher retention rates and motivation compared to traditional instructional methods (Conrad, Kablitz and Schumann, 2024). Additionally, interactive roleplaying scenarios in VR have proven effective for enhancing historical understanding and empathy in learners (Yang and Boulom, 2024). Beyond interactive applications, 360-degree videos have also received attention as an immersive educational medium. A comparative study found that more immersive devices induced stronger place illusion, more positive affect, and better learning outcomes, all while minimizing simulator sickness (Rupp et al., 2019). Conversely, less immersive methods not only undermine engagement but also lead to increased simulator sickness, thereby negatively impacting user well-being and knowledge retention. Despite these benefits, integrating VR into curricula poses technical and pedagogical challenges. Many VR applications require substantial hardware resources and issues such as motion sickness could negatively affect learning outcomes. Furthermore, managing cognitive load is critical to effective VR learning experiences (Rogers and Franklin, 2021). Scholars in e-learning emphasize reducing extraneous cognitive load. That is, the burden unrelated to core learning tasks, to optimize student performance and comfort (Davids, Halperin and Chikte, 2015).

2.3 Challenges of Misinformation in Digital Media

Misinformation and extremist content have become pressing concerns in online spaces. The proliferation of social media platforms such as TikTok, Telegram, Facebook and X, facilitates rapid dissemination of unverified or polarizing information (Rogers, 2023). Research indicates that selective exposure and algorithmically reinforced echo chambers can further entrench individuals within biased viewpoints (Hameleers and Van Der Meer, 2020), (Kim, 2023). This environment could intensify the risk of historical revisionism and extremist narratives going unchallenged. While studies on misinformation typically explore algorithmic detection, user behaviour, and platform policies, relatively few have investigated how immersive media, particularly VR, could counter or inadvertently perpetuate such narratives. By transporting users into alternative virtual contexts, VR provides unique tools to encourage critical thinking and empathy (Stavroulia and Lanitis, 2019). However, designers must carefully curate content and interactions to avoid reinforcing echo chamber effects, which refer

to environments where individuals are exposed only to information that aligns with their existing beliefs, reinforcing biases and limiting diverse perspectives.

2.4 Historical Education and Collective Memory

As direct memories of major historical events fade with time, awareness of events such as the Holocaust risks the loss of details, exaggeration or reinterpretation (Bourgeois, 2020). Historical memory is a crucial component of group identity, even though it naturally evolves over time (Gvinjilia, 2023). In the context of the Holocaust and other atrocities, studies indicate that digital natives may rely on fragmented social media content for historical information, raising concerns about inaccurate or revisionist depictions (Donovan, 2022). While more research is needed, educational VR simulations have the potential to support historical education by creating immersive experiences that can help learners engage with historical content in meaningful ways. Careful design and evidence-based approaches are necessary to assess their effectiveness in preserving historical accuracy and fostering critical engagement with the past.

2.5 Hand-Tracking in VR

Hand-tracking has emerged as an intuitive and natural way to interact with virtual environments, eliminating the need for physical controllers. However, studies reveal mixed results regarding whether hand-tracking truly outperforms controllers in terms of speed and ease of use (Hameed, Möller and Perkis, 2023). For instance, some investigations have found that participants using hand-tracking did not report higher immersion or achieve better performance than those using controllers (Hameed, Möller and Perkis, 2023). (Varela-Aldás et al., 2023). Therefore, further research might be needed to investigate whether technological advancements and different hand-tracking implementations could provide benefits over controllers. Adapting guidelines from HCI literature may suggest that hand-tracking gestures need to be easily discoverable, require minimal physical strain, and map intuitively to actions. Failure to optimize these factors can contribute to extraneous cognitive load (Davids, Halperin and Chikte, 2015).

2.6 AI-Generated Voices

Voice-overs and interactive dialogue can significantly influence immersion, especially when characters or commentators guide users through educational experiences (Yang and Boulom, 2024), (Gorini et al., 2011). Although professionally recorded audio has traditionally been used, AI-generated voices are increasingly prevalent due to their cost efficiency and scalability. Research indicates that the quality and naturalness of AI voices can affect user trust, engagement, and emotional response (Choi and Zu, 2022). However, if an AI voice sounds inauthentic or robotic, it may disrupt immersion and reduce perceived credibility, thereby increasing the cognitive effort required from the listener. Moreover, studies have shown that users often cannot reliably distinguish AI-generated voices from human ones, which raises ethical and security implications (Barrington, Cooper and Farid, 2022).

3. VR Application Design

“Down the Rabbit Hole” is an interactive, story-driven experience designed to teach users about hidden extremist symbolism on social media through exploration and puzzle-solving. The application was built using the Unity game engine for the Meta Quest platform, leveraging the headset’s hand-tracking capability to allow natural interaction without physical controllers. The design draws on the metaphor of “going down the rabbit hole”, reflecting how one might unknowingly descend into extremist content online through algorithms.

Users begin the experience on an island beach, introduced by a mysterious rabbit character. The rabbit serves as a narrative guide, leading the user to an island with a cave that symbolizes the descent into the depths of extremist forums. *Figure 1 and 2* illustrate the VR environment on rabbit island, including the rabbit guide that leads the narrative.

Figure 1: Rabbit Island from above

Figure 2: Approaching Rabbit Island from the users perspective

After falling into the depths of the cave the user is confronted with a digital display showing an antisemitic meme, containing subtle references that are not immediately obvious. The user is challenged to inspect the content and identify any hidden hateful symbolism or coded messages. For example, the meme features a seemingly innocent icon of a ballpoint pen, which is a reference to a known Holocaust denial conspiracy about the usage of a ballpoint pen trying to discredit Anne Frank's diary. The immersive environment encourages the user to look closely and engage with the content, not unlike the critical observation needed in real social media browsing.

To reinforce the learning, the application includes an interactive puzzle that the user must solve after observing the social media post. For this puzzle segment, letters are scattered around interactive elements in the cave and the user must physically reach out with their hands to collect these floating letter spheres. These letter spheres only appear during interaction with educational information about the social media content and therefore make sure every piece of content is interacted with. After collecting the spheres the user assembles the letters into a word or phrase that reveals the hidden message in the extremist post. This design element turns the act of deciphering a coded message into an engaging activity. Solving the word puzzle "hidden codes" emphasizes the point of the application and what is supposed to be the key takeaway. Throughout this process, visual and audio feedback give meaning to the users' actions. A narrator voice (via an AI-generated voiceover) announces the tasks for the user, while other AI voices are used to explain the different symbolism used. The use of an AI voice allowed for easy iteration on the script in the projects scope, though care was taken to ensure the synthetic speech was clear and appropriately serious in tone.

A key design consideration was to keep interactions intuitive. Users select answers or progress through dialogue by using simple hand gestures. For example, giving a "thumbs-up" gesture in front of an option will select one answer, while a "thumbs-down" gesture would select another. A subtle gaze-based indicator (a small icon that lights-up when the user looks directly at a commenter) was implemented to help users understand what elements can be interacted with, addressing the discoverability of view-based interactions. The environment also provides continuous guidance through the rabbit character and visual as well as auditive prompts, so that even users new to VR can follow along. Figure 3 shows the educational content in the Rabbit Hole Cave, while Figure 4 shows the solving of the final code word puzzle after collecting the letter spheres.

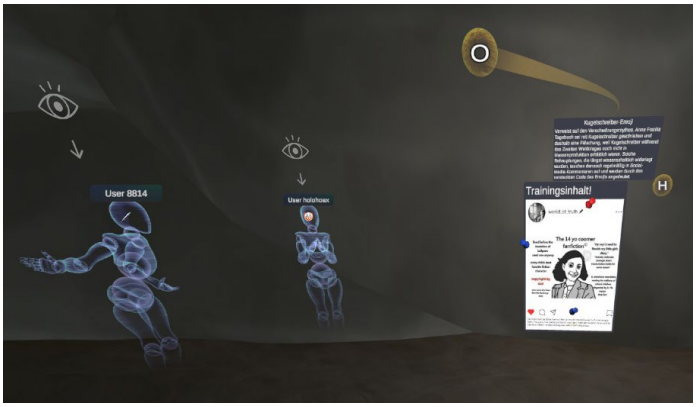

Figure 3: Interacting with social media content inside the Rabbit Hole

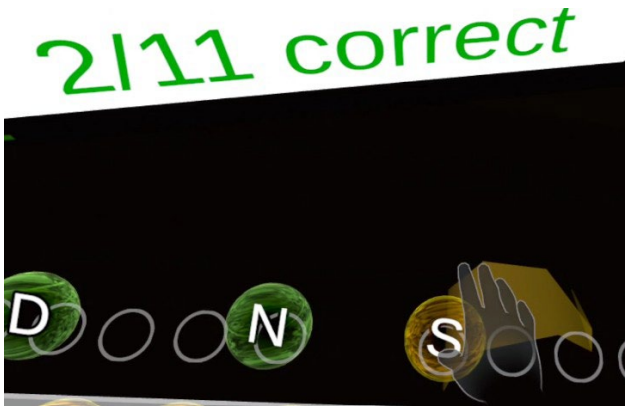

Figure 4: Solving the word puzzle

In terms of implementation, performance optimisations were applied to ensure a smooth experience on the standalone VR headset. The virtual scenes (the island shore, the cave interior, etc.) were kept relatively small and geometry was optimised, since complex graphics could reduce frame rates and possibly induce motion sickness. The overall experience was designed to last around 10–15 minutes, balancing a journey that is long enough to immerse yourself in the narrative with a duration that would not exhaust novice VR users. By the end of *the experience,* the user has interacted with a piece of extremist content, attempted to identify covert symbols, and received immediate feedback and education about those symbols. The expectation is that this immersive trial-and-error learning will help users become more alert to similar extremist cues in real online environments.

4. Methodology

An evaluation study was conducted to assess the usability and educational impact of the VR experience. A total of n=15 volunteer participants (average age of 30, 11 male and 4 female) were recruited from the university campus. Notably, about two-thirds had prior experience with VR technology (67% reported using VR more than a dozen times), while the remainder had little to no VR exposure.

Each participant took part in an individual session lasting approximately 36 minutes. Sessions began with a **pre-experience questionnaire** to collect baseline data. This questionnaire asked about demographics, prior experience with VR, and initial awareness of extremist symbolism. It also included a self-rating of confidence in identifying harmful online content. This gauged participants' baseline confidence level in spotting harmful content.

Participants were then introduced to the VR equipment (an Oculus Quest headset) and given a brief tutorial on using hand gestures for interaction. They proceeded to use the *Down the Rabbit Hole* VR application on their own, with a study facilitator observing for any technical issues and noting any commentary.

After completing the VR experience, participants filled out a **post-experience questionnaire**. This survey included quantitative measures (notably the **System Usability Scale (SUS)** for usability and Likert-scale items application and technology specific areas, like the perceived control using hand-tracking. In addition to this,

qualitative questions were collected through the questionnaire in the areas of immersion, engagement, interaction, usability and physical discomfort. To conclude the questionnaire, users had to take note of their most memorable, most enjoyable and least enjoyable moments to promote feedback on both weak and strong areas of the application.

5. Results

5.1 Pre-Study-Questionnaire

From a sample of n=15 people who completed the study, 73% or 11 out of 15 people identified as male, with an average age of 30.4. Many people had prior VR experience, with 66.7%, or 10 out of 15 people having had extensive prior experience, while 5 people had only limited or moderate experience. Most people rated themselves as somewhat knowledgeful and aware of hidden codes in social media with an average of 3.6 out of 5. In general people were confident that they could identify harmful content in social media with an average of 4.13 out of 5. Most people chose the English version of the application, while only 5 people chose to test the German version. However, every participant had to declare to be fluent in English to participate in the study.

5.2 Post-Study-Questionnaire

Overall, the VR application was well-received in terms of usability. The average SUS score from the 15 participants was **80.17** (out of 100). According to standard SUS benchmarks, a score around 80 indicates good to excellent usability, exceeding the statistical average of 70.9 as found by Bangor, Kortum and Miller (2009). Most participants navigated the experience without major issues, and no one encountered a serious technical problem that prevented completion. In terms of engagement, participants gave very high ratings. When asked to rate how engaging and fun the experience was, the mean response was **4.67 out of 5**, with 10 out of 15 participants selecting the highest agreement level. Many participants commented that they enjoyed the experience and the hand-tracking, one user noting their most enjoyable aspect as: *"Interacting with the puzzle letters. picking up the letters and watching them move to the sorting table and finally the interaction sorting the letters to form the puzzle word."* To many the experience did not feel like a lesson but more like a game, which kept their attention. A summary of key quantitative metrics from the study is provided in Table 1. In rows with a darker background the question is worded negatively. Figure 5 showing the perceived control using hand-tracking for the user, with an average result of 4.27 out of 5. Figure 6 shows the user perceived engagement and fun using the hand-tracking, with an average result of 4.67 out of 5. The sense of presence in VR was rated at an average of 4.33 out of 5. At last, the perceived quality of the AI generated voices resulted in an average rating of 4 out of 5.

Table 1: Results of the System Usability Scale Test

Question	Rating of 1	Ratings of 2	Ratings of 3	Ratings of 4	Ratings of 5	Average Ratings
Frequent use	0 (0%)	3 (20%)	2 (13.3%)	4 (26.7%)	6(40%)	3.87
Complexity	7 (46.7%)	6 (40%)	1 (6.7%)	0 (0%)	1 (6.7%)	1.8
Ease of use	0 (0%)	0 (0%)	2 (13.3%)	8 (53.3%)	5 (33.3%)	4.2
Tech support needed	4 (26.7%)	6 (40%)	2 (13.3%)	3 (20%)	0 (0%)	2.27
Function Integration	0 (0%)	0 (0%)	1 (6.7%)	4 (26.7%)	10 (66.7%)	4.6
Inconsistency	8 (53.3%)	2 (13.3%)	2 (13.3%)	2 (13.3%)	1 (6.7%)	2.07
Learnability	0 (0%)	0 (0%)	0 (0%)	9 (60%)	6 (40%)	4.4
Cumbersomeness	8 (53.3%)	3 (20%)	1 (6.7%)	3 (20%)	0 (0%)	1.93
Confidence	0 (0%)	1 (6.7%)	1 (6.7%)	3 (20%)	10 (66.7%)	4.47
Learning Required	11 (73.3%)	2 (13.3%)	2 (13.3%)	0 (0%)	0 (0%)	1.4

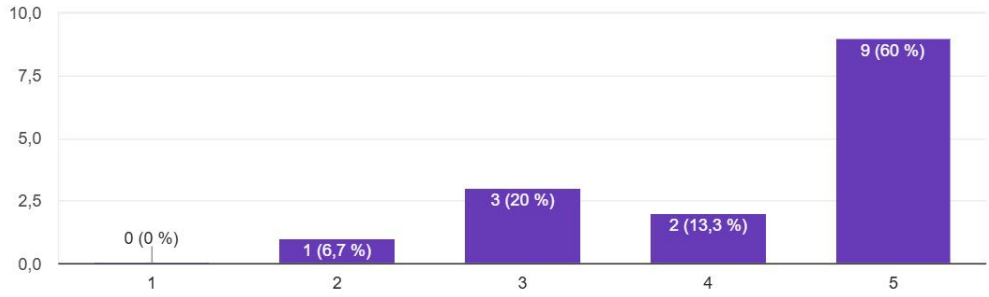

Figure 5: Perceived Control Using Hand-tracking (1 = low, 5 = high)

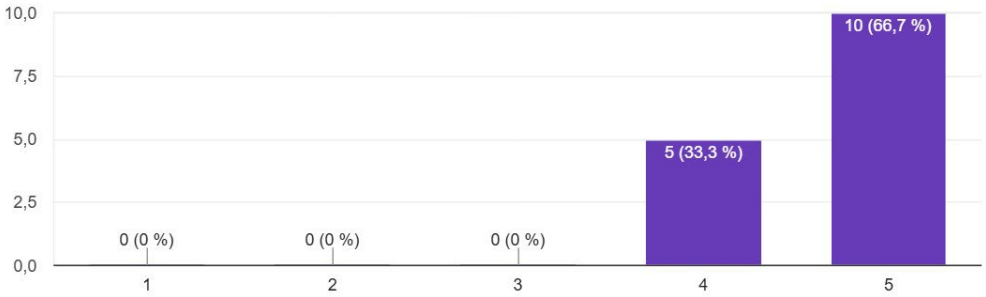

Figure 6: Engagement and Fun using Hand-tracking (1 = low, 5 = high)

5.3 Qualitative Data

In addition to the quantitative data, participants provided open-ended feedback, which was analyzed thematically to identify recurring patterns. The qualitative analysis highlighted several key themes:

5.3.1 Immersion and Engagement

Many participants described a strong sense of immersion, emphasizing how the experience felt realistic and engaging. One participant noted, “I was feeling that I am in the scene and engaging, and it is like real life." This sentiment was consistently shared in other responses.

5.3.2 Interaction and Usability

Participants expressed both appreciation and constructive feedback regarding interaction design. Many praised the intuitive nature of hand-tracking and interactive elements, as mentioned in the comment: "How easy it was to use. Really intuitive." However, some participants encountered difficulties with gesture recognition, with one stating, "Sometimes it's not clear what gestures I had to use to interact.".

5.3.3 Physical Discomfort

While the overall technical performance was well-received, specific sequences, such as the boat ride or the free-fall into the rabbit hole were mentioned by at least one participant describing a "slight nausea" in these moments. Another hinted at disliking the teleportation over long distances: "(...) movement felt a bit heavy when moving a lot.".

5.3.4 Specific Suggestions

Beyond general usability, participants provided specific feedback on interaction mechanics. One user suggested: “Hints on what object is going to be grabbed” to improve clarity.

6. Discussion

This chapter discusses the evaluation results of the interactive VR experience designed to improve digital literacy about extremist symbolism on social media. The findings offer insights into usability, hand-tracking interactions, AI-generated voices, educational impact, immersion, and overall user engagement.

The SUS score of 80.17 indicates good usability, with high ratings for system integration, ease of learning, and user confidence. However, lower scores for Frequent Use suggest the application is currently perceived as limited, highlighting areas for expanding content and improving gesture controls, guidance, and consistency.

Hand-tracking received mixed feedback. Participants appreciated its intuitiveness and immersion but noted issues with gesture accuracy. Users who experienced better gesture recognition and perceived control reported higher engagement and fun ($r = 0.898$, $p < 0.001$; $\beta = 0.424$, $p < 0.001$). This strong correlation indicates that refining gesture precision could significantly enhance user satisfaction.

AI-generated voices were generally well received, though German voices were rated slightly lower than English voices. Despite occasional unnatural pronunciations, statistical analysis showed no significant perceived quality difference between languages. An intriguing finding was a strong negative correlation between voice quality and motion sickness ($r = -0.76$, $p = 0.00095$), suggesting that voice naturalness may influence user comfort or vice versa.

While specific educational impact data was not collected, participants praised the realistic integration of hidden extremist codes. Reactions to the authenticity of the content varied greatly based on individual perspectives, which would fit the polarized self-assessments of individuals abilities to identify hidden codes in social media as seen in Figure 7.

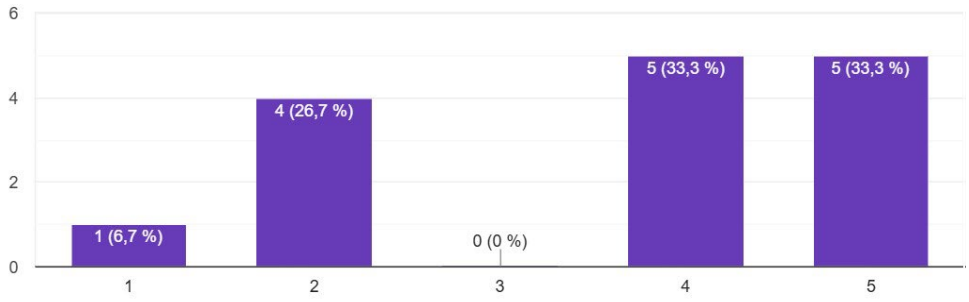

Figure 7: Self-Assessed awareness of hidden codes in social media (1 = low, 5 = high)

Immersion was generally high, although some users experienced discomfort during intensive movement sequences, such as boat rides or falls. This suggests optimizing navigation methods could further enhance comfort and presence.

Overall, the VR experience effectively engaged users through interactive elements like hand-tracking and puzzles, reinforcing the potential of VR for educational applications and engagement, as supported by qualitative feedback and existing literature.

7. Conclusion

This study investigated how a hand-tracking-based VR application could enhance engagement and enjoyment in digital literacy education. Findings showed users found the application generally engaging and intuitive, with precise and responsive hand-tracking significantly contributing to higher engagement. AI-generated voices were positively received, with no significant quality differences between languages, although a notable link between voice quality and motion sickness emerged, requiring further investigation.

Overall usability was highly rated, but participants identified challenges in gesture recognition accuracy and occasional system inconsistencies. Addressing these along with optimizing motion comfort settings would enhance accessibility and ease of use.

The research contributed to the VR education field by demonstrating that effective hand-tracking significantly boosts user engagement, highlighting AI-generated voices as efficient tools, and underscoring the need for further exploration into voice quality and motion sickness. The study also emphasized the importance of

expanding digital literacy education and offered practical insights for future misinformation awareness applications.

Limitations included the small sample size and limited content within the prototype, restricting the generalizability and depth of long-term educational impact evaluation. Future research should involve larger and more diverse participant groups, test additional interaction methods like voice commands or controllers, and investigate AI-voice quality's impact on comfort more comprehensively.

Application improvements suggested by participants include better grab interactions for precise control, reducing forced motion sequences to mitigate discomfort, clearer in-app guidance to enhance usability, refining the gaze-based interaction system used for the virtual commenters, and expanding educational content for comprehensive knowledge assessment.

After all, continued refinement of usability and interaction mechanisms is an important step not only in developing educational VR applications, but any application and can undermine the intended purpose of the application if not addressed.

Ethics Statement

No specific ethical clearance was required for this project and study. All participants were adults who provided informed consent prior to participation. All data was anonymised to protect participants' privacy.

AI Statement

Some sections such as the abstract started as the bare structure of a summarized draft of the more detailed thesis this paper is based on. Any paragraphs that are based on the structure of an AI draft have been rewritten for coherence and factuality and extensively proofread to produce a qualitative result.

References

Bangor, A., Kortum, P. and Miller, J. T. (2009) "Determining What Individual SUS Scores Mean: Adding an Adjective Rating Scale", Journal of Usability Studies, Vol 4, No. 3, pp 114–123, May.

Barrington, S., Cooper, E. A. and Farid, H. (2025) "People Are Poorly Equipped to Detect AI-Powered Voice Clones", Scientific Reports, Vol 15, Article 11004.

Bourgeois, E. (2020) "In the Shadows of Memory: The Politics of Holocaust Memorialization and the Rise of Global Populism", The Expositor: A Journal of Undergraduate Research in the Humanities, Vol 15, pp 26–36.

Choi, I. and Zu, J. (2022) "The Impact of Using Synthetically-Generated Listening-Stimuli on Test-Taker Performance: A Case Study With Multiple-Choice, Single-Selection Items", ETS Research Report Series, Vol 2022, No. 1, pp 1–14, December.

Conrad, M., Kablitz, D. and Schumann, S. (2024) "Learning Effectiveness of Immersive Virtual Reality in Education and Training: A Systematic Review of Findings", Computers & Education: X Reality, Vol 4, Article 100053.

Davids, M. R., Halperin, M. L. and Chikte, U. M. E. (2015) "Optimising Cognitive Load and Usability to Improve the Impact of E-Learning in Medical Education", African Journal of Health Professions Education, Vol 7, No. 2, pp 147–152, November.

Donovan, H. (2022) "The Challenge of Holocaust Memory in Germany", Israel Journal of Foreign Affairs, Vol 16, No. 3, pp 404–408.

Gorini, A., Capideville, C. S., De Leo, G., Mantovani, F. and Riva, G. (2011) "The Role of Immersion and Narrative in Mediated Presence: The Virtual Hospital Experience", Cyberpsychology, Behavior, and Social Networking, Vol 14, No. 3, pp 99–105, March.

Gvinjilia, M. (2023) "The Historical Memory as Way to Save Our Identity", Proceedings of Tskhum-Abkhazian Academy of Sciences, Vol 23, pp 101–108, September.

Hameed, A., Möller, S. and Perkis, A. (2023) "How Good Are Virtual Hands? Influences of Input Modality on Motor Tasks in Virtual Reality", Journal of Environmental Psychology, Vol 92, Article 102137, December.

Hameleers, M. and van der Meer, T. G. L. A. (2020) "Misinformation and Polarization in a High-Choice Media Environment: How Effective Are Political Fact-Checkers?", Communication Research, Vol 47, No. 2, pp 227–250, March.

Kim, L. (2023) "The Echo Chamber-Driven Polarization on Social Media", Journal of Student Research, Vol 12, No. 4, November.

Michael, G. (2009) "David Lane and the Fourteen Words", Totalitarian Movements and Political Religions, Vol 10, No. 1, pp 43–61, March.

Rogers, B. A. and Franklin, A. E. (2021) "Cognitive Load Experienced by Nurses in Simulation-Based Learning Experiences: An Integrative Review", Nurse Education Today, Vol 99, Article 104815, April.

Rogers, R. (ed.) (2023) The Propagation of Misinformation in Social Media: A Cross-Platform Analysis, Amsterdam University Press, Amsterdam.

Rupp, M. A., Odette, K. L., Kozachuk, J., Michaelis, J. R., Smither, J. A. and McConnell, D. S. (2019) "Investigating Learning Outcomes and Subjective Experiences in 360-Degree Videos", Computers & Education, Vol 128, pp 256–268, January.

Stavroulia, K. E. and Lanitis, A. (2019) "Enhancing Reflection and Empathy Skills via Using a Virtual Reality Based Learning Framework", International Journal of Emerging Technologies in Learning (iJET), Vol 14, No. 7, pp 18–36, April.

Varela-Aldás, J., Buele, J., López, I. and Palacios-Navarro, G. (2023) "Influence of Hand Tracking in Immersive Virtual Reality for Memory Assessment", International Journal of Environmental Research and Public Health, Vol 20, No. 5, Article 4609, March.

Yang, H. and Boulom, T. (2024) "An Interactive Role-Playing Game Based Learning System for History Using Artificial Intelligence and 3D Modeling", in Security, Privacy and Trust Management (SPTM 2024), CS & IT Conference Proceedings, Vol 14, No. 11, pp 83–90, June.

Yesmen, N., Naha, A. and Sharmin, S. (2023) "Hate Crimes in Social Media: A Criminological Review", International Journal of Social Science, Vol 3, No. 1, pp 23–28, June.