Time travel in the classroom
Exploring the potential of VR as a pedagogical tool in History lessons

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1 Overview
VR has previously allowed students to:
- Embody a piece of coral reef in the ocean to learn about climate change [1]
- Visit a Roman city to learn about ancient architecture [2]
- Learn the phases of the moon through a simulation [3]

Our research:
How do the unique features of VR contribute to the use of VR as a pedagogical tool in children?

This study:
Does the inclusion of a dynamic soundscape contribute to better factual recall performance and increased presence & engagement in the VR experience?

2 Methodology

Participants
N = 58 Age: 7-9 years

Design
Educational virtual experience in an ancient trading city on the Silk Road. See Figure 2.

DV 1: Factual recall performance
Measured with a 15-item quiz (short answer & multiple choice)

DV 2: Engagement
Measured with a 5-item questionnaire (adapted from the Museum Experience Scale [4])

DV 3: Presence
Measured with a 3-item questionnaire (adapted from the Slater-Usoh-Steed Questionnaire [5])

Moderators

Moderator 1: Sensory sensitivity
Measured with the Glasgow Sensory Questionnaire [6]

Moderator 2: Visual-auditory integration
Measured with a simultaneity judgement flash-beep task [7]

Moderator 3: Embodiment
Measured with a 2-item questionnaire (adapted from a standardised questionnaire [8])

IV: Inclusion or exclusion of a dynamic soundscape in the VR experience

3 Results

Factual recall performance

Findings: High factual recall on the quiz (out of 15) in both the sound (M = 9.14) and no sound (M = 8.97) conditions, but no significant difference between the conditions, p = .338.

Presence

Findings: Participants in the sound condition (M = 4.30) reported significantly higher presence in the VR world than participants in the no sound condition (M = 3.69), p = .037. See Figure 3.

Engagement

Findings: There was a significant Sound condition x Embodiment score interaction (p = 0.005).

Embodiment has a stronger effect on engagement in the sound condition compared to the no sound condition, with higher embodiment predicting higher engagement (see Figure 4).

4 Conclusions

- Including a dynamic soundscape in the educational VR experience promoted an increased feeling of “being there” in the virtual world
- Higher embodiment in the VR experience predicted increased engagement, but only when a dynamic soundscape was included in the experience

Next steps
- Explore the impact of increased embodiment on learning, by comparing two hand forms in VR: realistic hands and non-realistic 3D blocks
- Explore the impact of increased interactivity on learning, by including more objects for the PP to directly manipulate, such as silk material or ceramic vases
- Add a new multisensory feature to the VR experience: touch
- Conduct the study on an older age group (11-14 years)

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References
[2] Villena Taranilla et al. (2022)

Figure 1. Visual representation of relationship between IV, moderators & DVs

Figure 2. Screenshots of the VR Silk Road experience

Figure 3. Average presence score in the sound and no sound conditions. The bars display standard errors.

Figure 4. Scatterplot to show the engagement and embodiment scores for the sound and no sound conditions.