Motivation and reading in high-immersion virtual reality

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Abstract. Many language learners lack the motivation to read complex texts. Because high-immersion Virtual Reality (VR) is increasingly reported to be highly motivating, the goal of our study was to compare English as a Second Language (ESL) learners' (*N*=79) motivation while reading a story with subtitles in VR (experimental group) versus reading the same story screencast in two-dimensions (2D – control group). The Wilcoxon signed-rank test revealed that learners' motivation in VR was significantly higher compared with the control group. Our finding confirmed that VR is highly motivational in the context of reading foreign texts and can be useful for Computer Assisted Language Learning (CALL) researchers, practitioners, and instructional designers. This analysis is a part of a larger study (Kaplan-Rakowski & Gruber, 2023) on VR facilitating reading tasks.

Keywords: motivation, high-immersion virtual reality, reading, subtitles.

1.   Introduction

High motivation to practise languages is essential for their mastery. For practising complex language skills such as reading, high motivation is important as many learners today tend to limit their reading input to short text messages or social media posts. Therefore, devising approaches that allow students to read larger text passages without becoming demotivated have become increasingly important. Immersive technologies have come to the rescue because they can be highly engaging, immersive, and motivational (Kaplan-Rakowski & Meseberg, 2019). An example of such technology is high-immersion VR.

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To experience VR, users need to wear a VR headset that serves as a viewing and interactional tool. Thanks to headtracking technology, users can experience 360° scenarios and feel that they are 'there', that is, in the middle of the scenario. Such a state is often referred to as the sense of presence (Slater, 2018) or immersion. Both concepts typically distinguish high-immersion VR from other immersive technologies because, as of 2022, no other technology offers as high levels of immersion as VR. Our definition of VR is "computer-generated 360° virtual space that can be perceived as being spatially realistic, due to the high immersion afforded by a head-mounted device" (Kaplan-Rakowski & Gruber, 2019, p. 552).

The use of Virtual Reality-Assisted Language Learning (VRALL) has been on the rise. While VRALL research has been limited and clear benefits of VR learning outcomes are still inconclusive (Dhimolea, Kaplan-Rakowski, & Lin, 2022), language scholars have been exploring VR affordances to practise various language aspects including vocabulary learning (Papin & Kaplan-Rakowski, 2022), communication (Gruber & Kaplan-Rakowski, 2022), and foreign language anxiety (Gruber & Kaplan-Rakowski, 2020, 2023; Thrasher, 2021).

This study focused on reading subtitles which differs from traditional forms of reading. Research on reading subtitles in CALL has been extensive (see, e.g. Pattemore & Muñoz, 2020; Winke, Gass, & Sydorenko, 2010), but the new form of digital reading of subtitles in VR needs to be explored. Our research question was: does reading a story in a foreign language in VR enhance motivation compared with reading the same story in a video screencast capture on a 2D screen?

2. Method

The study sample consisted of 79 intermediate ESL students at a German university. The volunteers signed a letter of consent and were instructed individually on how to use the VR device (Oculus Quest 2). The participants were randomly assigned to two groups and were tasked to read an identical 20-minute interactive story in English in two different formats. The experimental group used high-immersion VR, wearing a VR headset, and the control group viewed the screenshot video of the same story on a 2D screen (see Figure 1). A screenshot of a part of the story read by the students is displayed in Figure 2. The groups had a comparable distribution of participants' gender, age, L1, and L2 (English) proficiency.

Figure 1. Participants reading in VR (left) and on a two-dimensional screen (right)

The story consisted of about 1,000 words, which is equivalent to two double-spaced pages. Unlike the control group, the experimental group could interact with the setting using the haptic system (i.e. virtual hands) and could benefit from the 360° experience using headtracking. Such actions allowed for higher immersion and a sense of agency (Kaplan-Rakowski & Gruber, 2021).

Figure 2. A screenshot of a part of the story

Note. The use of virtual hands offers the possibility of interaction within the story. Subtitles help follow the story.

In addition to the demographic questionnaire eliciting information such as gender, age, L1, and L2 level, the participants completed a survey with the goal of measuring levels of motivation across conditions. This survey was based on

the Intrinsic Motivation Inventory and consisted of nine five-point Likert-scale items. The items assessed levels of self-perceived enjoyment, effort, value, and competence. The choices of agreement ranged from 'not at all true', to 'somewhat true', to 'very true'. The instrument had excellent internal reliability (α =.92). To calculate differences between the levels of motivation between the two groups, we used the Wilcoxon signed-rank test.

3.   Results and discussion

The Wilcoxon signed-rank test revealed that motivation of the VR group was statistically significantly higher than the 2D desktop group (Z=6.33, p=<.0001). The robustness of this finding is very strong as indicated by a very high effect size (Cohen's d=1.94). The descriptive statistics of the VR group (n=35) were M=4.50, SD=.59, Min=2.14, Max=5.00; of the video group (n=44), they were M=3.12, SD=.79, Min=1.57, Max=5.00.

A systematic review of VRALL research (Dhimolea et al., 2022) showed that students reveal high levels of motivation while using VR. Our results add to this line of research and confirm results of other language scholars (Alfadil, 2020; Kaplan-Rakowski & Wojdynski, 2018; Pack, Barrett, Liang, & Monteiro, 2020). However, the context of the other studies differed from ours as they focused either on vocabulary learning, communicative skills, or writing, without exploring reading in VR.

Compared to the control condition, the experimental condition in VR was more interactive and had an increased sense of agency and immersion. The video condition was passive as it involved following the story on a 2D screen which had been recorded in VR (see video screencast: https://tinyurl.com/mcbtkyn4). Because we did not use eye-tracking technology, the exact ratio of time spent on reading the text and exploring other parts of the scenery within the VR story is unknown, thus, limiting our study. We could treat our experimental and control conditions holistically, assuming that their overall affordances impacted the perceived levels of motivation.

4.   Conclusions

This one-time-intervention study confirmed that VR has potential to motivate and engage students in the context of reading comprehension tasks. Further

studies should measure other factors such as cognitive load, sense of presence, and ability to comprehend the text (Kaplan-Rakowski & Gruber, 2023). Because reading tasks are often considered difficult and dull, offering language learners the possibility of reading text with subtitles within VR is a viable option that would expose them to written input and, consequently, foster the expansion of vocabulary, grammar structures, and other key factors that boost language proficiency.

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