



Low-Immersion versus High-Immersion Virtual Reality: Definitions, Classification, and Examples with a Foreign Language Focus

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Abstract

Since the beginning of the Digital Revolution in the 1950s, the influx of rapidly evolving technologies has posed a challenge to those trying to keep pace. This challenge is compounded by ever changing terms which can lead to confusion, including concepts related to virtual environments, virtual worlds, and virtual, augmented, or mixed realities. A detailed analysis of previous publications (e.g., Berti, 2019; Lin & Lan, 2015; Peeters, 2019) reveals that scholars have been using the same term, “virtual reality” (VR), to describe several distinct educational settings, ranging from low-immersion virtual environments (LiVR) to high-immersion three-dimensional spaces (HiVR). The intention of this manuscript is three-fold: (1) to define and classify the main types of VR, as they have been used in educational research, (2) to outline the differences between the two main types of VR, and (3) to provide examples of VR language learning research.

Keywords: *embodiment, immersion, language learning, virtual reality, virtual environments.*

1. VR definitions and classification

The difficulty of defining and classifying VR has existed since its inception and is related to its constantly evolving nature. The way VR was seen in the 1960s is not the same as in the 2020s (for an overview, see Sherman & Craig, 2018). Various definitions of VR are available (e.g., Steuer, 1992; Burdea & Coiffet, 1994; Girvan, 2018; Pan & Hamilton, 2018), with many of them tending to be unnecessarily complex.

As there are two main types of VR: LiVR and HiVR (Lee & Wong, 2014; Marakansky, Terkildsen, & Mayer, 2019), we offer two separate, simplified definitions. We define LiVR as “a computer-generated three-dimensional virtual space experienced through standard audio-visual equipment, such as a desktop computer with a two-dimensional monitor”. The online virtual world *Second Life* is a popular example of a LiVR setting. We define HiVR as “a computer-generated 360° virtual space that can be perceived as being spatially realistic, due to the high immersion afforded by a head-mounted device”.

2. What differentiates LiVR and HiVR

Both LiVR and HiVR can be immersive. The level of immersion is the essential characteristic that distinguishes between the two types of VR. LiVR settings may be expansive and interactive, but they do not appear realistic to one’s senses. The immersion in LiVR comes from the extent of virtual interactions and activities. HiVR may not necessarily include any social interactions or an expansive setting, but it incorporates a spatial awareness that tricks the users’ senses into a sensation of physical presence.

While immersion intensity may depend entirely on the quality of the viewing content or a storyline, the different levels of immersion are largely due to the equipment used to experience the VR content. Users experience LiVR by viewing a standard two-dimensional monitor and using a keyboard or a mouse, or both, for interacting. The key equipment used for experiencing HiVR is a head-mounted device or, in short, a headset. The headset physically disconnects users from the real world, allowing for deeper immersion in the virtual space. In addition, it features advanced sensors, such as gyroscopes, magnetometers, and accelerometers, which detect the position of the user, thereby allowing for adjustment of the viewing content. Head-motion tracking is an important aspect in HiVR because it makes learners feel that “they have a greater sense of control and autonomy in the learning process” (Marakansky & Lilleholt, 2018, p. 1156).



3. Theoretical framework

LIVR and HiVR are distinctly different in terms of embodiment, or virtual body ownership, “which refers to the virtual body a VR-user coincides with and uses from first person perspective, which then can give the illusion that it is the person’s body” (Slater, 2017, n.p.). Makransky and Lilleholt (2018) suggest that HiVR, much more than LiVR, can increase perceived learning outcomes by giving learners a higher sense of autonomy because of better control over the environment. Peeters (2019) points out that when experiencing HiVR environments, participants enter the depicted scenes themselves as no artificial spatial divide exists between stimulus and participant. Just like in the real world, participants are in the same space as the stimulus. HiVR offers a spatial dimension, which is not the case with LiVR, where the users’ embodiment experience is reduced.

Empirical research in science education suggests that students favor the HiVR over the LiVR version of a virtual learning simulation, due to their sense of presence, affective variables, behavioral intention, and immediacy of control (Makransky & Lilleholt, 2018). Students’ positive views on HiVR technology, as compared with LiVR technology, are also evident in foreign language–focused investigations (Dolgunsöz, Yildirim, & Yildirim, 2018; Kaplan-Rakowski & Wojdyski, 2018).

4. Examples of VR in language learning

Research on LiVR suggests that certain features afforded by LiVR, such as incorporating real-life tasks and collaboration, can have a positive impact on learners’ oral output, performance, and communicative competence (see, for instance, Jauregi, Canto, de Graaff, Koenraad, & Moonen, 2011). Overviews of LiVR language activities or studies are provided in Kaplan-Rakowski (2011), Legault et al. (2019), Lin and Lan (2015), and Sadler (2017). Chen (2018) points out that some studies on LiVR are descriptive, do not show a link between results and theoretical underpinning in second language acquisition, or focus on text-based task interaction.

Studies on HiVR using headsets for language learning indicate that HiVR can help contextualize students’ learning. HiVR can also reduce the cognitive burden and can increase the students’ interest in the target culture (Xie, Chen, & Ryder, 2019). A recent study suggests that low-ability learners might profit the most from HiVR (Legault et al., 2019).

The widespread availability of Google Cardboard in 2015 spurred various ideas for developing HiVR materials for language learners as well as attempts to investigate how foreign language learners can benefit from VR technology. Berti (2019), for instance, developed open-source 360° HiVR materials for learners of Italian. Papin (2018) investigated how exposure to 360° videos made learners more eager to use the target language outside the classroom. Dolgunsöz, Yildirim, and Yildirim (2018) explored how 360° videos can affect second language writing performance.

value of more sophisticated VR devices for learning also needs to be explored. With the increased availability of portable HiVR such as Oculus Go, Kaplan-Rakowski and Wojdyski (2018) conducted a pilot study analyzing students’ attitudes about using a HiVR application for language learning, showing that learners perceive VR technology to be a potential tool for language learning. Gruber and Kaplan-Rakowski (in progress) developed a project exploring whether HiVR simulation of a classroom could help students to cope with foreign language anxiety. Using *HTC Vive*, students were required to speak in front of student-like avatars in a virtual classroom that simulated a real-life scenario (i.e., giving a presentation during a seminar).

5. Conclusions

This manuscript set out to untangle the concept of VR used in the literature for foreign language teaching and learning. It attempted to provide a useful distinction between the commonly confused concepts of LiVR and HiVR. The brief overview of definitions and classification showed that VR technology for language learning is multifaceted in that the level of immersion, sense of presence, and embodiment are experienced differently depending on the type of VR under consideration. As technology progresses and provides additional learning affordances, the terminology and equipment specifications likely will evolve. For example, we mentioned how equipment such as a headset differentiates LiVR from HiVR. Recently released Huawei VR glasses allow users to experience HiVR without a traditional headset. Going forward, the types and affordances will continue to advance and expand the differences in how immersion is generated across different platforms.



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