



Social VR in Education: Transforming Learning Through Immersive Collaboration

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Abstract. Social virtual reality (social VR) is transforming education by integrating immersive technology with real-time collaboration in shared virtual spaces. Unlike traditional VR, social VR supports social constructivism through dynamic interactions, allowing students to engage in both verbal and non-verbal communication, fostering deeper connections and enhancing learning outcomes. This paper examines the pedagogical applications of social VR, highlighting how it encourages collaboration, active learning, and inclusivity. Key topics include the pedagogical uses, the perception of avatars in shaping identity and interaction, emerging trends like AI-driven personalization, exploring social VR, and future advancements in social VR. This paper discusses examples from ongoing projects to potential developments for classroom use at all levels.

Keywords: Social Virtual Reality, Social Constructivism, Active Learning, Avatars.

1 Introduction

Social virtual reality (social VR) is an innovative platform that merges the immersive qualities of virtual reality with the interactions typical of social networks. Unlike traditional VR, which often emphasizes individual, solitary experiences, social VR enables users to connect and collaborate in shared virtual spaces. This fosters a sense of presence and community that web-conferencing programs cannot achieve. In contrast to other social media, where individuals use text, images, and videos to construct their online identities, social VR presents a novel method for self-presentation by combining one's physical presence with an avatar. Through customizable avatars, voice communication, and interactive environments, social VR provides opportunities for rich, collaborative experiences that transcend physical barriers. As a colleague remarked, "Social VR brings the social back into social media."

Social constructivism, a theory of knowledge in sociology and communication, explores how individuals collaboratively develop their understanding of the world. The theory posits that understanding, significance, and meaning are developed in collaboration with other human beings [1]. Platforms such as FrameVR, Rec Room, and Engage VR demonstrate the potential social constructivism in educational social VR. These platforms create virtual environments for group discussions, collaborative projects, and immersive learning activities. Integrating social interactions and VR technology transforms how educators and learners engage with content and one another.

2 Social Constructivism and Immersive Learning

Social VR can enhance active, collaborative, and experiential learning. Grounded in social constructivism theory, students engage in dynamic learning activities that involve simulated scenarios, role-playing, and problem-solving tasks. This theory views knowledge as subjective and constructed as learners interact with and derive meaning from their experiences [1]. Vygotsky [14] argued that social constructivism is the process through which learners construct knowledge via social interaction, interpretation, and understanding. Through social VR, students immerse themselves in active learning by exploring and engaging with the virtual environment. Furthermore, the sense of presence in social VR enriches learning by making students feel physically situated in the environment, thereby strengthening their emotional and cognitive connections to the material. Embodied learning is essential

to this process, as students interact with virtual objects, use gestures, and learn through movement, making abstract concepts more tangible and meaningful.

3 Pedagogical Applications

One of the more popular active and collaborative learning spaces is the educational escape room or edu-escape room [5]. In Edu-scape rooms, learners are confined to a virtual space designed to have them work together to exit the room as fast as possible. The players' mission is to collect clues, perform tasks, and solve puzzles to find a key, passcode, or device needed to exit the room [9]. Francisco and Maher identified that escape rooms potentially reinforce individuals' competencies in problem-solving while also facilitating the shift from rote or memorization to problem-based learning [3].

Social VR offers experiential learning opportunities through virtual field trips, historical re-creations, and project-based learning in safe, controlled environments. The ability for students to meet anywhere in the world and at any time in history introduces so many learning opportunities. With the inclusion of AI and VR, Engage VR has created the School of AI. This new emerging media platform in Engage allows students to talk to the AIs of multiple historical figures such as Cleopatra, Einstein, and Nikola Tesla. Students can meet and ask questions of John F. Kennedy in the White House or Julius Caesar in ancient Rome.

In addition to historical figures and places, social VR allows students to meet in locations at a micro and macro level. For biology, students can meet inside a heart and see how the valves work and how blood flows from chamber to chamber. At a macro level, students can meet outside the universe and dissect the rotation of the planets around the sun. Lastly, they can meet in a chemistry lab and experiment with possible toxic chemicals to see their reactions in a safe environment. Concepts gained from direct experience or making inferences can be converted into understanding through critical reflection or productive exploration [6].

For students at Syracuse University, the Social VR class taught at the S.I. Newhouse School of Public Communications, they explore different virtual environments and collaborate in Engage VR on different social tasks with each other. On platforms such as Rec Room and VR Chat, they explore and discuss the design of the spaces and how their avatars affect their interactions with others in those spaces. They explored how they felt present in the conversation in their discussion about the different social virtual spaces. They also discussed how they could directly engage with classmates and users. This engagement made them feel more present; for several, they forgot they had the VR headsets on. They each discussed how they discovered numerous opportunities in social VR for active, collaborative, and experiential learning.

4 Perception of Avatars in Social VR

Avatars influence user experiences in social VR, affecting identity expression, interactions with others, and navigation of virtual spaces. Acting as digital representations, avatars function as visual and social connections, enhancing presence and communication within immersive settings. Their design and customization impact self-perception and social dynamics, underscoring their significance in educational and collaborative social VR applications. Understanding how users perceive and embody avatars is crucial for developing inclusive, engaging, and effective virtual learning environments.

The identity of avatars enhances the presence and immersion of social VR participants in virtual spaces. This heightened presence fosters a stronger connection to the environment [13]. The avatars that participants embody facilitate their communication with others. Rogers suggests that full-face and body motion capture can make social interactions in VR closely resemble face-to-face interactions [11]. We anticipate that VR social interaction will represent the next significant technological evolution in human-computer-mediated communication and propose avenues for further research. Freeman and Malone indicated that their participants appeared to identify more strongly with their avatars in social VR than on other platforms [4]. They could feel more present through their immersion as their avatars in the space.

There are even broader considerations for avatars in social VR. Huh and William stated that due to avatar-mediated communication, social VR allows participants to explore new identities, such as cross-gender play [7]. In contrast, ethical considerations must be made regarding appropriation, stereotyping, or misrepresentation in avatar design. Research has also looked at the effect of hyper-realistic avatars in VR and how participants interact with them [12]. Overall, there is a necessity for heightened communication in social VR spaces to ensure respectful interactions through avatar moderation and guidelines.

5 Exploring Social VR

Social VR's use in education has multiple benefits, such as increased engagement. Students can demonstrate verbal and nonverbal communication skills more effectively in VR than in any web-conferencing program. The immersive environment allows for gestures, spatial awareness, and more natural interactions, replicating real-world dynamics. Bailenson [2] stated that social VR is less likely to cause "Zoom fatigue" due to its interactivity and immersion. Social VR allows students to interact similarly to face-to-face classes by being able to be in proximity to each other and make direct contact with other students. In Zoom, students do not have that capability; they must utilize the chat features.

Other ethical considerations to social VR include privacy, a significant issue in today's social media platforms. Several new privacy issues must be considered for social VR, such as the platform's ability to record eye-tracking, body movement, and user interaction data. This data can be used to identify users' personal identities and be sold for commercial use [8].

Both educators and students face a learning curve when using the hardware and software. In addition to understanding the technology, even though stand-alone devices are individually priced at a consumer level, buying them for a classroom of 20 is cost-prohibitive for most schools [8]. Social VR is predominantly visual interaction; the accessibility options for all students need to be increased and developed to be multimodal. Some platforms are integrating accessible features but work still needs to be done.

6 Future Directions

The future of social VR in education is filled with possibilities, driven by technological advancements and evolving pedagogical needs. Emerging trends, such as the integration of artificial intelligence (AI), offer the possibility of personal learning experiences in which virtual mentors or AI-driven avatars adapt to individual student needs. Additionally, innovations in haptic feedback and multisensory VR environments will likely enhance immersion and engagement. In addition, developments in cross-platform interoperability will make social VR more accessible and inclusive for diverse educational contexts.

For educators interested in exploring social VR, beginning with small pilot projects is essential for effectively integrating it into their classrooms. This approach allows students to experiment and develop their skills in navigating virtual spaces before scaling up. Moreover, it's crucial for educators to align VR activities with clear learning objectives to ensure that the technology enhances educational outcomes rather than causing distractions. Educators should also provide students with structured guidance and opportunities for reflection to help them engage critically with the virtual experience. By incorporating debriefing discussions or written reflections, students can connect their VR experiences to course concepts, thereby enhancing their comprehension retention.

Looking ahead, social VR has the potential to transform education by bridging geographic divides, enabling global collaboration, and fostering previously unimaginable experiential learning opportunities. By embracing best practices and remaining attentive to emerging technologies, educators can leverage the full potential of social VR to create engaging, inclusive, and future-ready learning environments.

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