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Insights into College Students' Experiences and Expectations for VR Integration in Education

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Abstract. Despite the increasing accessibility of Virtual Reality (VR) technology in recent times, its adoption in educational settings mirrors that of other emerging technologies. User experiences and readiness play pivotal roles in the successful integration of new technologies within educational environments. Drawing from a prior investigation into college students' preparedness for VR integration in education, this study endeavors to dissect the nuances of user experiences and reactions following immersive engagement and completion of VR tasks. We conducted a study involving four college students who participated in a one-hour VR session. During this session, participants engaged in a range of VR tasks and subsequently took part in semi-structured interviews. We utilized content analysis to examine patterns of users' experience and expectations. The analysis of audio and video recordings from the VR sessions, along with transcripts of interviews, revealed a noteworthy finding: irrespective of their individual levels of prior experience with VR, students held comparable expectations regarding the potential of VR technology within an educational framework. Specifically, the students expressed a consensus that instructor guidance is a crucial component for successful VR implementation in educational settings, leading to the indication of an increased confidence level in successful VR task completion. Taking the insights from this iLEAD paper, further investigation into the challenges of adopting VR technology in education is necessary to streamline its effective and efficient utilization, thereby facilitating learning, retention, and the transfer of knowledge.

Keywords: VR Immersion, User Experience, VR Readiness.

1 Introduction

Virtual reality (VR) is a distinct technology that has surged to the forefront of the entertainment industry. This cutting-edge innovation is not only reshaping the entertainment sector but is also poised to revolutionize higher education, offering unprecedented potential to transform teaching and learning methods [1].

By providing immersive experiences, VR offers unique educational opportunities that eliminate the need for extensive travel or resources. Therefore, students can readily embark on virtual visits to distant locations and conduct experiments in a virtual laboratory [2, 3]. Moreover, VR experiences transcend physical limitations, enabling individuals to explore other planets, journey through historical periods, and interact with magnified models of microscopic objects [3, 4].

These hands-on approaches to learning actively engage students and support cognitive development, resulting in increased classroom engagement and better retention [5] and improve overall learning outcomes by reducing cognitive load, promoting higher engagement, and enhancing memory recall, particularly in complex subjects like science, technology, engineering, and mathematics (STEM) [2]. The tools also provide feedback to both students and educators, allowing for the adjustment of individual learning objectives to ensure students reach their full potential and minimize the number of students falling behind [6].

Considering the benefits and potential use cases of VR technologies, it is clear that the future of instructional practices lies in their implementation. Therefore, our research team aimed to assess the level of familiarity and readiness among college students regarding these technologies and their potential in educational applications. Specifically, we sought to understand the students' familiarity, experience, and readiness to integrate such technologies into instructional practices. While shedding light on students' VR readiness in an educational context, we recognize the need to delve into nuanced experiences and reactions during the use of VR and how these might impact perceptions of using VR in educational settings, as well as the necessity to better adopt this technology in instructional environments.

2 Methods

Following our survey study [7], we contacted students who had shown interest in VR sessions and organized hour-long immersive experiences for those willing to participate. We arranged four different one-hour time slots, accommodating three undergraduate and one graduate student from a STEM-focused southern university in the US. Among them, two were inexperienced in VR and expressed a low level of confidence in using VR headsets and controllers, while the other two were experienced with VR and demonstrated more than moderate confidence in their VR skills. The participants' level of experience was assessed by calculating the average scores from items about both their usage frequency (ranging from never to daily) and familiarity (ranging from not at all familiar to extremely familiar) with various VR devices (such as MetaQuest and Oculus), their general experience with VR, their experience with VR in educational settings, their engagement with VR games and videos, and their participation in online and collaborative activities using VR. Students identified as “inexperienced” scored below 2.15 on both the usage and familiarity scores, which were rated on a scale from 1 to 5. Conversely, experienced students scored above 3.10 on both measures.

Prior to the scheduled VR sessions, participants were provided with proper instructions to review the required VR controller guide and a sample gameplay video of a Rec Room game called “Crimson Cauldron”, along with an optional Rec Room tutorial video. During these VR sessions, participants engaged in a series of activities. Firstly, they completed a tutorial of an app called Rec Room, followed by adding a friend, engaging in multiplayer gameplay (specifically, playing Crimson Caldron), and finally, undertaking a drawing task in GTRecRoom within Rec Room. The app and its related tasks were selected intentionally to capture the types of affordances that students commonly encounter in an educational VR environment.

Subsequent to the completion of these tasks, semi-structured interviews were conducted to delve into participants' experiences. These interviews covered various aspects, including their likes and dislikes, expected and unexpected occurrences, encountered challenges and difficulties, any physical or mental discomfort experienced, their confidence levels in using VR, comfort levels, and expectations regarding the adoption of VR in education. Researchers utilized video, audio, and screen recordings of the sessions, which were later transcribed and analyzed to identify common patterns and themes among the users, as well as any distinctions or differences observed. Guided by content analysis, we triangulated these different data sources to draw insights into the participants’ experiences and expectations towards the usage of VR in educational settings.

3 Findings and Implications

One of the findings highlighted that participants' prior VR experiences and their confidence in using VR headsets and features didn't significantly alter the difficulty of given tasks. Instead, these factors subtly shaped their overall confidence in navigating the virtual realm. Throughout the virtual journey, both experienced and inexperienced participants encountered a common challenge, such as grappling with spatial awareness and recognition. From the initial tutorial to subsequent activities, this shared struggle underscored the universal nature of certain VR challenges when navigating a new application.

Remarkably, despite variations in experience levels, the time taken to complete tasks exhibited little correlation with participants' confidence or expertise. Even among beginners, who grappled with adjusting to controllers and the VR interface, task completion times remained consistent, hinting at the diverse exploration styles each participant brought to the virtual world. The researchers observed that inexperienced participants spent the majority of their time trying to figure out how to navigate during the tutorial and didn't attempt many of the activities that could have been helpful for subsequent tasks. In contrast, experienced users noticed these interaction opportunities and took their time to enjoy and practice the movements before completing the tutorial.

When evaluating participants' confidence levels, it was found that despite rating task difficulty moderately, novices demonstrated surprisingly strong confidence in using VR. In contrast, experienced users, although

encountering similar task challenges, displayed significantly higher confidence levels, underscoring the resilience developed through repeated engagement with VR.

Another key insight we can highlight is the importance of incorporating a variety of interactive components within VR applications to enhance overall immersion and interest for participants. Participants repeatedly cited interactive and immersive components as the most enjoyable aspect of the session, elevating their VR experience. For example, Participant 1, a novice, favored using the bow and arrow in "Crimson Cauldron," while Participant 2, experienced in VR, appreciated the tactile feedback while drawing in GTRecRoom, stating, "It had some vibrating interaction when touching the board to draw, making it easier." However, participants also noted room for improvement in the interactivity of VR devices and applications to better simulate real-world senses. Participant 4 expressed a desire for more interactive controls, stating, "The controls – they were not as interactive as I would have liked."

Lastly, our analyses revealed that providing clear instructions and assistance can effectively guide students in educational settings to develop initial or further interest in adopting VR technology, thus expanding its usage in daily activities. When we asked participants about their confidence levels with instructor assistance during VR use in a classroom setting, all indicated increased confidence scores. For instance, Participant 1 rated their confidence level as 2 (out of 5) without assistance and 3 with assistance. Furthermore, researchers observed that participants found reaching for certain objects and spatial awareness challenging to adjust to. As a result, separate instruction had to be provided for tasks such as picking up objects like a ball.

In conclusion, our findings underscore the pivotal role of clear instructions and instructor assistance in fostering student confidence and interest in VR technology within educational environments. By addressing challenges such as spatial awareness and object interaction through tailored guidance, we can pave the way for broader adoption and integration of VR into educational activities. These insights illuminate the pathway toward maximizing the potential of VR as a powerful educational tool poised to revolutionize learning experiences for students across diverse settings.

Further studies could replicate this study with a larger sample size to assess the consistency of the observed findings. Moreover, building on the insights gained from this study, future research endeavors could explore the nuanced impacts of instructor assistance and structured guidelines in facilitating students' completion of VR tasks aimed at achieving specific learning goals, thus potentially enhancing their overall learning performance.

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