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Evaluating VRChat Usability in Desktop Mode: A Student-Led Case Study on Social VR Platforms

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Abstract

Social virtual reality (Social VR) platforms such as VRChat have become prominent spaces for online interaction, yet academic research has focused predominantly on head-mounted display (HMD) experiences. This neglects the desktop mode, which accounts for a majority of VRChat's users. This study investigates the usability of VRChat's desktop mode from the perspective of undergraduate students, addressing three research questions: (1) How do students perceive its usability? (2) What challenges or limitations do they encounter? (3) What improvements could enhance user satisfaction? Eighteen students from Software, Computer, and Mechatronic Engineering participated in a structured usability test comprising ten core tasks (e.g., avatar creation, world navigation, friend addition, and object interaction). Data were collected through demographic questionnaires, post-test surveys, and detailed researcher observation notes. Quantitative results revealed high ratings for visual design and enjoyability but lower scores for learnability, security, and error handling. Qualitative findings indicated recurring barriers in navigation, avatar customization, friend adding, and object manipulation, compounded by performance issues such as low FPS and lengthy loading screens. Participants valued the platform's creative and social potential, yet reported frustration with unclear menus, limited onboarding, and inconsistent interaction feedback. The results contribute to the underexplored domain of desktop-mode Social VR usability, complementing prior desktop VR research. Recommendations include improved in-app guidance, streamlined menu design, more accessible avatar customization, and optimization for non-VR hardware. These findings offer actionable insights for developers and inform the design of accessible, engaging Social VR experiences beyond HMD-centric paradigms.

***Keywords*:** Social VR, VRChat, desktop mode, usability evaluation, user experience, virtual environments

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1. Introduction

Social Virtual Reality (Social VR) platforms such as VRChat offer immersive, interactive environments that support socialization, collaboration, and creative expression. As a prominent example of the emerging metaverse, VRChat enables users to interact within diverse virtual worlds, customize avatars, and engage in synchronous activities across geographical boundaries. While most of the usability research on Social VR platforms has concentrated on immersive headset-based experiences[1,2,3], a substantial proportion of users access these environments through desktop mode, a non-VR interface that substitutes keyboard-and-mouse controls for motion-tracked input.

Desktop mode introduces distinct usability considerations. It modifies core interaction patterns, changes navigation efficiency, and may alter perceived immersion and accessibility. These differences can affect onboarding, task completion, and user satisfaction, particularly for

novice users. Despite its significance for broadening access to Social VR, desktop mode remains largely underexplored in existing literature. Understanding its specific usability characteristics is critical for improving inclusivity and optimizing design for non-headset users. This study addresses this gap by evaluating the usability of VRChat in desktop mode through a student-led case study conducted within a Human–Computer Interaction (HCI) course. Undergraduate students acted as both test users and researchers, following a structured usability testing protocol across ten core interaction tasks, including avatar creation, world navigation, and social interaction. Data were collected through demographic surveys, post-test usability ratings, and researcher observation notes. The study is guided by three research questions:

1. How do students perceive the usability of VRChat's desktop mode?
2. What challenges or limitations do students experience while using VRChat in desktop mode.
3. What improvements can be made to VRChat's desktop mode to enhance user satisfaction?

By focusing on desktop mode, this research contributes practical insights for platform designers, educators, and researchers, offering recommendations that can enhance both VR and non-VR access to Social VR environments.

2. Background

2.1. Social VR and VRChat

Social VR platforms enable users to interact in real-time within three-dimensional, persistent, and often user-generated environments. Unlike traditional online communication tools, Social VR supports a heightened sense of presence through customizable avatars, spatial audio, and embodied gestures [4]. VRChat is one of the most widely adopted of these platforms, providing an extensive library of worlds, tools for avatar creation, and cross- platform accessibility via VR headsets or desktop computers. Research has shown VRChat's applicability for remote collaboration [5], virtual events [6], and creative social expression [7]. However, most studies emphasize VR headset usage, leaving desktop-mode experiences comparatively underexplored.

2.2. Desktop Virtual Reality in Educational and Social Contexts

Desktop virtual reality (desktop VR) refers to immersive environments experienced through a standard monitor, keyboard, and mouse, without specialized VR hardware. Several studies have highlighted that desktop VR can be more accessible, cost-effective, and less prone to simulator sickness than head-mounted display (HMD) VR, while still supporting spatial understanding and engagement [2,8]. For example, [1] demonstrated that desktop-based Social VR can support group learning activities effectively, although interaction fidelity and immersion may be lower than in VR headset mode. Similarly, [9] compared desktop-based VR social platforms to video conferencing in higher education, finding advantages for engagement and user experience.

These findings suggest that desktop VR is a viable modality for collaborative and educational applications but also highlight a need for dedicated usability research in platforms like VRChat where non-VR users constitute a large fraction of the user base.

2.3. Usability Considerations in Virtual Environments

Usability in virtual environments encompasses factors such as learnability, efficiency, memorability, error prevention, and user satisfaction [10]. Studies in VR interface design [11,12] have identified common challenges, including non-intuitive navigation, inconsistent interaction feedback, and insufficient onboarding guidance. Desktop- mode VR introduces additional considerations: the absence of physical embodiment via motion controllers, reliance on keyboard–mouse input, and potential interface scaling issues for two-dimensional screens.

These factors can influence both user performance and perception of the environment's usefulness and enjoyment.

Research also points to gaps in error handling and task efficiency for desktop VR users. For example, [13] found that even well-designed desktop VR applications for training scenarios required clearer affordances and guidance to reduce user confusion. Applying such insights to Social VR platforms can inform improvements that make them more inclusive for non-HMD users.

2.4. Identified Gap

Although VRChat is among the most widely used Social VR platforms, there is little empirical evidence documenting the usability experience of its desktop mode, particularly for new users in an educational context. Existing Social VR studies (e.g., [1,5]) typically center on immersive VR or treat desktop mode as a peripheral comparison, without systematically examining the specific interaction, navigation, and performance challenges it poses. Given that approximately 70% of VRChat users access the platform through desktop mode, understanding and improving this experience is both a research and design priority.

3. Methodology

This study employed a task-based usability evaluation within a naturalistic educational context. The evaluation was conducted as part of a Human–Computer Interaction course, where undergraduate students acted as both test participants and peer researchers. The design combined quantitative (post-test survey ratings) and qualitative (observation notes, open-ended comments) data to address the three research questions.

3.1 Participants

Eighteen undergraduate students from Çankaya University participated voluntarily. The sample included 12 males (66.7%) and 6 females (33.3%), aged between 17 and 24 years (M=22). Participants were enrolled in Software Engineering (n = 10, 55.6%), Computer Engineering (n = 6, 33.3%), or Mechatronic Engineering (n = 2, 11.1%). Half were in their 4th year of study (n = 9, 50%), nearly as many were in their 3rd year (n = 8, 44.4%), and one was a 1st-year student (n = 1, 5.6%).

Prior VRChat use was rare (n = 1, 5.6%), though over half (n = 10, 55.6%) had used other VR/AR applications or games. Five participants (27.8%) reported experience coding 3D applications, and the majority (n = 17, 94.4%) expressed liking computer games. The evaluation protocol included ten predefined interaction tasks designed to cover core VRChat functionalities.

3.2 Materials

Hardware & Software:

- Standard monitor, keyboard, mouse in desktop PCs
- Steam platform for application installation and access
- VRChat desktop version (via Steam)

Instruments:

- Participant Consent Form
- Demographic Information Form
- Task List (see section 3.4) comprising 10 predefined VRChat actions
- Post-Test Survey with 16 usability dimensions rated as Good, Fair, or Bad, plus an open-ended comment section
- Observation Notes Form for peer researchers to record behaviors, difficulties, and emotional responses during the test.

3.3 Procedure

Pre-Test Setup: Participants installed Steam, created an account, added VRChat to their library, and launched it using their Steam credentials. They then completed the demographic information form.

Usability Tasks: Participants performed ten VRChat desktop-mode tasks in sequence:

- Create an avatar
- View self in a mirror
- Sit on a chair/sofa
- Visit another world (via portals or the Worlds menu)
- Use the microphone to speak to nearby users
- Add a friend
- Change avatar (full or partial modification)
- Take a front/rear photo
- Return to the default home environment
- Retrieve a pen and draw their name

Participants were instructed to think aloud while performing the tasks.

Observation: A peer researcher observed each participant, recording notes on task performance, visible confusion, errors, coping strategies, and emotional reactions.

Post-Test: Upon completing the tasks, both the participant and the researcher filled out the post-test survey, with the participant providing ratings and comments, and the researcher documenting observed behaviors.

4. Data Analysis

Quantitative data from the post-test survey were summarized as frequency distributions for each usability dimension. Qualitative data from observation notes and open-ended survey responses were analyzed using thematic coding, identifying recurring patterns related to navigation, interaction mechanics, system feedback, performance, and user engagement. These results were then mapped to the three research questions to triangulate findings.

5. Results

A total of 18 students participated in the study as users, supported by 26 student researchers responsible for guiding sessions, observing interactions, and collecting qualitative data.

Table 1 presents the demographic breakdown of the user participants. The majority were male (66.7%), aged between 20 and 22 years (66.7%), and enrolled primarily in Software Engineering (55.6%). Almost all participants (94.4%) had no prior experience with VRChat, although 38.9% reported previous use of other VR/AR applications. Only 16.7% had prior 3D coding experience, but 94.4% expressed enjoyment of computer games.

5.1. Quantitative Findings

Post-test survey ratings covered 16 usability dimensions. Responses were coded on a three-point scale (Good, Fair, Bad). Figure 1 and Table 2 summarize the results.

Key trends:

- Strengths: “Enjoyable” (12/18 rated Good), “VR visual design” (10/18 Good), and “Avatar–avatar interaction” (9/18 Good) received the most positive ratings.
- Weaknesses: “Learnability” and “Memorability” received good ratings from only 5 and 6 users respectively, with many markings them as Fair or Bad.
- Interaction with environment was rated Good by only 7 users, suggesting limited intuitiveness in object manipulation.
- Error prevention and Error tolerance were consistently low rated, indicating inadequate

system feedback and recovery mechanisms.

- Efficiency and Effectiveness had mixed ratings, with approximately half of users marking them as Fair.

Variable	Category	n	%
Gender	Female	6	33.3%
	Male	12	66.7%
Age	17–19	2	11.1%
	20–22	12	66.7%
	23–24	4	22.2%
Department	Software Engineering	10	55.6%
	Computer Engineering	6	33.3%
	Mechatronics Engineering	2	11.1%
Academic Year	1st	1	5.6%
	3rd	9	50.0%
	4th	8	44.4%
Prior VRChat experience	Yes	1	5.6%
	No	17	94.4%
Prior VR/AR experience	Yes	7	38.9%
	No	11	61.1%
3D coding experience	Yes	3	16.7%
	No	15	83.3%
Enjoy computer games	Yes	17	94.4%
	No	1	5.6%

Table 1. Paticipant Demographics.

Usability Dimension	Good (%)	Fair (%)	Bad (%)
Avatar appearance	44.4	44.4	11.1
Usability of avatar actions/moves	44.4	44.4	11.1
Avatar–environment interaction	38.9	50.0	11.1
Avatar–avatar interaction	44.4	44.4	11.1
Viewable area in the app	44.4	44.4	11.1
VR visual design (colors/creativity)	50.0	38.9	11.1
Learnability of VRChat	27.8	55.6	16.7
Memorability of VRChat	44.4	38.9	16.7
Efficiency (time/effort/steps)	38.9	44.4	16.7
Effectiveness (compatibility w/ purpose)	44.4	38.9	16.7
Enjoyable	55.6	33.3	11.1
Security	11.1	55.6	33.3
Error prevention	22.2	55.6	22.2
Error tolerance	27.8	50.0	22.2
Readability	38.9	44.4	16.7
Usefulness	38.9	50.0	11.1

Table 2. Participant ratings for VR Chat desktop mode usability (n=18)

The mid-range dimensions, such as avatar–environment interaction and efficiency, suggest that while core interactions were functional, they often lacked polish or intuitiveness. This pattern indicates that first impressions are driven by aesthetics and social novelty, but long-term satisfaction may be hindered by gaps in guidance, reliability, and perceived safety.

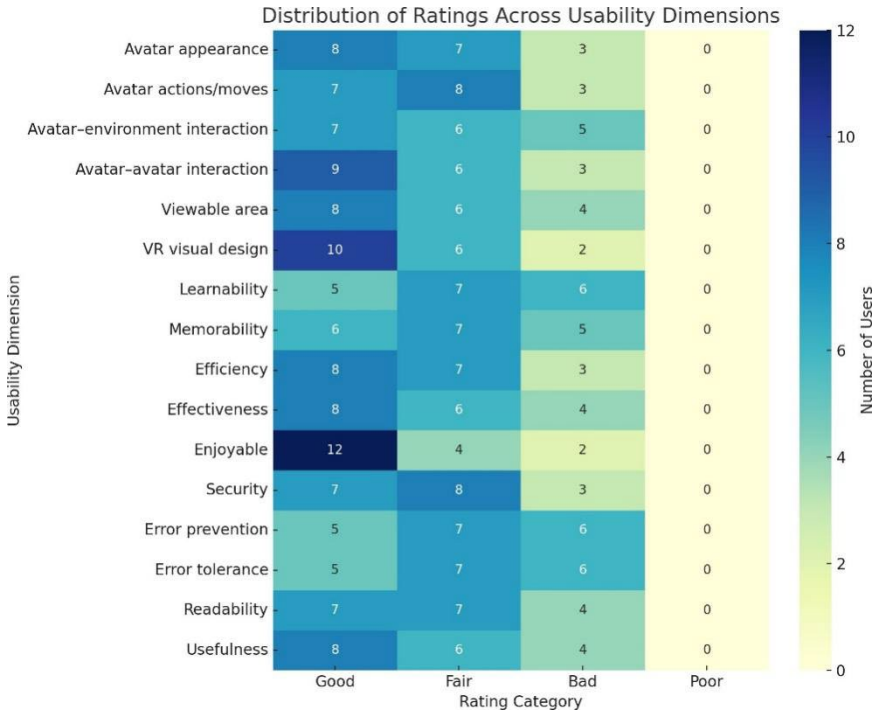

Fig. 1. Ratings Distribution Heatmap

5.2. Qualitative Findings

Thematic analysis of observation notes, think-aloud comments, and post-test survey responses revealed five recurring themes that encapsulate the most prominent usability issues encountered by participants during the task-based evaluation of VRChat. These themes are presented below, with representative user quotes and observer notes to illustrate each finding (see Table 3).

Theme 1 Navigation and Menu Complexity Participants frequently struggled to locate features such as avatar creation, friend-adding, and returning home. Observation notes highlighted confusion over menu labeling, lack of shortcuts, and unclear or hidden icons (e.g., disappearing mouse cursor). Many users relied on trial-and-error or assistance from other avatars to complete tasks.

- "There is nothing showing how the quick menu is opened, so the user has to try, which wastes time and reduces interest".
- "Adding friend is very bad, menus are confusing and not clear".
- "It takes a little time to learn navigating through the menus".

Theme	n	%
Navigation/Menu Complexity	28	30.1%
Learnability/Memorability Challenges	20	21.5%
Performance/Optimization Issues	18	19.4%
Avatar Customization Limitations	15	16.1%
Positive Social Interaction	12	12.9%
Total	93	100%

Table 3. Frequency of researcher observation themes

Theme 2 Avatar Customization Limitations While the overall appearance of avatars was appreciated, over half the participants noted limited customization options and difficulty accessing relevant menus. The absence of part-by-part modification guidance led to frustration

and reduced engagement in early tasks. Several participants abandoned customization after repeated failed attempts or sought in-world assistance.

- "I couldn't find where to adjust features like hair change or costume change."
- "Creating characters is not easy."
- "I couldn't find the feature to change avatar part by part."

Theme 3 Performance and Optimization Issues Long loading times, occasional frame rate drops, and delayed environment rendering disrupted the task flow and diminished user engagement. Observers recorded boredom or distraction during loading sequences and frustration when actions were delayed, or worlds failed to render smoothly.

- "Due to too many loading screens, the user is distracted, and interest is reduced."
- "I was bored while waiting for another world to load."
- "FPS and graphics are bad, and character movement should be smoother."

Theme 4 Positive Social Interaction Features Despite technical and usability challenges, many participants valued moments of social interaction, especially when receiving guidance or collaborating to complete tasks. The friendliness of other avatars enhanced immersion and sense of presence.

- "Being able to communicate with people from other parts of the world made me happy and amused."
- "One player accepted my friend request very quickly and went alongside me to show his avatar."
- "Socializing is good."

Theme 5 Learnability and Memorability Challenges New users often required multiple attempts to discover how to perform basic actions such as using the pen, taking photos, or navigating portals. Some tasks lacked persistence in memory once learned, they were not easily recalled, particularly for infrequent interactions. Observation notes captured recurring difficulties with pen/stylus use (misaligned input, disappearing text), unintuitive sitting/standing mechanics, awkward camera handling, and reduced micro- phone clarity in crowded spaces.

- "Users must rely on trial-and-error learning due to insufficient guidance, potentially leading to frustration and disengagement."
- "It was difficult to write with the pen; it didn't write where I was pointing."
- "It's not memorable; I felt lost without equipment."

6. Discussion

This study provides an in-depth, student-led, task-based evaluation of VRChat's usability, revealing both strengths and critical areas for improvement. By combining quantitative ratings with qualitative insights from novice users, the findings enrich the understanding of Social VR usability from a perspective that has received limited attention in prior research.

6.1. Comparison with Existing Literature

The present findings corroborate and extend prior research on social VR usability, with particular emphasis on desktop-based interaction modes. Earlier work has shown that desktop interfaces can offer advantages over HMDs in terms of task efficiency and reduced physical strain, albeit at the expense of immersion [2,8]. In this study, participants were able to complete core interaction tasks in VRChat's desktop mode; however, the consistently low ratings for learnability, error prevention, and error tolerance suggest that discoverability and recovery remain significant challenges for novice users. These findings align with usability constraints

identified in virtual-world assessment tools such as the Virtual Reality System Usability Questionnaire [12] and the VRSUQ framework [14], but they diverge from HMD-focused studies in which physical comfort and simulator sickness have been more prominent usability concerns [15].

Positive social affordances, including peer assistance and spontaneous collaboration, were widely noted by participants, echoing the educational and engagement benefits documented in studies of social VR for collaborative learning [1,9]. The present work contributes novel, task-level evidence illustrating how these social dynamics can partially offset interface-related difficulties during onboarding and navigation.

Such detailed observations e.g., difficulty accessing quick menus, customizing avatars, and navigating between worlds are not extensively reported in existing classroom-based VR studies, which often focus on general perceptions rather than task-specific barriers.

Performance-related issues, including extended loading times and frame rate instability, were also identified as major detractors from engagement. While technical constraints have been acknowledged in earlier VRChat research [5,15], the results highlight their tangible effect on flow and task success in an educational usability testing context. Finally, participants' reliance on in-world peer guidance reflects interactional patterns noted by [16], reinforcing the role of social scaffolding as an important, if informal, facilitator of usability in complex virtual environments.

This study confirms that the educational potential of desktop-based social VR is tempered by persistent usability deficits that can limit novice adoption. By situating these task-specific findings within the broader literature, the work provides actionable insights for refining interface design and onboarding strategies to better support both first-time and sustained engagement in academic contexts.

6.2. Novel Contributions

This research offers several distinctive contributions to the study of Social VR usability: Existing Social VR studies overwhelmingly privilege immersive HMD use, leaving the desktop experience largely undocumented despite accounting for an estimated 70% of VRChat's user base. This study addresses that gap through a structured, empirical assessment, establishing a new reference point for non-immersive VR usability research.

The study operationalizes a student-as-researcher model within a Human–Computer Interaction course, combining pedagogical objectives with authentic research outcomes. This dual framework provides both a methodology for data collection and a replicable template for embedding real-world usability testing in academic curricula.

The combination of 16-dimensional post-test surveys, think-aloud protocols, and direct observational coding allowed for a deep analysis of task-specific pain points (e.g., navigation, avatar customization, performance issues) and positive affordances (e.g., social interactions). This methodological integration strengthens internal validity and offers a richer dataset than self-report alone.

Findings directly inform interface design and onboarding processes for VRChat's desktop mode, while remaining transferable to other non-immersive social VR environments. The recommendations are grounded in both quantitative usability ratings and qualitative behavioral observations, enhancing their practical relevance.

By merging experiential student learning with the generation of publishable-quality research, the study demonstrates how academic settings can serve as productive environments for applied HCI investigations, benefiting both educational practice and industry application.

6.3. Design Implications for Social VR Platforms

The findings from this study highlight several targeted design implications for enhancing usability in desktop-mode Social VR environments, particularly VRChat:

The observed difficulties in locating core functions (e.g., avatar creation, friend- adding, returning home) underscore the need for a more intuitive and context-sensitive menu system. Implementing persistent visual cues, descriptive tooltips, and customizable quick-access panels could reduce reliance on trial-and-error exploration.

While avatar appearance is a central feature of user identity in Social VR, the desktop interface lacks intuitive pathways for granular customization. Step-by-step onboarding for avatar editing, in-menu search functions, and visual previews before applying changes could increase engagement and reduce abandonment rates.

Performance-related interruptions such as long loading times and inconsistent frame rates disrupted immersion and task flow. Social virtual environments should implement background preloading, low-latency world transitions, and progress indicators with engaging micro-interactions to sustain user attention during unavoidable delays.

Learnability challenges, particularly for infrequently used features (e.g., pen tools, camera functions), suggest the value of in-situ, on-demand micro-tutorials. These could be triggered contextually upon first use or after a prolonged period of inactivity, ensuring features are discoverable and memorable without requiring external guides.

Current Social VR design often prioritizes VR headsets, with desktop mode treated as a secondary experience. Equitable design should ensure that desktop users have access to optimized interaction mappings, clear visual affordances, and parity in social engagement opportunities to mitigate platform stratification.

Positive social encounters were key moments of enjoyment and engagement. Design mechanisms such as easy friend-request workflows, mutual activity suggestions, and safe-zone social hubs could further promote collaboration and community building without imposing cognitive overload.

By addressing these design implications, Social VR platforms can expand accessibility, enhance engagement, and support diverse user modalities, ultimately improving adoption and sustained participation across different hardware configurations.

6.4. Educational Implications

The findings of this study extend beyond platform-specific design considerations and offer valuable insights for integrating Social VR into educational contexts. Several implications emerge:

Scaffolded Usability Training in HCI and Interaction Design Courses: The student-led approach demonstrated that immersive usability testing can serve as a highly effective pedagogical tool for teaching usability evaluation methods. Consistent with findings by [17] on the social affordances of VR, engaging students in structured, task-based evaluations encourages deeper reflection on both interface design and user experience measurement.

Development of VR Literacy Skills: Students' varied familiarity with VR technologies mirrors observations from [18], who emphasized the importance of early exposure to usability and performance evaluation frameworks for VR systems. Incorporating VR usability assessments into curricula helps future practitioners develop not only technical competencies but also empathy for end users navigating novel interaction paradigms.

Bridging Theory and Practice through Experiential Learning: The project exemplifies how experiential learning aligned with Kolb's learning cycle [19] , can reinforce theoretical concepts from usability, human–computer interaction, and user re-search methods. By performing both user and researcher roles, students gain a holistic understanding of task design, observation, data analysis, and reporting, paralleling pedagogical models in active learning literature.

Preparation for Cross-Modal Design Challenges: The desktop-mode context foregrounded design limitations and affordance mismatches that may not be apparent in headset-based VR. This aligns with calls in VR education research to expose students to

multiple interaction modalities, enabling them to design inclusive systems that accommodate diverse hardware access.

Incorporating Social VR usability testing into educational programs not only strengthens students' methodological skills but also enhances their adaptability to emerging immersive technologies an increasingly vital competence in both academic and professional domains.

7. Conclusion

This research conducted a systematic, student-led usability evaluation of VRChat in desktop mode, providing empirical insights into interaction, navigation, and social engagement within virtual environments. The evaluation, grounded in a structured task protocol and triangulated through participant surveys, observation notes, and task flow analyses, revealed five dominant usability themes: navigation and menu complexity, avatar customization limitations, performance and optimization issues, positive social interaction affordances, and learnability/memorability challenges.

By isolating these themes within the context of desktop-based interaction, the study contributes a nuanced perspective often absent from VR usability literature, which predominantly focuses on headset-based experiences. This distinction is critical, as the interaction modality directly influences onboarding requirements, interface accessibility, and overall user engagement. The findings underscore the need for improved onboarding processes, streamlined menu architectures, enhanced customization pathways, and performance optimization to ensure equitable usability across both VR and non-VR configurations.

From an educational standpoint, the study demonstrates that immersive, real-world usability projects can serve as powerful pedagogical tools in Human–Computer Interaction curricula. The dual role of participants as both evaluators and users facilitated reflective learning and enhanced methodological competence aligning with prior research that advocates experiential, task-based learning for skill development in usability engineering.

Future research should extend this investigation to compare headset and desktop modes directly, examine longitudinal retention of usability skills among student evaluators, and explore demographic factors influencing task performance and social engagement. By bridging empirical usability research with educational application, this study advances both the understanding of Social VR platform design and the preparation of the next generation of usability practitioners.

8. Limitations

First, testing was conducted only in desktop mode, limiting insights into immersive headset-based experiences where interaction and social presence may differ.

Second, participants were undergraduate HCI students, providing novice-user perspectives but reducing generalizability to broader or more diverse user groups.

Third, data were collected from single-session interactions, restricting analysis of long-term learning curves and adaptation effects.

Fourth, performance issues (e.g., loading delays, frame rate drops) were assessed through user perception rather than instrumented system metrics.

Future research should compare desktop and headset use, include varied participant profiles, and incorporate controlled performance measurements over extended periods.

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Authors' Declaration

Conflicts of Interest: The author declares that there is no conflict of interest regarding the publication of this paper.

Authors' Contribution Statement

The author was solely responsible for the conception and design of the study; the design of the data collection process; supervision and conduct of the data collection sessions; ensuring ethical approval and data integrity; and the analysis and interpretation of the data.

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