

# User Perception and Behavior on Social VR: a Case Study on Mozilla Hubs

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## Abstract

Mozilla released a Social VR platform named Mozilla Hubs in April, 2018, and there has been little usage amongst college students regarding this platform compared to popular Social Networking Services (SNS). Social VR platforms are unique as they enable users to have a spatial online presence that is different to the flat presence powered by SNS platforms such as Facebook. The usage of Social VR has potential to give birth to innovative thinking and reduce carbon footprints; these hallmarks render Social VR as a suitable means for team collaboration amongst college students. Then, how do we democratize Social VR? This study aims to suggest means to achieve this research goal by researching user perceptions and behavior on Social VR by analyzing the user perceptions and behavior of Mozilla Hubs in the context of team collaboration amongst college students.

## Keyword

Social VR, Virtual Reality, Mixed Reality, Team Collaboration, College Students, Mozilla Hubs

## 1. Introduction

### 1.1. Social VR

What is Social Virtual Reality (VR)? Social VR "represents a growing set of multiuser applications that enable people to interact with one another in virtual space through VR head-mounted displays (HMDs)" and is shaped by ample research on collaborative virtual environments (CVEs) and social play [1, 2, 3, 5]. Despite the fact that there are multiple platforms available such as "VRChat, Rec Room, AltspaceVR, High Fidelity, Facebook Spaces, Anyland, and Mozilla Hubs," the usage of such spaces are meager compared to popular SNS [4]. According to Steam Charts and Statista, VRChat has approximately 6,000 players per month while Facebook has approximately 2.4 billion users per month as of 2019.

This paper aims to gather and analyze the user perception on Social VR platforms to understand

why there are comparatively lower amounts of users within the realms of Social VR.

The research procedures and outcomes of the study are the following:

- Collect user perception of Social VR
- Identify patterns in user behavior in Social VR
- Suggest useful usages of Social VR

## 2. Methods

A survey and interviews were conducted from November 2nd, 2019 to November 21st, 2019, with the purpose of collecting data to investigate VR user perceptions and observing the user behaviors in Social VR.

### 2.1. Survey

A survey via Google forms was conducted on 145 people to learn about user perceptions on Social VR.

### 2.2. Recruiting

A total of 10 participants, 6 females and 4 males, that are first time Social VR users were interviewed in the Republic of Korea. The participants were comprised of college students and one high school student. College students were mainly recruited since colleges are an apt place to utilize Social VR for team collaboration as team collaboration is promoted and often required to be conducted by classes and student organizations. Backgrounds of the participants were diversified based on majors, age, purposes of team collaboration, and devices that they use in order to learn how disparate demographic groups with different environment settings perceive and behave in Social VR.

### 2.3. Interview Procedures

5 interviews were conducted in total. There were 3 individual interviews, 1 group interview of 2 design college students, and 1 group interview of 4 college students from diverse majors with the purpose of conducting a team meeting in the context of Social VR. The first 6 interviews were approximately 15 minutes long while the last interview with 4 participants was 60 minutes long to thoroughly

capture the user behaviors of collaborating with team members in Social VR.

### 3. Findings

The following was able to be found through the interviews that were conducted.

#### 3.1. Survey Results

Table 1. % of those who have heard about Social VR

Q1. Have you heard about Social VR before?	
Yes	No
23.4%	76.6%

Table 2. % of those who have used Mozilla Hubs before

Q2. Have you used Mozilla Hubs before?	
Yes	No
4.8%	95.2%

Table 3. % of those who is interested in Social VR

Q3. Would you be interested in using Social VR?	
Yes	No
51.7%	48.3%

Table 4. 3 main reasons for those who said “No” to Q3.

I do not feel the need.
58.5%
I have never heard of it before.
18.3%
I do not want to buy a VR headset.
12.2%

Despite the fact that most of the participants of the survey have not heard about Social VR, and nearly the entirety of the participants have not used Mozilla Hubs before, more than half of the participants were interested in using Social VR.

Those who responded that they are not interested in using Social VR in the future expressed that the main reason why they are not interested in using it for the future is because they do not feel the need of using Social VR. The second popular reason for not choosing to use Social VR in the future was because they have never heard of it, which means that they would not choose to use the platform because it is unfamiliar. The third popular reason was the unwillingness to purchase a VR headset in order to access Social VR, which is a misconception since

Mozilla Hubs does not require additional equipment other than a web browser to access the platform.

#### 3.2. Misconception of Space

It was interesting to note that users experienced a common pain point, which is the misconception of space.

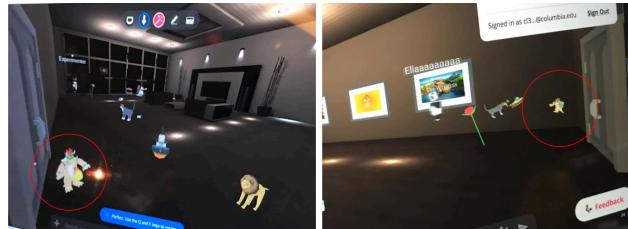


Image 1 (Left) Screen of Participant (Right) Screen of Researcher

When participants learned that they could place items across the virtual space, most of the participants started placing items the moment they learned about this function. Most of the participants aimed to place items on the floor or on the furniture. However, none succeeded on the initial attempt because there are no shadows or indicators present to notify the user of the exact placement of the item.

Observed in Image 1 above, the character in the red circle on the left looks like it is placed on the floor, which was the intention of the participant according to her response to the question on whether she was aiming to do so. Nonetheless, on the right side, which is the screen of the researcher who was in the same virtual room, the character is floating, which was not the intention of the participant.

Participants showed frustration when it comes to placing items because they said that it was “hard to control” the movement of the items as it was not “intuitive.” A participant commented that the imitation of gravity in the virtual space would be helpful so that the item would “fall” instead of “float,” which is a more familiar concept for users.

#### 3.3. Navigation on Different Devices

2 out of the 4 participants of the 2nd group interview migrated to their iPhones to use Mozilla Hubs after they found that the Mozilla Hubs crashed on their devices, which was a HP laptop, and an iPad. The user of the iPad stated that Mozilla Hubs indicated his iPad as a computer, which made it uncomfortable for him to navigate around the Social VR space since the touch function was not working properly via his iPad. However, when he used his iPhone, he was able to navigate around Mozilla Hubs with much more ease as the service identified

touch input. After this discovery, the other team members also tried using Mozilla Hubs on their iPhones and exclaimed that the navigation of Mozilla Hubs is done the most intuitively in the mobile phone environment.



Image 2 Participant using Mozilla Hubs on iPhone

### 3.4. Game-like Feel

Participants said that there is a game-like feel mainly because the avatars look like robots. They said that this aspect would hinder them from using the platform since it looks “unprofessional.” Although it enables them to do a team meeting like they would do so in Skype with the benefit of being able to draw in open space to exchange ideas, participants said that having a professional feel is more valued, and exclaimed that it would be more preferred to have the avatars look more like humans to achieve this.

### 3.5. Usage Patterns of Confused Users

Users were confused when they first entered Mozilla Hubs because there is not enough guidance from the service on how to use it despite the interface being unfamiliar as it does not resemble popular SNS interfaces. The users were especially confused on what buttons to press and on what functions were available to them. Participants stated that there is a need for an on-boarding guidance for those who first enter Mozilla Hubs as the unfamiliar interface could discourage users from using the service. Users mainly learned how to use the functions by interacting with other users in the room, and they usually followed the pattern and order of 1) placing objects around the room, 2) watching videos, and 3) drawing in the open space.

Users showed the pattern of alternating between moving around and randomly engaging in one of the three activities stated above. Users gathered together the closest when a video clip was shared by a user.

### 3.6. Useful Usages of Social VR

Users exclaimed that Social VR could be useful for team meetings as it allows them to carry out tasks that they would do on a whiteboard, which is a useful element to utilize for team meetings and readily available in professional conference spaces for team collaboration.

Although Mozilla Hubs was slightly slower compared to whiteboards to reflect user action, the users said that the function is still useful to use for

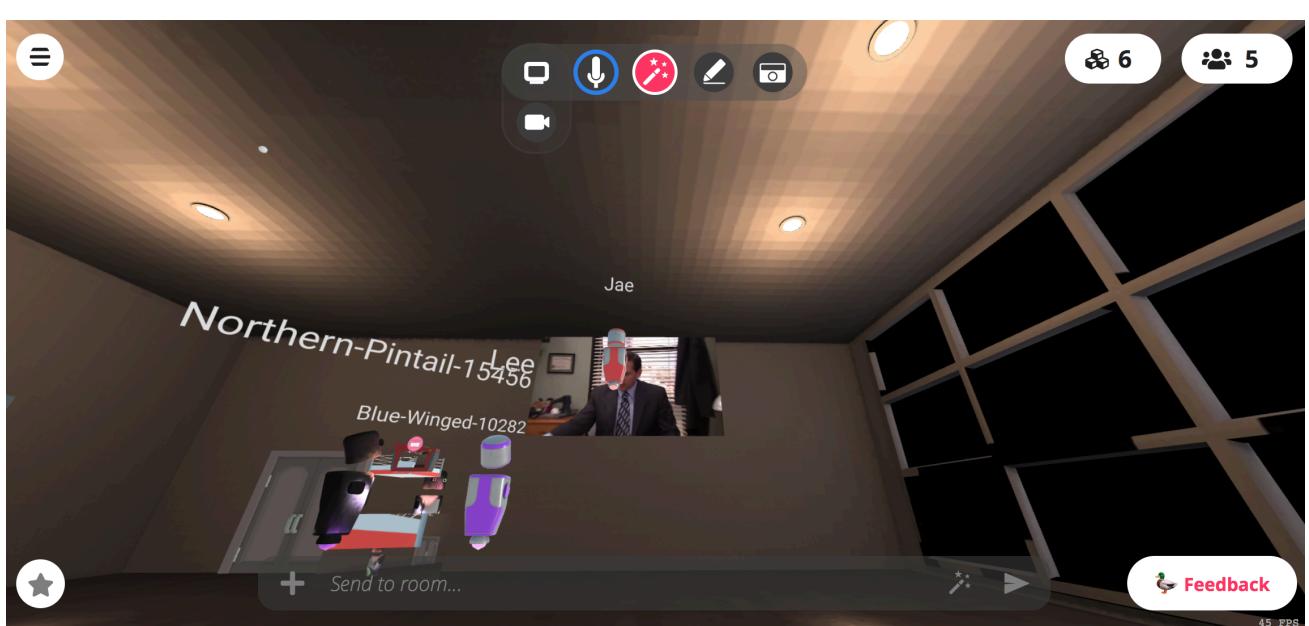


Image 3 Participants watching “The Office,” a television series, on Mozilla Hubs during the break time of a team meeting

team collaboration as it would enable them to collaborate on a whiteboard without having to meet up at a physical location.

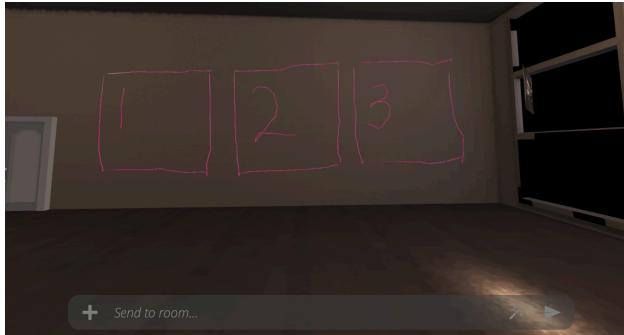


Image 4 Participant drawing in open space to communicate

#### 4. Conclusion

Mozilla Hubs has the potential to be used for team collaboration as users expressed that they would use the platform for team meetings if the navigation of the service is improved, if the interface looks more professional by providing human-like avatars, and if there is more guidance or visual reference on how to utilize the platform.

This research aims to provide insight into user perception and behavior of Social VR mainly in the context of team collaboration. This study invites researchers to conduct further research on this arena to increase the user traffic of Social VR so that more users will be able to reap the benefit of the platform.

#### 5. Discussions

User perceptions indicate that users find Mozilla Hubs, although confusing and unprofessional, interesting and capable of team collaboration: it should be noted that Mozilla Hubs could be more intuitive or provide more guidance as user behaviors mostly showed disorientation regarding navigation.

The navigation of the room would be more intuitive if the avatars of the users had hands or feet; this way, users would be able to know where they are standing, and indicate that they are moving around the room as some users were oblivious of the fact that they had an avatar in the first place because they did not see hands or feet.

Moreover, it is recommended that the avatars look like humans so that the service provides a more professional appeal that would make it more attractive for holding team meetings. As of now, users can only select pre-made avatars that resemble a robot with no arms and legs.

Placing items is one of the most frequented tasks of the users; however, users often misplace the items. It is suggested that Mozilla Hubs should have gravity or visual feedback for items when they place the items to resemble reality more. For example, an item the user places could fall down to reach the ground, and have a brief circle appear when the item reaches a surface.

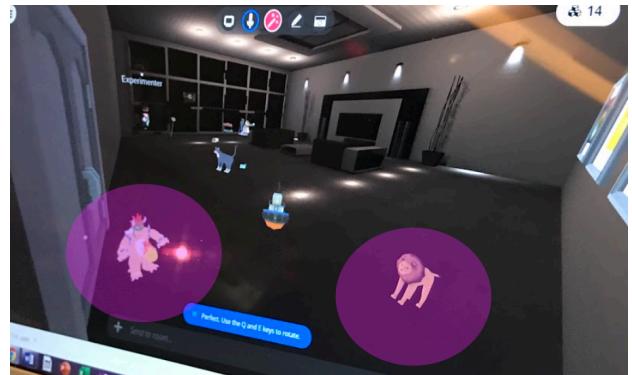


Image 5 Example of visual signal when items hit surface  
The service could be useful for team meetings and event planning as users can decorate the space and communicate ideas via drawing or sharing clips.

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