

Impact of Immersive VR Environments Versus Video Conferences on Team Engagement and Idea Generation in Brainstorming Sessions: Framework and Pilot Experiment

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1. ABSTRACT

This research investigates the impact of immersive virtual reality (VR) environments (such as Noda) versus traditional video conferences (such as Microsoft Teams) on team engagement and idea generation during brainstorming sessions. A framework for quasi-experiment was developed and piloted, involving teams participating in brainstorming sessions using both mediums. The study aims to evaluate which medium better simulates face-to-face interaction and enhances team engagement and idea generation.

The pilot experiment indicated that VR environments increase verbal active communication and the size of the mind map, suggesting higher engagement and idea generation compared to traditional video conferences. However, the duration of the brainstorming sessions showed no significant difference between the two mediums.

Interviews after the pilot experiment revealed that most participants preferred VR over video conferencing for brainstorming, citing higher creativity, enjoyment and immersion. Despite the promising results, the study acknowledges limitations such as potential topic bias and small sample size. Future research should involve larger samples to validate these findings and explore the broader applicability of VR in enhancing virtual collaboration. This research provides a foundational framework for researcher and organizations who are looking to test the effect of VR immersive technology to improve their remote teamwork experience.

1. KEY WORDS

- Virtually: using computer technology over the internet, and not involving people physically.
- VR: Virtual reality is the term used to describe a three-dimensional, computer-generated environment which can be explored and interacted with by a person [26].
- Face to face: meeting in person
- Two mediums: This is referencing the VR immersive environment and the video conference platforms like Microsoft Teams.
- nodes: are shapes used to represent an idea when creating a mind map and are usually connected to each other by lines to show relations.

2. INTRODUCTION

In today's interconnected and fast-paced world, effective collaboration is the cornerstone of organizational success. Whether teams are collocated or distributed globally, they rely on seamless communication and cooperation to achieve their objectives [23]. With the advent of virtual collaboration tools, teams have undergone a paradigm shift in how they interact and work together, marking a new era in team dynamics [24].

A new era of virtual collaboration has been brought about by the development of video conferencing software like Microsoft Teams, which enables creative methods for teams to connect, communicate, and work together remotely. Those platforms can bridge gaps in location and can be chosen as a method of team collaboration, but it is difficult to mimic face-to-face meeting experiences. research from Stanford University found that pairs working in person generated 15-20% more ideas compared to those working via Zoom[37]. Virtual reality environments are seen as the next step in virtual meetings [10], attempting to be closer to face-to-face meetings than traditional video meetings. They offer engaging and immersive experiences that attempt to mimic in-person interactions, attempting to increase users' sense of presence and engagement. Teams within various sectors and brainstorming sessions serve as vital forums for idea generation, problem-solving, and innovation within the team [1]. Brainstorming has different use cases, whether it's coming up with ground-breaking ideas, perfecting product designs, or taking on challenging problems; its collaborative format encourages open dialogue and cultivates a culture of innovation within teams. Brainstorming sessions are typically done in face-to-face meeting rooms, but with the rise of the new era of virtual meetings, brainstorming is seen on many different platforms, such as Microsoft Teams. It then becomes burning to explore and understand how the use of the immersive VR environment compares to traditional video conference platforms like Microsoft Teams when it comes to meetings. This research focuses on creating a framework that guides experimenting the two mediums during a brainstorming session within a team. The comparison is done by investigating the impact of these virtual collaboration tools on key aspects such as engagement level, idea generation, and duration. Organizations and teams can then gain

valuable insights using the framework to experiment whether VR environments can maximize team performance by bringing them one step closer to face-to-face offline meetings without having to be at the same place.

The primary objective of this research is to dive into the impact of immersive virtual reality (VR) environments on teams' participation in brainstorming sessions, as compared to traditional video conferences like Microsoft Teams. By addressing this research question, the study aims to contribute to a deeper understanding of the potential benefits and drawbacks of using immersive VR in team collaboration, thereby paving the way for more informed decisions in the future.

As part of this research, a pilot quasi-experiment will be conducted to test and refine the proposed framework. This small-scale preliminary study will involve a limited number of teams participating in brainstorming sessions using both immersive VR environments and video conferencing. The pilot study will help identify potential issues, validate the research design, and ensure the feasibility of the full-scale study, providing essential insights into the comparative impact of these environments on team engagement.

3. PROBLEM STATEMENT

The emergence of video conference platforms that most teams use nowadays on personal computers or mobile phones has created some benefits over face-to-face meetings; however, face-to-face meetings still have advantages that video conferences cannot provide [11,12,18]. VR focuses on narrowing down the gap between the two worlds, having as many benefits as possible from both sides. VR technology could be the next faze after the fatigue of current video call platforms [10].

Although research is conducted on whether or not video conference meetings are more effective than face-to-face offline meetings, fewer studies have been conducted comparing VR meetings to traditional video meetings. However, there is a lack of research on comparing video conferences and immersive VR environments when conducting a brainstorming session.

With that being said the research question for this study is "How can an experiment framework be developed to evaluate the impact of immersive VR environments in the metaverse versus Microsoft Teams video conferences on team engagement and idea generation during brainstorming sessions?"

Sub questions are:

1. How does the level of team engagement differ between immersive VR environments and Microsoft Teams video conferences during brainstorming sessions using verbal active

contribution as a variable in quasi experiment?

2. What are the differences in idea generation rates between immersive VR environments and Microsoft Teams video conferences during brainstorming sessions using size of mind map as a variable in quasi experiment?
3. How does session duration differ between immersive VR environments and Microsoft Teams video conferences during brainstorming sessions?

The framework is meant to help with answering these questions.

4. THEORETICAL BACKGROUND

It has been acknowledged that effective teamwork and collaboration are fundamental to an organization's success and performance improvement [22]. In this context, brainstorming serves a vital role in idea generation, information sharing, and cherishing creativity within a team[8]. The arrival of virtual collaboration platforms has revolutionized the way teams interact and work together, establishing cooperation across geographical boundaries [4]. With the introduction of new ways of interaction, newer ways of conducting brainstorming sessions would emerge. Studies have shown that immersive VR can give a sense of presence and engagement that closely simulates face-to-face interactions, and papers [6,7] highlight that the sense of being in a virtual environment can impact users' cognitive and emotional responses. Similarly, video conferencing became crucial for remote collaboration due to the features that it offers for team members [9]. Knowing this makes it interesting to see how the two mediums would influence the user's behavior.

Studies have shown that engagement in collaborative meetings is valuable [3,5,8]. So, the more engaged a meeting has the more beneficial it is and the more it truly represents the participants opinions and views. Based on that, it is important to do the comparison between the two mediums to see how they compare, which would get more people to participate. Since engagement is a vague term that revolves around how involved and invested team members are in the process [27], for this experiment engagement would be represented by verbal active communication. verbal communication, is essential for fostering effective collaboration and productivity within a group [28]. Research at the Free University of Bozen-Bolzano [23] compared brainstorming sessions when walking and in a usual room. The results show a difference in the duration of the brainstorming sessions. Such differences show that when brainstorming meetings are set

differently, the duration is impacted. Such research indicates that the duration of the different mediums in this research will show a different duration time. In brainstorming sessions the number of ideas generated can be seen by the size of the mind map the team creates. Tracking the sizes of the mind map would then quantify the idea generation in the brainstorming sessions. Size of the mind map is a variable that is measured during the experiments such decision is made to measure the quantity of the outcome of the brainstorming session. The study [24] shows that a higher quantity of output indicates a higher team participation. Such variable can then be used in the experiment to measure the quantity of the output per setting.

4.1 Related work

The research conducted comparing VR environments and video conferences mainly focuses on the idea of attending a meeting where participants are mainly inactive, receiving information but not actively participating or the research take more of a general approach not focusing on brainstorming [13,14,17,19]. This study aims to compare the two mediums not just when a lecture is given but also when collaboration is done, hence the choice of brainstorming sessions.

There was 1 article found that could be considered the closest to this research [20]. It compares the 2 different mediums within a brainstorming session like this research intends to do but the difference is that the research focuses on comparing the creative thinking aspect and focuses on different variables than the ones this research focuses on. For example, the research focuses on the quality of ideas and ease of use rather than verbal interaction. Another difference is that the experiment is done on 3 graduate students only students rather than university student. Furthermore, the results showed no difference between the 2 mediums within regards of the variable there were looking for during the meeting.

5. METHODOLOGY

5.1 Research design

This study attempts to create a framework for a quasi-experiment to test the impact of immersive VR environments versus Microsoft Teams video conferences on team engagement and idea generation during brainstorming sessions. A pilot experiment is also conducted to evaluate the framework. This section provides a detailed and structured description of conducting the experiment.

5.2 Participants

The participants are people who usually participate in teamwork activities. Particularly brainstorming activity. All the teams must be the same size when conducting

the experiment to avoid giving an unfair advantage/disadvantage. Variables like age, nationality, and sex have no restrictions as long as the population has a representation of the real-world population. According to Paulus and Kenworthy [29], between 4 and 7, members is the optimal number for a team to participate in the brainstorming session since it allows for enough people to have diversity of opinion but also allows everyone to have a chance to say their opinion. To keep the experiment with minimal bias and to ensure the results are generalizable and not influenced by pre-existing group dynamics or characteristics, the teams should be created randomly from the sample of participants you[30].

The framework could be implemented by organizations that already have established teams and the company would like to experiment if VR immersive technology would bring any change in their brainstorming sessions compared to traditional video call, then the team size and randomization of members could be overseen to work with the current existing team within the organization and see how the change of medium would affect their performance.

5.3 Materials and tools

VR headsets that are capable of running programs that could host the brainstorming sessions are required. It is also capable of recording what is happening during the sessions so the footage can be used later for analysis. The number of VR headsets required is based on the number of participants since every participant needs their own VR headset. it is a plus for the person conducting the experiment to also have a headset to record from their perspective, but it is not necessary and the recording could be done from one of the participants headset, though it requires requesting more from the participants and could cause them to stress more.

A personal computer that is capable of running Microsoft Teams using a webcam and microphone for each member of the team.

An immersive VR environment: that could host the brainstorming session like Noda and Arthur on the meta quest store and is capable of creating a mind maps. An environment where mind maps could be created While conducting the video call. For example, Microsoft whiteboard.

Dedicated rooms: If participants are not conducting the experiment from their own place, then a dedicated room for each participant must be provided since you can't have all the team members in one room, and it would not simulate the conditions for online meetings. If the rooms are too close to each other, they must not allow sound through to keep the participants from thinking the other team members are present with them in the real world.

A personal computer for the person conducting the

experiment: this is needed so that the footage can be stored on the device, and the device can be used to create analysis later to show the results of the experiment.

5.4 Procedure

5.4.1 Preparation

Two different topics are needed to be Prepared to be used for the experiment since having one team do the same topic on both different mediums Would be redundant because in the second session whether it is in VR or in video call, they would already know the topic and have discussed in detail already. The topics must be general enough to relate to all participants and does not make the participants role-play since it can cause an increase in cognitive load [36]. This causes the participants to manage additional information related to their character and scenario, which can distract them from their primary task. Causing them to not give a natural respond.

Structuring which team would start with which medium and which topic would be assigned to them in the first and second sessions.

Set up the VR environment to be ready to host the team and test it at least once to identify any technical issues. Ensure the VR headsets are fully charged before the start of a meeting.

5.4.2 Session structure

According to Maaravi [31], maintaining shorter focused brainstorming sessions yields better idea generation, which is why the sessions would be a maximum of one hour long per session. A team would start with one of the mediums and be given instructions and a tutorial on using the materials and tools and the brainstorming topics for the session. Then, they would be left for an hour to construct a mind map with their ideas regarding the topic. The team can stop at any time once they feel they are done brainstorming this topic, even if it is below the one-hour mark. However, if they reach the one-hour mark, they will be interrupted and asked to end the session. After one session, they are given a short break, and then the second session starts using a different medium and discussing the new topic but repeating the same process.

An example of how the sessions could be structured is in the table below.

Table 1 sessions structure example.

team 1		team 2	
MS team	VR	MS team	VR
Topic1	session1	Topic1	session2
Topic2	session2	Topic2	session1
team 3		team 4	
MS team	VR	MS team	VR
Topic1	session1	Topic1	session2
Topic2	session2	Topic2	session1

As can be seen from Table 1 the starting medium is alternating the starting topic is alternating and which topic comes with which medium is also alternating. Such choices are made to reduce multiple bias effects like order effects, topic bias, learning and fatigue effects.[32]

5.4.3 Data collection Phases:

During the session, it would be difficult to collect data while people are speaking live, so the main objective would be for the researcher to be a silent participant as an organizer, recording the meetings and interacting if necessary.

Most of the data collection happens post-session. The research conductor starts by interviewing each participant individually. Then, since the researcher will get to watch the recorded sessions, they can focus on collecting data for the three main variables: verbal interaction, size of mind map, and session duration.

5.5 Data collection Methods

5.5.1 Quantitative Methods

Verbal active communication is measured by counting the number of times each team member has actively communicated in the sessions, for example, using direct speech, asking questions and answering, giving comments and elaborate feedback, engaging in a dialogue, and clarifying and confirming. Such a decision was made using the interaction process analysis [35] by choosing some points of the system of categories used in observation and major relations. The score of each member is then added to have the team's score.

The size of the mind map is calculated by counting the number of nodes/shapes created in the mind map by the end of the session.

The duration of the session is measured by checking the recording and timing how long it took the team to complete the brainstorming session.

5.5.2 Qualitative Methods:

The interview is open but focuses on some properties. If the interviewee does not answer them, questions from the interviewer will be asked then. The properties are Collaboration, Creativity, Comfort, Preference, Enjoyability, avatar vs. cam, and Immersiveness.

5.6 Data Analysis

5.6.1 Quantitative

The scores must be compared in different scenarios to indicate any biases. Verbal communication scores have to be compared when the topic is topic 1 and when it is topic 2, and the scores are compared as well when it is the first session or the second session. This way, if there are biases towards one of the topics or the order of the sessions, the data would hint at it. The same has to be

done for map size and session duration. Descriptive statistics is first used to summarize and describe the main features of the data. For example, it calculates the means, median, standard deviation, and end ranges for the three collected quantitative variables. Finding the differences between the means would then give an indication of differences between the 2 variables in each of the variable. After descriptive statistics, the sample T-test will help further compare the means of the same group under different conditions. Since the same participants participate in two sessions with two different conditions, it would be applicable to compare their scores between two mediums [34].

5.6.2 Qualitative

After conducting and recording the interviews the research then can use the recordings to listen to all the answers and divide them into 3 answers based on what the participants prefer. Those answers are MS Teams, VR environment, and hard to say/same. Once each participant has completed the short interview, the total number of each answer could be collected. The interview result is not necessarily used, but it is useful to compare the participants' feelings to the observations.

5.7 Pilot experiment specifics.

Due to time and resource constraints, the suggested range of participants per team was not possible. Instead, each team had only 3 participants instead of 4 to 7. The participants are all from university level since that was where the researcher has most connections with possible participants. It happens that all participants are between the age of 20 to 26.

The topics used in the pilot experiment were technological integration in classrooms and sustainability on university campuses. Both topics were chosen to be general enough to be related to every person participating. The experiment should not require the participants to role-play; they can be themselves as much as possible since they most likely already have some opinions regarding those topics This openness is encouraged to enhance creativity and generate a wide range of ideas [33].

The pilot experiment participants used Noda as the VR environment (apendixA.1) on the Meta Quest 2 headset. Participants also used their personal laptops for the video call sessions, and MS Teams was used in every call, as was the whiteboard (apendixA.2) feature within MS Team.

The paired sample t test would be difficult and less meaningful to perform on the pilot experiment data thus the difference between the descriptive analysis would be enough for a small sample data.

6. RESULTS

6.1 Quantitative data

This section focuses on the data collected within the pilot experiment conducted throughout this research. The results focus on showing the differences rather than what each team's score is. the decision was made to show graphs rather than tables of data since graphs could highlight the difference more rather than give specific number which is the point.

To have a deeper look at the numbers to see how the graphs were made and check how biasness is checked use this link: http://tiny.cc/experiment_data_tables

Figure 1 shows difference in verbal interaction between MS-team and VR between the 12 participants. A number is put above each participant to highlight the difference. A positive score shows how much VR scores were more than MS-team scores, and the negative scores show how much VR scores were lower than MS-team scores.

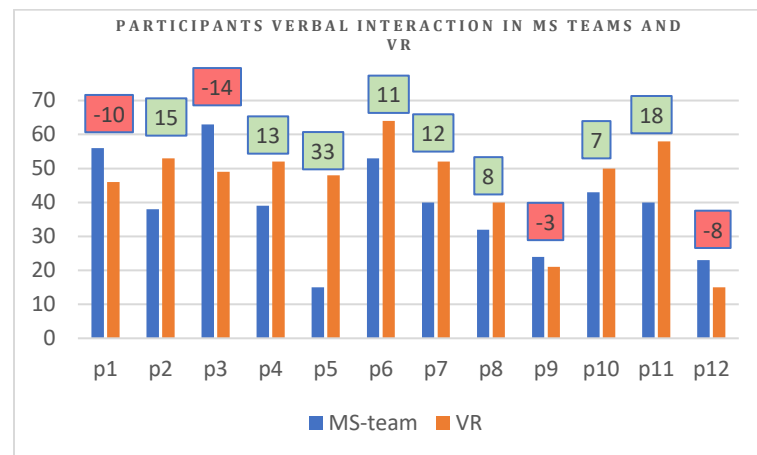


Figure 1 difference in verbal interaction between MS-team and VR between the 12 participants

Figure 2,3 and 4 shows the difference in verbal interaction, Mind map size, and duration between the 4 participating teams. A number is put next to each team's scores to highlight the difference. A positive score shows how much VR scores were more than MS-team scores, and the negative scores show how much VR scores were lower than MS-team scores.

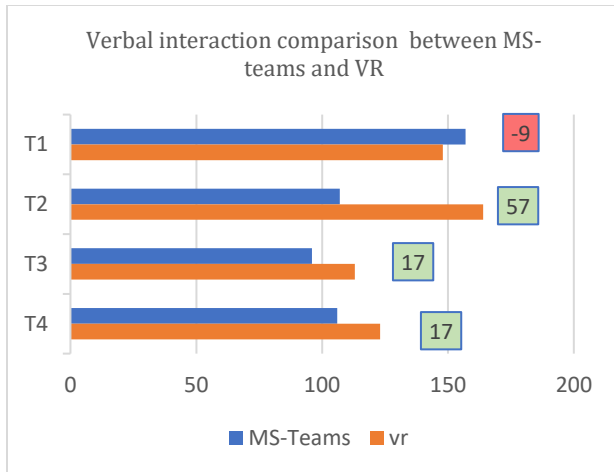


Figure 2 Number of verbal interactions.

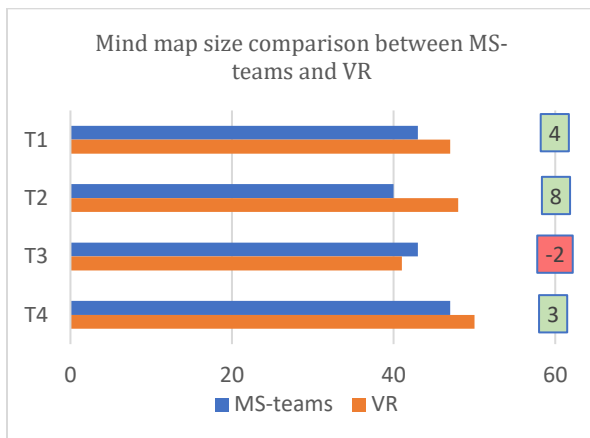


Figure 3 unites are number of nodes/shapes.

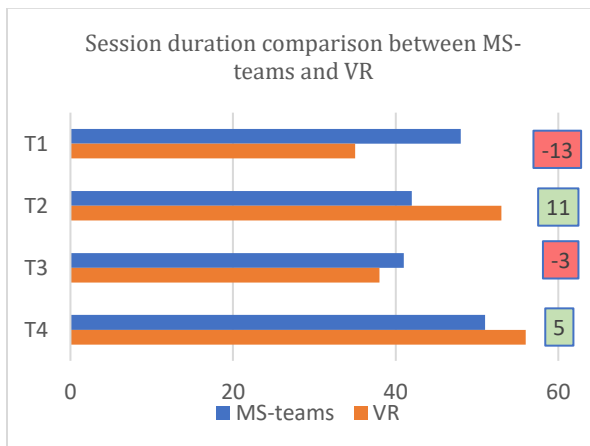


Figure 4 Session duration comparison unites in minutes.

Figure 5 shows the number of responses for each preference in each of the categories. (Collaboration, Creativity, Comfort, Preference, Enjoyability, avatar vs. cam, and Immersiveness)

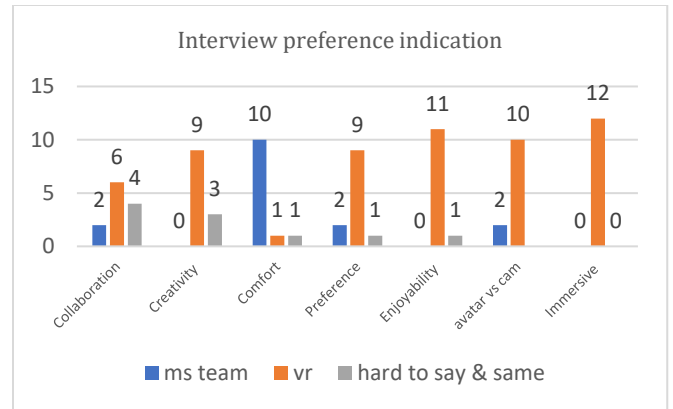


Figure 5 participants opinion.

Figure 6 shows the difference in the mean between in MS-teams and VR (VR mean- MS team mean) in each of the variables duration (in minutes), mind map size (in nodes), and verbal interaction (number of interactions). A number is put next to each team's scores to highlight the difference. A positive value indicates that the mean of VR is higher than the mean of MS teams with in the variable. The mean was calculated for each medium by adding all the teams scores for that medium and dividing by the number of teams, then the same done for the other medium. Once both means are available the difference can be shown.

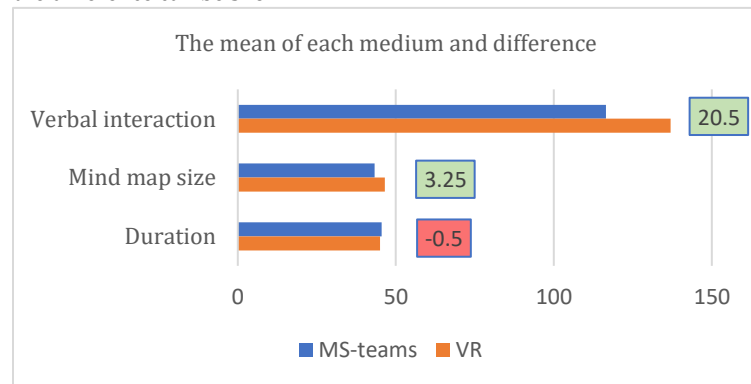


Figure 6 The mean difference between MS-teams and VR.

	Interaction score		Mind map size score	
	Topic1	Topic2	Topic1	Topic2
Team1	157	148	43	47
Team2	164	107	48	40
Team3	96	113	43	41
Team4	123	106	50	47
Total	540	474	184	175
Mean	135	118.5	46	43.75

Table 2 Topic bias possibility.

6.2 Observations

During the experiment and after watching the recordings, observations were made that were worth mentioning in the results. During the sessions in the VR environment, the participants had a sense of physical presence during the meeting. The sense of physical presence has affected how they behave differently, making it closer to how people would behave if they met in a real room. The first example is the placement of the member, which would then be the immersive environment and the mind map. The mind map, being three-dimensional in the VR environment, had people standing around it, possibly in all four different directions. The sense of position then influences which part of the mind map they will be working on or suggesting ideas for; for example, if a participant is closer to a node that mentions advantages, then the participant is inclined to think about advantages more than other nodes.

The second observation is that the avatar of the participants in the VR immersive environment truly represents the arms and head of the participant's actions. So, a participant can always do what their fellow teammates are doing. For example, whether or not they are looking at the mind map, whether they are using their hands to create more nodes, or whether they have moved their place in the environment, meaning they are not even present between them anymore. That sense of presence that the avatar gives the participants is somewhat similar to how it would be in a face-to-face brainstorming meeting because, similarly, in a face-to-face meeting, you would also be able to tell who is working or not, who is in the room, and who is writing the ideas. This sense of presence did not exist in video conferences since a person could be looking at the camera while doing something completely different or have a different tab open. If the camera is off, the participant cannot even be in the meeting, yet there are participant counts.

Third observation that was noticed between the two different sessions and also was commented on during the interviews is the distraction level. Currently, Online meetings suffer from the issue of participants being easily distracted, whether using different tabs while the meeting is happening, using their phone, or even being distracted by other people within the environment where they are sitting. Immersive virtual reality could also have its own distractions, such as being distracted by things around your avatar in the environment. However, the VR immersive environment really limits all the other known issues of distractions that are usually found in video conferences. The participant in VR cannot use their phone, cannot be distracted by other people around them, and cannot just be doing some random activity; otherwise, it will be very obvious to all

the other participants in the meeting that they aren't being productive.

7. DISCUSSION

With the analysis of the results, answering the research question became clearer. The results of the pilot experiment really reflected the framework for the experiment. With regard to the engagement level, which was measured using the verbal, active communication variable, it can be seen from the results (figure2) that 3 out of 4 teams have increased their verbal, active contribution. Their results show an average of 20 more verbal, active communication in VR compared to the MS Team (figure6). When looking at it from an individual perspective (figure1), nine out of the 12 participants have shown an increase in verbal active communication in the VR environment compared to the MS team. Regarding the second question, which questions the idea generation between the two different mediums using mind map size as a variable, the results (figure3) show that three out of the four teams have created a larger mind map size. The data shows an average of 3.3 nodes/shapes created more in the VR environment than in MS Teams, indicating more idea generation happening in the VR environment (figure6). For the last question regarding the duration of the sessions, the results show barely any difference between the two mediums. The difference between the averages is 0.5 minutes longer towards the MS team sessions (figure6).

Such information shows the potential that, with a real experiment and a big data sample, this framework can be used to prove that team engagement does or does not truly differ from one medium to the other. Though the pilot experiment data shows potential to favor the VR environment if the averages stay the same even with the bigger data sample, the difference between the medium would be considered quite insignificant when looking at a paired sample T-test perspective. In the scenario of such insignificant differences, it's questionable if companies and organizations would be willing to invest in technology that might not show compelling changes in results within team engagement. However, the interview results indicate that a more extensive sample could show a significant difference (figure5), especially since nine out of the 12 participants mentioned that they would instead do a similar brainstorming session in VR rather than a MS team after completing the experiment. Preference was not the only category that is favoring VR; imagine enjoyability and creativity favor VR. The only category that MS team excelled in during the interviews was comfortability, which is something not to undermine.

7.1 Limitations

There are several limitations that come with this framework and pilot experiment. 1st and most important is the topic bias. Since the teams are participating in two different sessions, the topic cannot be the exact same, so two topics are created, but that could result in one topic being more engaging than the other, making it an unfair comparison. During the pilot experiment, three out of four teams showed more interaction in topic one rather than topic 2, Whether that was in the MS team or VR (table 2). The same could be said about the size of the mind map that three teams have shown to have created more nodes/shapes in topic one rather than topic 2 (table 2).

The small sample size hindered the possibility of analyzing the possibilities that could be done in the pilot experiment. And the methodology discusses the use of that sample tea test which could that's the hypothesis There is a significant difference between the two means. Unfortunately, since it would only be applied to four teams the results wouldn't be significant, but is definitely worth doing when applying this framework to a bigger sample size for example more than 30 teams. Another limitation that could be seen is that some teams might have more experience with one of the mediums than the other; for example, a team that has used VR headsets before might be more comfortable using it during the experiment, unlike other teams that would be using VR headsets for the first time. The framework attempts to reduce this limitation by giving a tutorial on the environment that will be used before the beginning of the session; however, a team with more experience will still show an advantage in using the environment.

8. CONCLUSION

This research aimed to develop an experimental framework to evaluate the impact of immersive VR environments versus traditional video conferences on team engagement and idea generation during a brainstorming session. By conducting a pilot quasi-experiment, it aimed to test and refine this framework, providing insights into potential benefits and drawbacks of these virtual collaboration tools.

Based on the pilot experiment conducted in the report, the framework appears to be successful in providing valuable insights into the impact of immersive VR environments compared to traditional video conferencing.

The findings indicate that immersive VR environments have the potential to enhance team engagement and idea generation compared to traditional video conferencing tools like Microsoft Teams. This indicates that the VR environment can foster a more engaging and productive brainstorming atmosphere closely simulating the dynamic of face-to-face interaction.

Despite the promising results, several limitations were identified, and future research should address these limitations by involving a larger, more diverse sample and providing enough time for the participants to become familiar with VR equipment. The framework offers a structured approach and clear methodology for data collection and analysis. Which can be picked up to conduct larger experiment in same or different settings. The framework has direct implications for organizations looking to enhance remote teamwork. It empowers organizations to make data-driven decisions regarding the adoption of VR technology by testing their teams in the different mediums.

Organizations considering the adoption of VR technology should weigh the potential benefits against the current limitations, particularly regarding user comfort and the initial learning curve. By doing so, they can make informed decisions about integrating immersive VR into their collaboration strategies. The quantitative data and the positive feedback from participants regarding their preference for VR over video conferencing for brainstorming indicates a potential shift towards greater adoption of VR technology in professional environments. Organizations may invest in VR technology to enhance remote collaboration, leading to a transformation in how virtual meetings and collaborative activities are conducted. The large investments leading technology companies are putting into VR headset can also indicate how these companies see how the medium has potential within the professional environment.

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10. APPENDIX

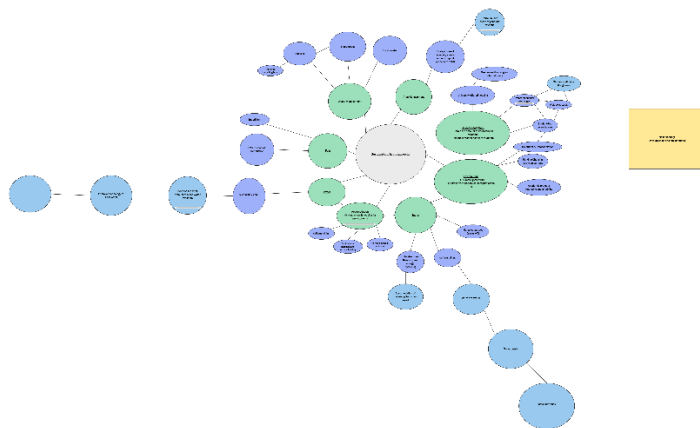
Appendix A.1

An example of the Noda environment that was used on meta quest VR headset.



Appendix A.2

An example of the whiteboard environment used on Microsoft teams.



Appendix B (tools used)

During the preparation of this work the author(s) used Grammarly in order to double check spelling, punctuation and grammatic mistakes within the report. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the work.

During the preparation of this work the author(s) used ChatGPT in order to check spelling, punctuation and grammatic mistakes within the report, suggest better written sentence structures, suggest synonyms for a better academic tone and suggesting better structure. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the work.