Interactivity and Its Impact in virtual Communication Modes: An Expert Perspective about virtual reality and media

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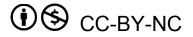The Netherlands

ABSTRACT

As hybrid work is getting more popular, organizations are looking for meeting media that would feel natural and alive just like face-to-face encounters. Making use of Social Presence and Media Richness theories, this study is exploring how interactivity – users' ability to act withing the environments with the environment – shapes both presence and media richness in Video Conferencing versus Virtual Reality meetings. Five experts in the VR field were interviewed using semi-structured format. Afterwards, schematic analysis helped to establish a framework. Across all the interviews it was seen that interaction with 3D object had to be context specific and avatars should be higher fidelity to add to the Media Richness. Since the users' expectations are not met the potential is not being used. Routine information exchange remains being the best on Video Calls. Findings are showing that organizations should invest in VR interaction features as long as they are serving a purpose and not just unnecessary complexity.

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Keywords
Social Presence, Media Richness, Interactivity, Virtual Reality, Video Conferencing.

1. INTRODUCTION

1.1 Situation and complication

Hybrid or fully remote work has become a widely established practice in professional life over the past few years (Hennig-Thurau et al., 2022). In these times, numerous tools such as Microsoft Teams help people stay connected, but they fall short of perfectly mimicking the real-life feel of being in the same room and discussing matters face-to-face (Speidel et al., 2023). Virtual Meetings feel less personal, not as engaging, and more tiring than traditional ones (Speidel et al., 2023). This is when the concept of social presence emerges; it is a sense that people are present with each other, even though the meeting is taking place on a virtual platform (Kim et al., 2016).

While "traditional" face-to-face meetings offer the most defined sense of social presence, video conferencing has some downsides to match that level of social presence (Hennig-Thurau et al., 2022). Emerging technologies such as virtual reality are offering promising features, which include a 3D environment and avatars that could improve social presence (Speidel et al., 2023), but more recent research shows that expectations are not met in VR meetings (Hennig-Thurau et al., 2022). One of the fundamental reasons for underdelivering VR is lack of interactivity; VR meetings often feel too passive and awkward (Hennig et al., 2022). In fact, Hoogendoorn's (2025) study found that VR was the lowest among Virtual reality and Microsoft Teams in providing the feeling of co-presence, highlighting that meaningful interaction is not guaranteed simply by providing the hardware.

Moreover, another concept that helps explain this idea is the Media Richness Theory (Hennig-Thurau et al., 2022). It is stated that a diverse set of tools has different abilities to handle complex, multi-level communication (Daft & Lengel, 1986). Media that is rich is an enabling factor for fast feedback, intonation of the voice, and other non-verbal cues. Adding interactivity to the equation to the platforms could help them to become more natural and feel richer, especially within the context of virtual reality.

These findings highlight interactivity as the principal underlying issue in the digital meeting experience, specifically in VR. According to a study by Effing and Hinz (2024), a lack of interactivity can cause more confusion and a lower sense of presence. In Virtual Reality meetings participants more often feel like passive observers and non-active partakers, which in turn results in a less engaging experience. It is also mentioned in findings made by Oh et al. (2018), who underlined that presence is a product of interaction and not only of visuals and audio, that the users must have the ability to respond to the environment in real time.

Relative to this, interactivity refers to the ability for two-way communication and collaboration, something that is currently underdeveloped in Virtual Reality. Its potential can only be produced if the working virtual environments can support engagement, social interactions and collaboration (Biocca et al., 2003). Therefore, to bridge the gap between technology and user experiences, it is crucial first to understand how incorporating interactivity enhances or transforms social presence and media richness across various meeting formats. Instead of direct experimentation with users, this study explores the issue

perspective of experts who are most prominent in the field of Virtual Reality collaboration and immersive technologies.

1.2 Research objective and question.

This research is based on a previous study conducted by Hoogendoorn (2025), which compared social presence in virtual reality, Microsoft Teams, and face-to-face meetings. Because social presence and media richness are naturally high in face-to-face settings, the primary goal of this study is to investigate how interactivity influences social presence and richness across mediums – from the perspective of experts in digital collaboration, communication, and immersive technology.

Research question: How does interactivity influence perceived social presence and media richness across video conferencing and virtual reality meetings, according to experts?

1.3 Academic and practical relevance

When it comes to academics, this study will contribute to research about Social Presence Theory as well as Media Richness Theory. Using these two combinations and adding interactivity will add new angle to the future of communication in digital environment (Hennig-Thurau et al., 2022).

Also, this research could help with the practical applications and better information on tools for conducting remote, virtual meetings. If during the experiment, after adding a level of interactivity to it, the companies will be able to better understand how to use the technology and where to invest their resources in for a better future.

2. LITERATURE REVIEW

2.1 Social Presence Theory

Social presence theory explores how close communication through technologies can replicate the sense of presence and authenticity felt in real-life communication. It was first introduced by Short, Williams, and Christie in 1976; its focus was on how connected and present users feel in communication with others. In live communication, the presence is naturally high. Meanwhile, in digital settings, it is more challenging to maintain the same level of presentness due to the lack of non-verbal cues and physical interaction in space (Biocca et al., 2003).

Initially, its development focused on interactions that primarily took place over the telephone and ancient video conferencing systems. Social Presence Theory was developed to assess how communication platforms vary in their ability to provide the necessary context for a sense of personal presence with other participants. It was emphasized that some of the previously available technologies, which have a better ability to provide immediate feedback and richer sensory input, are superior at making the user feel that they were truly "with" the other participant (Short et al., 1976). Over time, the theory has evolved and expanded beyond telecommunications, now covering spaces such as digital platforms and immersive digital environments. Such evolution has brought new challenges and opportunities to study presence, especially

in the latest emerging interactive technologies, such as virtual reality.

Hoogendoorn's (2025) research is built on this theory while using the Networked Minds Social Presence Inventory, which is inclusive of six dimensions like: co-presence, attention allocation, message understanding, affective understanding, emotional interdependence, and behavioral interdependence. In his study, three different ways of communication were compared: face-to-face, Microsoft Teams and Virtual Reality meetings, and he found that Virtual Reality had the lowest level of social presence. It was likely caused by the lack of opportunities for interaction, with users mostly listening and not engaging. This finding underscores that hardware is not the only important factor in creating the feeling of being together, and that interaction is.

Moreover, more recent research has been applying Social Presence Theory across a wider selection of different platforms, from online conferencing environments (Microsoft Teams) to Virtual Reality spaces. For example, certain tools, such as chat-based applications, can also foster the feeling of presence through the inclusion of emojis (Lowenthal & Snelson, 2017). In more immersive technologies, such as virtual reality, presence is closely tied to features like interaction and the embodiment of avatars. Moreover, it has been found that making spaces more immersive and improving the responsiveness of the avatars in real-time significantly enhances perceived social presence (Oh et al., 2018). This has shown that presence is not only about how visually natural it appears but rather about how the platform is able to allow users to interact and engage, also respond to cues within the shared environment. Similarly, Kreijns et al. (2021) note that mutual responsiveness is the key driver of perceived presence. These findings are highly relevant to this research, which aims to investigate how interactivity can address the current deficiencies of Virtual Reality.

To add more, these findings are also supportive of other research findings, one key example being Hennig-Thurau et al. (2023), who argue that social presence is significantly enhanced when people can do more than just talk and listen, but also move, interact, and use non-verbal cues (Gunawardena, 1995). However, there are currently limitations in VR platforms that lack these features, which makes Virtual reality inferior to video calls (Speidel et al., 2023).

Therefore, the most significant gaps in interactivity when placing VR meetings against video calls are delayed hand-tracking and limited facial animation.

2.2 Media Richness Theory

Media Richness Theory (Daft & Lengel, 1986) is useful for explaining the differences between technologies in their ability to facilitate more complex communication. A channel is considered good or "rich" when it can handle multiple dimensions of conveying information, such as (voice, facial expression, body language), and personal interaction. Naturally, Face-to-Face is considered the richest form of communication, followed by video calls and texting or emailing being at the bottom of the list (Biocca et al., 2003).

From the beginning of the development of the media richness theory, it has been applied to various contexts of communication, including modern digital platforms and immersive technologies. Later in its development, it was expanded through Media Naturalness Theory, which essentially states that platforms that copy and resemble face-to-face interaction are more efficient and more comfortable for users (Kock, 2005). It is relevant for virtual reality, which theoretically should offer a very high level of naturalness, but it is not as effective in resembling interaction, which hinders its ability of naturalness.

Media Richness Theory synergizes well with Social Presence Theory. If a medium can deliver multi-dimensional communication, people will likely feel more present and engaged (Biocca & Harms, n.d.). Online video calls offer some richness, including real-time video and voice, but they are limited in aspects such as full-body cues. VR has the potential to be richer through interactive 3D spaces, but only if they are sufficiently utilized (Speidel et al., 2023).

Newer research offers an alternative perspective on the media richness theory, suggesting that it is not necessarily fixed but can be influenced by user engagement with the medium. Dennis et al. (2008) proposed that Media richness video conferences can be perceived differently depending on how much it is paired with interactivity. Therefore, VR meetings might only feel richer if the user interaction with space is meaningful and there is equally mutual responsiveness.

On the other hand, Media Richness Theory has also faced criticism for its categorization of media. Another theory of a similar nature was introduced – Channel Expansion Theory, which argues that perceptions of media richness are not set in stone and can vary depending on the level of user's familiarity (Carlson & Zmud, 1999). For instance, if email is written with only text, it can be perceived as very poor, and it can be made richer by introducing media attachments or emojis. It is a direct challenge to the previous theories' insights that media is static and unable to improve as user adaptation becomes more prevalent, suggesting that a more dynamic framework is needed, one that incorporates interactivity as the user adapts. This research could uncover the flexibility needed by asking relevant experts how changing design and user familiarity could make today's design better to deliver the full potential of richness in a very promising platform.

3. METHODOLOGY

This study, instead of the original experimental approach of Hoogendoorn (2025), will be taking a different approach and will adopt a qualitative survey format based on expert interviews. It does not mean that the study will be less valuable due to the limited feasibility of conducting an experiment. Moreover, interviewing experts allows for deeper and more in-depth insights and reflections based on years of practical experience, which will offer a much deeper understanding of the original constructs navigated by Hoogendoorn before.

3.1 Research design

This research will be designed to adopt a qualitative design while conducting semi-structured expert interviews. Initially, this study is based on Hoogendoorn's (2025) work, which was previously comparing different media for

the collaboration of teams. Instead of making a copy of the study, this research will still be focused on similar themes, such as social presence and media richness, but interactivity will be added to the list of themes, too; it will be achieved through the reflections of different experts in this field.

Sample and Participants

The study will have a selected expert pool with concrete criteria, such as prior academic or professional experience related explicitly to Virtual Reality technologies or their systems. Moreover, professionals must have published academic work on VR or have direct experience in the field of immersive technologies, either developing, advising on or implementing VR. At least 3 years of relevant experience is the minimum threshold for inclusion. A total of 5 interviews is planned, depending on expert availability.

Data Collection

The data will be collected through semi-structured interviews through online video conference platforms such as Microsoft Teams or Google Meet. The interviews will be conducted using a question set primarily based on Hoogendoorn's (2025) original points of interest. The main topics covered will be inclusive of Technological VR affordances, limitations of the VR environment, Perceived Social Presence, and communication effectiveness in different mediums. All the recordings of each meeting will be transcribed for data analysis.

3.2 Data Analysis

The Audio-Video recordings of the interviews will be transcribed verbatim and checked if any direct identifiers were present; after that, each of the speaker's interview turn was numbered. The five transcripts were moved to Microsoft Word because it served as a lightweight environment that is still suitable for coding. Searching through the texts, relevant constructs such as Interactivity, Social Presence, and Media richness were highlighted to be used later in the study.

Afterwards, after all the interviews are coded, the number of the highlighted segments of the interviews will be exported to Excel to create a simple frequency table of how many times each construct is mentioned.

4. RESULTS

After finding fitting participants to interview, a thematic coding framework was used, the data was analyzed by looking at the key constructs, and reoccurring patterns from the interviews were drawn to create themes.

The five selected participants (Table 1) were all experienced in VR or other immersive technology. The list contained consultants, researchers, and Book authors on VR and the Psychology surrounding it. Despite different professional backgrounds, all had a solid foundation of knowledge about Virtual Reality.

Interviewee	Background Summary
I1	VR researcher
I2	VR technology expert
I3	Professor & Book author on VR
I4	VR Developer
I5	VR advisor

Table 1

Most reoccurring themes

All the experts almost unanimously agreed that interactivity is the perfect tool to increase engagement exponentially and that interaction can be in any form – spatial manipulation, co-creation, synchronized tasks - if it is using the capabilities of the 3D environments "Being able to interact physically with objects in VR, like moving a 3-D model or collaborating on a prototype, skyrockets the feeling of presence. Just watching isn't enough.". Moreover, participants underlined that interactivity can even help with collaboration by making it immersive. Continuing, experts mentioned multiple times that currently, there are limitations to Media Richness and Social presence in the context of the depiction of users: "You still have caricatures in VR—funny-looking avatars. If you're just having a discussion, there's no real benefit over video,". Currently, avatars are an issue as they are unable to simulate high-fidelity presence because of the absence of facial expression and natural movement. Although not all feedback on avatars was negative, one of the speakers mentioned that low-quality avatars can be beneficial as they can allow users to focus on the shared task at hand instead of appearances.

Finally, experts noted that VR is not a solution to all virtual communication as it is only effective if it is used in the proper context – particularly, special awareness and co-creation. "VR makes perfect sense when we're prototyping a sneaker, designing a mall, or walking through a new building concept. That's where 3-D makes a difference," It suggests that communicative goals should align with the communicative goal.

5. DISCUSSION

This study was done to explore the place of interactivity in shaping perceived social presence and media richness between the two popular digital communication environments: virtual reality (VR) and video conferencing (VC). Semi-structured interviews were conducted with five different domain experts, including VR technology advisors, researchers, and developers. In turn, a few different perspectives appeared on how VR is able or not to replicate the studied constructs, which are highly prevalent in face-to-face communication

Interactivity as a tool for fostering presence

One of the most prevalent and prominent ideas across expert interviews was the central role of interactivity in building a sense of social presence in a VR environment. Defined by Short et al. (1976), it refers to the level of realness of the feelings of other people in communication. It was deduced that in Virtual Environments, presence is not a product of being in the 3D virtual space with other people. However, it is heavily dependent on the ability to interact within that space.

Multiple experts have concluded that interaction must be substantive and allow users to manipulate and respond to the surrounding shared virtual environment in real time. As a VR researcher said, "Being able to interact physically with objects in VR, like moving a 3D model or collaborating on a prototype, skyrockets the feeling of presence. Just watching isn't enough." This statement underlines the essence of Oh et al. (2018) work, which concluded that interaction is the primary catalyst of social presence.

On the other hand, interactivity is not providing universal benefits across all types of meetings. Professor of Virtual Reality stressed the main constraint: "You still have caricatures in VR—funny-looking avatars. If you're just having a discussion, there's no real benefit over video." This suggests that interactivity is only valid when the strong points of the medium match the goals of the interaction. For example, if the meeting is verbal and the only topic is information exchange, traditional video conferencing is a far greater choice because it beats VR due to familiarity and transmission of facial cues.

Media Richness: Potential vs. Practice

According to Media Richness Theory (Daft & Lengel, 1986), the richer the media, the more capable it is of transmitting multiple non-verbal cues (e.g., facial expressions, tone of voice) at the same time, which in turn allows for instantaneous feedback. Intuitively, VR should be better suited to provide a prominent level of richness due to 3D spaces, embodied interaction, special sound, and 3D object-shared manipulation. Albeit expert interview proved otherwise and revealed that the gap between potential richness and actual perceived richness of users is consistent.

Interviewed Tech Expert had an observation, "Even though VR headsets today have facial and eye-tracking, most collaborative software doesn't make use of them. So, you miss key signals like eye contact or expressions." This statement underlines that the users are provided with certain expectations which do not get reflected in the actual usage of the VR hardware.

Use Case Matters: Matching Medium to Purpose

The most prominent takeaway from most of the interviews was that VR can only be more effective than other mediums when the context and the purpose of communication align. Multiple experts mentioned that it should not be seen as a replacement for all video meetings. On the contrary, it is most effective in creative and collaborative tasks, where the technology's full potential can be leveraged.

Professor in VR said, "VR makes perfect sense when we are prototyping a sneaker, designing a mall, or walking through a new building concept. That's where 3D makes a difference." It supports the statement made by Tech Expert, which highlighted that working with manipulable 3D objects in VR creates a sense of activity which enhances engagement and social presence.

5.1 Conclusion

The study's sole purpose was to answer the question: How does interactivity affect perceived social presence and media richness across video-conferencing and virtual-reality meetings, according to experts? After the expert interviews, it was found that interactivity is key in enhancing Social Presence and Media Richness, although it needs to align with the meeting's purpose. Interactivity provides value only when participants can manipulate shared objects or co-create in real-time. On the other hand, if the task at hand is simply status reporting, the added interactivity will add more complexity than benefits, being counterproductive. Furthermore, VR is not seen as a replacement for all video meetings because the VR space is not as efficient and effective in certain communication scenarios. Experts repeatedly mentioned that VR is not a permanent replacement for all video meetings; rather, it is best as a complement for specific tasks which would benefit from a highly interactive or 3D special environment. Regular day-to-day conversations such as HR or quick client check-ins are still best carried out in conventional video platforms because of their speed and simplicity. Lastly, most of the potential of VR is underused, as there are technical limitations that are yet to be overcome.

Findings imply that VR should not be overused for the sake of it being new; it is because it is only effective for selected tasks that include co-creation or prototyping. To increase the productivity in VR space, there should be technological improvements made not on avatars visually, but rather on interactivity features as they directly increase engagement and productivity of the users.

This research is supportive of the Social Presence Theory and Media Richness Theory being subjects of interactivity in digital environments. Moreover, it suggests more recent views that these theories are subject to context and user experience instead of the different levels of media complexity.

A key limitation was the sample size of the interviewees, as they only provided a limited number of views on the matter. Moreover, experts were only able to give their "expert" perspective without considering regular users' experiences.

Further research should be focused more on observational and experimental studies to see how the increase in context-specific interactivity manipulates the VR meeting

participants' levels of perceived presence and richness of the media. Moreover, it would be valuable if there would be a study on how communication becomes more efficient when there is an improvement in avatar fidelity.

6. REFERENCES

Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a More Robust Theory and Measure of Social Presence: Review and Suggested Criteria. *PRESENCE Virtual and Augmented Reality*, *12*(5), 456–480. https://doi.org/10.1162/105474603322761270

Channel Expansion Theory and the Experiential Nature of Media Richness Perceptions on JSTOR. (n.d.). https://www-jstor-org.ezproxy2.utwente.nl/stable/257090?seq=1

Cobb, S. C. (n.d.). *Social Presence and Online Learning: A Current View from a Research Perspective*. https://eric.ed.gov/?id=EJ938832

Defining and measuring social presence: Contribution to the networked minds theory and measure | Request PDF. (2001, January 1). ResearchGate. https://www.researchgate.net/publication/228887603_Defining_and_measuring_social_presence_Contribution_to_the_networked_minds_theory_and_measure

Dennis, A. R., & Valacich, R. M. F. a. J. S. (2008). Media, Tasks, and Communication Processes: A Theory of Media Synchronicity. *MIS Quarterly*, *32*(3), 575–600. https://doi.org/10.2307/25148857https://www.jstor.org/stable/25148857

Effing, R., & Hinz, M. (2024). Are Children Ready for the Metaverse? The Minefield of Virtual Participation in Digital Social Spaces with Harmful Content and Behavior. In *Lecture notes in computer science* (pp. 1–15). https://doi.org/10.1007/978-3-031-70804-6_1

Gunawardena, C. N. (1995). *Social Presence Theory and Implications for Interaction and Collaborative Learning in Computer Conferences*. Learning & Technology Library (LearnTechLib). https://www.learntechlib.org/p/15156/

Hennig-Thurau, T., Aliman, D. N., Herting, A. M., Cziehso, G. P., Linder, M., & Kübler, R. V. (2022). Social interactions in the metaverse: Framework, initial evidence, and research roadmap. *Journal of the Academy of Marketing Science*, *51*(4), 889–913. https://doi.org/10.1007/s11747-022-00908-0

Kim, J., Song, H., & Luo, W. (2016). Broadening the understanding of social presence: Implications and contributions to the mediated communication and online education. *Computers in Human Behavior*, *65*, 672–679. https://doi.org/10.1016/j.chb.2016.07.009

Knowledge transfer in virtual systems development teams: an exploratory study of four key enablers. (n.d.). IEEE Journals & Magazine | IEEE Xplore. https://ieeexplore.ieee.org/document/1435630

Kreijns, K., Xu, K., & Weidlich, J. (2021). Social Presence: Conceptualization and Measurement. *Educational Psychology Review*, *34*(1), 139–170. https://doi.org/10.1007/s10648-021-09623-8

Lowenthal, P. R., & Snelson, C. (2017). In search of a better understanding of social presence: an investigation into how researchers define social presence. *Distance Education*, *38*(2), 141–159. https://doi.org/10.1080/01587919.2017.1324727

Oh, C. S., Bailenson, J. N., & Welch, G. F. (2018). A Systematic Review of Social Presence: Definition, Antecedents, and Implications. *Frontiers in Robotics and AI*, *5*. https://doi.org/10.3389/frobt.2018.00114

(PDF) Criteria And Scope Conditions For A Theory And Measure Of Social Presence. (2003, October 1). ResearchGate. https://www.researchgate.net/publication/239665882_Criteria_And_Scope_Conditions_For_A_Theory_And_Measure_Of_Social_Presence

Speidel, R., Felder, E., Schneider, A., & Öchsner, W. (2023). Virtual reality against Zoom fatigue? A field study on the teaching and learning experience in interactive video and VR conferencing. *PubMed*, *40*(2), Doc19. https://doi.org/10.3205/zma001601