International Journal of Research in E-learning
Vol. 9 (2), 2023, pp. 1–24



DOI 10.31261/IJREL.2023.9.2.05

**Jan Waligórski**
AGH University of Krakow / EduVRLab / Poland
https://orcid.org/0000-0002-9399-9786

**Aleksandra Cząstkiewicz**
Maria Curie-Sklodowska University / Department of Philosophy and Sociology / Poland
https://orcid.org/0009-0002-9614-756X

**Zofia Samsel**
Université Paris Cité / Learning Planet Institute / France
https://orcid.org/0000-0001-6554-9051

**Natalia Frys**
Jagiellonian University / Department of Polish studies / Poland
https://orcid.org/0009-0002-8747-960X

# Reimagining Online Academic Conferences: The Promise of Social Virtual Reality for the Return of Co-Presence

## Abstract

New technologies and societal shifts are profoundly influencing communication and conducting meetings. Over the past few years, the number of online conferences has increased. The body of literature indicates that online events allow for cost and social inequalities reduction. Despite this, they also present challenges in non-verbal communication, and diminish the sense of co-presence, thus affecting networking. Current academic discussions on the advantages and limitations of organizing remote academic conferences are typically confined to those conducted via video-conferencing systems. The aim of this research is to explore the potential of virtual reality (VR) technology and social VR platforms as alternative methods for organizing online academic conferences. The authors present the course of one of the first academic conference conducted entirely in social VR (*Wirtualium 2.0*), along with the survey outcomes regarding the potential of this environment

for hosting academic conferences. Our findings indicate that, compared to video-conferencing systems, social VR platforms offer for most participants a higher sense of co-presence, facilitating networking and engagement in informal conversations. In this context, the identified limitations of social VR platforms encompass limited device accessibility, technical challenges, and impediments to efficient note-taking. Nonetheless, the majority of users consider social VR as suitable for hosting academic conferences. This suggests that even though academic events via social VR platforms encounter technical challenges and will not be the same as in-person conferences, they should exploit the potential of VR technology to achieve what is unattainable in a physical setting.

K e y w o r d s: Virtual Reality (VR), social virtual reality (social VR), co-presence, online academic conference, *Spatial*, networking

Academic conferences play an essential role in advancing science, primarily by providing opportunities for knowledge exchange (Mulders & Zender, 2021, p. 1; Edelheim et al., 2018, p. 12) and for establishing new connections, which can lead to new scientific collaborations (Edelheim et al., 2018, p. 13).

In recent years, there has been a marked increase in the frequency of academic conferences organized remotely (Roos et al., 2020, p. 5). The COVID-19 pandemic played a key role in accelerating this trend (Bray et al., 2022, p. 1). However, despite the possibility of resuming in-person conferences, many organizers have chosen to continue their events online due to the numerous benefits of remote events (Roos et al., 2020; Bray et al., 2022). The most commonly used tools for organizing remote conferences are *video-conferencing systems* (VCS), such as *MS Teams, Zoom, Google Meet, Skype, Webex*, and others (Chessa & Solari, 2021, p. 1). During these events, participants have the opportunity to present papers and participate in virtual poster sessions via the Internet (Roos et al., 2020, p. 5).

As online events become more and more popular, the academic debate about the advantages and limitations of organizing academic conferences remotely is intensifying (e.g., Bray et al., 2022; Roos et al., 2020; Lortie, 2020; Sá et al., 2019; Niner & Wassermann, 2021). Although more publications are addressing this subject, most focus only on video-conferencing systems (e.g., Roos et al., 2020; Bray et al., 2022; Lortie, 2020), neglecting less-known methods. Therefore, this article seeks to elucidate the potential of social virtual reality (social VR) platforms and virtual reality (VR) technology for organizing an academic conference, comparing them to video-conferencing systems. For this purpose, the authors present an evaluation of one of the first academic conferences held entirely in social VR (the Polish academic conference *Wirtualium 2.0*) and provide outcomes of the survey about participants' perspectives on social VR and its potential for organizing academic conferences.

## Strengths and limitations of online academic conferences

One of the most commonly highlighted advantages of online conferences is their cost-efficiency for both organizers and attendees (Roos et al., 2020, p. 11; Bray et al., 2022, p. 4; Lortie, 2020, p. 2; Sá et al., 2019, p. 6). Conducting events remotely eliminates the need to rent venues and provide catering (Roos et al., 2020, p. 11). The reduced expenses often enable organizers to lower or even waive registration fees (Bray et al., 2022, p. 4), thereby enhancing conference accessibility. Moreover, participants in online conferences save on travel and accommodation costs (Sá et al., 2019, p. 8; Niner & Wassermann, 2021, p. 10). This proves beneficial for individuals unable to attend physical events due to geographical barriers or constraints such as financial limitations, health concerns, or family commitments (Sá et al., 2019, p. 8-10; Roos et al., 2020, p. 6). Additionally, the elimination of conference trips contributes to the reduction of carbon dioxide emissions, positively impacting the environment (Niner & Wassermann, 2021, p. 3). Furthermore, the absence of travel-associated exhaustion ensures that attendees can avoid jet lag, enhancing their well-being throughout the conference (Bray et al., 2022, p. 3).

The virtual format of events enables participation from a more diverse and global audience moving beyond the confines of the local academic community (Lortie, 2020, p. 6; Bray et al., 2022, p. 3). This has the potential to reduce inequalities stemming from factors such as gender or ethnic origin (Sá et al., 2019, p. 11; Bray et al., 2022, p. 1). Online academic conferences enable effortless recording and archiving of participants' presentations, enriching the open access collections of educational materials (Lortie, 2020, p. 6) and allowing for revisiting the shared materials later. However, organizing academic conferences remotely also carries the risk of technical problems or lack of access to suitable equipment for some participants (Roos et al., 2020, p. 12; Niner & Wassermann, 2021, p. 10).

On the one hand, the remote form of an academic conference enables participants to join from any location via the Internet, tailored to individual needs and available time (Niner & Wassermann, 2021, p. 8). On the other hand, the familiar environment and household duties can easily distract participants, making it difficult to actively participate in the event (Sá et al., 2019, p. 9).

Greater anonymity of participants in remote conferences compared to in-person conferences has dual consequences. It can facilitate communication for shy and introverted individuals (Raby & Madden, 2021, p. 4). On the other hand, a diminished sense of other participants' presence can hinder networking and informal interactions (Roos et al., 2020, p. 12) and decrease participant engagement (Raby & Madden, 2021, p. 6). Limiting networking and informal interactions is one of the biggest and most frequently cited disadvantages of academic conferences organized through video-conferencing systems (Roos et al., 2020, p. 12; Bray et al., 2022, p. 8; Holly & Wassermann, 2021, p. 6; Raby & Madden, 2021, p. 6; Sá et al., 2019, p. 8).

A significant problem that arises during online conferences is participants' issues with concentration. As Sá et al. write: "Too easy to be distracted by work, home, and all the other daily routines – unless you lock yourself in a closet" (2019, p. 9). Video-conferencing systems inherently pose limitations in the means of expression they offer (Raby & Madden, 2021, p. 4) There is a perceived lack in the availability of non-verbal communication or the ability to see the reactions of each of the attendees (Sá et al., 2019, p. 9). The issue of participants not turning on their cameras during a conference means it is indiscernible whether they are genuinely present during discussions (Bray et al., 2022, p. 8). Some video-conferencing systems often have built-in time restrictions, especially if organizers or delegates are using the free version of the software.

Numerous studies highlight the *zoom fatigue effect* (e.g., Bailenson, 2021; Nesher Shoshan & Wehrt, 2022; Fauville et al., 2021). The increased cognitive effort required to maintain concentration during a conference organized through video-conferencing systems results in a feeling of amplified fatigue after the event (Raby & Madden, 2021, p. 5).

## The use of social VR and VR technology to conduct academic conferences

Social VR represents a new generation of multi-person platforms designed to facilitate user interaction within computer-generated 3D virtual environments using personalized avatars (digital representations of individuals). Distinguishing itself from previous collaborative virtual environment platforms, such as *Second Life* and *OpenSimulator*, social VR applications allow for the use of immersive head-mounted displays (HMD; McVeigh-Schultz et al., 2019, p. 1), which are the most common type of VR technology.

Typically, social VR platforms consist of collections of virtual worlds created by the users themselves (e.g., *VRChat, Spatial, Mozilla Hubs*). These emerging platforms can serve users both as places for activities related to daily human existence (e.g., meetings, work, learning, social games, travel), and as venues for hosting collective events (e.g., academic conferences, music festivals, community gatherings).

In recent years, social VR platforms have emerged as new venues for hosting academic conferences. In 2020, an academic conference conducted in German language, *VRARBB@Social VR*, was organized on the AltspaceVR platform (Mulders & Zender, 2021). In the same year, the *IEEEVR 2020 – Conference on Virtual Reality and 3D User Interfaces* took place on the *Mozilla Hubs* platform. During this event, a space was created for the collective viewing of paper presentations,

and a session of four posters was conducted (Le et al., 2020). In 2022, part of the subsequent edition of the *IEEEVR 2022 – Conference on Virtual Reality and 3D User Interfaces* took place on the *Virbela* platform. In 2022, the first edition of the Polish-language academic conference *Wirtualium* was hosted on the AltspaceVR platform, and in 2023 the second edition of this conference – *Wirtualium 2.0* – was held on the *Spatial* platform, detailed proceedings of which are elaborated in the subsequent section.

During conferences in social VR, users are in virtual rooms that typically resemble conference rooms from the physical world, where they can move freely via their avatars. This structure allows for informal discussions between participants in smaller groups, as was observed during the *VRARBB@Social VR* conference (Mulders & Zender, 2021, p. 3–4). Evaluative research conducted after this conference indicates that the structure of virtual rooms can influence participants' assessment of their suitability for interpersonal interaction (Mulders & Zender, 2021, p. 4). As Catlin Pidel and Philipp Ackermann have noted, „virtual reality conferencing affords more social interaction than video conferencing, such as the ability to organically break off into small groups, or interacting with virtual objects in the scene" (2020, p. 3).

Participant behaviors in space, like changes in interpersonal distances, are an inherent part of non-verbal communication, which, in contrast to VCS, can occur on social VR platforms (Li et al., 2021, p. 1). Proximal behaviors of users also relate to another non-verbal cue – the gaze, an important element of communication in social VR (Wei et al., 2022, p. 4). When social VR users utilize HMDs, movements of their physical body synchronize with the movements of their avatar visible in the virtual space. A directed gaze towards another person becomes visible in the virtual space through the avatar's movement. Similarly, HMD users can make a gesture, and for some devices with additional tracking systems, users' facial expressions can also be synchronized in this way (Wei et al., 2022, p. 4). Some social VR platforms (e.g., *Spatial*, *VRChat*) allow for other non-verbal messages, such as *emoji icons* appearing above the avatars' heads or markers enabling real-time sketching in space (Wei et al., 2022, p. 6). This contributes to the fact that communication in social VR, compared to VCS, „shows the most similarities to offline face-to-face, in terms of spatial behavior, hand behavior, and facial expressions" (Wei et al., 2022, p. 6).

Avatar-mediated communication in social VR offers rich non-verbal communication and provides users with a sense of partial anonymity. This can facilitate communication for shy and introverted individuals (Wei et al., 2022, p. 6). It also has the potential to reduce biases based on appearance, enhancing the comfort of women by decreasing the likelihood of them feeling judged purely based on appearance (Campbell et al., 2021, p. 15). It is hypothesized that this effect may similarly benefit men, however further research in this area is needed. Furthermore, users in social VR experience a higher sense of social presence compared to VCS (Wei et al., 2022, p. 6).

However, inclusivity cannot be found in all aspects of social VR. While, in theory, every user can create their own avatar representation, some creators (e.g., *Ready Player One*) have built-in limitations regarding available templates. This leads to underrepresentation of certain groups, such as individuals with disabilities or obesity. Further changes are necessary to make social VR accessible for all interested individuals.

A significant limitation for social VR is the availability of HMDs. Consequently, some social VR platforms (such as *VRChat, Spatial, Virbela, Mozilla Hubs*) also allow users to use other devices: computers, laptops, tablets, or phones. In the evaluation questionnaire after the academic conference *IEEEVR 2020*, 5 out of 26 respondents declared that they used HMDs (Le et al., 2020, p. 490). In the subsequent edition, *IEEEVR 2021*, "most people accessed *Virbela* from a desktop, while 16.3% reported experimenting with HMDs and small percentage (4,6%) used a VR headset all the time" (Moreira et al., 2022, p. 1918). In the evaluative study after the *VRARBB@Social VR* conference, 76% of respondents declared that they used HMDs during the conference (Mulders & Zender, 2021, p. 1).

Using social VR only with desktop devices can limit the possibilities for user interaction in the virtual environment and non-verbal communication. Although desktop users can freely move their avatar around virtual rooms and turn towards other users, they are not able to freely communicate non-verbal messages in real-time, as users with HMDs. Some social VR platforms (e.g., *VRChat, Spatial*) allow desktop users to activate avatar animations (e.g., applauding, thumbs up, smiling) to express non-verbal messages. The results of Chessa & Solari's (2021, p. 11) study, conducted in the context of university classes, indicate that even users without HMDs in social VR (in this case on the *Mozilla Hubs* platform) might feel a stronger sense of presence compared to VCS.

On the one hand, HMDs limit the influx of distractions from the physical world, which can lead to increased focus on communication contents (Le et al., 2020, p. 492). On the other hand, a prolonged use of HMDs can lead to discomfort and fatigue (Mulders & Zender, 2021, p. 5; Wei et al., 2022, p. 6), which is a significant drawback of this technology.

Another advantage of social VR platforms include possible interactions with 3D objects (Mulders & Zender, 2021, p. 5; Wei et al., 2022, p. 6), which, for instance, can augment presentations prepared by speakers and provide opportunities for organizing innovative entertainment (e.g., social games) or networking activities during conferences (Moreira et al., 2022, p. 1910–1911).

It is worth noting that users rate social VR platforms as more challenging to use than VCS (Wei et al., 2022, p. 6). Similar to other conferencing tools, significant issues with social VR platforms arise from internet connection quality and software errors (Mulders & Zender, 2021, p. 5; Le et al., 2020, p. 486).

## *Wirtualium 2.0* – academic conference on the *Spatial* platform

The aim of this section is to describe the proceedings of the academic conference, *Wirtualium 2.0*, which took place on May 26–27, 2023. It was organized by several Polish academic student groups, including *Sekcja Filozofii Techniki KNSF* from Jagiellonian University, and both *Koło Naukowe Architektów Informacji* and *Koło Naukowe Kognitywistyki* from Maria Curie-Sklodowska University. Additionally, *Academia Electronica* was involved in the organization. To the best of the authors' knowledge, this conference was the first academic conference in the world to be held on the *Spatial* platform and one of the first academic conferences entirely conducted in social VR. The previous edition of the conference, titled *Wirtualium 1.0*, took place on June 4th, 2022, on the AltspaceVR platform. To the authors' knowledge, it was the first academic conference in Poland organized entirely on social VR platform.

The conference theme revolved around interdisciplinary research in virtual reality. The language of the conference was Polish. Participation was free of charge for both speakers and attendees. During the conference, there were 23 speakers' presentations, 4 expert lectures, and 1 discussion panel. 196 people registered for the conference using the attendee registration form. At its peak, the conference was attended by 75 people – during the opening lecture. We do not have statistics on the number of unique users who participated throughout the conference, but we estimate that a total attendance ranged from 90 to 100 individuals.

The conference was organized using the *Spatial* platform – a social VR platform established in 2016, accessible via web browsers, mobile applications, and HMDs (*Meta Quest 1*, *Meta Quest 2*). *Spatial* features an integrated avatar creator (which allows for customization of the users' digital representations) and is synchronized with the *Ready Player Me* tool, enabling users to use the same avatar across multiple social VR platforms. The key features of the *Spatial* platform in the context of holding an academic conference include: a built-in text chat, an extensive system for animating non-verbal avatar messages for users of the browser version and mobile application (e.g., clapping animation, thumbs up, dancing, emojis appearing over the avatar), a screen-sharing system in the browser version, a user management system (e.g., the ability to send users to the audience, block and ban users), as well as a virtual space editor and space templates. *Spatial* also allows for sharing a webcam video over an avatar and real-time translation, however, these features were not employed during the *Wirtualium 2.0* conference.

The conference was held in the virtual auditoriums of *Academia Electronica* (AE). AE is a Polish academic and educational center operating in virtual reality, founded by Sidey Myoo in 2007 on the *Second Life* platform (see Ostrowicki, 2022). Since 2021, AE has also been operating on social VR platforms: until March

2023, on *AltspaceVR* and, since early 2023 on *Spatial*. AE is the venue for regular academic classes for Polish university students and other academic events.

During the conference, the keynote speakers gave their presentations, and the expert discussion panel was held in the *Digital Beam* auditorium (see Figure 1a), which features a clear division between the stage and the audience. Additionally, a hanging chair for the lecturer was placed on the stage. On the back of the stage, there was a large screen where presentations were displayed. A major limitation of the *Spatial* platform is that it only allows 50 users to be in one room simultaneously while maintaining communication among them. For this reason, in the *Agora* auditorium, a live broadcast from the Digital Beam auditorium was relayed onto an auxiliary screen. The speakers' presentations took place in two parallel panels in the *Fireworks* auditorium (see Figure 1b) and the *TV Room* auditorium (see Figure 1c). Both of these auditoriums maintained a clear division between the audience space and the speaker's stage, with a screen set up on the back of the stage to display presentations. One of the experts, Maciej Pronkiewicz, utilized a template and editor available on the *Spatial* platform to prepare his own space (see Figure 1d), where his presentation combined with a discussion segment took place.

After each expert lecture, during the expert panel discussion, and at the end of the speakers' panels, conference participants had the opportunity to discuss and ask questions using a text or voice chat. Consequently, they were deeply engaged in discussions, often utilizing the time allocated by the organizers for this purpose (sometimes also the time scheduled for breaks).

The organizers provided guidelines on how to use the *Spatial* platform and facilitated instructional sessions for interested attendees before the conference. Apart from a few isolated incidents, the attendees experienced no issues navigating through the spaces where the conference was held. They transitioned seamlessly between auditoriums using teleports. Some users encountered difficulties sitting on some virtual chairs, potentially due to a non-intuitive interface. A few speakers did not ascend to the stage while presenting. Several times during the conference, the presentation display on the screen was interrupted and had to be restarted by the speaker, possibly due to software errors or issues with the speaker's internet connection. During some presentations, the audio quality was subpar, likely resulting from the presenter's inadequate internet connectivity.

The conference participants were encouraged by the organizers to use network nomenclature, for instance, addressing each other by network names and omitting official courtesy phrases. The participants partially adhered to these guidelines. In the future, we aim to examine whether this shift can enhance interpersonal communication during academic conferences.

To facilitate networking among users, the organizers invited conference participants to a virtual campfire after the official proceedings on both the first and second days (see Figure 1e). Those who joined the gathering expressed strong ap-

preciation for this idea in conversations with the organizers. Nonetheless, further research in this area is necessary.

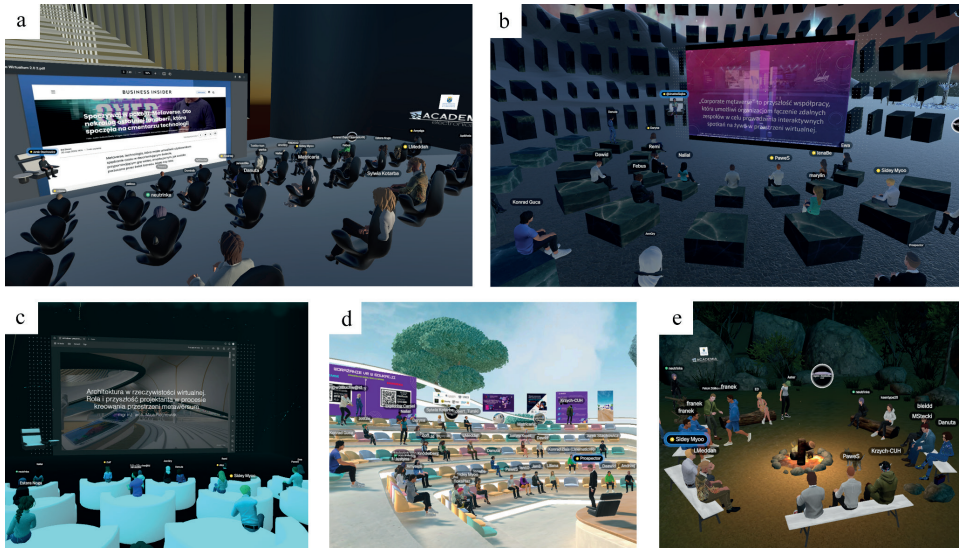


*Figure 1.* Photographic documentation from the academic conference *Wirtualium 2.0*: a) *Digital Beam* auditorium, b) *Fireworks* auditorium, c) *TV Room* auditorium, d) auditorium designed by the expert, e) integration by the campfire

S o u r c e: Own work.

## Evaluation

In this section, we present the findings of a survey that examined the perspectives of *Wirtualium 2.0* conference participants regarding the potential of utilizing social VR for organizing academic conferences. The survey questionnaire addresses the following research questions (RQ):

- RQ1: What devices were used by the conference participants?
- RQ2: Do conference participants think that social VR is a suitable venue for organizing an academic conference?
- RQ3: Do conference participants think that, during a conference in social VR, the sense of presence of others is more strongly felt compared to VCS?
- RQ4: Do conference participants think that there are fewer distractions during conferences in social VR compared to VCS?
- RQ5: Do conference participants think that there are fewer networking issues during conferences in social VR than on VCS?

- RQ6: Do conference participants think that attending a conference in social VR is technically simpler than attending one via VCS?

The subsequent section of the article will delve into the methods and evaluation outcomes. In the survey questionnaire, the authors opted to refrain from employing specialized terminology. The term *social virtual reality* was replaced with *3D virtual environment* (VE), *video-conferencing system* was substituted with *video communication tools* and *head-mounted display* was replaced with *VR headset*. To avoid potential misunderstandings, the examples of platforms belonging to each respective category were provided.

Upon further reflection, we recognize potential ambiguity associated with the term *3D virtual environment*. This designation can encompass a broader range of platforms and might not exclusively pertain to social VR, which is the primary object of our analysis. In our case, it most likely did not affect the results, as for 86% of the respondents, Wirtualium 2.0 (conducted in social VR) was the only academic conference they attended in a 3D virtual environment. Among the remaining respondents (N=8) who also attended other academic conferences in 3D virtual environments: 5 indicated events in social VR, 2 did not specify the platform, and 1 mentioned both social VR and other platforms. Nonetheless, in the future, we suggest refraining from such replacement.

## Method

The responses were collected using *Google Forms*, and completion took approximately 5 to 10 minutes. The study was conducted in Polish. Participation was voluntary and anonymous. Information about the opportunity to participate was provided to *Wirtualium 2.0* attendees via a post-conference email. The questionnaire consisted of 21 questions divided into 5 sections, including both close-ended and open-ended questions. The questions covered both demographic information and aspects directly related to the investigated subject matter. Categories in open-ended questions were formulated inductively.

## Limitations

The respondents were participants of a conference addressing the VR topic. Since the conference was attended largely by individuals with a vested interest in VR technology or by those who use this technology in their professional work, this might have influenced their responses. The authors of the research were involved in the organization of the *Wirtualium 2.0* conference, which creates a risk of bias in the interpretation and analysis of the results.

## Results

In the survey, 43 respondents (N=43) provided responses out of an estimated 90-100 unique conference attendees. At its peak, the conference was attended by 75 individuals during the opening keynote lecture. The precise data on unique participants throughout the conference are unavailable. Questions in section I. were used to verify the minimum inclusion criterion, which was participation in the *Wirtualium 2.0* conference. Due to the non-fulfillment of this condition, responses from one participant were excluded from the analysis. Most of the respondents included in the study (N=42) were women (67.7%, compared to 33.3% men). The average age in the group was 34 years, with ages ranging from 20 to 66 years.

Among the respondents, the majority declared they possessed higher education (N=31, 73.8%) (see Figure 2). Only one individual had a secondary education. 23.8% of the respondents (N=10) reported an active student status within Bachelor's or Integrated Master's programs, with an equivalent percentage holding a Master's or Master of Engineering degree (N=10). Those with PhD or post-PhD qualifications constituted 19% (N=8) of all respondents, while Master's students (N=6) and PhD candidates (N=5) accounted for 14.3% and 11.9%, respectively. Graduates of Bachelor's and Engineering programs constituted 4.8% (N=2) of all respondents.

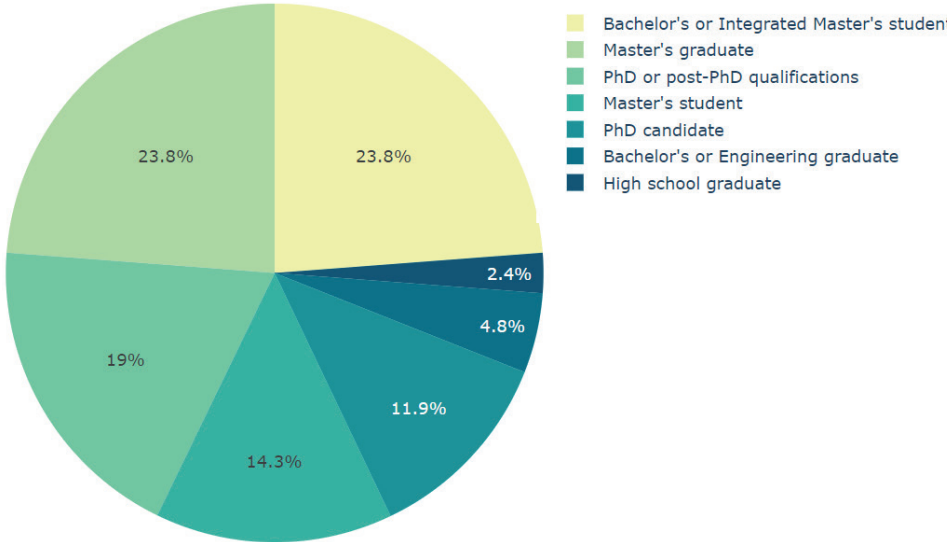


*Figure 2.* The pie graph illustrates the level of education of the respondents

S o u r c e: Own work.

For 81% of the respondents, *Wirtualium 2.0* was their first academic conference experience within a VE (N=34). The remaining 19% (N=8) declared having prior

experience with other VE-based academic conferences. In the open-ended question, a majority of them (N=4) pointed to the previous edition of the *Wirtualium* conference.

***RQ 1. Devices*** Regarding the equipment utilized for conference participation, nearly all respondents (97.6%, N=41) reported (in a closed-ended question) using a laptop or desktop computer (hereinafter referred to as *desktop users*) for at least a part of the event. For 82.9% of them (N=34), this was the sole device employed for participation in the event.

Only one participant used exclusively VR headset for this purpose, while no participants used only a mobile device (tablet or smartphone). Three desktop users, constituting 7.3% of the surveyed individuals, also used VR headsets. The same percentage of desktop users (N=3) also employed mobile devices. One respondent combined the usage of all available options (laptop or desktop computer, VR headset and mobile devices) (Figure 3).

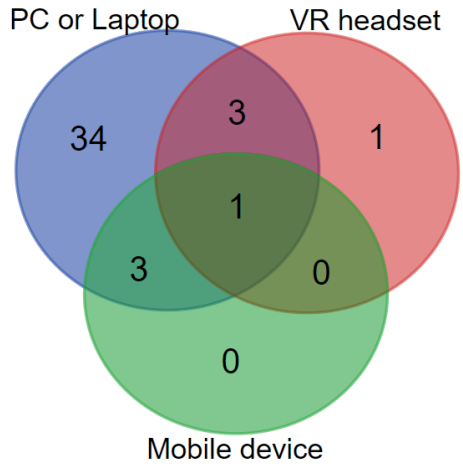


*Figure 3.* The Venn diagram illustrates the distribution of equipment used by respondents to attend the conference (https://bioinformatics.psb.ugent.be/webtools/Venn/)

S o u r c e: Own work (with the tool https://bioinformatics.psb.ugent.be/webtools/Venn/).

Among the reasons for not using VR technology during the conference, as reported in a semi-open multiple-choice question, the default options presented in the questionnaire content were dominated by the lack of access to such equipment (N=32, 86.5% of 37 respondents answering this question). Additionally, 8.1% (N=3) selected "*Want to avoid the discomfort of using a VR headset*" and one respondent chose the answer "*Difficulties associated with using a VR headset*". In the open-ended section of the question, respondents indicated technical issues (N=2), difficulty in taking notes (N=1), incompatibility of the *Spatial* application

with a specific VR headset model (N=1), and the need to perform other tasks during the conference (N=1). A total of 88.1% (N=37) of the participants included in the analysis provided responses to this question. As only one individual exclusively used a VR headset during the conference, there is no possibility to compare the influence of the employed hardware on user responses.

***RQ 2. Academic social VR*** In response to the question of whether a VE, such as the *Spatial* platform, is a suitable venue for organizing an academic conference, 38.1% of respondents answered "Strongly yes" (N=16), 42.9% "Rather yes" (N=18), 9.5% "Rather no" (N=4), 4.8% "Strongly no" (N=2), and 4.8% "I don't know" (N=2).

The majority of respondents (88.1%) answered "Strongly yes" (N=26) or "Rather yes" (N=11) to the question of whether they would be willing to participate in future academic conferences organized in VE-based platforms, such as *Spatial*. Two individuals selected the response "Rather no" (4.8%), while three individuals chose "I don't know" (7.1%). No one chose the response "Strongly no" (Figure 4).

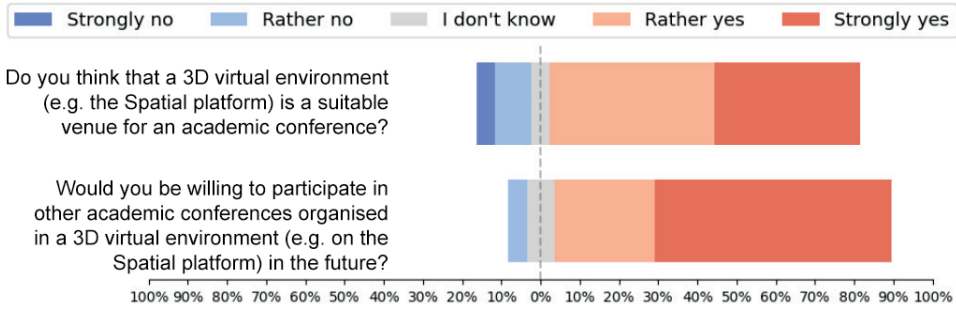


*Figure 4.* The graph illustrates respondents' answers to the five-point Likert-scale questions concerning their attitude towards attendance in academic conferences in a 3D virtual environment

S o u r c e: Own work.

The respondents were asked (in an open-ended question) to specify the major advantages of participating in an academic conference organized in a VE (e.g., on the *Spatial* platform). Among the collected responses (N=41), the most frequently indicated advantage was the avatar-mediated communication (N=11). According to the examined individuals, avatar-mediated communication facilitated informal interactions among conference participants, provided support for shy individuals, and did not require sharing a webcam. As one individual stated: "*When presenting a paper, my avatar represents me, which is much more convenient than having to adjust my real environment to the conference conditions, such as making sure no household members enter the camera's frame during the conference. Additionally, this type of conference gives me more time to practice my presentation before the panels begin, as I don't have to spend a lot of time getting ready, doing makeup, or*

*choosing the right outfit*". The respondents pointed out the benefit of gaining new experience (N=10) related to "*engaging with new technologies*" and participating in an experimental form of conference organization within the VE. The next most commonly cited advantages were: stronger sense of presence of other conference attendees (N=7) and experience of spatiality (N=7) compared to VCS. The sense of presence reported by respondents was generally associated with the feeling of being situated within a shared avatar-mediated virtual space. When discussing the advantage of spatial experience, surveyed individuals most frequently indicated the freedom to move around virtual rooms and spatiality of perception. Further advantages highlighted by the respondents pertained to the visual attractiveness of the VE (N=6) as well as convenience and availability associated with a remote form of conference organization (N=6). Furthermore, two individuals mentioned the possibility of using VR headset (N=2) and chat feature (N=2).

In the subsequent open-ended question, the respondents were asked to specify the primary limitations of participating in an academic conference organized in a VE such as the *Spatial* platform. Among the collected responses (N=37), the majority of individuals indicated potential or actual ensuing technical issues (N=19). Amid them, Internet connection-related issues were the most frequently mentioned (N=9). Another drawback highlighted by the respondents was the limited visibility of presentations (N=8). They also elaborated on the inability to switch to a full-screen presentation view, and challenges associated with properly configuring and zooming the screen view. Some mentioned that avatars of other conference attendees occasionally obstructed the screen. A subsequent disadvantage pointed out by the respondents pertained to personally experienced or observed issues with navigating the virtual space using avatars (N=7). As one person commented, "*I think that if someone is not often in virtual environments, they might find it difficult to navigate in the digital world – to operate keys, move freely, and add reactions. However, this is more a matter of habituation or practice rather than a genuine drawback"*. The respondents also reported that VEs require more advanced hardware compared to VCS (N=5). Some mentioned that due to the lack of a compatible VR headset, they could not fully leverage the conference's potential (N=3).

In a subsequent question respondents were asked to choose which type of platform they considered as a better venue for hosting an academic conference. Given the comparative nature of this question, an additional criterion for inclusion in the analysis was set: apart from participating in *Wirtualium 2.0*, respondents must have declared in the questionnaire that they had taken part in any conference via VCS. This inclusion criterion was also applied to all subsequent questions, hence out of 42 responses, 36 were considered for this set of questions.

When choosing a better venue for organizing an academic conference, the largest number of respondents (44.4%, N=16) declared an advantage of VE-based platforms over VCS. In contrast, 33.3% of participants (N=12) indicated an advan-

tage of VCS over VEs. Another 8.3% (N=3) saw no difference between the two, and 13.9% (N=5) selected "*I don't know*".

***RQ 3. Co-presence*** The subsequent set of questions compared experiences of attending academic conferences on VE-based platforms (such as *Spatial, AltspaceVR, Virbela*) with those on VCS platforms (such as *Google Meet, MS Teams, Zoom*).

According to 69.4% of surveyed individuals (N=25), during an academic conference organized in a VE, the presence of other participants is more strongly felt. A notably smaller proportion of respondents saw an advantage in this regard with VCS (16.7%, N=6) or stated that there was no difference between the two previously mentioned options (13.9%, N=5).

In a subsequent question, respondents were asked about the type of platform on which they felt a stronger sense of co-presence in one place during an academic conference. The majority of respondents (72.2%, N=26) chose VEs. Some individuals stated no difference (22.2%, N=8) while the fewest indicated an advantage of VCS in this aspect (5.6%, N=2) (Figure 5).

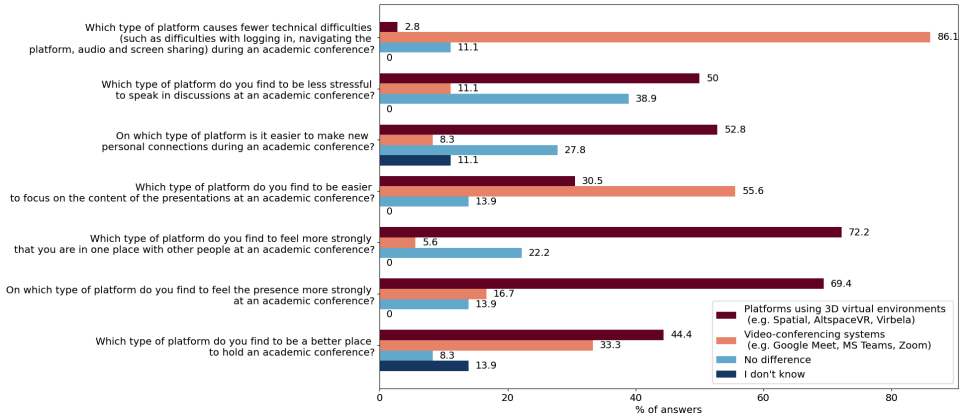


*Figure 5.* The graph illustrates respondents' answers related to the level of co-presence, attention, ease of establishing new connections, and possibility of technical issues depending on the type of academic conferences (platforms using 3D virtual environments or video communication apps)

Source: Own work.

***RQ 4. Ease of focus*** For the majority of respondents (55.6%, N=20), it is easier to focus on the content of papers presented during academic conferences when using VCS. 11 surveyed individuals (30.5%) indicated a superiority of VE-based platforms in response to this question, while 5 respondents (13.9%) saw no difference between VCS and VE-based platforms.

***RQ 5. Networking*** A considerable portion of respondents (52.8%, N=19) reported that they think it is easier to establish new connections during an academic

conference in a VE. There were 10 surveyed individuals who did not perceive a difference between VE-based platforms and VCS in this case (27.8%). 4 individuals selected the answer "I don't know" (11.1%), while 3 individuals indicated an advantage for VCS (8.3%). In a subsequent question, half of respondents (50%) stated that taking part in discussions during an academic conference is less stressful on VE-based platforms (N=16). Meanwhile, 14 surveyed individuals observed no difference (38.9%) and 4 participants (11.1%) indicated a preference for VCS in this case.

***RQ 6. Technical issues*** When assessing technical issues (such as difficulties with logging in, navigating the platform, audio and screen sharing) during an academic conference, the vast majority of surveyed individuals (86.1%, N=31) specified that they deem VCS to present fewer such difficulties. 1 participant (2.8%) stated the advantage of VE-based platforms in this matter, whereas 4 individuals (11.1%) claimed no difference between those two types of platforms.

## Discussion

Only one in ten respondents (11.9%) used an HMD during the conference (**RQ1**), marking the lowest utilization rate compared to reports from other academic conferences in social VR (refer to section 3 for details). The vast majority of respondents (86.5%) reported lack of access to appropriate devices as the reason for not using HMDs. This result may also be influenced by the fact that, at this time, the *Spatial* platform was solely compatible with HMDs *Meta Quest 1* and *Meta Quest 2*. Further research on this issue is necessary, as in the future it may partially exclude Polish researchers from participating in social VR conferences.

In open-ended questions, a new issue was identified, which is the inability to take notes and use them while wearing an HMD (this arises due to the lack of access to appropriate software and the inability to take notes in a physical notebook due to the HMDs' limitation on visibility of the physical environment). This issue was also highlighted during the *Wirtualium 2.0* conference, in the keynote lecture by Jerzy Stachowicz.

Numerous studies indicate differences in the perception of presence, immersion, and emotional responses between users of the same applications using HMDs and flat-screen computers (e.g., Pallavicini et al., 2019; MacQuarrie & Steed, 2017; Kim et al., 2014). Due to the small number of respondents using only HMDs during the conference (N=1), it is not possible to analyze this difference in our case. However, based on available research, it can be hypothesized that increasing the availability of HMDs is crucial for harnessing the full potential of social VR platforms.

The respondents generally rated the potential of social VR for organizing academic conferences very positively (**RQ2**). However, there exists a significant limitation concerning generalizability. To the best of authors' knowledge, there

have been no studies evaluating opinions about academic conferences held in social VR that do not focus on VR-related topics.

Conferences in social VR have the potential to emulate certain aspects of the experience of physical conferences. This may be indicated by the return of the sense of presence, which was markedly diminished in standard online conferences (conducted via VCS), but constitutes a key element of the overall conference experience. Our study demonstrated that a significant part of respondents (72%) perceived academic conferences organized on social VR platforms as providing them with greater social and spatial presence compared to VCS (**RQ3**), which may predispose this format to provide a better experience, especially when in-person meetings are not possible.

It is worth noting that for the majority of respondents participating in the study, *Wirtualium 2.0* was the only academic event conducted within a VE that they had attended. The fascination with the possibilities and the relative novelty of the conference format could have influenced their experience and consequently the results, thus, further research is needed in this regard.

The obtained results align with other studies suggesting that virtual reality provides users with a sense of being there and being around others (Li et al., 2019; Maloney, 2020). However, what seems most significant, given the current limitations on access to HMDs, is that these results indicate a stronger sense of presence in social VR (compared to VCS) even when HMDs are not being used (Chessa & Solari, 2021, p. 11).

This may reflect the quality of relations established during the event, which was noticed and reported by participants as an advantage of social VR. A prevalent finding in open-ended question was the reduction in networking inconveniences and a decrease in attendees' stress level during engagement in discussions compared to VCS (**RQ5**). Similarly, in closed-ended questions, for the majority of surveyed individuals conferences in social VR offered a better opportunity to forge new acquaintanceships, and for half of them - this conference format is more favorable to unrestricted expression compared to VCS. In addition to the mentioned attributes of social VR platforms, it is noteworthy that avatar-mediated communication not only enhances the sense of presence, but also facilitates communication for individuals who are shy or affected by prevailing stereotypes (Baker et al., 2019; Baker et al., 2021). One respondent noted that "*virtual avatars encourage shortening distance and engaging in direct, informal communication*".

Additionally, social VR platforms allow for the formation of smaller groups suitable for conducting discussions and informal interpersonal exchanges (Mulders & Zender, 2021, p. 3–4). Possessing an avatar's body, users can also enrich the networking process through non-verbal communication (e.g., utilizing various gestures, presenting specific body posture), including proximal communication which constitutes the key factor for communication in social VR. This is linked to the inherent characteristic of social VR, namely spatiality (refer to section 3 for details).

The results of our survey indicate that for the majority of participants, maintaining focus on presentation content is easier when the event is conducted through VCS as opposed to events in social VR (**RQ4**). These data are in contrast with other research suggesting that VR enhances focus during virtual events (Li et al., 2019; Le et al., 2020). One possible explanation for this effect could be linked to the high perceived immersion in the VE (e.g., Cadet & Chainay, 2020; Baker et al., 2021; Smith & Neff, 2018), as well as the elimination of disruptive stimuli from external surroundings (Li et al., 2019) that can positively influence focus. Many of these studies primarily explored the potential of virtual reality experienced using HMDs. On the other hand, in our study, nine out of ten participants attended the conference using only computers or mobile devices, which compared to HMDs, might provide a lower level of immersion (Pallavicini et al., 2019). However, some research also suggests that even without HMDs, individuals can achieve a high level of perceived immersion, and consequently, concentration in VR (Zhang et al., 2021). Further research is needed to resolve this issue.

The reason for concentration problems as indicated in the open-ended question among the respondents was the excessive activity of some conference participants. One respondent pointed out that such behavior might "*disturb others and draw attention to oneself*." A similar issue might also arise during in-person conferences, for instance, when someone enters the room late or slams the door. The literature also points out the following sources of concentration problems: technical issues, frustration, and stress caused by insufficient skills in handling devices, overstimulation, or the novelty of environments (Williamson et al., 2021; Moreira et al., 2022). As VR technology continues to develop, research on optimal design practices seems crucial for enhancing effectiveness and focus in social VR. Further studies are essential to explore this issue.

The majority of participants found academic conferences conducted through VCS to be less technically challenging than those held on social VR platforms (**RQ6**). The technical challenges highlighted in the open-ended responses were primarily related to the quality of the internet connection, such as poor sound, loss of connection, or delays in loading virtual rooms. Additionally, the respondents mentioned the need to dedicate extra time for learning how to use the new tool and the accompanying stress of "*fearing something might go wrong*" as additional drawbacks.

To proactively mitigate technical issues, we conducted pre-conference instructional meetings for speakers and provided a platform user guide for all participants, ensuring they could navigate the social VR environment and validate equipment, connectivity, and software setup beforehand. We presume that these solutions could have reduced the number of technical problems that occurred during the event.

In addition to these steps, we propose further improvements. A dedicated technical support chat can offer real-time assistance during the conference. Interactive in-platform tutorials aid users in adapting to the interface and functionalities.

Appointing virtual moderators or support staff for real-time assistance guides participants through technical challenges. We believe these enhancements can help reduce technical difficulties. Therefore, we recommend that future organizers of social VR conferences consider these ideas.

It also seems worthwhile to point out the graphical aspect of social VR. On the one hand, its appealing visual representation adds value. However, in countries like Poland, where there is significant digital exclusion and issues with access to stable internet connections are prevalent (Bartol et al., 2021), the high hardware requirements needed to load such visually advanced spaces may pose a limitation. Consequently, for certain groups of interested individuals the participation in the event might be complicated or even impossible.

## Summary

The conducted analyses support the recommendation of social VR, especially the *Spatial* platform, as a venue for organizing online academic conferences. Compared to VCS, there are indications that participants in social VR might often experience a stronger sense of others' presence, more comfortable discussions, and convenient networking conditions. However, further research is still needed, especially regarding conferences that would not be related to the topic of new technologies.

Said aspects constitute a pivotal element of participation in academic conferences, which is significantly curtailed on VCS. Nonetheless, it is imperative to bear in mind the limitations associated with organizing events in social VR, such as the need for access to HMDs, higher hardware requirements, and the necessity of acquiring new technical skills.

Presumably, with the development of the HMD technology and its increased accessibility, social VR conferences, while retaining the benefits of online events, will be able to overcome the limitations stemming from mediated communication. On the other hand, conferences in social VR will always differ from their physical counterparts. Hence, according to the authors, more significant than attempting to emulate in-person conferences under virtual conditions is the utilization of novel opportunities afforded by virtual reality.

## Acknowledgements

We wish to express our gratitude to the members of the Organizing and Scientific Committees, the creators of Academia Electronica, keynote speakers, the patrons, and participants of the *Wirtualium 2.0* academic conference for their collaborative contribution to this unique event.

## References

Bailenson, J. N. (2021). Nonverbal overload: A theoretical argument for the causes of Zoom fatigue. *Technology, Mind, and Behavior, 2(1).* https://doi.org/10.1037/tmb0000030.

Baker, S., Waycott, J., Carrasco, R., Kelly, R. M., Jones, A. J., Lilley, J., Dow, B., Batchelor, F., Hoang, T. & Vetere, F. (2021). Avatar-mediated communication in social VR: an in-depth exploration of older adult interaction in an emerging communication platform. Proceedings from the *2021 CHI conference on human factors in computing systems*, 1–13. https://doi.org/10.1145/3411764.3445752.

Baker, S., Vetere, F., Kelly, R., Waycott, J., Carrasco, R., Hoang, T., Batchelor, F., Ozanne, E., Dow, B. & Warburton, J. (2019). Interrogating Social Virtual Reality as a Communication Medium for Older Adults. *Proceedings of the ACM on Human-Computer Interaction*. 3. 1–24. https://doi.org/10.1145/3359251.

Bartol, A., Herbst, J. & Pierścińska, A. (2021). Wykluczenie społeczno-cyfrowe w Polsce. Stan zjawiska, trendy, rekomendacje. *Fundacja Stocznia*. Retrieved from https://fundacja.orange.pl/strefa-wiedzy/post/wykluczenie-spoleczno-cyfrowe-w-polsce-2021 (accessed 05.08.2023).

Bray, H. J., Stone, J., Litchfield, L., Britt, K. L., Hopper, J. L. & Ingman, W. V. (2022). Together alone: Going online during covid-19 is changing scientific conferences. *Challenges*, *13*(1), 7. https://doi.org/10.3390/challe13010007.

Cadet, L. B. & Chainay, H. (2020). Memory of virtual experiences: Role of immersion, emotion and sense of presence. *International Journal of Human-Computer Studies,* 144, 1906–1922. https://doi.org/10.1016/j.ijhcs.2020.102506.

Campbell, A. G., Holz, T., Cosgrove, J., Harlick, M. & O'Sullivan, T. (2020). Uses of virtual reality for communication in financial services: A case study on comparing different telepresence interfaces: Virtual reality compared to video conferencing. *Advances in Information and Communication: Proceedings of the 2019 Future of Information and Communication Conference (FICC), Volume 1*, 463–481. https://doi.org/10.1007/978-3-030-12388-8_33.

Chessa, M. & Solari, F. (2021). The sense of being there during online classes: analysis of usability and presence in web-conferencing systems and virtual reality social platforms. *Behaviour & Information Technology*, *40*(12), 1237–1249. https://doi.org/10.1080/0144929x.2021.1957017.

Fauville, G., Luo, M., Queiroz, A. C., Bailenson, J. N. & Hancock, J. (2021). Zoom exhaustion & fatigue scale. *Computers in Human Behavior Reports, 4,* 100–119. https://doi.org/10.1016/j.chbr.2021.100119.

Edelheim, J. R., Thomas, K., Åberg, K. G. & Phi, G. (2018). What do conferences do? What is academics' intangible return on investment (ROI) from attending an academic tourism conference?. *Journal of Teaching in Travel & Tourism*, 18(1), 94–107. https://doi.org/10.1080/15313220.2017.1407517.

Kim, K., Rosenthal, M. Z., Zielinski, D. J. & Brady, R. (2014). Effects of virtual environment platforms on emotional responses. *Computer methods and programs in biomedicine*, *113*(3), 882–893 https://doi.org/10.1016/j.cmpb.2013.12.024.

Le, D. A., Maclntyre, B. & Outlaw, J. (2020). Enhancing the experience of virtual conferences in social virtual environments. Proceedings from the *2020 IEEE Conference on Virtual Reality and 3D User Interfaces: Abstracts and Workshops (VRW)*, 485–494. https://doi.org/10.1109/vrw50115.2020.00101.

Li, J., Kong, Y., Röggla, T., De Simone, F., Ananthanarayan, S., De Ridder, H., Abdallah, A. & Cesar, P. (2019). Measuring and understanding photo sharing experiences in social virtual reality. Proceedings from the *2019 CHI Conference on Human Factors in Computing Systems*, 1–14. https://doi.org/10.1145/3290605.3300897.

Li, J., Vinayagamoorthy, V., Williamson, J., Shamma, D. A. & Cesar, P. (2021). Social VR: A new medium for remote communication and collaboration. Proceedings from the *2021 CHI Conference on Human Factors in Computing Systems*, 1–6. https://doi.org/10.1145/3411763.3441346.

Lortie, C. J. (2020). Online conferences for better learning. *Ecology and Evolution, 10(22)*, 12442–12449. https://doi.org/10.1002/ece3.6923.

MacQuarrie, A. & Steed, A. (2017). Cinematic virtual reality: Evaluating the effect of display type on the viewing experience for panoramic video. *2017 IEEE Virtual Reality (VR)*, 45–54. https://doi.org/10.1109/vr.2017.7892230.

Maloney, Divine & Freeman, Guo & Wohn, Donghee. (2020). "Talking without a Voice": Understanding Non-verbal Communication in Social Virtual Reality. *Proceedings of the ACM on Human-Computer Interaction*. 4. 1–25. https://doi.org/10.1145/3415246.

McVeigh-Schultz, J., Kolesnichenko, A. & Isbister, K. (2019). Shaping pro-social interaction in VR: an emerging design framework. Proceedings from the *2019 CHI conference on human factors in computing systems*, 1–12. https://doi.org/10.1145/3290605.3300794.

Mulders, M. & Zender, R. (2021). An academic conference in virtual reality? - evaluation of a Social VR conference. Proceedings from the *2021 7th International Conference of the Immersive Learning Research Network (iLRN)*, 1–6. https://doi.org/10.23919/ilrn52045.2021.9459319.

Moreira, C., Simões, F. P., Lee, M. J., Zorzal, E. R., Lindeman, R. W., Pereira, J. M., Johnsen, K. & Jorge, J. (2022). Toward VR in VR: Assessing Engagement and Social Interaction in a Virtual Conference. *IEEE Access*, 11, 1906–1922. https://doi.org/10.1109/access.2022.3233312.

Nesher Shoshan, H. & Wehrt, W. (2022). Understanding "Zoom fatigue": A mixed-method approach. *Applied Psychology, 71(3)*, 827–852. https://doi.org/10.1111/apps.12360.

Niner, H. J. & Wassermann, S. N. (2021). Better for whom? Leveling the injustices of international conferences by moving online. *Frontiers in Marine Science, 8,* 638025. https://doi.org/10.1111/apps.12360.

Ostrowicki, M. (2022). The Academia Electronica-Vision, Experiment, Future. *Analiza i Egzystencja: czasopismo filozoficzne*, (58), 111–124. https://doi.org/10.18276/aie.2022.58-06.

Pallavicini, F., Pepe, A. & Minissi, M. E. (2019). Gaming in virtual reality: What changes in terms of usability, emotional response and sense of presence compared to non-immersive video games?. *Simulation & Gaming*, *50*(2), 136–159. https://doi.org/10.1177/1046878119831420.

Pidel, C. & Ackermann, P. (2020). Collaboration in virtual and augmented reality: a systematic overview. Proceedings from the *Augmented Reality, Virtual Reality, and Computer Graphics: 7th International Conference, AVR 2020, Lecce, Italy, September 7–10, 2020, Proceedings, Part I 7*, 141–156. https://doi.org/10.1007/978-3-030-58465-8_10.

Raby, C. L. & Madden, J. R. (2021). Moving academic conferences online: Understanding patterns of delegate engagement. *Ecology and Evolution*, *11*(8), 3607–3615. https://doi.org/10.1002/ece3.7251.

Roos, G., Oláh, J., Ingle, R., Kobayashi, R. & Feldt, M. (2020). Online conferences–Towards a new (virtual) reality. *Computational and Theoretical Chemistry*, *1189*, 112975. https://doi.org/10.1016/j.comptc.2020.112975.

Sá, M. J., Ferreira, C. M. & Serpa, S. (2019). Virtual and face-to-face academic conferences: comparison and potentials. *Journal of Educational and Social Research*, 9(2), 35–47. https://doi.org/10.2478/jesr-2019-0011.

Smith, H. J. & Neff, M. (2018). Communication behavior in embodied virtual reality. Proceedings from the *2018 CHI conference on human factors in computing systems*, 1–12. https://doi.org/10.1145/3173574.3173863.

Wei, X., Jin, X. & Fan, M. (2022). Communication in immersive social virtual reality: A systematic review of 10 years' studies. *arXiv preprint arXiv:2210.01365*. https://doi.org/10.48550/arXiv.2210.01365.

Williamson, J., Li, J., Vinayagamoorthy, V., Shamma, D. A. & Cesar, P. (2021). Proxemics and social interactions in an instrumented virtual reality workshop. Proceedings from the *2021 CHI conference on human factors in computing systems*, 1–13. https://doi.org/10.1145/3411764.3445729.

Zhang, Q., Ban, J. S., Kim, M., Byun, H. W. & Kim, C. H. (2021). Low-asymmetry interface for multiuser VR experiences with both HMD and Non-HMD users. *Sensors*, 21(2), 397. https://doi.org/10.3390/s21020397.

Jan Waligórski, Aleksandra Cząstkiewicz, Zofia Samsel, Natalia Frys

## Nowa wizja konferencji akademickich online. Potencjał społecznej wirtualnej rzeczywistości do powrotu współobecności

Streszczenie

Nowe technologie i zmiany społeczne głęboko wpływają na sposób komunikacji i przeprowadzania spotkań. W ciągu ostatnich kilku lat liczba konferencji online wzrosła. W literaturze wskazuje się, że wydarzenia online pozwalają na redukcję kosztów oraz nierówności społecznych. Pomimo tego mogą one istotnie ograniczać komunikację niewerbalną i zmniejszać poczucie współobecności, utrudniając tym samym nawiązywanie nowych kontaktów zawodowych. Bieżące dyskusje akademickie dotyczące zalet i ograniczeń zdalnych konferencji akademickich, zwykle koncentrują się na tych prowadzonych za pomocą systemów wideokonferencyjnych. Naszym celem jest zbadanie potencjału technologii wirtualnej rzeczywistości (VR) oraz platform społecznościowych VR jako alternatywnych narzędzi do organizacji akademickich konferencji online. Autorzy prezentują przebieg jednej z pierwszych konferencji akademickich (*Wirtualium 2.0*), która została przeprowadzona w całości w społecznościowej VR, wraz z wynikami ankiety badającej opinie jej uczestników na temat potencjału tej platformy do organizowania akademickich konferencji. Nasze wyniki sugerują, że w platformy społecznościowe VR, w porównaniu z systemami wideokonferencyjnymi, oferują dla większości uczestników wyższe poczucie współobecności, ułatwiają nawiązywanie kontaktów i prowadzenie nieformalnych rozmów. Zidentyfikowane ograniczenia platform społecznościowych VR w tym kontekście to: ograniczony dostęp do urządzeń, trudności techniczne oraz utrudnione sporządzanie notatek. Większość respondentów uważa społecznościowy VR za odpowiednie miejsce do organizacji konferencji akademickich. Chociaż wydarzenia akademickie na platformach społecznościowych VR wiążą się z trudnościami technicznymi i nigdy nie będą oferowały takich samych doświadczeń jak konferencje stacjonarne, to ich organizatorzy powinni przede wszystkim skupić się na wykorzystaniu potencjału technologii VR, aby osiągnąć to, co jest nieosiągalne w fizycznym środowisku.

S ł o w a  k l u c z o w e: wirtualna rzeczywistość (VR), społecznościowa wirtualna rzeczywistość (social VR), współobecność, konferencja akademicka online, *Spatial*, networking

Jan Waligórski, Aleksandra Cząstkiewicz, Zofia Samsel, Natalia Frys

## Nueva visión de las conferencias académicas en línea. El potencial de la realidad virtual social para el regreso a la co-presencia

R e s u m e n

Las nuevas tecnologías y los cambios sociales están influyendo profundamente la comunicación y la conducta de reuniones. En los últimos años, el número de conferencias en línea ha aumentado. La literatura existente indica que los eventos en línea permiten la reducción de costos y desigualdades sociales. Sin embargo, también presentan desafíos en la comunicación no verbal y disminuyen la sensación de copresencia, afectando así el networking, es decir el establecimiento de nuevos contactos. Las discusiones académicas actuales sobre las ventajas y limitaciones de conferencias académicas remotas generalmente se limitan a aquellas realizadas a través de sistemas de videoconferencia. El objetivo de esta investigación es explorar el potencial de la tecnología de realidad virtual (VR) y las plataformas de VR social como métodos alternativos para organizar conferencias académicas en línea. Los autores presentan el transcurso de una de las primeras conferencias académicas realizadas íntegramente en VR social (*Wirtualium 2.0*), junto con los resultados de encuestas sobre el potencial de este entorno para albergar conferencias académicas. Nuestros hallazgos indican que, en comparación con los sistemas de videoconferencia, las plataformas de VR social ofrecen para la mayoría de los participantes una mayor sensación de copresencia, facilitando el networking y el entusiasmo en conversaciones informales. En este contexto, las limitaciones identificadas de las plataformas de VR social abarcan acceso limitado a dispositivos, desafíos técnicos e impedimentos para tomar notas de manera eficiente. Sin embargo, la mayoría de los usuarios consideran que el VR social es adecuado para albergar conferencias académicas. Esto sugiere que, aunque los eventos académicos a través de plataformas de VR social se enfrenten a desafíos técnicos y no sean lo mismo que las conferencias presenciales, se debería explotar el potencial de la tecnología VR para lograr lo que es inalcanzable en un entorno físico.

P a l a b r a s  c l a v e: Realidad Virtual (VR), Social Realidad Virtual (social VR), Copresencia, Conferencia académica en línea, *Spatial*, networking

Ян Валигорский, Александра Часткевич, Зофия Самсель, Наталия Фрыс

## Новое видение онлайн-академических конференций. Потенциал социальной виртуальной реальности для возвращения к совместному присутствию

А н н о т а ц и я

Новые технологии и социальные изменения глубоко влияют на коммуникации и проведение встреч. За последние несколько лет количество онлайн-конференций увеличилось. Литературные источники указывают, что онлайн-мероприятия позволяют снижать затраты

и социальные неравенства. Тем не менее, они также представляют собой вызовы в области невербальной коммуникации и уменьшают чувство совместного присутствия, что влияет на сетевое взаимодействие. Текущие академические обсуждения преимуществ и ограничений организации дистанционных академических конференций обычно ограничиваются теми, которые проводятся с использованием систем видеоконференций. Цель этого исследования – изучить потенциал технологии виртуальной реальности (VR) и социальных платформ VR как альтернативных методов организации онлайн-академических конференций. Авторы представляют ход одной из первых академических конференций, полностью проведенной в социальной VR (*Wirtualium 2.0*), а также результаты опроса относительно потенциала этой среды для проведения академических конференций. Наши выводы указывают, что по сравнению с системами видеоконференций, социальные платформы VR предоставляют большинству участников более высокое чувство совместного присутствия, способствуя сетевому взаимодействию и участию в неформальных беседах. В этом контексте выявленные ограничения социальных платформ VR включают в себя ограниченный доступ к устройствам, технические проблемы и трудности в эффективной записи. Тем не менее, большинство пользователей считают социальную VR подходящей для проведения академических конференций. Это предполагает, что, несмотря на технические проблемы и отличия от очных конференций, стоит использовать потенциал технологии VR для достижения того, что невозможно в физической среде.

Ключевые слова: Виртуальная реальность (VR), Социальная виртуальная реальность (социальная VR), ко-присутствие, Онлайн-академическая конференция, *Spatial*, нетворкинг