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Immersive media as a tool for overcoming communication barriers in higher education: the example of virtual reality (VR)

Media immersyjne jako narzędzie w przełamywaniu barier komunikacyjnych w szkolnictwie wyższym: przykład wirtualnej rzeczywistości (VR)

Immersive media provides users with engaging experiences that go beyond traditional media. Virtual reality (VR), an example of immersive media, is characterized by its ability to simulate real environments and interactions, offering a sense of presence in a virtual space. This article analyzes the potential use of virtual reality (VR) in overcoming communication barriers in higher education and identifies the possibilities of utilizing VR technology in the process of global collaboration within the academic environment. The text employs an exploratory research methodology as well as the methods of description, analysis, and synthesis.

Key words: immersive media, virtual reality (VR), communication barriers, higher education

Media immersyjne zapewniają użytkownikom angażujące wrażenia, które wykraczają poza tradycyjne media. Wirtualna rzeczywistość (VR), stanowiąca przykład mediów immersyjnych, charakteryzuje się zdolnością do symulacji rzeczywistych środowisk i interakcji, oferując poczucie obecności w przestrzeni wirtualnej. W niniejszym artykule dokonano analizy możliwości wykorzystania wirtualnej rzeczywistości (VR) w przełamywaniu barier komunikacyjnych w szkolnictwie wyższym oraz

zidentyfikowano i ukazano możliwości wykorzystania technologii VR w procesie globalnej współpracy w środowisku akademickim. W tekście zastosowano metodologię badań eksploracyjnych, metodę opisu oraz analizy i syntezy.

Słowa kluczowe: media immersyjne, wirtualna rzeczywistość (VR), bariery komunikacyjne, szkolnictwo wyższe

Introduction

In the digital era, everything is increasingly interactive, interconnected, open, and global. Human daily life has become shaped by technology and takes place more within the media than alongside them[1]. The media today are largely personalized and mobile, and the mediatization of everyday life changes our perspectives on how we perceive the world and society. The way we receive and experience content today is entirely different from several decades ago. Media messages in various forms are with us constantly, and we are increasingly becoming attached to a certain type of digital interdependence.

At the beginning of the 21st century, we witnessed the emergence of new storytelling styles in the media and their use in everyday life. Since 2012, we have observed a new ecosystem of immersive media, allowing stories to be experienced in an entirely different way. Immersive media combine the real and virtual worlds, creating engaging environments for content experiences. VR technology enables users to achieve a sense of presence and interaction in a digital space within the frameworks of virtual reality (VR), augmented reality (AR), or mixed reality (XR).

Virtual reality is an interactive simulation environment that immerses users in a virtual world through computer technology. VR systems typically include head-mounted goggles designed to simulate interactions in the real world. In the past decade, it has become evident that virtual reality is impacting many areas of social life. VR technology has gained popularity primarily due to its potential to revolutionize various aspects of life.

[1] Ch. Beckett, M. Deuze, *On the Role of Emotion in the Future of Journal*ism, "Social Media + Society" 2016, no. 2(3): 205630511666239, pp. 1-6.

The literature contains numerous studies on the application of virtual reality. VR technology is used, among other areas, in entertainment, providing immersive experiences in gaming, as well as in tourism, allowing users to explore distant locations without the need to travel[2]. Virtual reality is also implemented in medicine[3] and psychology[4]. VR technology is revolutionizing education by offering immersive experiences that increase student engagement[5]. The use of simulations for experimentation and training makes virtual reality a valuable tool in modern education. Additionally, virtual reality has the potential to develop empathy[6] as it allows users to experience various situations from different perspectives, which is not always possible in reality.

This article raises the following research questions:

RQ1: *How can immersive media, particularly virtual reality (VR), overcome communication barriers in higher education?*

RQ2: *How can the use of virtual reality (VR) impact global collaboration in the academic environment?*

As the research will be exploratory in nature, no hypotheses have been formulated. Due to space limitations, the focus will be on selected examples of how virtual reality (VR) is used to overcome communication barriers among students.

The cognitive aim of this article is to answer the above research questions and, in doing so, to demonstrate the application of virtual reality, as an example of immersive media, in the process of social communication, with particular emphasis on the role of virtual reality in overcoming communication barriers in higher education. The starting point for this discussion will be an exploration of virtual reality (VR) within the world of immersive media. The core of the text will focus on analyzing the potential use of virtual reality in the communication process within higher education, with particular attention to its capacity to break down

[2] E. Novotny, S. J. (Grace) Ahn, *Virtual Reality*, [in:] *The International Encyclopedia of Health Communication*, E. Y. Ho, C. L. Bylund, J. C. M. van Weert, I. Basnyat, N. Bol, M. Dean (eds.), Hoboken, New Jersey 2022, pp. 1–5.

[3] L. Li et al., *Application of Virtual Reality Technology in Clinical Medicine*, "American Journal of Translational Research" 2017, no. 9(9), p. 3867.

[4] Ch. J. Wilson, A. Soranzo, *The Use of Virtual Reality in Psychology: A Case Study in Visual Perception*, "Computational and Mathematical Methods in Medicine" 2015, article 151702, pp. 1–7.

[5] D. Bhatnagar, A. Boruah, *Virtual Reality: A Mechanism for Modern Education*, [in:] *Transforming Education with Virtual Reality*, R. Malik, A. Sharma, P. Chaudhary (eds.), 1st. ed., Hoboken, New Jersey 2024, pp. 229–247.

[6] R. Hassan, *Digitality, Virtual Reality and the "Empathy Machine"*, "Digital Journalism" 2020, no. 2(8), pp. 195–212.

communication barriers and its role in global collaboration in the academic environment. The article will conclude with findings that address the research questions. The methodology employed includes exploratory research, along with the methods of description, analysis, and synthesis.

Immersion is now a key element in many areas of social life. Besides its many possibilities, virtual reality technology also raises certain ethical concerns. However, due to space constraints in this article and the research objectives, the focus will be exclusively on attempting to answer the research questions posed.

Virtual reality (VR) in the world of immersive media

Immersive media refers to media experiences that engage the user's senses and simulate a sense of full immersion in a virtual environment. They utilize various audiovisual effects and sensory modalities to allow the user to feel a sense of presence and have the potential for social interaction[7]. Immersive media engage multiple human senses and offer realistic and interactive experiences by simulating our surrounding reality through digital means. Immersion means the ability of media to absorb users into the content, creating the impression of participating in a given narrative. Immersive media, such as virtual reality (VR), augmented reality (AR), mixed reality (MR), or advanced 360-degree user interfaces, enable content to be experienced in a more engaged manner than other types of media can offer[8].

Immersive media enable experiences that alter the user's reality. While technology plays a crucial role in shaping and advancing immersive media, the use of sensory stimuli to deceive the human brain into seeing or feeling things that do not exist is not a new concept. Optical illusions have been used in art and design for centuries to provide viewers with enhanced sensory experiences[9]. Today, with the development of modern technology, the range of possibilities for utilizing immersive media is significantly greater. However, the success of immersive media largely

[7] B. Belisle, P. Roquet, *Guest Editors' Introduction: Virtual Reality: Immersion and Empathy*, "Journal of Visual Culture" 2020, no. 1(19) (April 2020), pp. 3–10.

[8] M. A. Moinnereau, A. A. De Oliveira, T. H. Falk, *Immersive Media Experience: A Survey of Existing Methods and Tools for Human Influential Factors Assessment*, "Quality and User Experience" 2022, no. 1(7), p. 5.

[9] S. Greengard, *Virtual Reality*, Cambridge, Massachusetts 2019, pp. 119-152.

depends on the subjective experiences of the user, as it relies on the sense of immersion in the simulated reality and the user's perceptions[10]. Assessing the factors that affect users of immersive media is crucial for the development of virtual reality technology, aiming to engage users to the fullest extent in the narratives created.

Virtual reality (VR) can be traced back to the 1980s, but it wasn't until the early 21st century that a new ecosystem of immersive technologies emerged, allowing for greater engagement in immersive experiments. A pivotal moment for virtual reality came in 2012 with the development of the Oculus Rift VR headset, which Facebook acquired for 2 billion dollars in 2014[11]. Virtual reality (VR) is based on immersion, which means experiencing a sense of physical presence in a virtual world. Immersive experiences are made possible by using headsets that display high-resolution images with a fast refresh rate directly in front of the user's eyes. This allows for the perception of the virtual world to occur exclusively within the virtual environment, eliminating external stimuli[12]. VR technology enables users to engage with audiovisual content in a way that differs from traditional media creation methods.

The foundations of virtual reality can be traced back to Ivan Sutherland's pioneering work in 1965[13], where he anticipated a computer-generated environment that could be interacted with in real-time. Simulated reality, which mimics real experiences, transports users into an illusory world. Using modern technologies (software and hardware components), virtual reality allows users to interact with a virtual environment. Virtual reality replicates sensory information, such as visual, auditory, and tactile signals, to create natural experiences for users. Head-mounted devices, such as goggles and hand-held joysticks, enable tracking of users' movements and navigation within the virtual world. Interactivity is also crucial for virtual reality, allowing users to intuitively interact with the virtual environment[14]. Sensors and motion controllers record the movement of the body, head, and hands to achieve more natural and immersive real-time

[10] M.A. Moinnereau, A.A. De Oliveira, T. H. Falk, *Immersive Media Experience: A Survey of Existing Methods and Tools for Human Influential Factors Assessment*, "Quality and User Experience" 2022, no. 1(7), p. 5.

[11] K. Wolny-Zmorzyński et al. (eds.), *Leksykon Terminów Medialnych MZ*, Wydawnictwo Adam Marszałek, Toruń 2024, pp. 480-481.

[12] M. Slater, M. V. Sanchez-Vives, *Enhancing Our Lives with Immersive Virtual Reality*, "Frontiers in Robotics and AI" 2016, no. 3, p. 74.

[13] I. E. Sutherland, *The Ultimate Display*, [in:] *Proceedings of the IFIP Congress*, vol. 2, New York 1965, pp. 506–508.

[14] S. M. LaValle, *Virtual Reality*, Cambridge 2023, pp. 350-356.

interactions, providing realistic experiences[15]. Another element of virtual reality is sensory perception. To create more immersive experiences, it is essential for virtual reality to include not only sight and sound but also sensory stimuli and feedback[16]. For instance, haptic gloves are used to allow users to experience the resistance of virtual objects, enhancing the sense of realism. Integrating multiple sensory inputs helps create a more immersive virtual reality. Sensory immersion is further enriched by force feedback devices and 3D sound systems.

Virtual reality can be classified based on the degree of immersion into immersive, semi-immersive, and non-immersive types[17]. The difference between these three types of VR primarily lies in the use of appropriate equipment. The most demanding and costly are the software and hardware components for immersive VR, while semi-immersive and non-immersive VR are available at a lower financial cost. However, non-immersive and semi-immersive VR offer users less realistic experiences[18]. Despite the immersive experiences that virtual reality can provide, which can simulate reality, they still differ from directly experiencing that reality[19]. Thus, there is a need for further technological solutions that would minimize or eliminate differences in the sensory processing of user experiences. This would make the experience even more immersive and realistic.

Virtual reality (VR) in the communication process in higher education

Virtual reality has undergone significant evolution since its early applications in education. The first uses of VR technology in education can be traced back to the 1980s and 1990s, but they were limited due to the early stage of immersive media development. Additionally, the

[15] J. Jerald, *The VR Book: Human-Centered Design for Virtual Reality*, San Rafael 2015, pp. 139-154.
[16] G. C. Burdea, P. Coiffet, *Virtual Reality Technology*, Hoboken, New Jersey 2024, pp. 209-211.
[17] R. Villena-Taranilla et al., *Effects of Virtual Reality on Learning Outcomes in K-6 Education: A Meta-Analysis*, "Educational Research Review" 2022, no. 35, p. 100434.
[18] WS. Wang et al., *Feedback Mechanism in Immersive Virtual Reality Influences Physical Hands-on Task Performance and Cognitive Load*, "International Journal of Human–Computer Interaction" 2024, no. 40(15), pp. 4103–4015.
[19] B. Schöne et al., *The Reality of Virtual Reality*, "Frontiers in Psychology" 2023, no. 14, article 1093014, pp. 1-17.

complexity of software and hardware at that time generated high costs, which constrained the use of VR technology in education. Initially, virtual reality was used in aviation and medicine[20] because it allowed for a controlled way of developing user skills.

Technological advancements at the beginning of the 21st century made virtual reality (VR) more accessible, leading to its potential use in the field of education. Lower costs for software and necessary components, along with improved graphics capabilities, prompted educational institutions to begin researching VR technology in the context of its application in education[21]. Research conducted so far indicates that virtual reality can significantly enhance the understanding of complex concepts in the educational process[22]. VR technology allows for the creation of personalized learning environments, making education more accessible. How, then, can virtual reality overcome communication barriers in higher education?

According to Ciupe[23], the use of virtual reality environments in the educational process enhances students' communication skills and helps overcome language and cultural barriers. By utilizing virtual reality technology, students can immerse themselves in various linguistic and cultural environments. The goal of such activities is to better understand multiculturalism, which can complicate communication in various ways. Immersing in virtual environments that simulate natural settings helps students feel comfortable, and their sense of security fosters effective communication. It has also been observed that using virtual reality in language learning[24] reduces students' anxiety about communication and increases their motivation to effectively develop communication skills. Students who use virtual reality in foreign language learning are more engaged in communicating with foreigners. Language experiences gained through immersive media reduce students' anxiety and enhance their

[20] J. Psotka, *Immersive Training Systems: Virtual Reality and Education and Training*, "Instructional Science" 1995, no. 23(5), pp. 405–431.

[21] B. Dalgarno, M. J. W. Lee, *What Are the Learning Affordances of 3-D Virtual Environments?*, "British Journal of Educational Technology" 2010, no. 41(1), pp. 10–32.

[22] Z. Merchant et al., *Effectiveness of Virtual Reality-Based Instruction on Students' Learning Outcomes in K-12 and Higher Education: A Meta-Analysis*, "Computers & Education" 2014, no. 70, pp. 29–40.

[23] A. Ciupe et al., *From Speaking Skills to Virtual Mobilities: Challenges of VR Technologies in Communication from the European University of Technology*, [in:] *2023 IEEE Global Engineering Education Conference (EDUCON)*, Salmiya, Kuwait 2023, pp. 1–4.

[24] F. Utami, Y. W. Tama, I. Mayuni, *A Review of Virtual Reality for English Language Learning in Higher Education*, "Edunity Kajian Ilmu Sosial Dan Pendidikan" 2024, no. 3(2), pp. 163–180.

sense of presence in interactions with others[25]. Therefore, the use of virtual reality can strengthen global collaboration among students, unlocking the potential for barrier-free communication.

The use of virtual reality among students also reduces anxiety related to public speaking. Research conducted by Rodero and Larrea[26] showed that VR training sessions attended by students significantly reduced their anxiety levels, thereby enhancing their ability to effectively present themselves. Virtual reality technology can also effectively break down communication barriers by increasing awareness and empathy among students towards individuals of different backgrounds or with physical limitations[27]. VR environments allow users to experience different perspectives, which can lead to a more profound understanding of the surrounding world and its social issues. Thus, the use of VR can contribute to promoting empathy and reducing prejudices and stereotypes, thereby minimizing the social exclusion of individuals with different viewpoints or social statuses.

Virtual reality also enhances student engagement in the learning process. The use of VR technology helps in understanding abstract and complex content[28]. Virtual reality, through the simulation of real-world scenarios, makes learning more relational[29]. Realistic virtual environments, made possible by VR technology, enable interactive experiences. With VR, students can participate in simulations and control virtual objects. Education in virtual laboratories and participation in simulations of natural realities develop cognitive skills and critical thinking. VR technology increases student engagement[30] by providing them with experiences of realistic events.

VR technology also allows for the simulation of various scenarios that require the development of communication skills. For example,

[25] S. Canto, K. Jauregi-Ondarra, A. Gruber, *High-Immersion Virtual Reality-Mediated Intercultural Virtual Exchange: A Case Study*, [in:] *Telecollaboration Applications in Foreign Language Classrooms*, Hershey 2023, pp. 136–159.

[26] E. Rodero, O. Larrea, *Virtual Reality with Distractors to Overcome Public Speaking Anxiety in University Students,* "Comunicar" 2022, no. 30(72), pp. 87–99.

[27] R. Raposo et al., I*ncreasing Awareness and Empathy among University Students through Immersive Exercises–Testing of the Virtual Reality Application: A Pilot Study*, "Medycyna Pracy" 2023, no. 74(1), pp. 187–197.

[28] J. Y. Wong et al., *Evaluations of Virtual and Augmented Reality Technology-Enhanced Learning for Higher Education*, "Electronics" 2024, no. 13(8), p. 1549.

[29] P. E. Paramita et al., *Utilization of Virtual Reality (VR) in Developing Interactive Learning Experiences*, "Al-Fikrah: Jurnal Manajemen Pendidikan" 2024, no. 12(1), pp. 136–148.

[30] J. Chen et al., *Effectiveness of Virtual Reality on Learning Engagement: A Meta-Analysis*, "International Journal of Web-Based Learning and Teaching Technologies (IJWLTT)" 2024, no. 19(1), pp. 1–14.

journalism students can conduct interviews with individuals from different parts of the world, while medical students can interact with patients in various languages. Virtual reality also facilitates the development of negotiation skills and conflict resolution[31]. Through VR simulations, students can engage in situations they would not have the opportunity to experience in real life. VR scenarios enable them to participate in numerous situations without the stress associated with the real-world consequences of their actions.

Virtual reality also enables teamwork[32], thereby developing communication skills. VR applications often require interaction and collaboration during task execution. By providing immersive work environments, VR further supports global collaboration within the academic setting, enhancing students' communication competencies. Universities can create virtual spaces using VR technology where students from different parts of the world can collaborate and engage in activities at every stage. VR technology allows both students and academic teachers from various countries to work together in virtual spaces, minimizing challenges related to distance. VR platforms make real-time communication and collaboration achievable even in international environments. Simulating a lecture hall or laboratory allows project participants to feel as though they are physically present in the same location due to the immersive experience.

An example of a VR platform that allows for engaging in virtual activities and provides immersive experiences is the social network Metaverse[33]. The Metaverse is an environment that combines physical reality with digital virtuality, enabling users to engage in multisensory interactions with digital objects in virtual environments such as virtual reality (VR) and augmented reality (AR). The Metaverse facilitates seamless communication and interaction with digital objects and avatars. Tools for developing communication skills in a global environment also include VR platforms like Global Virtual Teams (GVT)[34]. This platform helps in developing communication skills in an intercultural environment, thus

[31] N. Kaul, Ch. Kumar, *Exploring the Landscape of Virtual Reality in Education: A Bibliometric and Thematic Analysis,* [in:] *Transforming Education with Virtual Reality*, R. Malik, A. Sharma, P. Chaudhary (eds.), 1st. ed., Hoboken, New Jersey 2024, pp. 181–199.

[32] Ch. L. Goi, *The Impact of VR-Based Learning on Student Engagement and Learning Outcomes in Higher Education*, [in.] *Teaching and Learning for a Sustainable Future: Innovative Strategies and Best Practices*, Ch. L. Goi (ed.), Hershey, Pennsylvania 2024, pp. 207–223.

[33] S. Mystakidis, *Metaverse,* "Encyclopedia" 2022, no. 2(1), pp. 486–497.

[34] S. Swartz, A. Shrivastava, *Stepping up the Game–Meeting the Needs of Global Business through Virtual Team Projects*, "Higher Education, Skills and Work-Based Learning" 2022, no. 12(2), pp. 346–368.

increasing engagement in virtual team projects. By utilizing VR technology, students can learn to adapt their behavior in interactions with members of international teams, regardless of geographical boundaries.

Conclusions

Immersive media represent one of the most recently evolving innovations. Virtual reality (VR) offers the ability to create immersive and interactive environments, thereby changing the way we communicate with each other and with our surroundings. Through the use of modern technologies, abstract concepts and previously unrealistic activities become more tangible and possible to experience and experiment with.

Virtual reality (VR) enables a wide range of activities across various areas of social life, including the realm of communication in higher education. VR technology makes creating interactive communication environments engaging and conducive to collaboration, regardless of geographical location. Additionally, the use of avatars on VR platforms allows individuals to represent themselves without the limitations that may exist in the real world. As a result, virtual reality reduces participants' anxiety during communication processes and encourages interaction. The anonymity provided by VR technology can be particularly beneficial for students who struggle with communication in real-world settings. Virtual reality helps to break down communication barriers, fostering the development of essential communication and social skills needed both in academic and professional environments. VR technology also allows for the personalization of activities for individual students or groups, which is often lacking in conventional educational models.

The implementation of immersive media in higher education for developing communication skills, despite the many benefits outlined in the text, also faces several challenges and limitations. These include the high costs of software and hardware, which significantly restrict accessibility. Additionally, the technical skills required by individuals to effectively use virtual environments pose a challenge for integrating such technologies into higher education. Nonetheless, this is a broad topic that can serve as the basis for further research, discussion, and analysis.

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