Using Media Equation Theory to Assess Anthropomorphism of Intelligent Virtual Reality Training Systems in Organizational Settings

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ABSTRACT

The advent of immersive virtual reality (VR) media technology is revolutionizing communication by providing a platform that goes beyond traditional video, audio, and static web pages. These new media technologies allow users to engage in life-like, anthropomorphic interactions with both humans and non-human entities within immersive environments. Notably, this technology holds the potential to address and solve cultural and societal issues through more meaningful and effective engagement. This research explores the application of an intelligent VR media system in diversity, equity, and inclusion (DEI) training, highlighting its potential to enhance organizational training. Unlike traditional one-size-fits-all approaches, which may fail to meet the specific needs of different organizations—whether corporate, academic, or non-profit—VR-based DEI training offers a tailored, impactful experience. Rooted in media equation theory, which posits that humans react to media as they do to other humans, the study presented in this paper investigates how immersive VR can better equip individuals to navigate complex cultural and societal challenges. The findings suggest that successful DEI training via VR involves three critical components: an engaging and immersive user experience, the use of storytelling as a key communication tool, and interactive media to enhance learning effectiveness. Effective user experience design, supported by a strategic human-computer interaction framework, significantly boosts the impact of DEI training. Immersive environments, when well-designed, enhance learning by providing realistic contexts that mirror real-world scenarios, thereby aiding in practical understanding and memory retention. Additionally, VR creates a safe space for exploring sensitive issues, encouraging open dialogue and reflection without real-world consequences. Interactive scenarios can be customized to align with an organization's specific DEI goals, ensuring relevance and applicability to workplace situations. Ultimately, VR transforms DEI training from a passive learning experience into an active exercise in empathy and understanding, making it more engaging and meaningful for participants.

Keywords: Media equation theory, Interactive media, Virtual reality, Intelligent systems, Strategic media, Anthropomorphism, DEI, Communication training, Immersive media, Immersive technology

INTRODUCTION

The significance of outdated training strategies used for DEI training in modern organizations is multifaceted, affecting not only the effectiveness of the training itself but also the broader organizational culture, employee engagement, and the organization's ability to innovate and respond to diverse needs. These outdated strategies can lead to several negative outcomes. First, the strategies may not adequately address the current social, political, and economic contexts or the evolving understanding of identity, intersectionality, and systemic inequality (Kaplan et al., 2020). As societal norms and values shift, training that fails to evolve alongside these changes can result in programs that are disconnected from the realities and needs of a diverse workforce, undermining the effectiveness of DEI initiatives (Roberson, 2019). Moreover, engagement and retention issues may arise when employees perceive DEI efforts as performative or not reflective of their lived experiences.

From an organizational performance perspective, inadequate DEI training may limit innovation and problem-solving capabilities. Diverse teams are shown to be more creative and better at solving complex problems; however, this benefit is contingent upon an inclusive culture that values and integrates diverse perspectives (Phillips, 2014). Outdated media technologies might not equip employees with the necessary skills to collaborate effectively in diverse teams, thereby missing out on the potential competitive advantages of diversity. In a globalized economy, organizations must be adept at navigating cultural differences to serve diverse markets effectively. Legacy media strategies used in DEI training may not prepare employees for the nuances of global communication and cross-cultural understanding, potentially harming an organization's reputation and its ability to expand into new markets (Morrison, 2016).

The research gleaned from this study—which focuses on the convergence of DEI training and emerging intelligent immersive media—is vital to providing a better understanding of how immersive media technology like virtual reality (VR) can better prepare and train humans for a wide variety of cultural and societal situations that are not easy to comprehend. Another significant outcome of this study provides a guide for immersive media training strategies grounded in the media equation theory framework. The combination of intelligent systems and immersive media such as VR has the unique ability to simulate real-world environments within an anthropomorphic context, allowing people to practice skills and decision-making in a risk-free setting. This study highlights experiential learning—which enhances knowledge retention and transfer, as it fosters active participation and firsthand experience. Moreover, this study focuses on the anthropomorphism of immersive VR training systems for personalized learning. The study emphasizes how immersive media communication strategies can be tailored to individual needs using artificial intelligence, leading to improved training and learning outcomes.

USING MEDIA EQUATION THEORY AS A GUIDING FRAMEWORK

Reeves and Nass (1996) conducted a series of experiments to explore the media equation and its implications for human-computer interaction. The research findings revealed that individuals often respond to computers and other media entities in ways that are remarkably similar to their responses to humans (Reeves & Nass, 1996). For example, participants demonstrated politeness, reciprocity, and even flattery when interacting with computers, which are behaviors typically reserved for social interactions with other humans (Reeves & Nass, 1996). Reeves and Nass' study proposed that these findings could be attributed to individuals' natural tendency to rely on social scripts, which are deeply ingrained and automatic responses to social situations (Reeves & Nass, 1996). This insight has significant implications for the design of computer interfaces and new media technologies such as augmented and virtual reality, as it suggests that designers should consider users' social expectations and needs when creating interactive systems.

Human-centered design is an essential component of media equation theory. Nass et al. (1999) investigated the extent to which individuals exhibit politeness toward computers during interactions. Building on the media equation theory, which suggests that people treat computers, television, and new media like real social entities, the research sought to understand the implications of politeness in human-computer interaction. Their study included a series of experiments wherein participants interacted with computer-based interviewing systems. The results demonstrated that participants were, in fact, polite to computers, displaying behaviors such as providing positive feedback and avoiding criticism, even when such politeness was not explicitly required or rewarded (Nass et al., 1999).

Current research surrounding media equation theory continues to explore the implications and applications of this theory across various forms of media and technology, including social media, human-computer interaction (HCI), robotics, and artificial intelligence (AI). In HCI, recent studies have focused on user attachment and trust in voice assistants and other AI interfaces, investigating how these technologies are anthropomorphized and what social cues they trigger in users. Researchers have found that users often apply social rules and etiquette to these interactions, thanking their devices or apologizing for errors, indicative of the media equation in action (Nass & Moon, 2000). In the realm of robotics, studies have examined how the physical embodiment of AI in robots can trigger even stronger social responses. Media equation theory has been used to explain anthropomorphism and why humans can feel empathy toward robots, sometimes to the extent of perceiving them as teammates or companions (Kahn et al., 2012).

DEVELOPING AND TESTING AN INTELLIGENT VR SYSTEM FOR ORGANIZATIONAL DEI TRAINING

Within many organizations, traditional communication media such as online web videos, PowerPoint presentations, and PDF documents are widely used for DEI training. However, the advent of virtual reality technology offers learners a new dimension of communication in relation to these training

programs. The findings of this study highlight the effectiveness of VR in conjunction with an intelligent software application and how its use as a communication medium measures up against the traditional media-based methods used in DEI training. Furthermore, the qualitative findings of the study offer critical insight into the thematic factors that virtual reality media provides in the context of creating a more enriched, impactful, and meaningful experience for users when it comes to training, as opposed to the traditional media strategies currently in use by many organizations.

Study Participants

The study sample was drawn from a population of individuals who were full-time and part-time employees of a large research university in the Midwest region of the United States. The participants ranged between the ages of 23 and 65 years old. All participants had to be fluent in the English language, but English did not have to be their native language. Gender demographics for participants of this study include a make-up of 47% women and 53% men. Additionally, all participants had to be comfortable using a virtual reality device—although there was no requirement for any previous experience using such a device. The population to which the results of the participants will be generalized include full-time and part-time employees of medium to large-sized organizations in the United States that incorporate a mandatory diversity, equity, and inclusion training session.

Procedures Followed

During the study procedure, a total of fifteen participants completed a 20-minute DEI training using traditional media-based technology as well as a 20-minute DEI training using the Bodyswaps® virtual reality-based DEI training application on a Meta® Quest 2 VR device. An integral component of the Bodyswaps® software application is the built-in AI feature that communicates and gives feedback to the user. All fifteen participants were interviewed immediately following the two training sessions. After every third individual interview, the batch of three interviews was transcribed using NVivo® qualitative research software. This process aided in the overall transcription accuracy.

   The transcribed interviews were sent to the interviewees for a single review, during which they had the opportunity to omit any content, though such action was discouraged. Interviewees were also inquired if they wished to add any reflections. Upon participant approval, necessary edits, including the incorporation of reflective thoughts, were applied to the transcription. However, participants did not contribute to the writing or editing of the analysis and results, lacking insight into the collective perspectives of the group due to restricted access to other interviews.

Data Analysis

The combined manual and NVivo® analysis yielded nine selective codes, detailed in Table 1. Three overall categories emerged in relation to the types of selective codes found in the analysis of data: (a) user experience-centric

codes, (b) technology-centric codes, and (c) strategic communication-centric codes. Each of the nine selective codes and the three theoretical themes specifically address how the findings connect to the testing of the intelligent VR system versus the use of traditional digital media. Additionally, these correlations provide insight into topics addressing user experience, media preferences among participants, media richness, participant empathy, and information retention.

Table 1. Selective coding results from NVivo® Analysis.

(a) User Experience Centric Codes	(b) Technology-Centric Codes	(c) Communication-Centric Codes
User engagement	Interactive media components	Foundational storytelling
Immersive environment	Digital learning platform	Human-computer interactions
Task involvement	Technology standardization	Effective communication strategies

Note: Selective coding results were determined from the manual coding process and analysis.

Study Findings

The combination of using a mind-mapping technique and NVivo® software analysis revealed three themes related to motivating factors for effective DEI training for the participants of the study, which were derived from theoretical coding. This analysis of interrelations across selective codes was visualized through a mind-map and the selective codes that exhibited the most connections were prioritized at the commencement of the theoretical coding process. The motivating factor themes that resulted from the theoretical coding process included: (a) an engaging and immersive user experience is critical to learner success, (b) storytelling is a key component of effective communication in DEIB training, and (c) interactive media in virtual reality is a critical factor in learning effectiveness.

Immersiveness was the only code that had a 100% response rate, indicating that for all the participants, the immersive nature of virtual reality was notable and stood out during their training experience. Engaging and immersive user experiences were revealed to be pivotal for the learner participants in the virtual reality environment, as these qualities significantly enhance the learning process. Immersion acts as a catalyst for deeper learning by providing users with a lifelike context that closely simulates real-world experiences, thereby facilitating practical understanding and retention. Moreover, the interview data analysis revealed that engaging VR content captured the learner's full attention, minimizing distractions and increasing the focus on the educational material.

The analysis further indicated that anthropomorphic features of the intelligent VR application enabled learners to actively participate rather than passively consume information, which bolsters learning through doing and

experiential engagement. Participant 9 encapsulates the conceptual nature of this theme in her description of the virtual reality training experience.

I feel the VR was more effective. You were more immersed. It really felt like you were in the room talking to those people. I liked being involved in the conversations so you could really sit and think about the microaggressions part of the training and really listen. I found it to be effective. I felt like I needed this training and I felt that more with the VR version than the other one. (Participant 9).

The data from the interview analysis suggests that storytelling is a key component to establishing effective communication in DEI training. The selective code assigned to storytelling was found in nine participants and ten vignettes, indicating that for many of the participants, storytelling is important when they are engaged in the training process. The interview data analysis suggests that storytelling is a fundamental element of effective communication as it harnesses the power of narrative to engage the learner's emotions and imagination.

Furthermore, the data analysis illustrates that storytelling is shown to help transform abstract concepts into relatable and memorable experiences, making information more accessible and impactful. Participant 11 describes how the virtual reality training made the stories seem more immersive during his learning experience.

I felt more excited by the VR, just because I like technology and it felt a little bit more immersive. I just felt a little bit more involved in the situation. The stories that were happening were immersive, more involved. (Participant 11).

Ten participants indicated that the interactive media used in the virtual reality training was noticeable. The interview data analysis suggests that interactive media used within virtual reality applications are critical to learning as they foster an active rather than passive educational experience. It allows learners to engage directly with the material. Additionally, the data indicates that the interactive nature of VR media also aids in creating realistic scenarios that can adapt to each learner's actions, providing individualized feedback and a tailored learning path. One of the participants describes how the sensory-rich environment of interactive VR media helped him form strong memory associations, making the educational content more memorable and easier to recall outside the virtual space.

I think the VR version helps you keep the information better. I would remember more about it than I would with a computer version just because it's interactive and you are immersed in it. And so, it's like, really going to training with people instead of just watching people on a screen. (Participant 5).

Demographic trends found in the study indicate that virtual reality usage is more prevalent among younger, tech-savvy generations, such as Millennials and Gen Z, who are more open to adopting new technologies. These users were found to often engage with VR for gaming, education, and social experiences, attracted by the immersive and interactive nature of the medium. Out of the 15 participants in the study, only three noted that they owned a VR device. Two of those participants were identified in the 18–24-year-old

age category, and the third participant who owned a VR device was identified in the 25–34-year-old age category.

Conversely, older demographics showed a lower usage rate, potentially due to less familiarity with technology and a higher prevalence of motion sensitivity issues or headset discomfort associated with VR. Out of the 15 participants in the study, four noted that they had never used a VR device. Three of those participants were identified in the 55–64-year-old age category, and the fourth participant who had never used a VR device before was identified in the 65 or older age category.

Gender did not appear to play a significant role in previous usage of virtual reality. Out of the eleven participants who had previous experience using a VR device, four females indicated that they had used virtual reality at least once, and seven males indicated that they had used the technology at least once before. In the sample of participants who had never used virtual reality in the past, two were identified as female, and two were identified as male. Additionally, all three participants who indicated that they own a VR device were identified as male.

CONCLUSION

While technology and digital learning platform preferences varied among participants of the study, each one of the three common theoretical themes was found to be a prominent factor in the delivery of impactful and meaningful DEI training. During the duration of the study, these themes exhibited dynamic qualities that pinpoint the critical attributes of meaningful and impactful training strategies.

This study's conclusion that an engaging and immersive user experience (UX) is critical to learner success is consistent with literature focusing on user experience strategies. The study suggests that engaging and immersive user experiences are pivotal in enhancing learner success, as they contribute significantly to maintaining attention, motivation, and the effective assimilation of knowledge. This insight is grounded in practical observations of instructional design, where the quality of user experience can profoundly influence learning outcomes. Data collected throughout the interview sessions of the study imply that as learners interacted with the educational training content, UX design played a critical role in shaping their ability to understand, retain, and apply new information.

Through personal interview data collected during the study, storytelling emerged as a fundamental element of effective communication in DEI training. The efficacy of storytelling found in the DEI training used in the study stems from the humanization of complex issues, the bridging of cultural gaps, and the facilitation of a deeper emotional connection with the material. The findings of the study suggest that at the heart of DEI training, the storytelling component serves as a tool for empathy-building, allowing individuals to see the world through others' perspectives. Stories, such as the ones presented in virtual reality-based training, have the unique ability to transport listeners into the shoes of someone else, breaking down barriers and preconceived notions that may exist (Solomon, 2020). That type of immersive

storytelling experience not only increases awareness of diverse experiences but also fosters a sense of empathy and understanding among participants, which is crucial for cultivating an inclusive culture.

The use of interactive media in virtual reality training is thought to have an impact on learning effectiveness through the implementation of immersive, experiential learning environments. This study supports findings related to previous literature that imply virtual reality media creates immersive, interactive learning environments that facilitate students' understanding and engagement (Gudoniene & Rutkauskiene, 2018). VR technology is shown to harness the principles of active engagement, multisensory input, and contextual learning, making it a critical factor when enhancing educational outcomes.

Moreover, the study shows that the multisensory components of virtual reality technology cater to diverse learning styles, addressing the visual, auditory, and kinaesthetic needs of users. By engaging multiple senses, VR provides a rich, multi-dimensional learning experience that can help enhance memory retention. Participant interview data highlights the importance of personalized learning experiences, a factor increasingly recognized as crucial for educational effectiveness. The study implies that interactive media in VR can adapt to the learner's pace, allowing for the customization of learning paths.

When implemented properly, virtual reality has the potential to enhance DEI training by creating an immersive and engaging environment where participants can experience the realities of others, leading to a profound understanding of diverse perspectives. This immersive technology simulates real-world interactions and social dynamics, allowing individuals to witness and address biases and discrimination in a visceral, impactful way. VR's experiential learning facilitates deep empathy, enabling users to embody different identities and confront challenges that marginalized groups face, which can lead to lasting behavioural change.

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