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Using Virtual Reality in Education: Ethical and Social Dimensions

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Abstract. This paper investigated the socio-ethical challenges associated with the integration of new technologies in education. Its primary objective was to undertake a mixed-methods case study that delved deeply into the ethical considerations within the socio-cultural context, particularly concerning the effectiveness of virtual reality in educational settings. To comprehensively address the identified issues, the research combined a case study approach with a thorough literature review, which supported and validated the study's hypotheses. The literature analysis encompassed 50 sources sourced from reputable scientific databases, including Web of Science, Google Scholar, and Scopus, with selections made through the

stratified sampling method. The inclusion criteria consisted of articles published between 2019 and 2023 that examined the effects of virtual reality and artificial intelligence in educational settings. The findings highlighted essential elements regarding the application of virtual reality in education, including its ethical considerations and its effects on both students and teachers from a socio-ethical viewpoint. The paper also addressed the ethical principles that must be considered when implementing immersive educational practices. Through an extensive literature review, emerging trends and challenges that necessitate further investigation were investigated. The paper outlined specific ethical guidelines that should be adhered to when utilising immersive technologies in education, thereby establishing a framework for their responsible application. The examination of the risks and opportunities presented by virtual reality offers valuable insights for educators aiming to incorporate these technologies into their teaching methodologies. This paper also explored the emerging possibilities that virtual reality brings to education and outlines the most effective strategies for its application. In terms of practical applications, the findings can inform the development of guidelines for the ethical utilisation of virtual reality in education, assisting educators in mitigating any potentially adverse effects on students.

Keywords: immersive education, new computer technologies, educational design, transformation of education, ethical dimension of the teacher's position.

Introduction

Research indicates that integrating cutting-edge computer technologies into education profoundly influences various aspects of human life. Specifically, the application of virtual reality raises a number of ethical and social concerns that require careful consideration. To protect the well-being and comfort of those involved in educational settings, it is essential to thoroughly examine the ethical and social dimensions associated with virtual reality in learning environments. The trend of employing immersive digital education, with virtual reality at its core, is becoming increasingly prominent in contemporary education systems. This analysis explores the role of virtual reality in higher education and knowledge management as a significant facet of learning. Additionally, it examines professional didactics, which serves as a theoretical foundation for methodologies and cognitive development characteristics. The findings highlight the importance of re-evaluating the traditional concept of "skill development" in light of educators' practical experiences and insights. The research explores the effects of incorporating virtual reality (VR) as a pedagogical tool within higher education, focusing on its implications for student learning. Initially, it provides insights into this ground-breaking digital technology and subsequently addresses the intricacies of knowledge transfer within this framework, along with the ethical considerations surrounding its impact on learners.

Integrating virtual reality into educational settings offers a chance for engaging and immersive experiences, which can enhance learning outcomes (Wang, Hu, Hwang & Yu, 2022). Nevertheless, it also presents ethical challenges pertaining to privacy and data protection (Khan,

Johnston & Ophoff, 2019), as well as social concerns including ensuring access for all students and leveraging technology to nurture communication and teamwork abilities (Marks & Thomas, 2022). Moreover, it is crucial to equip instructors with the necessary training to effectively utilize new technologies in their teaching practices. Therefore, the advancement of virtual reality in education necessitates careful consideration of ethical and social factors, along with adequate training for successful integration.

This paper examined and expanded upon the notion that virtual reality, when integrated with thoughtful educational design, could serve as a vital resource in the educational process within a practical and scientific framework. Unlike the current focus on technology and pedagogy surrounding virtual reality, which is primarily in the early stages of implementation in higher education, this approach offers both educators and learners a fresh perspective on their educational interactions and collaboration (Ateş & Garzón, 2023). This dynamic pertains to three primary theoretical frameworks of learning: knowledge transfer, knowledge sharing, and co-creation. It is essential to address the intricacies of the cognitive processes involved in knowledge transfer, which necessitate both decontextualisation and recontextualisation, thereby underscoring the significant role of the educator (Checa & Bustillo, 2020). Additionally, the teacher's role is pivotal in research concerning the effectiveness of simulation-based learning, as they provide essential feedback. Therefore, a deeper exploration of the teacher's ethics and positioning is vital to uncover insights that promote not only knowledge transfer but also the exchange of information.

Research Problem

This study offered a comprehensive examination of the socio-ethical implications associated with the integration of emerging technologies, specifically virtual reality (VR), into the educational process. Research on the socio-ethical dimension of virtual reality in education is still underdeveloped. The importance of understanding not only the technological capabilities of VR, but also its social and ethical implications can affect the interaction between teachers and students, as well as the learning environment in general. The formulation of specific ethical principles regarding the use of VR in education becomes the basis for further practical recommendations and the definition of rules that will help to avoid the risks associated with the psychological or social effects of VR. Analysing the trends and new opportunities that VR opens up in knowledge acquisition, interaction and practice, as well as identifying best practices for their implementation, will make it possible to develop strategies for integrating VR into the learning process to maximise its potential and minimise its negative effects.

Research Focus

This research aimed to examine recent technologies as educational tools, laying the groundwork for developing research hypotheses and evaluating potential social impacts associated with the use of computer technologies, particularly virtual reality. The study's objective was to explore the function of virtual reality and to outline its ethical guidelines. While numerous

scenarios discussed by researchers primarily focus on the implications of artificial intelligence in educational settings, highlighting the social ramifications of AI in various sectors, the integration of virtual reality into higher education still presents unanswered questions. The study proposed the following hypotheses:

Hypothesis 1: Implementing virtual reality as a teaching tool in higher education significantly enhances student participation in the learning experience.

Hypothesis 2: Virtual reality transforms the teacher's role, shifting their position from a traditional lecturer to a facilitator of learning.

Research Aim and Research Questions

This study is viewed in relation to the incorporation of immersive elements in higher education and the potential transformations in teachers' roles and activities. This leads us to propose a research inquiry: In what ways does the incorporation of virtual reality as an educational tool in higher education influence teachers' roles, either by altering their responsibilities or highlighting them? Additionally, what ethical and social implications arise from the application of virtual reality in educational settings?

Literature Review

Technical aspects of VR

The scientific literature lacks a unified definition of virtual reality (VR), presenting various perspectives on the concept. These include technical (Guerra-Tamez, 2023), technocentric (Huang, 2022), and anthropocentric (Khodabandeh, 2023) approaches. In general terms, VR encompasses a scientific and technological domain that employs computational and behavioural interfaces to create simulations of 3D objects within a virtual environment. In this space, these objects engage with the user in real time via sensory and motor interactions (Lin & Yu, 2023). Going beyond the material aspects, VR is characterised by a deep immersion of the user in a virtual environment where they experience and interact with it through various interfaces (Iwanaga, Muo, Tabira, Watanabe, Tubbs, D'Antoni & Tubbs, 2023). For example, the user can feel like they are in the middle of a simulated situation, using a headset, whether it is an entertaining or serious application.

In higher education institutions, there is a gradual integration of virtual reality in the field of education. For example, in medicine, the SimForHealth software allows teachers and students to simulate critical clinical situations (Rojas-Sánchez, Palos-Sánchez & Folgado-Fernández, 2023). In marketing, virtual reality is used to transport students to a digital store (Mystakidis & Lympouridis, 2023). These examples from different industries highlight the different ways in which virtual reality can be used. In the healthcare industry, the use of virtual reality is a logical evolution of synthetic mannequin or procedural modelling (Obeid & Demirkan, 2023).

Ethical aspects of VR

Simulation-based learning and its educational aspects have been researched for more than 35 years and have already had numerous publications in this area (Zhang, Chen, Hu & Wang, 2022). In this context, Filippova (2021) emphasises that the expansion of simulation through virtual reality as a learning tool is based on the concept of "learning by doing", which combines theory and practical skills. In the realm of leadership and management, learning traditionally relies on theoretical frameworks. However, virtual reality bridges the gap by creating a more immersive connection between theory and practical application (Yang, Lai & Wang, 2023). It allows students to practice and teaches them through mistakes and trials. Various aspects of virtual reality, such as simulating crisis situations and emergencies, create opportunities for effective learning and training.

Going beyond the material aspects, VR is characterised by the deep immersion of the user in a virtual environment where they experience and interact with it through various interfaces (Iwanaga et al., 2023). However, this study did not consider how such interactions may affect the cognitive development of users, which leaves an important aspect unexplored. The existing scientific literature on the ethical considerations surrounding the use of virtual reality (VR) remains sparse. To mitigate risks for students, it is crucial to establish well-defined ethical guidelines for VR implementation in educational settings. Key factors to address include data confidentiality, the prevention of bias in algorithms, and the assurance of users' psychological safety (Pelletier et al., 2022). Adherence to principles such as data privacy, algorithmic bias detection, responsible decision-making, and safety are critical and help ensure that the use of virtual reality in education promotes objective and well-rounded student development and does not harm students' well-being and growth (Acosta, Navarro, Gesa & Kinshuk, 2019).

According to Bogusevschi, Muntean & Muntean (2020), the use of certain technologies can cause aesthetic dissonance in a student, which can affect their creativity or sense of beauty. Smart systems with artificial intelligence that exceed human abilities can lead to intellectual laziness in humans. This problem is becoming more and more urgent today.

One of the biggest threats to the future is the social side of the impact of computer technology, which can lead to a decrease in interpersonal interactions (Chen, Wang, Zou Lin, Xie & Tsai, 2022). This aspect is important in the context of introducing computers into the educational process. In this context, according to Fauzi (2022), new information technologies can contribute to the development of egocentrism and selfishness. No nation, religious community, or community will be able to control them; control will be in the hands of the users themselves, who will determine their nature and content. In this context, Wenk, Penalver-Andres, Buetler, Nef, Müri & Marchal-Crespo (2023) warn that users may lose interest in altruism and become more self-centred, forgetting about the outside world due to the constant attention to their personal needs.

VR in various fields of education

The introduction of computer technology into the learning process can lead to a decrease in face-to-face interaction between students and teachers. On the one hand, new technologies can facilitate communication through online platforms, but on the other hand, there is a risk that students become less inclined to face-to-face communication. This can have a negative impact on the development of interpersonal skills and emotional connection in the learning environment.

Technology, including virtual reality, can be a powerful tool for students with disabilities, offering new ways of learning. However, there is a risk that the inaccessibility of certain technologies or platforms may cause further isolation of this category of students. The inability to think rationally and make informed decisions can arise from the overwhelming presence of diverse information sources that spread rapidly due to technological advancements (Guaya, Meneses, Jaramillo-Fierro & Valarezo, 2023). The instability of relationships between people will also increase as rapid change and high mobility contribute to communication gaps at all levels - at work, in the family and in the community. These changes will divide even colleagues in the same profession and may affect relationships within the family circle.

The impact of information technology on society and education is a subject of study (Zhang, Ding, Naumceska & Zhang, 2022). According to Williams (2022), the preservation of social cohesion, the sense of community, and the diversity of human experiences require special attention. The main challenge is to preserve the human ability to solve problems and think rationally. The high social costs of ineffective educational technologies can have a serious impact on the quality of education (Uriarte-Portillo, Ibáñez, Zatarain-Cabada & Barrón-Estrada, 2023).

Thus, to avoid negative consequences, it is important to adhere to the basic principles in the creation of educational programmes. It is necessary to start a discussion about the principles that should be followed by the creators and distributors of these programmes in order to minimise possible risks, because the use of virtual reality as an educational tool allows educational participants to immerse themselves in virtual environments, situations, exercises and learning materials that change their perception of student-teacher interaction.

Materials and Methods

This research was grounded on a case study that drew from the work of Seufert, Oberdörfer, Roth, Grafe, Lugrin, and Latoschik (2022), which served as a notable illustration of how virtual reality can be utilised in medical education. The findings of this case study highlighted the ability of technology to enhance learning experiences, cultivate student competencies, and foster stronger connections between educators and learners. In their research, the authors employed various data collection techniques, including observation, surveys, and assessments of learning outcomes within a virtual environment. This case study is pertinent to the paper's subject, as it highlights the benefits of using virtual reality in medical education and its favourable influence on the learning experience.

Instruments and Procedures

The next phase of the research aimed to evaluate the effects of integrating virtual reality into higher education as a means to enhance teaching methods. To achieve this, a literature review was performed employing the Evidence for Policy and Practice Information and Co-ordination research methodology. This approach facilitated the precise identification of pertinent articles, enabled the summarization of collected information by subject, and allowed for the categorization of the research into several key areas: ethics, motivation, collaboration, and the educator's role. For future investigations, various databases were chosen, including Google Scholar, ResearchGate, Scopus, and Web of Science. A search was performed in English utilizing specific descriptive operators tailored for each database. This process yielded 2,300 articles. The literature review aimed to elucidate the effects of integrating virtual and augmented reality within educational settings. It focused on examining how virtual reality serves as a technological tool that enriches teaching and learning approaches, while also addressing the ethical considerations surrounding its implementation.

Data Analysis

To address the research questions, a systematic review utilising the content analysis was performed. This literature review rigorously identified, assessed, and synthesized all pertinent studies related to the topic. The total number of articles retrieved from the selected databases, along with the descriptors employed, is presented in Table 1:

Table 1

Definition by descriptors

Number of sources	Database and key terms
1026	Scopus - virtual reality in higher education. Designing classes with elements of virtual immersion
291	Research Gate - education, virtual artefacts, virtual and augmented reality and higher education
576	Google scholar - higher education, virtual reality or augmented reality in higher education, motivation of students.
407	ERIC - the latest technologies in education, virtual or augmented reality, higher education and training, virtual reality in medicine
2300	Total

Source: Author's development.

The corpus of 2300 articles were reduced by the following selection criteria in Table 2:

Table 1

Selection criteria

Criterion	Quantity
Peer-reviewed research in an academic context	50
Advances in immersive technologies	178
Years of publication 2019-2023	1000

Source: author's development

The study was constrained to 50 articles, allowing for the validation of the theoretical framework presented. The practicality of integrating virtual reality into higher education was assessed by combining scholarly insights with personal experiences. Nevertheless, it is important to acknowledge the limitations posed by this restricted sample size, as it does not comprehensively address every facet of the subject matter. This limitation was implemented to maintain the integrity of the theoretical foundations of the research. The practicality of implementing virtual reality in higher education was assessed through a combination of scholarly perspectives and personal insights. Based on a review of existing literature, the following hypothesis emerged: integrating virtual reality into higher education, especially in the field of the exact sciences, is essential, as it has the potential to motivate students and enhance their learning outcomes by substituting conventional teaching methods with virtual experiences.

Results

Virtual reality (VR) has revolutionised the understanding and experience of the surrounding environment. Thanks to its immersive qualities and interactive features, this cutting-edge technology has been integrated into numerous sectors, including education. Research literature frequently examines how virtual reality can reshape education, highlighting its advantages, potential obstacles, and ethical considerations. Essentially, virtual reality offers a simulated experience that can closely resemble or significantly differ from reality. This is typically accomplished with specialised headsets or eyewear designed to produce a three-dimensional digital environment, allowing users to navigate and engage with the space created on a computer (see Table 3).

Table 3

Systematisation of key social and ethical aspects of using virtual reality (VR) in education

Aspect	Advantages
Inclusiveness	VR can help create an inclusive environment where students from different backgrounds can learn together.
Social aspects	Accessibility: virtual reality can make education more accessible to people with different needs, including those with disabilities
Cooperation	Technology facilitates collaborative learning by allowing students to interact in real time despite physical distance
Engagement	VR promotes active engagement, presence and collaboration at the teacher-student level.

Source: Najmi, Alhalafawy & Zaki (2023).

Matovu, Ungu, Won, Tsai, Treagust, Mocerino & Tasker (2023) discuss the concept of presence as the cornerstone of virtual reality. The aim is to cultivate a feeling of being in an alternate reality, making users feel as though they have moved to a different location or time. This sensation is accomplished through an integration of visual, auditory, and occasionally haptic (touch-based) stimuli. VR experiences can vary significantly, encompassing everything from basic 360-degree videos to fully interactive, immersive environments.

Virtual reality technology has made significant advancements since its early days. The first experiments with virtual reality emerged in the 1960s, but it wasn't until the 1990s that VR truly began to gain traction (Tezer, Yıldız, Masalimova, Fatkhutdinova, Zheltukhina & Khairullina, 2019). In today's landscape, sophisticated VR devices equipped with high-resolution displays, motion tracking, and intricate hand and finger tracking capabilities are available. This evolution in hardware has paved the way for diverse applications, particularly in the field of education. As noted by Smutny (2022), advancements in virtual reality technology are anticipated to lead to enhancements in graphical rendering, sound spatialisation, and kinesthetic feedback. These improvements are likely to deepen the immersive quality of virtual experiences, rendering them more dynamic and engaging.

The integration of virtual reality in educational settings is linked to the potential for crafting deeply engaging experiences that can transform how students learn and process information. By bringing virtual reality into the classroom, the gap between theoretical knowledge and practical application can be narrowed; resulting in a more interactive and captivating educational experience (see Table 4).

Table 4

Key aspects of the emergence of virtual reality in education

Aspect	Description
An immersive experience	Virtual reality offers immersive and immersive learning programmes that increase student engagement in learning.
Reducing the distance between theory and practice	VR allows students to apply theoretical knowledge in practice, which contributes to better learning
Changes in teaching tools	The introduction of VR changes traditional approaches to learning, making them more modern and adaptive.
Interactivity	Virtual reality provides a high level of interactivity that allows students to interact with learning material in real time.

Source: author's own development

One of the key benefits of using virtual reality in education is the ability to provide students with hands-on experiences that would be impossible or difficult to carry out in real life. For example, students can explore the underwater world, travel to past eras, or even conduct virtual research, which helps them better understand a topic and keeps them curious.

The case study

The research conducted by Seufert, Oberdörfer, Roth, Grafe, Lugrin, and Latoschik (2022) showcases the effective application of virtual reality (VR) in the realm of medical education. It highlights the capability of this technology to enhance learning experiences, foster skill development among students, and improve the dynamics of the teacher-student relationship.

The primary objective of the study was to evaluate whether both educators and learners could enhance their competencies within a VR-enabled environment, and to determine if ethical alignment in teacher-student interactions is more prominent compared to traditional educational methods. Given the limited opportunities for practical experience and competency assessment in the area of deontology—beyond mere theoretical understanding—this research introduced a new fully immersive virtual reality program as part of the curriculum. The evaluation of competencies was conducted using self-assessments, teacher evaluations, and by examining the quality of learning across various educational settings. Additionally, the study measured social presence, credibility, and the perceived utility of both the virtual reality (VR) program and the course that integrated video elements.

The participants in this study included 55 deontology instructors from the University of Würzburg, who were involved in a quasi-experimental design featuring pre- and post-tests. Students were randomly divided into two groups for the intervention: the experimental group, consisting of 39 students, engaged with the Breaking Bad Behaviours (BBB) virtual classroom for an entire semester, while the control group, comprising 16 students, participated in traditional video-based instruction.

The evaluation conducted by the teachers reveals notable differences between the groups utilizing virtual reality (VR) and those using video at two different measurement points, as well as the interaction between the method and the timing of assessment. This indicates a highly significant enhancement in competence and ethical alignment within the VR group from the pre-test to the post-test ($p < 0.001$, Cohen's $d = 1.06$) when compared to the video group. Participants who engaged with the VR environment reported a statistically significant improvement in their competencies related to conflict management in the post-test compared to the pre-test ($p = 0.02$, Cohen's $d = 0.39$). Interestingly, those in the video group also assessed their skills as higher in the post-test ($p = 0.02$, Cohen's $d = 0.67$), suggesting discrepancies between self-evaluations and external assessments. Furthermore, the findings indicated that even though both groups were provided with the same theoretical foundation, the VR group experienced a more substantial growth in their understanding of deontological principles as facilitated by their instructors. Participants evaluated the virtual reality training system as an effective resource for assessing and reflecting on individual teaching practices. The immersive nature of the experience enhanced the sense of presence and showcased realistic scenarios within the deontology course. These results indicate that virtual reality environments may provide significant advantages in enhancing the skills and ethical understanding of both deontology instructors and their students.

This case study supports the proposed hypotheses. The first hypothesis focused on the potential of virtual reality (VR) as an educational instrument to significantly boost student involvement in the learning experience. In this study, the authors sought to determine if incorporating VR into deontology courses could foster a more interactive and captivating educational atmosphere. The complete immersion in VR content allowed students to feel like active participants in their learning journey, ultimately increasing their motivation and interest in the subject matter.

Hypothesis 2 examined the evolving role of teachers in the context of virtual reality (VR), suggesting that educators are transitioning from traditional lecturers to facilitators. The research highlighted the positive influence of VR on instructional styles and how it alters student perceptions of teachers.

As virtual reality continues to gain traction in the educational sector, it offers realistic simulations and immersive learning opportunities. Numerous case studies within medical education have demonstrated VR's effectiveness in training students, enhancing their skills and promoting patient safety.

The on-going exploration and application of virtual reality in education hold great potential for transforming training across various disciplines, including medicine. This technology not only facilitates the improvement of the educational process but also aids in the development of critical thinking skills alongside technical abilities, ultimately enhancing the quality of healthcare services and ensuring better patient safety.

In this regard, Sholihin, Sari, Yuniarti, and Ilyana (2020) point out that virtual reality facilitates the visualisation of intricate concepts, making them easier to grasp. For instance, it can assist learners in understanding challenging subjects in physics or mathematics by illustrating complex ideas. As a result, students are better equipped to comprehend the material and accelerate their learning.

Moreover, virtual reality liberates educators from traditional constraints, fostering personalised education. It enables students to learn at their own pace and in a manner that suits them best. This customisation of the learning experience caters to individual needs and abilities. For teachers, this shift allows them to concentrate on guiding students through problem-solving and enhancing their critical thinking skills, rather than merely conveying information.

The integration of virtual reality into higher education presents an exciting and significant opportunity, though it necessitates substantial investments in both hardware and software. As technology evolves at a rapid pace, it's crucial to continuously update equipment in order to ensure the high standard of VR training experiences.

It is important to consider the potential side effects associated with extended VR usage, such as discomfort and fatigue. Implementing appropriate guidelines, including scheduled breaks during instructional time, can help mitigate these issues. Another essential concern is safeguarding the privacy and security of student information within virtual learning environments, which must be thoroughly addressed.

Moreover, as technology advances and virtual reality becomes more accessible, new challenges arise regarding the socio-ethical implications of educators' roles. This topic warrants in-depth discussion.

While virtual reality (VR) holds significant promise for enhancing educational experiences and increasing student engagement, it also brings forth ethical and social responsibility challenges that must be carefully examined.

A key issue regarding virtual reality (VR) is the privacy of its users. The gathering and handling of personal information can jeopardize individual privacy and security. Both developers and users are responsible for upholding privacy protection standards and maintaining control over their data.

Moreover, it is essential to focus on the security of VR technologies to mitigate the risks of cyber-attacks and other potential threats. Developers must implement measures that bolster the security of augmented reality systems.

Ensuring the accuracy and reliability of the information presented to users in VR is critical. Providing false or misleading information can lead to confusion and misinformation.

Discussion

The effective integration of virtual reality in higher education necessitates a careful consideration of ethical and social dimensions, particularly concerning standards of security, privacy, and authenticity. While scholars have extensively examined these concerns, there is a notable gap in research addressing a crucial aspect of virtual reality's role in higher education: the evolution of the relationship between teachers and students. From an academic perspective, this ethical issue can be understood as a dynamic process where communication occurs through the sharing of knowledge, ideas, and the collaborative creation of new understanding. This process can be framed within three primary paradigms: transmission, exchange, and co-creation (Agbafe, Jazayeri, Baker & Cederna, 2023). The context, in which this process occurs, along with the dynamics between teachers and students and the social organisation of the learning environment, influences which of these approaches prevails in a given situation. For instance, lectures primarily focus on knowledge transmission, while practical classes promote the exchange of ideas, and case studies or simulations centre on the collaborative creation of new knowledge. In their research, Cabero-Almenara & Roig-Vila (2019) found that digital tools reshape the roles of both students and teachers and transform the concept of learning itself. E-learning alters the interactions between participants in the educational process, resulting in a redefinition of the teacher's role and their methods of instruction (Alam, 2022). Consequently, the teacher evolves from merely a source of information to a facilitator, encouraging active engagement and collaboration among all participants in the learning experience.

The use of virtual reality in education creates new opportunities for interaction between students and teachers. This new approach can be considered part of the modern education paradigm, where distance and proximity can be modelled in a virtual environment (Babakr, Mohamedamin & Kakamad, 2019). Immersion in a collaborative simulation allows for the creation of a new learning space where students and teachers can communicate and learn together, regardless of the physical distance between them. This approach also promotes social creativity, where participants can interact and solve problems together in a virtual environment that responds to their actions and interactions. Thus, it can be assumed that the use of virtual reality transforms the traditional student-teacher relationship and promotes the emergence of new forms of learning and collaboration in modern education.

In this context, according to Alam (2022b), the information systems approach aims to have both technological and organisational expertise: the technological component to understand the new challenges of using VR in education and the organisational component to assess the impact

of the teacher's role in the educational process. The problem of learning is constantly being rethought, even if the process itself is complex - the transfer of knowledge to students is the main goal.

One of the goals of learning is to mobilise and reuse knowledge. The academic literature considers transfer of learning as a process that may differ depending on the age of the learner and the context in which knowledge is reused. Chen (2019) defines knowledge transfer as the transfer of skills and attitudes from the learning environment to the workplace. This means that knowledge transfer occurs when the knowledge acquired by students is effectively applied in practice.

Based on Alkhabra, Ibrahem & Alkhabra (2023), knowledge transfer is seen as the final phase of the reuse of a complex process initiated by the knowledge creation and subsequent knowledge sharing phase. In the context of teaching and the teacher-student relationship, a partnership is established between the two and leads to the importance of the role of teachers, which differs depending on the context of communication. In this context, we consider virtual reality as a new tool for knowledge transfer.

The idea of transfer in relation to virtual reality in education emphasises the importance of both the learning context and the transfer context. While the immersive virtual environment may simulate real-world scenarios, the degree of realism can differ significantly. According to Chen, Huang, and Chou (2019), this dual nature of virtual environments—capable of mimicking real contexts yet inherently digital—complicates the definition of a transfer situation. Consequently, it is crucial for each participant to thoroughly examine this environment, considering its distinct characteristics.

This study explores the ethical dimensions of the teacher's role within a simulated learning environment, aiming to enhance effectiveness and maximize learning outcomes. Frewen, Oldrieve, and Law (2022) specifically investigate the ethical implications of a teacher's influence on the success of virtual reality applications in higher education. Currently, there is a dearth of responses to questions regarding the effects of digital transformation in education on users during the learning process. Despite the considerable body of literature and the potential for further research, particularly in the context of higher education, this area remains largely underexplored.

Thus, great importance is placed on the pragmatic judgements of teachers who are best placed to identify activities and their consequences, as modelling human behaviour is delicate (Guppy, Verpoorten, Boud, Lin, Tai & Bartolic, 2022). What is meant by pragmatic judgement is the predominant site of discourse among educational actors about their own activities. When analysing performance, we are confronted with the familiar language of the actor and the context-specific action that needs to be taken into account. Competence is a complex term that is difficult to define but can be assessed by its constant characteristics (Gustiani et al., 2022). The concept of competence can first be characterised in terms of its components: knowledge, know-how,

interpersonal skills, knowledge of how to develop, inseparable from action, as they are not contained in the resources to be mobilised, but in the mobilisation of these resources (Lin & Hou, 2022). Competence can also be understood as a quality of an effective personality (Javornik, Marder, Barhorst, McLean, Rogers, Marshall & Warlop, 2022), a process of connection with reality, iterative and progressive (Irwanto, Dianawats & Lukman, 2022). The term "competence" cannot be defined, but it can be understood as a pragmatic concept in the sense that "everyone understands each other when we talk about it, but no one knows how to define it" and where "most of our knowledge is skills". This approach focuses on understanding what makes it possible to say that individual A is more competent than individual B, and it moves from the concept of competence to the concept of a schema. A schema then represents a structured set of generalised characteristics of an action.

The integration of virtual reality (VR) into education presents significant opportunities to enhance the learning experience and cultivate students' competencies. However, it also introduces important ethical and social considerations that must be carefully addressed. Educators need to possess the skills to oversee students' activities in virtual environments and comprehend the implications of these actions.

In this context, the issue of competence is crucial, as it is essential to identify the knowledge, skills, and expertise required for the effective application of virtual reality in higher education. Additionally, it is vital to recognise that the concept of competence is complex and multifaceted, necessitating thorough analysis that encompasses all of its components. By adopting this comprehensive approach, we can promote the responsible integration of virtual reality in education while being mindful of its ethical and social dimensions.

The integration of virtual reality (VR) into higher education presents significant opportunities for enhancing students' competencies. VR not only fosters personal and cognitive growth but also cultivates essential skills applicable to future professional environments. In this regard, Low, Poh, and Tang (2022) emphasize that VR facilitates realistic simulations of various professional scenarios, enabling students to adapt to different conditions while honing the skills necessary for future career success. Researchers such as Sonntag, Albuquerque, Magnor, and Bodensiek (2019) further suggest that a shift towards interactive learning approaches fosters the development of both technical and communication skills, which are critical for effective professional performance. This approach ensures that the core aspects of professional practice are maintained while simultaneously enhancing students' adaptability and preparedness for emerging challenges in the job market.

In summary, the integration of virtual reality (VR) in higher education not only enhances students' competencies but also underscores the necessity of adapting to changes within their professional fields while preserving the core principles of professional practice.

In recent years, the popularity of VR in educational settings has surged, offering students opportunities to gain new knowledge and skills while actively engaging them through dynamic

interactive games and simulations. However, it's crucial to address the ethical and social implications tied to using VR in education.

Specifically, higher education instructors must understand how VR impacts the student-teacher relationship. They should also be cognizant of potential ethical concerns, including data privacy and user safety, associated with VR in the learning environment.

Research indicates that educators must not only prioritise the technology itself but also hone their own skills and competencies to effectively implement VR in the classroom. The discourse surrounding the use of virtual reality in education encompasses not only pedagogical considerations but also ethical and social dimensions that warrant careful examination and dialogue.

Conclusion

This research examined the role of teachers within the framework of immersive virtual reality pedagogy in higher education. It also addresses the ethical dimensions of the teacher-student relationship that emerge when utilising virtual reality. The study begun by defining virtual reality as a digital technology that alters the way interactions facilitate knowledge transfer. Additionally, it explored how professional didactics can be employed to foster personal and cognitive growth in the context of virtual reality. The study emphasised that incorporating virtual reality (VR) into education played a crucial role in enhancing the skill set of educators within the higher education framework. It is essential for teachers to familiarise themselves with modern technologies, including VR, which encompasses understanding the necessary hardware, software, and strategies for effectively integrating VR into their curriculum. Utilising VR paves the way for innovative pedagogical approaches, fostering active learning, incorporating gaming elements, facilitating group collaboration, and employing other interactive techniques that can surpass traditional teaching methods in effectiveness. Educators must be willing to explore new instructional modalities, which demand creativity and a swift adaptability to change. Overall, the research indicates that virtual reality has the potential to significantly advance the skill development of higher education teachers.

Limitations of the study

Nonetheless, the study presents some limitations, primarily due to its reliance on a single case study, which may not encompass all facets of the issue at hand. The use of just one case study restricts the applicability of the findings to a broader audience. Variations in learning contexts, such as subject matter, cultural backgrounds, and learner age groups, could yield different outcomes. Furthermore, the absence of standardised measurement methods could complicate comparisons with other research efforts. Additionally, the study was conducted over a relatively short timeframe, potentially limiting the depth and comprehensiveness of the resulting analysis.

Suggestions for Future Research

The integration of virtual reality (VR) in education presents exciting possibilities for enhancing learning, yet it also brings forth various ethical and social challenges that necessitate deeper exploration. We believe that an important initial step is to broaden the sample size and conduct a quantitative analysis to assess the impact of VR across diverse educational settings. Additionally, it is crucial to examine the long-term implications of VR on the development of students' cognitive and social abilities. The most promising issue for future research in this area is the analysis of the risks of collecting and storing users' personal data in educational VR platforms. However, the study of potential negative effects of VR use for students, such as addiction and anxiety, seems no less promising, as these topics are currently at the forefront of the conversation. Studying how VR can be accessible to all participants in education, including people with special needs, and continuing to explore how VR affects students' social skills, collaboration, and emotional support are quite relevant.

VR can be adapted to cultural contexts, and research on the impact of virtual reality on the learning of students from different cultures is also scientifically sound.

Financing issues and research into financing models for integrating VR into the educational system, including the cost of hardware and software, and assessing the need to develop technical infrastructure to support VR in educational institutions, especially in underserved regions, are topics that still remain unresolved.

Analysing the methods of using VR as the most effective for different types of learning and disciplines, analysing successful implementations of VR in the educational process in different countries and structures, and identifying key success factors can fully meet the needs of educators, students and their parents, as well as prevent potential risks associated with technological innovations.

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Conflict of Interest

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