Peertechz

BIOLSCI GROUP

Recent Advances in
Evolution of Education and Outreach
OPEN ACCESS JOURNAL

DOI: https://dx.doi.org/10.17352/raeeo

Mini Review

The Ethical Dilemma of Educational Metaverse

Mousa Al-kfairy* and Omar Alfandi

College of Technological Innovation, Zayed University, Abu Dhabi, United Arab Emirates

Received: 28 June, 2024
Accepted: 10 July, 2024
Published: 11 July, 2024

***Corresponding author:** Mousa Al-kfairy, College of Technological Innovation, Zayed University, Abu Dhabi, United Arab Emirates, E-mail: Mousa.al-kfairy@zu.ac.ae

ORCiD: https://orcid.org/0000-0003-3180-3861

Keywords: Educational metaverse; Ethics; Digital divide; Metaverse safety; IPR

https://www.biolscigroup.com

Check for updates

Abstract

This review investigates the ethical issues of integrating Metaverse technology in educational settings. Our study reveals significant ethical considerations, including privacy concerns, data security risks, and the widening digital divide. We identified critical challenges such as user safety, intellectual property rights, and the ethical use of artificial intelligence. To address these challenges, we propose robust solutions including enhanced privacy protections, initiatives to bridge the digital divide, and frameworks to ensure safe and inclusive environments. Additionally, we underscore the necessity of developing new pedagogical frameworks and management models to effectively incorporate Metaverse technologies. Our findings suggest that while the Metaverse offers immense potential for revolutionizing education, maintaining ethical standards and thoughtfully mitigating potential risks is crucial. By implementing the proposed solutions, educational institutions can harness the full potential of Metaverse technology while safeguarding the interests of all stakeholders.

Introduction

Adopting Metaverse technology in educational settings promises to revolutionize traditional teaching and learning paradigms by providing immersive, interactive experiences that transcend geographical and physical limitations [1,2]. Meta-education, as explored through the lens of these studies, leverages the power of virtual and augmented reality to create dynamic educational environments where learners can engage deeply with content and peers in a simulated, controlled space. These environments offer opportunities for experiential learning that are difficult to replicate in traditional educational settings [1,2].

However, there are significant ethical considerations that go along with the shift to a digital learning ecosystem. Metaverse studies highlight concerns about privacy, data security, and the potential exacerbation of the digital divide. Ensuring equitable access to technology, safeguarding students' personal information, and maintaining academic integrity in virtual spaces are paramount concerns that must be addressed as institutions navigate the integration of Metaverse technologies [1-3].

Moreover, the studies call for developing new pedagogical frameworks to incorporate these technologies while effectively addressing ethical concerns. This includes creating new management and organizational leadership models responsive to the unique challenges posed by virtual environments [1,2].

To explore the potential of the Metaverse in education, one must proceed with a balanced approach that promotes technological advancement and innovation while ensuring that ethical standards are not compromised [4]. The promise of meta-education is immense, but it must be pursued carefully, considering the potential risks and benefits.

The objectives of this review are to examine the ethical dilemmas associated with adopting Metaverse technology in educational settings, evaluate potential resolutions, develop pedagogical frameworks, assess the impact on learning, and

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

promote equitable access. Key research questions include identifying the ethical challenges, analyzing proposed solutions, developing new pedagogical frameworks, understanding the impact on student engagement and learning outcomes, and identifying strategies to ensure equitable access.

This review aims to thoroughly examine the ethical dilemmas and potential resolutions associated with incorporating the Metaverse into educational environments. To accomplish this, we have systematically reviewed recent studies in this field, summarizing both the challenges identified and the solutions proposed through a thematic analysis.

Integrating Metaverse technologies in education offers unprecedented immersive and interactive learning experiences [5]. However, addressing the ethical challenges is crucial to ensure these technologies' equitable and secure adoption [6]. By developing robust pedagogical frameworks and ensuring equitable access, the full potential of the Metaverse can be harnessed, while safeguarding the interests of all stakeholders. This balanced approach will promote technological advancement and innovation in education, paving the way for a future where meta-education is both effective and ethical.

The following section will detail the methodology employed for conducting this review. Then, the Metaverse applications in educational settings are discussed, followed by ethical challenges identified by various scholars, and explore their solutions. Subsequently, the implications of these findings are included. The final section provides a conclusion synthesizing our insights and recommendations based on the analysis.

Review methodology

This study employs a systematic review methodology to explore the ethical dilemmas and potential resolutions associated with integrating Metaverse technology in educational settings. A systematic review ensures a comprehensive and unbiased synthesis of existing research, providing a thorough understanding of the current state of knowledge in this area.

Search strategy

A comprehensive search strategy was developed to identify relevant studies. Multiple databases were searched, including PubMed, IEEE Xplore, Google Scholar, and Web of Science. Keywords used in the search included "Metaverse," "virtual reality," "augmented reality," "education," "ethics," "privacy," "data security," and "digital divide." Boolean operators (AND, OR) effectively combined these terms.

Inclusion and exclusion criteria

Studies were included based on the following criteria:

Inclusion criteria:

- Studies published in peer-reviewed journals or conference proceedings.
- Studies focusing on the application of Metaverse technologies in educational settings.
- Studies addressing ethical issues such as privacy, data security, and the digital divide.
- Studies published in English.

Exclusion criteria:

- Studies not related to educational settings.
- Studies not addressing ethical issues.
- Non-peer-reviewed articles, editorials, and opinion pieces.
- Studies published in languages other than English.

Data synthesis

A thematic analysis approach was used to synthesize the data. This involved identifying recurring themes and patterns related to the ethical challenges and solutions in integrating Metaverse technology into education. The synthesis process included the following steps:

Familiarization with the data: Reading and re-reading the extracted data to become thoroughly familiar with the content.

Coding: Systematically coding the data to identify significant themes and sub-themes.

Theme development: Collating the codes into potential themes and reviewing them to ensure they accurately represent the data.

Refining themes: Refining the themes to ensure coherence and clarity, resulting in a final set of themes that provide a comprehensive overview of the ethical issues and solutions.

Overview of educational metaverse

The concept of the Metaverse has gained significant traction in recent years, particularly in education. One of the primary applications of the Metaverse in education is the creation of virtual classrooms and lecture halls [7]. These platforms allow students and teachers to interact in a fully immersive environment, facilitating real-time communication and collaboration [8]. This setting replicates the physical classroom experience without geographical limitations, enabling virtual lectures, group discussions, and collaborative projects. Students can benefit from a more engaging and interactive learning experience, enhancing their understanding and retention of the material [9].

Simulations and virtual labs represent another powerful application of the Metaverse in education. These environments allow students to conduct experiments and practice skills in a risk-free, controlled setting. For instance, virtual labs enable students to perform science experiments without needing physical materials, while medical students can practice surgeries in a virtual operating room. These simulations provide valuable hands-on experience that is often impractical or impossible in the real world [10].

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

The Metaverse also facilitates immersive field trips, taking students to historical sites, museums, or outer space [11]. These virtual field trips provide unique learning opportunities that enhance the educational experience. Students can visit ancient civilizations, explore planets and galaxies, and engage with educational content in an informative and captivating way. This experiential learning approach helps students to understand better and retain information [12].

Gamification is another significant aspect of the Metaverse in education, making learning more engaging and enjoyable. Interactive educational games and activities motivate students and enhance their learning outcomes [13]. For example, math and science games can teach concepts through challenges and quests, while language learning environments allow students to practice skills with avatars in real-life scenarios. These interactive and gamified learning experiences help to maintain student interest and promote active participation [14].

The Metaverse also supports collaborative projects and teamwork, enabling students to work together on assignments regardless of their physical location. This collaboration extends to international students, promoting cultural exchange and global perspectives. In fields like design and engineering, students can collaboratively create and test structures, while business simulations allow them to run virtual businesses and learn about economics and management. These collaborative environments foster creativity, problem-solving, and critical thinking skills.

In special education and accessibility, the Metaverse offers tailored educational experiences for students with diverse needs. Virtual sensory rooms provide therapeutic experiences for students with autism or sensory processing disorders, while assistive technologies help students with physical disabilities fully participate in educational activities. These customizable environments cater to individual learning preferences and abilities, promoting inclusivity and equitable access to education.

Professional development and continuing education are also enhanced by the Metaverse. Educators and professionals can benefit from virtual workshops, training sessions, and conferences, supporting lifelong learning and professional growth. Teacher training programs can provide educators with new teaching strategies and technologies, while industry certifications offer virtual courses and simulations that mimic real-world job scenarios. This continuous learning approach helps professionals stay updated with the latest field developments.

Cultural and social learning are important aspects of the Metaverse, which hosts cultural festivals, social events, and other activities that promote social learning and cultural understanding. Virtual celebrations of cultural events allow students to experience diverse traditions, while social skills training environments help them build interpersonal skills. These activities enhance education's social and cultural dimensions, fostering a more inclusive and understanding learning community.

Despite the numerous benefits, integrating Metaverse technologies in education presents several challenges. Technical requirements, such as high-speed internet and VR/AR hardware, can be a barrier for some institutions and students. Privacy and security concerns must be addressed to protect student data and ensure secure virtual environments. The digital divide is another critical issue, as not all students have access to the necessary technology. Teacher training is essential for educators to integrate Metaverse technologies into their teaching practices effectively. Additionally, ethical considerations must be carefully managed, such as the impact on students' mental health.

In conclusion, the Metaverse holds immense potential to revolutionize education by providing immersive, interactive, and accessible learning experiences. By leveraging virtual and augmented reality, educators can create dynamic environments that engage students and enhance their learning outcomes. However, to fully realize these benefits, the associated challenges must be addressed, and the integration of Metaverse technologies must be ensured that they are equitable, secure, and ethically sound. The future of education in the Metaverse is promising, offering unprecedented opportunities for innovative and effective learning.

Advantages and disadvantages of metaverse-based classroom

Metaverse-based classrooms offer several significant advantages that can enhance the educational experience. One of the primary benefits is the provision of immersive learning experiences that make complex subjects more understandable and engaging [15]. Students can explore 3D models, participate in virtual simulations, and interact with dynamic content, making learning more engaging and memorable [3]. Additionally, these classrooms eliminate geographical barriers, allowing students worldwide to attend the same class. This flexibility supports inclusivity and gives students in remote or underserved areas access to high-quality education [3].

Another advantage is the enhanced collaboration facilitated by the Metaverse. It enables students to work together in virtual spaces, allowing seamless group projects, discussions, and problem-solving activities that promote teamwork and communication skills [16]. Furthermore, AI-driven analytics in the Metaverse can tailor educational experiences to individual learning styles and paces. This personalized approach helps address the unique needs of each student, enhancing overall learning outcomes [17]. Additionally, virtual labs and simulations can reduce the need for physical resources and equipment, making advanced educational tools more accessible and reducing the financial burden on educational institutions [18].

Despite these advantages, there are also notable disadvantages associated with Metaverse-based classrooms. Implementing these classrooms requires significant technological infrastructure, including high-speed internet, VR/AR hardware, and powerful computing resources [3]. This can be a barrier for some schools and students, particularly

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

in low-income areas. Moreover, the collection and use of data within the Metaverse raise concerns about privacy and security. Protecting student data and ensuring secure virtual environments are critical issues that must be addressed [19].

There is also a risk of exacerbating the digital divide, as not all students can access the necessary technology. Ensuring equitable access to Metaverse-based education is essential to prevent further inequalities. Over-reliance on technology can lead to technical failures, cyber-attacks, and disruptions in the learning process. Schools must have contingency plans and robust IT support to manage these risks. Lastly, extended use of virtual environments can impact students' mental health, causing eye strain, reduced physical activity, and virtual fatigue. Balancing virtual learning with real-world interactions and activities is crucial to mitigate these effects [20].

In summary, while Metaverse-based classrooms offer numerous advantages, including immersive learning experiences, geographical flexibility, and enhanced collaboration, they also present challenges such as technical barriers, privacy concerns, and the potential to widen the digital divide. Addressing these disadvantages thoughtfully is essential to maximizing the benefits of Metaverse technology in education.

Ethical challenges of educational metaverse

Upon reviewing several research papers and studies, the author identified a set of ethical challenges that are faced by developers and policymakers when integrating Metaverse into education:

Privacy and data security: The collection, storage, and use of personal data in the Metaverse raise significant privacy concerns. In these immersive virtual environments, vast amounts of personal information are gathered, including user behaviors, preferences, interactions, and even biometric data. This data collection is necessary for creating personalized and interactive experiences, but it also poses several risks. One major concern is the risk of unauthorized data access. Hackers and malicious actors may target Metaverse platforms to steal sensitive information. Unauthorized access can lead to identity theft, financial fraud, and other malicious activities that compromise user safety and trust. The complexity and novelty of the Metaverse's infrastructure can create vulnerabilities that are not yet fully understood or mitigated [21,22].

Misuse of personal information is another critical issue. Companies operating within the Metaverse may collect detailed data profiles on users, which can be exploited for targeted advertising, manipulation, or even discriminatory practices. Without strict regulations and oversight, there is a potential for companies to misuse this data for profit, prioritizing commercial interests over user privacy. Users may be unaware of the extent to which their data is being collected and used, leading to a lack of informed consent. Potential breaches that expose sensitive user data represent a significant threat. Data breaches in the Metaverse could have far-reaching consequences, given the depth and sensitivity of the information collected. Such breaches could reveal personal conversations, private interactions, and detailed user profiles, causing emotional distress, reputational damage, and financial losses [21,23].

Furthermore, the Metaverse often involves the integration of multiple platforms and services, each with its data handling practices and security measures. This integration increases the complexity of managing data privacy and security, as vulnerabilities in one platform can compromise the entire system. Coordinating security standards and ensuring that all participating entities adhere to stringent privacy regulations is a challenging but necessary task. While the Metaverse offers exciting possibilities for immersive and interactive experiences, it also brings significant privacy concerns. The risks of unauthorized data access, misuse of personal information, and potential breaches highlight the need for robust security measures, clear regulations, and transparent data practices. Addressing these issues is essential to building a secure and trustworthy Metaverse environment [21,23].

Digital divide and accessibility: The Metaverse could exacerbate existing inequalities in access to technology. One major concern is whether all students will have equal access to the necessary technologies, which are often expensive and require robust internet connectivity. The cost of VR headsets, high-performance computers, and other advanced digital tools can be prohibitive for many families and educational institutions, particularly in low-income areas [24].

This disparity in access could lead to a widening gap between students with the resources to take full advantage of Metaverse technologies and those without. Students without access to these technologies may miss out on the enhanced learning experiences and opportunities that the Metaverse offers, further entrenching existing educational inequalities. As a result, the digital divide could become even more pronounced, with disadvantaged students falling further behind their peers [25].

Addressing these issues requires concerted efforts to ensure equitable access to technology. This could involve providing subsidies for VR equipment, investing in infrastructure to improve internet connectivity in underserved areas, and developing low-cost alternatives to high-end Metaverse tools. By taking these steps, the benefits of Metaverse-based education are accessible to all students, regardless of their socio-economic background [26].

User safety and harassment: The Metaverse can be a platform where harassment and cyberbullying might occur, posing significant challenges in monitoring and enforcing appropriate behavior. The immersive and often anonymous nature of virtual environments can make it difficult to identify and address harmful behavior promptly. Users might experience harassment, bullying, or other forms of misconduct that can impact their mental health and overall experience in these digital spaces [27].

Ensuring a safe and inclusive environment for all users is crucial. This requires robust monitoring systems, clear

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

community guidelines, and effective enforcement mechanisms. Developers and administrators of Metaverse platforms must prioritize user safety by employing AI and human moderators to detect and mitigate harmful behavior. Additionally, educating users about respectful conduct and providing support resources for harassment victims are essential to fostering a positive and inclusive virtual community [21].

Intellectual property: The virtual nature of the Metaverse complicates issues of intellectual property rights. In these digital environments, challenges such as copyright infringement and the unauthorized use of digital content become more prevalent. The ease with which digital assets can be copied, altered, and distributed in the Metaverse makes it difficult to protect the intellectual property of creators. This poses significant problems for artists, developers, and other content creators who rely on their intellectual property for income and recognition [28].

Monitoring and enforcing intellectual property rights in a virtual space is inherently challenging. Traditional legal frameworks and enforcement mechanisms may not be well-suited to address the unique issues in the Metaverse. As a result, creators may struggle to assert their rights and seek recourse when their work is used without permission. Developing new strategies and legal standards tailored to the digital landscape of the Metaverse is essential to protect intellectual property and ensure that creators are fairly compensated for their contributions [26].

Ethical use of artificial intelligence: AI plays a significant role in developing and operating the Metaverse, powering everything from virtual interactions to personalized user experiences [29]. However, this reliance on AI brings several ethical concerns to the forefront. One major issue is the potential for biases in AI decision-making processes. These biases can arise from the data used to train AI models or from the algorithms themselves, leading to unfair or discriminatory outcomes that can impact users negatively within the Metaverse [30].

Additionally, there are concerns about the lack of transparency and accountability in AI-driven actions. Users may find it difficult to understand how AI systems make decisions or to identify who is responsible when things go wrong. This opacity can erode trust and make it challenging to address grievances or ensure fair treatment. Ensuring that AI systems in the Metaverse operate transparently and are held accountable for their actions is crucial to fostering a safe and equitable virtual environment [21].

Impact on psychological well-being: Prolonged exposure to virtual environments may affect users' mental health, raising several important concerns.

One of the primary issues is the potential for addiction, where users spend excessive amounts of time in the Metaverse at the expense of their real-world responsibilities and relationships. Additionally, users may experience a loss of touch with reality, struggling to distinguish between virtual experiences and real-life interactions. This can lead to social isolation and difficulties in maintaining a balanced life outside the virtual world.

The impact of virtual experiences on young minds is another critical area that requires careful consideration and study. Children and adolescents are particularly vulnerable to the effects of immersive virtual environments, which can influence their development, behavior, and perception of reality. It's essential to understand how these experiences shape young users and to implement measures that protect their mental health, such as setting usage limits and providing guidance on responsible virtual engagement [31].

Identity and representation: How users represent themselves in the Metaverse can lead to significant identity-related issues. One concern is the potential for misrepresentation, where users create avatars that do not accurately reflect their true selves. This can lead to deceptive interactions and difficulties in establishing genuine connections. The ability to assume different identities may also encourage behavior that users would not exhibit in real life, complicating trust and authenticity within the virtual community [32].

Moreover, avatars' appearance can profoundly affect social interactions and self-esteem. Users may choose idealized or altered representations of themselves, which can influence how others perceive them and how they perceive themselves. This can lead to issues such as body image dissatisfaction, social anxiety, and unrealistic expectations. Understanding and addressing these psychological impacts is crucial for fostering a healthy and supportive environment in the Metaverse [21].

Informed consent: It is critical to ensure that users, particularly students, fully understand and agree to the data collection practices and the potential risks associated with their participation in the Metaverse. Transparency about how data is collected, used, and shared is essential to gaining informed consent. Users need to be aware of the implications of their data being stored and potentially analyzed, including the risks of privacy breaches and misuse of personal information. This understanding is vital for fostering trust and ensuring participants can make informed decisions about their involvement in virtual environments [33].

In educational settings, ensuring informed consent becomes even more complex due to the power dynamics between students and educators. Students might feel pressured to participate or not fully comprehend data collection practices' long-term consequences. It is crucial to implement robust consent processes that include clear communication, education about data rights, and mechanisms for students to express their agreement or concerns without fear of repercussions freely. Addressing these complexities is essential to protect students' rights and maintain ethical standards in using Metaverse technologies in education [34].

Equity and inclusivity: The design and governance of the Metaverse must consider inclusivity and equity to prevent any form of discrimination and to promote accessibility for users

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

with disabilities. Ensuring that the Metaverse is built with diverse users in mind involves creating environments that accommodate various needs and preferences. This includes designing interfaces that are accessible to individuals with visual, auditory, or motor impairments, as well as providing features that support different languages and cultural contexts. By prioritizing inclusivity, developers can help create a Metaverse where all users feel welcome and valued.

Promoting accessibility in the Metaverse also means implementing governance policies that actively prevent discrimination and bias. This involves establishing clear guidelines and standards for behavior, as well as robust reporting and enforcement mechanisms to address violations. Additionally, it is essential to involve users with disabilities in the development and decision-making processes to ensure their needs are adequately represented. By focusing on equity and accessibility, the Metaverse can become a space where everyone has the opportunity to participate fully and equally, regardless of their physical or cognitive abilities [35].

Regulatory and legal challenges: The Metaverse spans multiple jurisdictions, making regulatory and legal oversight challenging. As users from different countries and regions interact within a shared virtual space, it becomes difficult to apply and enforce a consistent set of rules and regulations. This complexity arises from the global legal standards and cultural norms, which can lead to conflicts and inconsistencies in how the Metaverse is governed. Addressing these challenges requires a coordinated approach that considers the diverse legal landscapes and aims to harmonize regulations across borders.

Developing comprehensive policies that protect users and ensure compliance with international laws is essential for the sustainable growth of the Metaverse. These policies must encompass data privacy, intellectual property rights, cyber-security, and user conduct. International collaboration and dialogue are crucial in crafting regulations that balance the interests of different stakeholders and provide a framework for safe and ethical interactions. By establishing clear and enforceable guidelines, the Metaverse can become a secure and trustworthy environment where users' rights are respected, and legal obligations are met [35].

Proposed solution to ethical challenges

Metaverse integration into educational settings must address significant ethical challenges (as defined in the previous section) to ensure it is beneficial and equitable. Below is a comprehensive proposal based on insights derived from various studies explored in the previous section.

Enhanced privacy protections: The development of stringent data protection frameworks specifically tailored for the Metaverse to safeguard student and educator data from unauthorized access and misuse were proposed. Given the sensitive nature of educational data, these frameworks must be robust and comprehensive, addressing the unique challenges posed by virtual environments. This includes defining clear protocols for data collection, storage, and sharing, as well as establishing strict access controls to prevent unauthorized use. Bycreating specialized guidelines that cater to the Metaverse's complexities, the privacy and security of the users is enhanced Implementing end-to-end encryption for all communications and data storage within Metaverse platforms is a crucial component of this framework. End-to-end encryption ensures that data remains secure and private as it is transmitted and stored, making it accessible only to the intended recipients. This measure is essential for preventing data breaches and safeguarding sensitive information from cyber threats. Additionally, regular security audits and updates should be mandated to maintain the integrity of the encryption protocols. By prioritizing these data protection strategies, a safer digital environment that fosters trust and confidence among students and educators is cultured [4,36,37].

Addressing the digital divide: To ensure equitable access to Metaverse-based education, it is crucial to establish funding and partnerships that provide necessary hardware and robust internet access to underprivileged students. Many students from low-income families or underserved communities may lack the financial resources to acquire VR headsets, high-performance computers, and reliable internet connectivity required for Metaverse participation. By securing funding from government programs, educational institutions, and private sector partnerships, the students are equipped with the tools they need to participate fully in Metaverse-based learning environments. This approach will help bridge the digital divide and promote inclusivity in educational technology [38].

Developing low-bandwidth versions of Metaverse applications will also accommodate users with limited internet access, thus broadening the reach and impact of these educational technologies. These versions can be optimized to function efficiently on lower-speed connections and less powerful devices, ensuring that students in rural or economically disadvantaged areas can still benefit from immersive and interactive learning experiences. Additionally, creating offline capabilities where possible can further enhance accessibility. By addressing both hardware and connectivity challenges, Metaverse-based education can become more accessible to all students, regardless of their socio-economic background [4].

Safe environment against harassment: Clear guidelines and codes of conduct should be created for behavior within the Metaverse, along with robust reporting and enforcement mechanisms. Establishing these guidelines will help set clear expectations for user behavior, promoting respect and positive interactions among participants. Codes of conduct can outline acceptable and unacceptable behaviors, providing a framework for addressing conflicts and ensuring that all users understand the standards they are expected to uphold. Additionally, having well-defined reporting mechanisms allows users to easily report any incidents of misconduct, harassment, or bullying, ensuring that issues are addressed swiftly and effectively [39].

AI-driven monitoring tools could be employed to identify and act on instances of harassment or bullying promptly, ensuring a safe learning environment for all participants.

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

These tools can analyze real-time interactions, detecting patterns and behaviors indicative of harassment or bullying. When such instances are identified, AI systems can flag them for review by human moderators or take immediate action based on predefined protocols. This proactive approach helps to maintain a secure and supportive environment where students and educators can focus on learning without fear of abuse or intimidation. The advanced monitoring technologies alongside clear behavioral guidelines, can foster a safe and respectful Metaverse community [3].

Intellectual property rights: Establishing clear policies on creating and using content within the Metaverse is essential for protecting creators' rights. These policies should outline content creation, distribution, and usage guidelines to ensure that creators maintain control over their intellectual property. By clearly defining the rights and responsibilities of content creators and users, the unauthorized use and misappropriation of digital assets can be prevented. This helps foster a fair and supportive environment for innovation and creativity within the Metaverse, encouraging more creators to contribute high-quality content [40].

Utilizing blockchain technology could transparently track and manage intellectual property rights, providing a secure and verifiable method of maintaining ownership over digital content. Blockchain's decentralized ledger system allows for the creation of immutable records of ownership and transactions, ensuring that each piece of content is attributed correctly to its creator. This technology can facilitate the enforcement of intellectual property rights by providing an indisputable history of content creation and usage. Implementing blockchain in the Metaverse would thus offer creators a reliable way to protect their work, enhance trust, and promote a vibrant and respectful digital ecosystem [35,40].

Ethical AI usage: AI systems within the Metaverse must be transparent, with auditable algorithms by independent third parties to prevent biases. Ensuring transparency in AI operations involves making the algorithms and decision-making processes accessible and understandable to external reviewers. By allowing independent third parties to audit these systems, and ensuring that AI behaves fairly and ethically, potential biases can be revealed. This openness is crucial for building user trust and demonstrating a commitment to accountability and ethical standards in AI deployment [41].

Involving diverse stakeholders in AI systems' development and training phases will ensure that these technologies are fair and inclusive, representing a broad range of perspectives. Engaging individuals from various backgrounds, including different genders, ethnicities, and socio-economic statuses, can help mitigate biases that might arise from a homogenous development team. This inclusive approach ensures that the AI systems consider various experiences and needs, leading to more equitable and effective outcomes. By prioritizing diversity and inclusion from the outset, we can develop AI technologies that better serve all users within the Metaverse [21].

Mitigating psychological impact: It is important to conduct ongoing research on the psychological effects of prolonged Metaverse exposure and establish usage guidelines accordingly. Continuous research will help us understand the impact of extended time spent in virtual environments on users' mental health, identifying potential issues such as addiction, desensitization, and social isolation. By gathering and analyzing data, we can develop evidence-based guidelines that recommend safe and healthy usage patterns, ensuring that users can enjoy the benefits of the Metaverse without compromising their well-being [42].

Providing mental health resources and support within Metaverse platforms will assist users who might be adversely affected, promoting a healthy balance between virtual and real-world interactions. Integrating features such as virtual counseling, stress management tools, and educational content on mental health can help users recognize and address any negative effects they may experience. By offering these resources directly within the Metaverse, we create an environment that supports holistic well-being and encourages users to seek help when needed. This approach enhances the overall user experience and fosters a responsible and health-conscious virtual community [31].

Authentic identity representation: Implementing verification systems to ensure the authenticity of user identities will maintain the flexibility for creative expression while ensuring a truthful representation. These systems can help verify that users are who they claim to be, preventing impersonation and enhancing trust within the Metaverse. Users can still engage in creative self-expression through their avatars by verifying identities, but with a layer of accountability that deters deceptive behavior. This balance between authenticity and creativity is crucial for maintaining a secure and reliable virtual environment [32].

Encouraging realistic and positive representation norms can foster a healthy virtual social environment and enhance user interactions within the Metaverse. Promoting norms that value honesty and positivity in avatar creation and interactions can help users feel more connected and respected. Realistic representations can also reduce the pressure to conform to unrealistic standards, promoting better mental health and self-esteem. This approach ensures that the Metaverse remains a supportive and inclusive space where users can build meaningful relationships and engage in positive social experiences [32].

Promoting equity and inclusivity: Metaverse platforms should be designed to be fully accessible, incorporating features that accommodate users with disabilities. This includes designing interfaces that are compatible with screen readers, providing subtitles for audio content, and ensuring that navigation can be performed using various input methods. By considering the diverse needs of all users during the design phase, Metaverse platforms can offer an inclusive experience that allows everyone to participate fully, regardless of their physical or cognitive abilities. Such thoughtful design promotes equal opportunities for learning and interaction within virtual environments [35,39].

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

Regular audits to ensure the Metaverse does not perpetuate existing inequalities or biases will help promote an inclusive and equitable digital learning environment. These audits should evaluate the accessibility features and the overall user experience, identifying areas where improvements are needed. By continually assessing and addressing potential disparities, we can prevent the digital divide from widening and ensure that the benefits of Metaverse technology are shared equitably. This commitment to regular evaluation and improvement fosters a Metaverse that is welcoming and supportive for all users, creating a fair and just virtual world [35].

Regulatory and legal frameworks: Collaborating with policymakers to develop regulations that address the unique challenges of the Metaverse, including cross-jurisdictional data flows and user interactions are essential. Given the global nature of the Metaverse, it is crucial to establish a regulatory framework that can handle the complexities of data privacy, security, and user rights across different regions. By working closely with policymakers, Metaverse developers can help shape laws and regulations that protect users while fostering innovation and growth within the virtual environment. This collaboration ensures that the Metaverse operates within a legal and ethical framework that considers its global user base's diverse needs and expectations [43].

Setting up a regulatory advisory board consisting of technologists, legal experts, ethicists, and user representatives will help adapt policies as the Metaverse evolves, ensuring it remains a safe and beneficial educational tool. This board can provide ongoing guidance and oversight, making sure that regulations keep pace with technological advancements and emerging issues. By including a range of perspectives, the advisory board can develop balanced policies that address technical, legal, and ethical concerns while prioritizing user welfare. This proactive and inclusive approach to regulation will help maintain the integrity and safety of the Metaverse as it continues to grow and change [44].

These proposals aim to tackle the pressing ethical challenges in the educational metaverse, ensuring it is a safe, equitable, and effective learning environment. By addressing these issues proactively, educational institutions and technology providers can harness the full potential of metaverse technologies while safeguarding users' interests and well-being.

Discussion

Integrating Metaverse technology into educational settings holds transformative potential but also introduces complex ethical challenges that demand comprehensive solutions. As this technology continues to develop, it is imperative that educational institutions and policymakers proactively address these concerns to harness the benefits of the Metaverse while mitigating potential risks [3].

Privacy and data security remain at the forefront of ethical considerations. The immersive nature of the Metaverse allows for deeper data integration and interaction, increasing the risks associated with data breaches and misuse. Implementing stringent data protection frameworks, such as end-to-end encryption and regular audits, is crucial. These measures ensure that student and educator data are safeguarded against unauthorized access, thus maintaining trust in these emerging digital environments [4,36,37].

The issue of the Digital Divide highlights the socio-economic disparities that the Metaverse might exacerbate. While technology offers innovative educational tools, its benefits could be unevenly distributed if not all students have equal access to the necessary technological resources. Addressing this challenge involves technological solutions, such as developing low-bandwidth versions of applications and policy interventions that provide necessary hardware and internet access to underprivileged students. Such initiatives would help democratize access to advanced educational tools, ensuring that the educational benefits of the Metaverse are accessible to all [4,38].

User Safety and Harassment in the Metaverse is another critical concern. The virtual nature of interactions can sometimes obscure the real-world impact of online behaviors. Establishing robust mechanisms for monitoring, reporting, and addressing harassment ensures a safe learning environment. This involves technical solutions and educational programs that promote digital citizenship and respectful online interactions [3].

Intellectual Property concerns in the Metaverse involve ensuring that creators' rights are respected and protected. The use of blockchain technology could serve as a transparent and efficient means to manage intellectual property rights, providing a secure method for creators to maintain ownership and control over their digital content [40].

The Ethical Use of Artificial Intelligence is particularly relevant as AI technologies significantly shape the Metaverse experience. Ensuring that AI systems are transparent and free from biases is essential. This can be achieved by involving diverse stakeholders in the AI development process, ensuring that these systems are fair and representative of all users [30].

The Psychological Impact of prolonged exposure to virtual environments is a less understood aspect that requires further research. Institutions should consider establishing guidelines that limit usage to prevent potential negative effects such as addiction or loss of touch with reality. Additionally, providing support systems within these platforms could help users manage and mitigate any adverse effects experienced [42].

Finally, addressing Regulatory and Legal Challenges involves collaboration across jurisdictions to develop comprehensive policies that protect users and ensure compliance with international laws. Establishing a regulatory advisory board could be crucial in adapting policies as the Metaverse evolves.

In conclusion, while the educational Metaverse offers exciting opportunities for innovation in learning and interaction, it also requires careful consideration of various ethical issues. By proactively addressing these challenges, educational

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

institutions can ensure that deploying Metaverse technologies enhances learning experiences without compromising ethical standards or exacerbating existing inequalities.

Conclusion

In this study, the ethical dilemmas associated with adopting Metaverse technology in educational settings, evaluating potential resolutions, developing pedagogical frameworks, assessing the impact on learning, and promoting equitable access, were examined. We aimed to answer key research questions including identifying the ethical challenges, analyzing proposed solutions, developing new pedagogical frameworks, understanding the impact on student engagement and learning outcomes, and identifying strategies to ensure equitable access.

Our systematic review of recent studies revealed several critical ethical challenges, such as privacy concerns, data security, the digital divide, user safety, intellectual property rights, the ethical use of artificial intelligence, and the psychological impact of prolonged virtual exposure. We found that while the Metaverse offers unprecedented opportunities for immersive and interactive learning, these benefits come with significant risks that must be thoughtfully addressed.

To address these challenges, we proposed robust solutions including enhanced privacy protections, initiatives to bridge the digital divide, frameworks to ensure safe and inclusive environments, and the development of new pedagogical models that incorporate Metaverse technologies ethically and effectively. Our recommendations emphasize the importance of transparent data practices, equitable access to technology, strong community guidelines, and ongoing research to mitigate potential psychological impacts.

By aligning our findings with our initial objectives and research questions, we demonstrated that it is possible to harness the full potential of the Metaverse in education while maintaining high ethical standards and ensuring that all students can benefit from these advanced technologies. This balanced approach will pave the way for a future where meta-education is both effective and ethical, fostering an inclusive and innovative learning environment.

While this study provides a comprehensive review of the ethical dilemmas and potential solutions associated with integrating Metaverse technology into education, it has several limitations. First, the rapidly evolving nature of Metaverse technologies means that new ethical issues and technological developments may emerge that are not covered in this review. Second, our reliance on existing literature may introduce bias, as the studies reviewed may not represent the full spectrum of perspectives and experiences in different educational contexts. Third, the thematic analysis approach, while thorough, may overlook nuanced differences in how ethical challenges manifest in various educational settings.

Additionally, our focus on published studies in English may exclude relevant research in other languages, potentially limiting the generalizability of our findings. The geographic concentration of the reviewed studies in certain regions may also influence the applicability of our recommendations to global educational contexts. Finally, the implementation of proposed solutions requires practical testing and validation in real-world settings, which was beyond the scope of this review.

Future research should focus on several key areas to build on the findings of this study. First, there is a need for empirical studies that investigate the practical implementation of Metaverse technologies in diverse educational settings, assessing both the benefits and the ethical challenges in real-world contexts. Longitudinal studies could provide valuable insights into the long-term impacts of Metaverse use on student learning outcomes, engagement, and well-being.

Second, research should explore the development and testing of innovative pedagogical frameworks and management models that effectively integrate metaverse technologies while addressing ethical concerns. This includes examining how different teaching strategies and organizational structures can support ethical meta-education.

Third, interdisciplinary research involving technologists, ethicists, educators, and policymakers is crucial to develop comprehensive guidelines and regulatory frameworks that address the unique challenges of the Metaverse. Collaborative efforts can help ensure that the Metaverse evolves in ways that prioritize ethical considerations and promote equitable access.

Finally, ongoing research should focus on the psychological effects of prolonged exposure to virtual environments, particularly for young learners. Understanding the cognitive, emotional, and social impacts of Metaverse use will help educators and policymakers develop guidelines that promote healthy and balanced virtual engagement.

By addressing these areas, future research can contribute to the ethical and effective integration of Metaverse technologies in education, ensuring that their potential is realized in a way that benefits all students.

Acknowledgments

This work was supported by the Zayed University RIF grant activity code R22085.

References

1. Nguyen BHT, Dang TQ, Nguyen LT, Tran TTT. Are we ready for education in metaverse? pls-sem analysis. Edelweiss Appl Sci Technol. 2024;8(2):73-83. Available from: http://learning-gate.com/index.php/2576-8484/article/view/693

2. Al-Adwan AS, Alsoud M, Li N, Majali T, Smedley J, Habibi A. Unlocking future learning: Exploring higher education students' intention to adopt meta-education. Heliyon. 2024;10(9). Available from: https://pubmed.ncbi.nlm.nih.gov/38698994/

3. Al-Kfairy M, Al-Fandi O, Alema M, Altaee M. Motivation and hurdles for the student adoption of metaverse-based classroom: A qualitative study. In: 2022 International Conference on Computer and Applications (ICCA). IEEE; 2022;1-5. Available from: https://zuscholars.zu.ac.ae/works/5689/

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

4. Al-Kfairy M, Alomari A, Al-Bashayreh M, Alfandi O, Tubishat M. Unveiling the Metaverse: A survey of user perceptions and the impact of usability, social influence and interoperability. Heliyon. 2024;10(10). Available from: https://pubmed.ncbi.nlm.nih.gov/38826724/

5. Sim JK, Xu KW, Jin Y, Lee ZY, Teo YJ, Mohan P, et al. Designing an educational metaverse: A case study of ntuniverse. Appl Sci. 2024;14(6):2559. Available from: https://www.mdpi.com/2076-3417/14/6/2559

6. Shahraki ZA, Nafchi MA. The social and ethical challenges of the metaverse. In: The Metaverse for the Healthcare Industry. Springer; 2024;59-75. Available from: https://link.springer.com/chapter/10.1007/978-3-031-60073-9_4

7. Marky K, Müller F, Funk M, Geiß A, Günther S, Schmitz M, et al. Teachyverse: Collaborative e-learning in virtual reality lecture halls. In: Proceedings of Mensch Und Computer 2019. 2019;831-834. Available from: https://dl.acm.org/doi/abs/10.1145/3340764.3344917

8. Nagao K. Virtual reality campuses as new educational metaverses. IEICE Trans Inf Syst. 2023;106(2):93-100. Available from: https://search.ieice.org/bin/summary.php?id=e106-d_2_93

9. Han E, Bailenson JN. Lessons for/in virtual classrooms: designing a model for classrooms inside virtual reality. Commun Educ. 2024;73(2):234-243. Available from: https://www.tandfonline.com/doi/full/10.1080/03634523.2024.2312879

10. Morsanuto S, Cipollone E, Peluso Cassese F. Learning labs and virtual reality. The metaverse to enhance learning. In: International Conference on Human-Computer Interaction. Springer; 2023;63-80. Available from: https://link.springer.com/chapter/10.1007/978-3-031-35897-5_5

11. Kamsulbahri KFK, Norman H. Online learning with metaverse for history education at primary school education level. Int J Acad Res Prog Educ Dev. 2023;13(2). Available from: https://ijarped.com/index.php/journal/article/view/1079

12. Watson K, Ensher E. Teaching in the metaverse: The use of virtual reality in a global learning context. J Jesuit Bus Educ. 2023;14(1). Available from: https://openurl.ebsco.com/EPDB%3Agcd%3A9%3A14505241/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A175184393&crl=c

13. Agustini K, Putrama IM, Wahyuni DS, Mertayasa INE. Applying gamification technique and virtual reality for prehistoric learning toward the metaverse. Int J Inf Educ Technol. 2023;13(2):247-256. Available from: https://www.ijiet.org/vol13/IJIET-V13N2-1802-IJIET-5586.pdf

14. Saphira HV, Prahani BK, Hariyono E, Marianus M. Metaverse: A paradigm shift in STEM education for science learning beyond the review. E3S Web Conf. 2024;482:04004. Available from: https://www.e3s-conferences.org/articles/e3sconf/abs/2024/12/e3sconf_ysssee2024_04004/e3sconf_ysssee2024_04004.html

15. Dreamson N, Park G. Metaverse-based learning through children's school space design. Int J Art Des Educ. 2023;42(1):125-138. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/jade.12449

16. Kanjug I, Singma S, Moeikao N, et al. The development of constructivist flipped classroom learning environments on metaverse to promote problem-solving and reasoning skills in mathematics of secondary education grade 10th students. IIAI Lett Inst Res. 2023;3. Available from: https://iaiai.org/letters/index.php/lir/article/view/142

17. Shu X, Gu X. An empirical study of a smart education model enabled by the edu-metaverse to enhance better learning outcomes for students. Systems. 2023;11(2):75. Available from: https://www.mdpi.com/2079-8954/11/2/75

18. Chatwattana P, Saisong P, Rojanapasnichwong K, Khiankhokkruad W. The virtual laboratory learning environment: Vlle on metaverse for university in Thailand. Int J Eng Pedagogy. 2023;13(5). Available from: https://openurl.ebsco.com/EPDB%3Agcd%3A8%3A4817832/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A164745651&crl=c

19. Said GRE. Metaverse-based learning opportunities and challenges: a phenomenological metaverse human-computer interaction study. Electronics. 2023;12(6):1379. Available from: https://www.mdpi.com/2079-9292/12/6/1379/review_report

20. Darda P, Pandey S, Gupta OJ, Yadav S, Malik R. Metaverse: A new avatar-based technology for diverse educational experiences. In: Transforming Education with Virtual Reality. 2024. p. 311-321. Available from: https://pure.jgu.edu.in/id/eprint/7295/

21. Prakash A, Haque A, Islam F, Sonal D. Exploring the potential of metaverse for higher education: Opportunities, challenges, and implications. Metaverse Basic Appl Res. 2023;2:40-40. Available from: https://mr.saludcyt.ar/index.php/mr/article/view/40

22. Alenazi S, Alshokeeran S, AlThaqeel S. Exploring security, privacy, and forensics concerns in the metaverse. In: 2024 12th International Symposium on Digital Forensics and Security (ISDFS), IEEE; 2024. pp. 1-6. Available from: https://ieeexplore.ieee.org/abstract/document/10527276

23. Chen C, Li Y, Wu Z, Mai C, Liu Y, Hu Y, et al. Privacy computing meets metaverse: Necessity, taxonomy and challenges. Ad Hoc Networks. 2024;158:103457. Available from: https://www.sciencedirect.com/science/article/abs/pii/S1570870524000684

24. He J, Ahmad SF, Al-Razgan M, Ali YA, Irshad M. Factors affecting the adoption of metaverse in healthcare: The moderating role of digital division, and meta-culture. Heliyon. 2024 Jul;10(7). Available from: https://www.cell.com/heliyon/fulltext/S2405-8440(24)04809-6

25. Othman A, Chemnad K, Hassanien AE, Tlili A, Zhang CY, Al-Thani D, et al. Accessible metaverse: A theoretical framework for accessibility and inclusion in the metaverse. Multimodal Technol Interact. 2024;8(3):21. Available from: https://www.mdpi.com/2414-4088/8/3/21

26. Hassanien AE, Darwish A, Torky M. The Future of Metaverse in the Virtual Era and Physical World. Vol. 123. Springer Nature; 2023. Available from: https://link.springer.com/book/10.1007/978-3-031-29132-6

27. Al-Adaileh A, Al-Kfairy M, Tubishat M, Alfandi O. A sentiment analysis approach for understanding users' perception of metaverse marketplace. Intell Syst Appl. 2024;22:200362. Available from: https://www.sciencedirect.com/science/article/pii/S2667305324000383

28. Abdusatarov J, Turdialiev MA. The issues of intellectual property in the realm of the metaverse. Available at SSRN 4694628. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4694628

29. Seo K, Tang J, Roll I, Fels S, Yoon D. The impact of artificial intelligence on learner–instructor interaction in online learning. Int J Educ Technol High Educ. 2021;18:1-23. Available from: https://link.springer.com/article/10.1186/s41239-021-00292-9

30. Al-kfairy M, Mustafa D, Kshetri N, Insiew M, Alfandi O. A systematic review and analysis of ethical challenges of generative AI: An interdisciplinary perspective. 2024;31. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4833030

31. Benjamins R, Rubio Viñuela Y, Alonso C. Social and ethical challenges of the metaverse: Opening the debate. AI Ethics. 2023;3(3):689-697. Available from: https://link.springer.com/article/10.1007/s43681-023-00278-5

32. Wu H, Zhang W. Digital identity, privacy security, and their legal safeguards in the metaverse. Secur Safety. 2023;2:2023011. Available from: https://sands.edpsciences.org/articles/sands/abs/2023/01/sands20220011/sands20220011.html

33. Zytko D, Chan J. The dating metaverse: Why we need to design for consent in social VR. IEEE Trans Vis Comput Graph. 2023;29(5):2489-2498. Available from: https://ieeexplore.ieee.org/abstract/document/10049740

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002

34. Anidjar LY, Packin NG, Panezi A. The matrix of privacy: Data infrastructure in the AI-powered metaverse. Harv Law Policy Rev. Forthcoming 2023;55. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4363208

35. Zhai XS, Chu XY, Chen M, Shen J, Lou FL. Can edu-metaverse reshape the virtual teaching community (vtc) to promote educational equity? an exploratory study. IEEE Trans Learn Technol. 2023;16:1130-1140. Available from: https://ieeexplore.ieee.org/document/10125040

36. Chen C, Li Y, Wu Z, Mai C, Liu Y, Hu Y, et al. Privacy computing meets metaverse: Necessity, taxonomy and challenges. Ad Hoc Networks. 2024;158:103457. Available from: https://www.sciencedirect.com/science/article/abs/pii/S1570870524000684

37. Al-kfairy M, Alomari A, Al-Bashayreh M, Alfandi O, Altaee M, Tubishat M. A review of the factors influencing users' perception of metaverse security and trust. In: 2023 Tenth International Conference on Social Networks Analysis, Management and Security (SNAMS). IEEE; 2023;1-6. Available from: https://zuscholars.zu.ac.ae/works/6331/

38. Wang M, Yu H, Bell Z, Chu X. Constructing an edu-metaverse ecosystem: A new and innovative framework. IEEE Trans Learn Technol. 2022;15(6):685-696. Available from: https://psycnet.apa.org/record/2024-14855-003

39. Zallio M, Clarkson PJ. Designing the metaverse: A study on inclusion, diversity, equity, accessibility and safety for digital immersive environments. Telematics Inform. 2022;75:101909. Available from: https://www.sciencedirect.com/science/article/pii/S0736585322001423

40. Bavana K. Privacy in the metaverse. Jus Corpus LJ. 2022;2:1. Available from: https://www.juscorpus.com/wp-content/uploads/2022/03/2.-K.-Bavana.pdf

41. Khreisat MN, Khilani D, Rusho MA, Karkkulainen EA, Tabuena AC, Uberas AD. Ethical implications of AI integration in educational decision making: Systematic review. Educ Adm: Theory Pract. 2024;30(5):8521-8527. Available from: https://kuey.net/index.php/kuey/article/view/4406

42. Kim T, Jin H, Hwang J, Kim N, Im J, Jeon Y, et al. Being excluded in the metaverse: Impact of social ostracism on users' psychological responses and behaviors. Int J Inf Manage. 2024;78:102808. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0268401224000562

43. Gulomov S. Regulatory frameworks for metaverse platforms: Challenges and opportunities. Int Conf Legal Sci. 2024;2:144-151. Available from: https://science-zone.org/index.php/conference/article/view/91

44. Valente J. Governing the Metaverse. Univ Cincinnati Intellect Prop Comput Law J. 2024;9(2):3. Available from: https://scholarship.law.uc.edu/cgi/viewcontent.cgi?article=1056&context=ipclj

Citation: Al-kfairy M, Alfandi O. The Ethical Dilemma of Educational Metaverse. Recent Adv Evol Educ Outreach. 2024;1(1): 006-016.
Available from: https://dx.doi.org/10.17352/raeeo.000002