Exploring ethical considerations in Metaverse from the education perspective

Mădălina ZAMFIR, Ion Alexandru MARINESCU, Dragoş IORDACHE, Monica BARBU, Carmen Elena CÎRNU

National Institute for Research & Development in Informatics - ICI Bucharest, 8-10, Maresal Averescu Avenue, sector 1, Bucharest, Romania

madalina.zamfir@ici.ro, ion.marinescu@ici.ro, dragos.iordache@ici.ro, monica.barbu@ici.ro, carmen.cirnu@ici.ro

Abstract: *Originally seen as a specialized aspect of Web 3.0, the Metaverse has experienced a significant transformation, now emerging as a multi-trillion-dollar industry. The educational sector holds a crucial role within this industry, utilizing the Metaverse as an inventive tool for both educators and students. Interactions within the Metaverse are anticipated to heavily rely on an extensive flow of user-derived data. This encompasses the potential to track personally identifiable biometric information using wearable devices or advanced technologies. These advancements raise ethical and legal concerns related to privacy and accessibility. Given these concerns, it is appropriate to initiate meditation on the ethical aspects and establish guidelines and frameworks regarding user interactions. The purpose of this paper is to initiate a dialogue about the ethical consequences of Metaverse-centered education, providing a nuanced comprehension of the ethical facets of this emerging field. Our objective is to highlight a broader perspective on a potential solution. In this sense, we suggest a set of Metaverse Ethical Principles that can enrich the understanding of this poorly explored territory. These principles aim to ensure the responsible, fair, and comprehensive implementation of the Metaverse in the field of education.*

Keywords: ethical code, Metaverse, digital education, immersive experience.

1. Introduction

As the lines between the physical and digital worlds become increasingly blurred, we stand at the threshold of an exciting new era in education. The 'Metaverse', a multidimensional, interconnected virtual space (Zhang et al., 2022), has the potential to transform education in ways previously unimaginable. It promises to offer immersive, personalized, and inclusive educational experiences (Fernandez & Hui, 2022), redefining pedagogical strategies and learning outcomes. But as we embrace the possibilities of this digital frontier, we must be mindful of the ethical implications (Canorea, 2022) associated with this paradigm shift.

The objective of this paper is to introduce ethical principles that can benefit both creators and users during the process of designing and developing content and applications for the Metaverse, particularly focusing on its educational aspects.

https://doi.org/10.58503/icvl-v18y202307

As the virtual environment becomes more complex and potentially invasive, we must also consider several ethical issues such as data privacy and security, digital identity, access and equity, ownership, and control of the impact on intellectual property of immersive technologies. From the perspective of the educational process, these issues take on a specific dimension. In a Metaverse-driven educational environment (Hirsh-Pasek et al., 2022), where learning activities can be highly personalized and closely tracked, the subsequent inquiries may arise: what protections are needed to ensure the privacy of learners and the security of their data? How can the digital identities of learners be ethically managed, ensuring respect for personal boundaries and cultural diversity? How do we ensure equitable access to such advanced technologies, avoiding a potential 'Metaverse divide'? What rules should govern the use and ownership of educational content in the Metaverse? These questions require a robust ethical code that not only addresses current challenges but also anticipates future shifts in this rapidly evolving landscape. It is vital to ensure that the application of Metaverse technologies in education remains human-centred, prioritizing the well-being and rights of learners and trainers. This paper aims to play a role in shaping this code, promoting knowledgeable, accountable, and future-oriented approaches in Metaverse-based education.

Based on the existing extensive analyses regarding the ethical risks and challenges in the Metaverse, this paper provides a nuanced understanding of the ethical landscape of the Metaverse from an educational perspective. Our objective is to illustrate the path toward an ethical digital evolution in education, offering guidance to different stakeholders. By pursuing this objective, our motivation is to facilitate the deliberate and thoughtful expansion of the educational domain within the Metaverse.

The article is structured as follows. Section 2 considers related work about ethical issues in Metaverse. Section 3 presents risks and challenges from the Metaverse with an emphasis on the educational aspect. Section 4 proposes a code of ethical principles for Metaverse. The paper ends with a chapter of conclusions and references.

2. Related work

The issue of ethics in Metaverse is addressed in specialized literature through the prism of several aspects starting from the security of use to copyright and fake news. Based on a semantic and etymological approach, the study developed by Zallio & Clarkson (2023) analyses the evolution of the term ethics in different fields, as well as the term Metaverse and investigates how ethical questions, principles, and approaches can influence the design and development of a new Metaverse. At the same time, the research proposes a new concept and field of expertise - Metavehtics - approaching the scientific and the broader, technology-oriented communities with new questions and inspiring opportunities for the

creation of digital, virtual environments that are framed within the context of acknowledging positive ethical implications for human beings.

Fernandez & Hui (2022) focus on three factors to guide the development of the Metaverse: privacy, governance, and ethical design. They also propose a preliminary modular-based framework for an ethical design of the Metaverse. The ethical implications are analyzed from the perspective of creative actions and social aspects in Metaverse, the study emphasizing modular ethical design motivated the "Ethical Hierarchy of Needs" where each module is interchangeable. According to Kaddoura & Al Husseiny (2023) a range of key challenges, ethical issues, and potential threats are outlined in relation to the utilization of the Metaverse in education. This delimitation offers a road map for future research, in order to improve learning and teaching experiences. In this study, the main addressed ethical issues are: integrity issues, including printing and spreading false information and fraud and violations of intellectual property rights. Benjamins et al., (2022) emphasize both the social and societal impact of the Metaverse, arguing that companies that are implementing the responsible use of AI are well prepared for the social and ethical risks of the Metaverse. Among the ethical issues mentioned in this study there are challenges associated with artificial intelligence, human intervention and appropriate system autonomy, privacy, security and safety, copyright and fake news, and deep fakes.

Cukurbasi et al. (2022) analyse several implications, including of an ethical nature regarding the use of the Metaverse in educational environments. According to this study, it is necessary to investigate the activity patterns of the learners, their level of involvement in the Metaverse, and the positive and negative effects of the learners on their learning activities. Cai & Song (2022) present two perspectives through which students can properly develop the ethical values to be considered when using the Metaverse for didactic purposes. The first is the privacy perspective, which was about how to protect individual private data and how to reasonably collect and store student data in the world of the capital-manipulated Metaverse. The second is the values perspective, which establishes correct values and worldviews in the context of a decentralized Metaverse, where students are exposed to different cultural outcomes and fake news. At the same time, the strong risk of "addiction" due to the immersive experiences and interactivity afforded by educational applications in the Metaverse should be considered.

3. Risks and ethical challenges in Metaverse from the educational perspective

For the adoption on the largest possible scale of an inclusive and responsible Metaverse, potential risks and challenges generated by the evolution of emerging technologies, innovation, and the appearance of new applications can be prevented. According to (Benjamins et al., 2023) risks in the Metaverse are determined by intentionally malicious actions or unintentional actions. Many of the risks are associated with the use of AI algorithms in Metaverse.

In the educational field, (Fernandez & Hui, 2022) refer to two types of risks: physical risks (such as distraction, and hitting) and psychological risks (such as addictive behavior or isolation) (Smith, 2022). In his paper, (Dwivedi et al., 2022) identified three categories of risks in the Metaverse, namely mental health issues, addiction to simulated reality, and privacy of data used or obtained in the Metaverse. (Identity Management Institute, 2023), (Certified Metaverse Security Consultant, 2023), (Kaddoura & Husseiny, 2023) and (Think Tank, European Parliament, 2022) present the category of security risks in Metaverse that may appear in areas of interest of users, such as remote work, training, health, education. Here there are cyberbullying, identity theft, unauthorized data collection, ransomware attacks, deep fake video recordings, social engineering attacks, shared spaces that bring people together, and new applications.

The challenges identified in the educational domains and applications already explored and used in Metaverse can be addressed from the perspective of data, users, content, and devices. (Benjamins et al., 2023) talks about two types of challenges: direct challenges found in companies, such as privacy and security, harm, ensuring equitable access of communities to Internet connectivity and affordable Virtual Reality (VR) devices (Tripathi, 2023), (Smith et. al, 2023) virtual property rights and, indirect challenges, which address issues that are noticed after a period of time, such as developing appropriate content that balances real world and digital skills in safely virtual learning environments or dependence on technology.

Therefore, the Metaverse offers multiple educational possibilities, which can be followed by risks and ethical challenges. Privacy concerns, data security, equitable access, maintaining a safe online environment, ensuring the right balance between engagement and over-dependence on virtual platforms, and providing accurate unbiased content are some of these key issues.

4. Ethical code for education

Due to the rapid expansion of Metaverse, both governments and companies give a significant focus on formulating strategies that aim not only to facilitate the creation of complex virtual worlds but also to address disruptive innovations and emerging technologies (Petre et al., 2023).

For instance, the United Arab Emirates (UAE) and Dubai have devised a Metaverse strategy aimed at enhancing the digital economy of the region, with intentions to generate approximately 30,000 Metaverse-related employment opportunities. Similarly, South Korea has introduced various funding initiatives to support creators within this industry while the Philippines and China are emphasizing the involvement of universities in driving industry development (CoinGeek, 2022). Congruently, prominent tech giants like Meta, Microsoft, Google, Apple, Nvidia, Epic Games, and others are making substantial investments in the advancement of VR platforms and expanding the Metaverse, envisioning a

future where it becomes an integral part of our daily lives encompassing fields such as commerce, education, medical services, and beyond (Mobile, 2023).

Despite all these substantial financial efforts, the exact extent and influence of the Metaverse on society and the economy remains uncertain (Nasdaq, 2023). However, it is not premature to initiate meditation on ethical concerns and establish guidelines and frameworks for ethical principles. Interactions in the Metaverse are poised to rely primarily on an extensive stream of data obtained from users. This includes the potential to monitor biometric data through wearable devices or through technological innovations such as neurotechnology and Brain-Computer Interfaces (BCIs). These advances raise ethical and legal considerations related to privacy as well as accessibility to these technologies (Park et al., 2021).

Tackling ethical risks and challenges in the Metaverse requires a multifaceted approach that involves various stakeholders, including technology developers, policymakers, researchers, and users (Anshari et al., 2022). In this sense, Responsible Metaverse Alliance, (2023) proposes a series of eleven Metaverse Ethical Principles that represent a subset of a Responsible Metaverse Strategy. These ethical principles embody the primary guidelines to adhere to when building immersive worlds, specifically: a) promoting the welfare of humans, society, and the environment, b) adopting human, safety & environment-centered design, c) assuring non-discrimination for individuals and their virtual representations, d) enabling access and inclusiveness for all people, e) offering safety and reliability in operation, f) assuring security and confidentiality, g) aligning with relevant regulations, laws, requirements, and societal norms, h) enabling contestability process, i) transparency and responsible disclosure, j) capacity to be explainable to other parties and k) identification and accountability for all parties.

The Ministry of Science and ICT (MSIT) in South Korea has established its Metaverse development strategy based on eight ethical principles: Authenticity, Autonomy, Reciprocity, Privacy Respect, Fairness, Personal Data Security, Inclusivity, and Responsibility for the Future. This framework aims to create a secure virtual environment where users can authentically express their identities within a safe, sustainable, and inclusive system (Soyeon, 2022).

In his analysis of the Metaverse, Don Heider (2022) discusses the concept of "safety" within virtual worlds, drawing a comparison between the risks existing in our physical reality and those within the virtual world. Heider asserts that complete safety is unattainable, highlighting how the technologies underpinning the Metaverse construction perpetuate similar hostilities, harassment, and aggressions observed in other societal and cultural domains. As a result, safeguarding marginalized individuals and vulnerable communities, as well as upholding the security of virtual spaces, necessitates the establishment of an ethical framework grounded in fundamental values acknowledged by all stakeholders. Such a code of ethics is pivotal not only in guiding the decision-making, design, and maintenance

of the Metaverse but also in fostering consistent standards and best practices for its users. Heider proposes a foundational blueprint for this code of ethics, comprising seven key principles: Show Respect, Tell the Truth, Do no Harm, Show Concern, Work for Good, Demonstrate Tolerance, and Respect Privacy.

To conclude, our perspective for constructing a code of Metaverse ethical principles from an educational perspective is anchored in four pillars: validated identity, safe experience, confidentiality, and cultural representation. Based on these values, we propose in Table 1 a set of fundamental principles intended to guide both developers and users in decision-making, design, and participation in the Metaverse educational process.

Table 1. Categories of ethical principles

Categories	**Description**
Privacy and Data Security	Companies and platforms operating in the Metaverse should be transparent about data collection, use, and storage practices. Users engaged in virtual learning environments should have con-trol over their personal information and be informed about how their data is used.
Digital Ownership and Property Rights	Users (students and educators) should have clear ownership of their virtual assets, creations, and intellectual property, and mechanisms should be in place to prevent theft, unauthorized copying, and infringement of these rights.
Inclusivity and Accessibility	The Metaverse should be accessible to users with different abilities and should not discriminate against any group based on identity or background.
Security and Safety	Metaverse must implement measures capable of preventing harassment, abuse, fraud, and other harmful activities.
Content Moderation and Educational Quality	Metaverse must implement mechanisms to prevent the spread of harmful or inappropriate content, hate speech, harassment, and other forms of misconduct. Ensuring high-quality educational content aligned with established pedagogical standards.

Transparency and Fairness	The operation of algorithms, virtual economies, and governance systems should be transparent and fair. Users should be informed about how decisions that affect them are made.
Identity and Authenticity	Ensuring the authenticity of users' identities and preventing identity fraud or misrepresentation. Online interactions must align with real-world values.
Digital Equity	Ensuring that socioeconomic factors won't limit education opportunities and avoid disadvantaging marginalized groups.
Loss of Physical Interaction	Ensuring face-to-face interactions, with attention to emotional development, and social skills.
Digital Addiction	Metaverse must create a balance between virtual and physical experiences, to avoid social isolation, addiction, mental health concerns.
Depersonalization of Education	Metaverse must take care of diminishing the role of teachers in favor of automated systems.
Regulation and Governance	Establishing appropriate regulations and governance structures for educational activities. Assuring a balance between fostering innovation and protecting user rights.
Environmental Impact	The ecological footprint of data centers and computing resources supporting Metaverse should be considered and mitigated.

These ethical principles should guide the development and operation of the Metaverse to ensure that it becomes a responsible, inclusive, and sustainable virtual space that benefits all its participants.

5. Conclusions

In line with the educational landscape's integration with the Metaverse, several notable risks and challenges come to the forefront. First and foremost is the concern about data privacy and security. As educational interactions become more immersive and interconnected within the Metaverse, there is an increased potential for sensitive student data to be compromised or misused. Striking a balance between providing personalized learning experiences and safeguarding students' personal information remains a formidable challenge.

Additionally, issues related to digital equity and accessibility emerge prominently. The Metaverse has the potential to offer groundbreaking learning opportunities, but it also has the capacity to exacerbate existing disparities in access to technology and digital resources.

Furthermore, the addictive nature of immersive digital environments poses concerns about students' engagement and well-being. Balancing productive educational engagement with potential negative consequences, such as excessive screen time or detachment from real-world experiences, requires careful consideration.

Finally, the evolving nature of the technology underpinning the Metaverse introduces a challenge in keeping curricula and practices up to date. Rapid advancements in virtual reality, augmented reality, and other related technologies mean that educational institutions must continually revise their strategies and content to remain relevant.

These are just some of the main challenges specific to the Metaverse, especially from an educational perspective. The consideration of associated risks and challenges is essential to ensure that its implementation leads to positive educational experiences for all learners.

As future work directions, the suggested ethical code will be enhanced by incorporating a range of new ethical and societal elements. These future upgrades are based on a series of practical trials conducted in laboratory settings, involving various educational applications designed for the Metaverse, and by analysing user interactions in-depth.

Acknowledgment

The work presented in this paper is supported by the project entitled "Institutional development projects for financing excellence in Research, Development and Innovation for the period 2015-2020 (PNCDI III)".

REFERENCES

Anshari, M., Syafrudin, M., Fitriyani, N. L., Razzaq, A. (2022) Ethical Responsibility and Sustainability (ERS) Development in a Metaverse Business Model. *Sustainability*. 14. 15805. doi: 10.3390/su142315805.

Benjamins, R., Rubio Viñuela, Y. & Alonso, C. (2023). Social and ethical challenges of the Metaverse: Opening the debate. *AI and Ethics*, 1-9.

Cai, S., Jiao, X. & Song, B. (2022). Open another door to education - Applications, challenges, and perspectives of the educational metaverse. *Metaverse 2022*. 3(1), 12.

Canorea, E. (2022) *Legal and Ethical implications of the Metaverse*. https://www.plainconcepts.com/metaverse-legal-ethical/. [Accessed 8th August 2023].

Certified Metaverse Security Consultant (2023) https://metaversesecuritycenter.org.

CoinGeek. (2022) *South Korea's Science Ministry unveils metaverse strategy, and ethical principles for industry operators*. https://coingeek.com/south-korea-science-ministry-unveils-metaverse-strategy-ethical-principles-for-industry-operators/ [Accessed Aug 2023].

Cukurbasi Calisir, E., Sabuncu, F. H. & Altun, E. (2022) *Reflections of Metaverse-Based Education on e-Learning*. Online Submission.

Fernandes, F. & Werner, C. (2022). A Systematic Literature Review of the Metaverse for Software Engineering Education: Overview, Challenges and Opportunities. *PRESENCE: Washington, WA, USA*.

Fernandez, C. B. & Hui, P. (2022) Life, the Metaverse and everything: An overview of privacy, ethics, and governance in Metaverse. In *IEEE 42nd conference on Distributed Computing Systems Workshops*, pp. 272-277.

Heider, D. (2022) *Ethics in the Metaverse*. https://www.scu.edu/ethics/metaverse/ [Accessed 8th August 2023].

Hirsh-Pasek, K., Zosh, J. M., Hadani, H. S., Golinkoff, R. M., Clark, K., Donohue, C. & Wartella, E. (2022) *A Whole New World: Education Meets the Metaverse*. https://www.brookings.edu/articles/a-whole-new-world-education-meets-the-metaverse/.

Identity Management Institute, Center for Identity Governance (2023) https://identitymanagementinstitute.org/top-10-metaverse-risks/.

Kaddoura, S. & Al Husseiny, F. (2023) The rising trend of Metaverse in education: challenges, opportunities, and ethical considerations. PeerJ *Computer Science*, 9, e1252.

Mobile. (2023) Top 10 companies investing in the metaverse in 2023. https://mobile-magazine.com/articles/top-10-companies-investing-in-the-metaverse-in-2023 [Accessed 8th August 2023].

Nasdaq. (2023) *The Metaverse: Never Too Soon to Discuss Ethics*. https://www.nasdaq.com/articles/the-metaverse%3A-never-too-soon-to-discuss-ethics [Accessed 8th August 2023].

Park, S., Min, K., Kim, S. (2021) Differences in learning motivation among Bartle's player types and measures for the delivery of sustainable gameful experiences. *Sustainability*, 13(16), 9121.

Petre, I., Iordache, D., Zamfir, M., Barbu, M., Dutescu, R., Marinescu, I. A. (2023) Virtual worlds, real technologies: an insight into Metaverse and its principles. In

CSCS 24th International Conference on Control and Computer Science (CSCS24). May 24 - 26, 2023, Bucharest, Romania.

Responsible Metaverse Alliance. (2023) *Ethical Metaverse Principles*, https://responsiblemetaverse.org/resources/ethical-metaverse-principles/ [Accessed 8th August 2023].

Smith, C. H., Molka-Danielsen, J., Rasool, J., Webb-Benjamin, J. B. (2023) The World as an Interface: Exploring the Ethical Challenges of the Emerging Metaverse. *Proceedings of the 56th Hawaii International Conference on System Sciences*, p. 6045.

Smith, M. (2022) *The Metaverse: A New Frontier in Digital reality amazon kindle book*. Kindle edition format, ASIN: B0BQZDF51G.

Soyeon, Y. (2022) *Ethics guidelines for metaverse released by Korea's Science and ICT Ministry*. https://koreajoongangdaily.joins.com/2022/11/28/business/tech/Korea-Metaverse-government/20221128173259964.html [Accessed 8th August 2023].

Think Tank, European Parliament (2022) *Metaverse: Opportunities, risks and policy implications*. https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)733557.

Tripathi, Dr. Ajay. (2023) *Metaverse and its Socioeconomic Impact.* [Online].USA: Library of Congress. https://www.amazon.com/dp/B0C6HG5GXG/ref=docs-os-doi_0?.%20(Accessed:%2026.07.2023.

Zallio, M. & Clarkson, P. J. (2023) Metavethics: Ethical, integrity and social implications of the metaverse. In *Intelligent Human Systems Integration (IHSI 2023): Integrating People and Intelligent Systems*. *AHFE (2023) International Conference*. AHFE Open Access, Vol. 69.

Zhang, X., Chen, Y., Hu, L. & Wang, Y. (2022) The Metaverse in education: Definition, framework, features, potential applications, challenges, and future research topics. *Frontiers in Psychology*. 13, p. 6063.