

43. METAVERSE AS A FOUNDATION FOR FUTURE EDUCATION

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Over the past several decades, the digital technologies have transformed learning and opened the way for new ways of learning. In this paper, an analysis of the effect of the metaverse on education, its benefits, drawbacks, and ethical concerns, and future advancements to make it accessible, secure, and effective in global learning are introduced.

The arrival of the metaverse marks the beginning of a new era where experiential learning through virtual reality (VR), augmented reality (AR) and artificial intelligence (AI) becomes possible. All these make it possible to have immersive learning environments away from the classroom, where students can engage and collaborate.

Experts suggest that the metaverse can improve learning by simulating real-world environments, facilitating global connectivity and personalising learning experiences. Studies indicate that VR-based platforms enhance the level of student engagement and improve information retention. For example, Prisms VR is applied to teach students in the fields of STEM (Science, Technology, Engineering and Mathematics) and offer them interactive and immersive lessons [1]. Similarly, software such as Engage VR and Mozilla Hubs give virtual classrooms where students from all over the world can learn from each other in the same virtual room [2]. The experiments of the Stanford University virtual reality courses revealed heightened student engagement and better understanding of complex topics [3].

Despite being promising, the integration of the metaverse in education also comes with its setbacks. Technical issues such as connectivity to the internet, the availability of proper devices, and compatibility of the platforms can deter en masse implementation. Research suggests that the present cost of virtual reality technology can make it difficult to provide it on a mass scale, further exacerbating learning divides and injuring marginalised communities in particular. Safety hazards and privacy issues, including the possibilities of psychological and social behaviour effects of deep immersion within virtual reality, have also been questioned. Virtual reality technology can be misused and cause "digital fatigue"; therefore, there is a necessity to utilise synchronisation measures which merge online studies with offline work.

As the metaverse develops, it can be assimilated into traditional learning patterns. Technical and ethical issues need to be addressed. Further research is needed to develop strategies for the effective use of meta-networks in global education that are accessible, safe and effective.

The most exciting aspect of meta-learning is AI adaptive learning. Intelligent metaverse platforms can monitor students' real-time performance and adjust lesson difficulty in real-time based on individual requirements. For example, Unimersiv uses artificial intelligence to make history and science simulations personalised to meet different learning requirements.

The metaverse further creates potential for students across different regions to collaborate on online platforms. Pilot virtual programs experiences shown that such experiences help in facilitating intercultural competence and foreign language competency for students, bridge distance, and facilitate an increase in more global learning cultures.

Despite the fact that the metaverse has the capability to revolutionise education, it also poses some serious ethical issues. Gathering students' biometric data, such as eye and body movements, for personalising learning processes may amount to a privacy violation when unregulated. Lack of implementation of stringent data privacy laws leaves learners vulnerable to misuse of their data by advertisers or other unauthorised third parties [4]. Exclusion and cyberbullying are also important issues, especially among young student learners. Implementation of policies such as mandatory break times and minimising screen time spent on virtual reality in schools can aid in promoting digital well-being. Policymakers, teachers, and stakeholders who care need to work together to create ethical guidelines to ensure learner safety keeps pace with technological developments.

Merging the metaverse into education provides unprecedented promise for engaging and personalised learning. It is vital, however, that the resulting technical, ethical and accessibility challenges are managed so that metadata-based learning is safe, accessible and effective for all.

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