

# ASCILITE 2024

## Navigating the Terrain:

*Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies*

### The Impact of Emerging Technologies on Higher Education: Generative AI and Immersive Reality

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New technologies like Generative AI and Immersive Reality are set to change higher education dramatically. They offer unique ways to improve learning outcomes, boost creativity, and provide better access to quality education. But, incorporating these technologies also comes with challenges, such as ethical issues, the need for big financial investments, and environmental concerns. This paper explores how Generative AI and Immersive Reality affect higher education, highlighting their benefits and the obstacles to their adoption.

*Keywords:* Generative AI, Immersive Reality, higher education, personalized learning, ethical considerations, teacher preparedness

#### Background

The advent of emerging technologies, particularly Generative AI and Immersive Reality (IR), is poised to transform higher education. These technologies promise significant advances in learning outcomes, creativity, and equitable access to quality education (Chen, 2023). However, their integration also presents a complex set of challenges, ranging from ethical issues to infrastructural limitations and the need for substantial investments (Bearman, Ryan, & Ajjawi, 2023). This paper aims to explore the dual impact of Generative AI and IR on higher education by focusing on their benefits, barriers, and broader implications for educational policy, practice, and ethics.

Specifically, this paper will analyse how Generative AI can create highly personalized learning experiences, offering tailored feedback and individual learning pathways, thereby enhancing student engagement and academic success (Almaraz-López et al., 2023). Likewise, IR, through technologies like Virtual Reality (VR) and Augmented Reality (AR), can generate interactive and engaging environments that facilitate deep, hands-on learning (Chen, L. J., Chen, P. P., & Lin, 2020). However, these benefits are juxtaposed with challenges such as privacy concerns, algorithmic bias, teacher preparedness, and environmental costs (Dempere, Modugu, & Hesham, 2023).

This analysis draws significantly from the author's perspectives and insights, as existing research in this field is still emerging and remains limited in scope. The author acknowledges that while the claims are supported by initial studies, many points reflect an informed viewpoint based on trends observed in the early adoption of these technologies. The analysis is grouped into three major themes: (1) The benefits and opportunities presented by Generative AI and IR, (2) The barriers and ethical considerations associated with their integration, and (3) The requirements for effective adoption, including teacher preparedness and infrastructural investment. By presenting a holistic view of the promises and pitfalls of these technologies, the paper aims to provide a balanced perspective on their role in shaping the future of higher education.

#### Benefits and Opportunities of Generative AI and Immersive Reality

Generative AI and Immersive Reality present considerable opportunities for enhancing higher education. Generative AI allows for the creation of personalized learning pathways, offering students tailored support based on their unique needs and performance data (Almaraz-López et al., 2023). By analysing individual student performance, AI can provide highly specific feedback and create customized content that helps address learning gaps. This level of personalization has the potential to increase student engagement and

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improve academic outcomes. This claim is grounded in both emerging research and the author's professional observations on how AI could enhance personalized learning, despite the scarcity of empirical studies in this area.

Immersive Reality technologies, such as Virtual Reality (VR) and Augmented Reality (AR), provide new ways of engaging students in interactive learning environments. These technologies can bring complex subjects to life, making abstract concepts more tangible and accessible. For example, medical students can practice surgical procedures in a simulated, risk-free environment, gaining hands-on experience without the associated real-world risks (Chen, L. J., Chen, P. P., & Lin, 2020). Similarly, students in fields such as engineering and architecture can explore virtual models of structures, which enhances their understanding of design principles and challenges. These examples reflect both existing practical implementations and author insights into future possibilities for IR in education.

Furthermore, the collaborative capabilities of IR align with Constructivist Learning Theory, which values social learning as a key component of knowledge construction. Virtual labs and classrooms offer students opportunities to work together in solving problems and building knowledge, simulating real-world environments that foster peer interaction and learning. This capability not only fosters teamwork but also helps break down geographical barriers to education, making quality learning opportunities accessible to a broader audience (Chen, 2023).

### Barriers and Ethical Considerations

Despite their promising potential, the integration of Generative AI and IR technologies into higher education is not without challenges. One significant barrier is related to ethical considerations, particularly regarding data privacy and algorithmic bias. AI systems rely heavily on data, which raises concerns about how student information is collected, stored, and used (Bearman, Ryan, & Ajjawi, 2023). Ensuring that AI applications in education are transparent and that students' privacy is protected is critical to fostering trust in these technologies.

Algorithmic bias is another concern. AI systems are only as unbiased as the data they are trained on, and if the training data contains biases, these biases may be perpetuated in the system's outputs. This could lead to unfair treatment of certain groups of students based on race, gender, or socioeconomic status. Addressing these biases requires careful attention to the data used and ongoing monitoring of AI systems to ensure equitable outcomes (Bearman, Ryan, & Ajjawi, 2023).

Teacher preparedness is another significant barrier to the successful integration of Generative AI and IR. Many educators feel unprepared to integrate these advanced technologies into their classrooms effectively. For example, the Los Angeles Unified School District (LAUSD) provides a real-world case where teacher preparedness was pivotal in implementing an AI-powered platform, 'Ed,' to enhance personalized learning (Alotaibi & Alshehri, 2023). This experience highlights the importance of comprehensive teacher training in using AI tools effectively. A study by the International Society for Technology in Education (ISTE) found that while teachers recognize the potential of AI, they often lack the necessary training and resources to use these tools effectively. Comprehensive professional development programs are essential to help educators acquire both the technical skills and pedagogical strategies needed to leverage Generative AI and IR technologies in meaningful ways (Cotton, Cotton, & Shipway, 2023). These programs should also focus on equipping teachers with the skills to adopt a constructivist approach, empowering them to use technology to enable students to construct their own knowledge through active learning and experiential methods.

The environmental impact of deploying energy-intensive AI systems also cannot be ignored. The computational power required to run these technologies contributes to carbon emissions, raising concerns about sustainability. Educational institutions must consider adopting energy-efficient practices and exploring

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renewable energy options to mitigate the environmental footprint of AI and IR technologies (Dempere, Modugu, & Hesham, 2023).

### Requirements for Effective Adoption

For Generative AI and Immersive Reality to be effectively integrated into higher education, several key requirements must be met. First and foremost, adequate infrastructure is crucial. Educational institutions need to invest in the necessary technology, including hardware and software, to support these advanced tools. This includes ensuring that all students have equitable access to the required devices and internet connectivity, which is especially important for reducing the digital divide.

Teacher preparedness is crucial not only for understanding the technology but also for facilitating a constructivist approach, where educators act as guides, helping students actively engage with personalized and immersive learning experiences. Additionally, examples such as LAUSD's 'Ed' platform demonstrate how effective training programs can lead to successful implementation of AI, where educators are supported to adopt both the technology and the constructivist teaching practices necessary for effective integration (Alotaibi & Alshehri, 2023). Programs such as Google's AI for Education and Microsoft's Mixed Reality in the Classroom offer valuable resources for teachers looking to integrate AI and IR into their teaching practices (Chen, 2023). By equipping teachers with the tools and training they need, institutions can ensure that the benefits of these technologies are fully realized.

Additionally, ethical guidelines and data protection policies must be established to ensure the responsible use of AI and IR in education. This includes implementing safeguards to protect student data, ensuring transparency in how AI systems make decisions, and addressing issues related to bias and fairness. By developing clear ethical frameworks, educational institutions can foster trust in these technologies and encourage their adoption (Reiss, 2021).

### Conclusion

Building on the insights discussed in the paper, the conclusion emphasizes the need for actionable strategies, grounded in the practical and ethical considerations previously highlighted. The impact of Generative AI and Immersive Reality on higher education is profound, offering opportunities to enhance personalized learning, foster collaboration, and bridge educational gaps. However, their integration also poses significant challenges, including ethical considerations, financial investment, and environmental impacts. To fully realize the potential of these technologies, educational institutions must adopt sustainable practices, address ethical and security concerns, and invest in infrastructure and training. Ensuring that educators are adequately prepared and upskilled is crucial to bridging the gap between student readiness and teacher preparedness. By doing so, higher education can harness the transformative power of emerging technologies to benefit students and educators alike. Even as we celebrate the remarkable opportunities these technologies present, we must also confront the complex ethical quandaries they raise, which will require thoughtful navigation (Dempere, Modugu, & Hesham, 2023).

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