

Incorporating Team Creativity in Virtual Metaverse in Education

Raed Ashraf Kamil Albadri

University of Samarra, Iraq



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

<https://doi.org/10.54153/sjpas.2025.v7i3.1307>

Article Information

Received: 18/06/2025

Revised: 20/07/2025

Accepted: 25/07/2025

Published: 30/09/2025

Keywords:

*Artificial Intelligence,
Virtual Worlds, Metaverse,
and Creativity*

Corresponding Author

E-mail:

raed@uosamarra.edu.iq

Mobile: 07707045520

Abstract

The rapid technological developments witnessed in the current era, virtual metaverse, especially the metaverse, have become an integral part of the digital transformation in various fields, including education. Modern technologies are a powerful tool for enhancing creativity and collaboration between students and teachers, especially in higher education environments where the need for innovative learning methods that transcend geographical and temporal boundaries is increasing. This research highlights the role of the metaverse in enhancing collective creativity within educational teams, focusing on the challenges and opportunities facing its implementation in academic institutions, particularly under challenging conditions such as a lack of infrastructure or political instability. This study aims to explore the effectiveness of the metaverse as a virtual learning environment in stimulating collaborative creativity among students at the University of Samarra, by combining quantitative and qualitative methodologies. It also highlights the technical and training challenges that may hinder achieving maximum benefit from this technology and offers practical recommendations to promote its adoption in educational institutions. Importance of this research lies in its provision of a comprehensive vision for the integration metaverse in education, opening new horizons for research and application in this promising field.

Introduction

Creativity, in a work context, is a topic that interests both scholars and practitioners from a variety of fields and industries. Creativity and innovation are closely linked. Organizations strive to achieve a competitive advantage with respect to innovation because innovation supports diversification and facilitates the organization's adaptation to the evolving market and technology environment[1, 2]. Previous research has traditionally explored creativity at both the individual and group levels as a precursor to innovation. However, this study expands the focus to include creativity at the organizational level, highlighting its significant impact on organizational innovation[3]. Creativity is defined as the ability to generate new ideas and solutions that require both novelty and utility. An idea is not considered creative if it lacks originality or practicality, emphasizing the importance of both factors in creative responses [4].

Globally distributed team collaboration involves complex, interconnected tasks across cultural and geographic boundaries, requiring the extraction and sharing of locally embedded knowledge. This complexity requires additional effort to manage communication and working

practices to prevent collaboration breakdowns [5]. Cultural diversity enhances creativity in globally distributed teams by bringing diverse perspectives and experiences, which can lead to innovative solutions. However, challenges such as the lack of shared physical space and time zone differences must be managed to optimize brainstorming activities[6]. Virtual teams are defined as groups working toward a common goal, distributed across locations, and communicating through various ICT channels. Reducing operational losses fosters creative activity within these teams, impacting their effectiveness and collaborative dynamics[7]. Figure (1) illustrates the importance of fostering creativity and collaboration among team members, which is a common experience that should be incorporated into educational teams to enhance creativity in sharing ideas and completing the results of important scientific experiments.

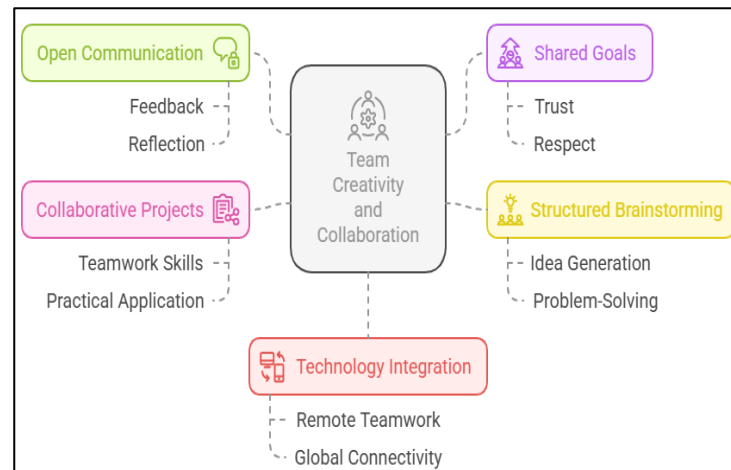


Fig. 1 Enhancing Team Creativity and Collaboration.

The V.Metaverse is becoming increasingly realistic and accessible, with the potential to change the way we work, learn, and play. With technology advances, it is expected to attract significant interest and investment, leading to broader adoption over time[8]. The study identifies nine characteristics that can shape virtual environments to creativity, and addresses the potential of the metaverse to enhance user creativity, including team-level creative activities and collaboration, thus contributing to an understanding of the potential of the virtual world[9]. Through identifying these creativity-enhancing potentials, we hope to shed light on the essence of creative engagement in virtual metaverse teams [10, 11]. Ultimately, our research aims to pioneer a detailed study of the interplay between creative processes, teamwork, and technology.

Literature Review

AI plays a significant and effective role in higher education. It has emerged as a transformative force in higher education, revolutionizing the way institutions deliver educational content and resources to students, teachers, and the products of personal or community creativity through scholarly corpora [12]. Artificial intelligence (AI) has already emerged as a transformative force in higher education, reshaping traditional teaching models and learning experiences. Its integration facilitates personalized learning, intelligent tutoring systems, and data-driven insights, enhancing the delivery of educational content and resources. As AI technologies evolve, they are creating adaptive and responsive learning environments, benefiting both educators and learners. This dynamic, technology-driven landscape promises

to revolutionize how institutions engage with students and harness societal creativity through scholarly institutions [13]. It's a transformative force in higher education by enabling personalized learning experiences and enhancing student engagement. Its applications include adaptive learning, smart lessons, and content generation, revolutionizing the delivery of educational content. Additionally, AI provides data-driven insights and administrative automation, improving institutional efficiency.

However, AI implementation must address ethical concerns such as data privacy and algorithmic fairness to ensure a dynamic and equitable education landscape [14]. It plays a vital role in higher education by enhancing e-teaching and e-learning processes. It transforms the way institutions deliver educational content and resources, facilitates personalized learning experiences, and improves student engagement. The chapter explores the educational implications of AI innovations and anticipates their impact on teaching and learning. Through a systematic review of the role of AI, the research highlights its potential to revolutionize educational practices, enhance creativity within academic settings, and ultimately shape the future of advanced education[15]. AI is transformative in higher education, fundamentally transforming the delivery of educational content and resources. It facilitates personalized learning, dynamic teaching methodologies, administrative advancements, and the alignment of educational systems with market demands. The integration of AI, including large language models like ChatGPT, enhances the educational experience by meeting the evolving needs of students and society, ultimately preparing learners for future challenges in a rapidly changing global landscape [16]. It's transforming higher education by impacting the way it is taught and learned, improving the delivery of educational content and resources to students and teachers, and encouraging creativity across the academic community[17] .

A study explores the transformative potential of augmented reality (AR) and virtual reality (VR) in enhancing creative learning experiences. By combining these immersive technologies with artificial intelligence (AI), students can engage more deeply with complex topics, enhancing motivation, memory retention, and comprehension. Applications in diverse fields, including science, technology, engineering, mathematics, and language acquisition, demonstrate how AR and VR can create impactful learning environments. However, challenges such as costs and content creation must be addressed through collaboration between educators, technology providers, and content producers [18]. It highlights how the Metaverse fosters team creativity in education by transforming traditional teaching methods into engaging activities, fostering collaboration among students globally, and using technologies like AR and VR to enhance creative learning experiences [19]. Accordingly, the potential of the metaverse for innovative learning experiences is large, which may enhance collaborative creativity among students through immersive technologies such as virtual reality and augmented reality [20]. A study focusing on the integration of artificial intelligence and the metaverse, with an emphasis on individual learning experiences and applications rather than collaborative or team-based aspects of creativity [21]. Collaboration in a virtual reality escape room also positively impacts learners' academic performance and experiences, indicating the potential benefits of creative teamwork in educational settings [22].Generative AI can enhance creativity in the Metaverse, including educational contexts, by enabling dynamic content generation and collaborative experiences, thus fostering team creativity and innovative applications in immersive learning environments[23].

The study emphasizes social collaboration within the Meta-mile framework, fostering team creativity in the Metaverse by integrating immersive environments and gamified learning paths, which enhance engagement and enable diverse learners to collaborate effectively, thus enriching the educational experience[24]. Focus on the effectiveness of a Metaverse-based blended learning module in enhancing English language proficiency and students' perceptions of engagement and motivation [25, 26]. A study in Egypt, focusing on the adoption of the metaverse in higher education, and analysing the factors that influence the continued intention to use metaverse technology for learning, especially among university students [27]. From this perspective, the metaverse and artificial intelligence are being integrated into education, enhancing immersive learning environments and tailoring educational experiences to the individual needs of students across various academic disciplines[21, 28].

Method

For the purpose of accurately identifying and addressing the potential of the virtual metaverse, we conducted a systematic literature review. Studies confirm that a systematic literature review protocol is critical to capturing current empirically evaluated knowledge in software requirements engineering, identifying gaps, and providing rigorous methodological insights to guide future research and practical applications in this field[29-31]. Following the protocol, we first created keywords related to our research topic: the potential of the virtual metaverse to enhance creativity at the team level [32]. The keywords were combined into search strings such as "virtual world" and "creativity"; "virtual metaverse environment" and "creativity"; and "virtual metaverse" and "innovation[9]." These search strings were used to search major electronic journal databases such as EBSCO, Scopus, the Science Citation Index, and the Social Sciences Citation Index [33]. Additionally, we distributed a questionnaire to a sample of students at University of Samarra in lab-based disciplines, consistent with our study of creative work during scientific groups [34].

This study adopted a quantitative and qualitative approach (mixed methods) to analyze the impact of virtual worlds [35] (Metaverse) on collective creativity among 70 students from University of Samarra (50 undergraduates + 20 graduate students). According to Creswell, in qualitative or mixed studies, a sample size of 50-100 may be considered acceptable for scientific analysis[36]. Data were collected through a 20-question online questionnaire (5-point Likert scale) and semi-structured interviews with 15 students. The results revealed that 78% of students confirmed that the metaverse contributed to improving collective creativity ($M = 4.2/5$, $SD = 0.6$), with a significant improvement in group brainstorming (72%) and increased collaboration across geographical boundaries (85%). However, 45% of students faced technical difficulties such as weak internet, while 60% indicated a need for further training on the platforms. The quantitative data were analyzed using SPSS (T-test), and the qualitative data were analyzed through thematic analysis, while ensuring ethical aspects such as written consent and anonymity. These results demonstrate that the metaverse is a promising tool for fostering collective creativity, but its success requires improved infrastructure and training as shown in the tables (1,2,3).

Table. 1 Results of the study data analysis on the use of the metaverse to enhance collective creativity among students.

Variable	Ratio/Average	SD	Interpretation
The effectiveness of the metaverse in creativity	78%(M=4.2/5)	±0.6	Most students (78%) believe that the metaverse has contributed to improving collective creativity.
Improve teamwork	85%	-	A high percentage of students noticed an improvement in collaboration across virtual teams.
Technical challenges	45%	-	Nearly half of the sample faced problems such as poor internet or complex tools.
Need for training	60%	-	More than half of the participants confirmed their need for prior training on metaverse platforms.
Avatar Experience Evaluation	M=4.0/5	±0.7	The interaction via avatar was positive but needs improvement in realism and smoothness.

Table. 2 shows the sample distribution (70 students)

Category	Number	Ratio	Notes
undergraduate students	50	71.4%	From various specializations (engineering, education, applied sciences).
graduate students	20	28.6%	Most of them are master's programs.
Males	42	60%	-
Females	28	40%	-

Table. 3 Additional analyses (T-test for comparisons)

Comparison	P Value	Statistical Significance	Conclusion
Gender differences in metaverse evaluation	0.12	Not statistically significant	There was no significant difference between males and females in the evaluation of effectiveness.
The difference between the educational stages	0.03	Significant at ($\alpha \leq 0.05$)	Graduate students are more positive about the metaverse than undergraduates.

M: arithmetic mean; SD: standard deviation; P: probability value in statistical tests.

The study adopted a mixed methodology (quantitative and qualitative) to analyze the impact of the metaverse on collective creativity. It included a sample of 70 students (50 undergraduates and 20 postgraduates) from University of Samarra. Data were collected via an

online questionnaire (20 questions with a five-point Likert scale) and in-depth interviews with 15 students. The results showed that 78% of students ($M=4.2/5$, $SD=0.6$) believed that the metaverse enhanced collective creativity, with improvements in brainstorming (72%) and cross-border collaboration (85%). However, 45% faced technical challenges (poor internet access), and 60% indicated a need for training. Based on statistical analysis (SPSS, t-test) [37] and objective analysis of qualitative data, the study recommends developing intensive training programs and improving internet infrastructure to maximize the benefits of the metaverse in education, with an emphasis on ethical aspects such as written consent and anonymity. Figure (2).

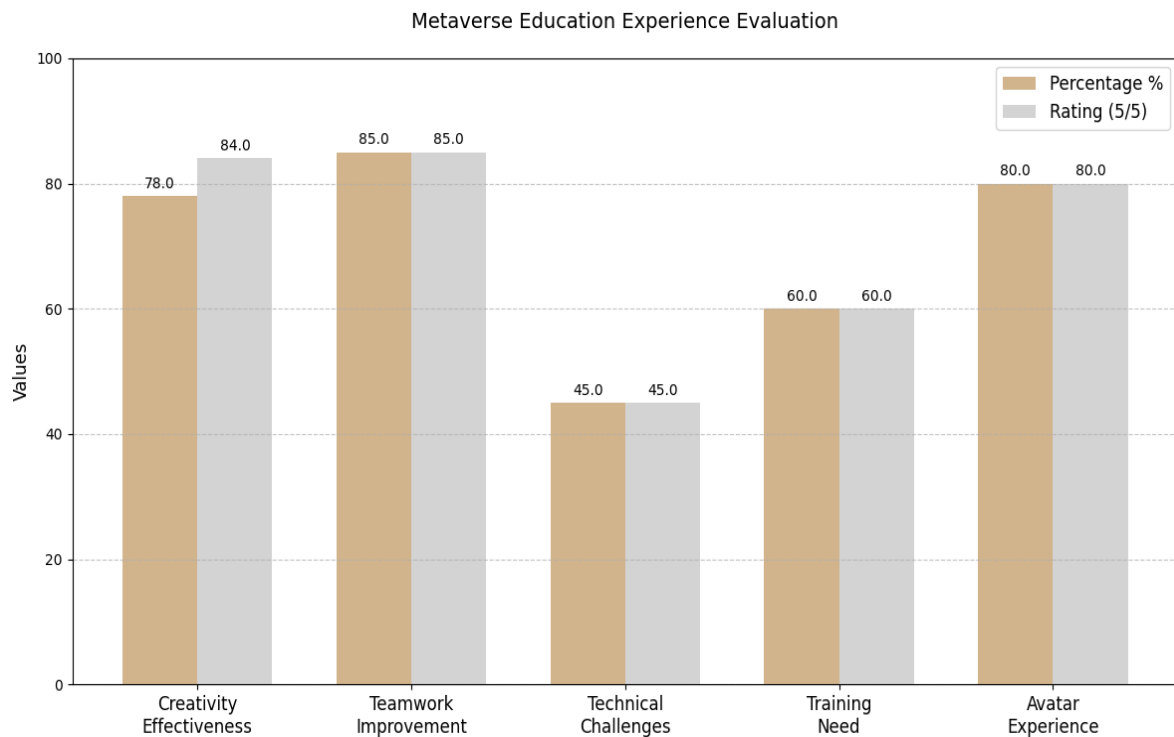


Fig 2: Results from students showed that the metaverse enhanced group creativity, with improved brainstorming.

Results

The study showed that 78% of participants noted an improvement in group creativity (average score of 4.2/5, standard deviation of 0.6), with a 72% improvement in brainstorming sessions and an 85% improvement in cross-border collaboration. User interaction via avatars received a rating of 4.0/5 (standard deviation of 0.7), with a need for improved realism. Forty-five percent encountered technical issues (poor internet), and 60% expressed a need for training. There were no gender differences ($P=0.12$), but graduate students rated the metaverse more positively ($P=0.03$). The results confirm the promise of the metaverse as an educational tool, with the need to improve infrastructure, develop intensive training programs, and consider ethical aspects to ensure its success in enhancing group creativity.

Conclusions

This study confirms that the metaverse represents a qualitative shift in the field of creative education. The results showed a significant improvement in collective creativity (78% of

participants with an average score of 4.2/5) and academic collaboration (85%), with improved brainstorming sessions (72%), despite technical challenges (45% faced difficulties) and training (60% need training). To realize the full potential of this technology, the study recommends adopting an integrated strategy that includes modernizing the digital infrastructure, developing comprehensive qualification programs, enhancing digital awareness, and ensuring ethical aspects of its use. This will contribute to transforming the metaverse from a mere technical tool into an effective educational platform capable of unleashing collective creativity and transcending geographical boundaries in academic work. These results also open new horizons for research into virtual education applications and their impact on the quality of educational outcomes.

References

- [1] H. A. Hussein, A. M. H. Ahmed, S. A. Shawkat, and R. A. Kamil, "The Effect of Using Smart Board Technology on the Educational Process in the Colleges of Education in Terms of Features and Challenges," in *AIP Conference Proceedings*, 2022/11// 2022, vol. 2394: American Institute of Physics Inc., doi: 10.1063/5.0122282.
- [2] R. Patil, "Nurturing innovation and creativity for business success," 2024, doi: 10.62801/jkjmrv1i1-12.
- [3] J. H. Han, J. T. Jung, and H. K. Joo, "A Study on Effects of Creativity to Organizational Innovation," *Indian journal of science and technology*, vol. 8, no. 24, pp. 1-13, 2015, doi: 10.17485/IJST/2015/V8I24/80245.
- [4] G. Afshan, "Defining Creativity," Routledge eBooks, 2022, pp. 5-21.
- [5] T. Ryser, E. Angerer, M. P. Ganesh, and H. Schulze, "Towards a Model of Collective Competences for Globally Distributed Collaborations," Palgrave Macmillan, London, 2016, pp. 201-225.
- [6] C. L. Andersen, "Collaborative Innovation in Global Teams: A Case Study of the Startup Grind Inc. Global Community Team," 2018. [Online]. Available: <https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=1285&context=studentpub>.
- [7] H. J. Curzer, "Virtual Teams and Digital Collaboration," *Oxford Research Encyclopedia of Psychology*, 2023, doi: 10.1093/acrefore/9780190236557.013.881.
- [8] J. Selvarani, A. Khanum, and D. S, "Metaverse," *International journal of innovative research in information security*, vol. 09, no. 03, pp. 215-220, 2023, doi: 10.26562/ijiris.2023.v0903.29.
- [9] I. W. Reis, A. Estevao-Romeiro, C. H. Berg, and V. R. Ulbricht, "Sociodigital Experiences and Creativity in the Metaverse: An Integrative Review," 2024, doi: 10.2139/ssrn.4700274.
- [10] A. M. H. A. Ali, H. A. Hussein, R. A. K. Albadri, and O. M. Dayef, "Cloud Computing Application and Its Advantages and Difficulties in the Teaching Process," 2021.
- [11] N. M. Mengalli and A. A. de Carvalho, "Metaverse in Higher Education and the Metaversities," IGI Global, 2024, pp. 219-245.
- [12] N. R. Abdurohman, "Artificial Intellegent In Higher Education: Opportunities and Challenges," *Eurasian science review.*, vol. 2, no. Special Issue, pp. 1683-1695, 2025, doi: 10.63034/esr-334.
- [13] J. Young, "The Rise of Artificial Intelligence in Education," *International journal of innovative research and development*, 2024, doi: 10.24940/ijird/2024/v13/i2/feb24019.
- [14] N. B. Trivedi, "AI in Education-A Transformative Force," vol. 1, pp. 1-4, 2023, doi: 10.1109/idicaiei58380.2023.10406541.

- [15] C. Diwaker, A. Sharma, and P. Tomar, "Artificial Intelligence in Higher Education and Learning," IGI Global, 2021, pp. 62-72.
- [16] S. Yadav, "Artificial Intelligence (AI) Integration in Higher Education," pp. 43-59, 2024, doi: 10.1201/9781032644509-4.
- [17] D. P. T. Girón, "La Inteligencia Artificial en la Educación," *Vida científica boletín científico de la escuela preparatoria no. 4*, vol. 13, no. 25, pp. 38-40, 2025, doi: 10.29057/prepa4.v13i25.14056.
- [18] J. S. G. A. Balushi, M. I. A. A. Jabri, S. Palarimath, M. Pyingkodi, K. Thenmozhi, and C. Balakumar, "Incorporating Artificial Intelligence Powered Immersive Realities to Improve Learning using Virtual Reality (VR) and Augmented Reality (AR) Technology," 2024, doi: 10.1109/icaaic60222.2024.10575046.
- [19] A. Sharma, L. Sharma, and J. Krezel, "Exploring the Use of Metaverse for Collaborative Learning in Higher Education: A Scoping Review," in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 2023, vol. 14060 LNCS: Springer Science and Business Media Deutschland GmbH, pp. 240-251, doi: 10.1007/978-3-031-48060-7_19.
- [20] J. Ren, Y. H. Tan, and J. Guo, "Scientific Mapping of Research on Metaverse in Education," *International journal of technology in education*, vol. 8, no. 1, pp. 1-21, 2025, doi: 10.46328/ijte.986.
- [21] K. Almeman, F. E. Ayeb, M. Berrima, B. Issaoui, and H. Morsy, "The Integration of AI and Metaverse in Education: A Systematic Literature Review," *Applied Sciences*, vol. 15, no. 2, pp. 863-863, 2025, doi: 10.3390/app15020863.
- [22] A.-M. Pazakou, S. Mystakidis, and I. Kazanidis, "Collaboration in a Virtual Reality Serious Escape Room in the Metaverse Improves Academic Performance and Learners' Experiences," *Future Internet*, vol. 17, no. 1, pp. 21-21, 2025, doi: 10.3390/fi17010021.
- [23] A. E. Saddik, J. Ahmad, M. Khan, S. Abouzahir, and W. Gueaieb, "Unleashing Creativity in the Metaverse: Generative AI and Multimodal Content," *ACM Transactions on Multimedia Computing, Communications, and Applications*, 2025, doi: 10.1145/3713075.
- [24] L. N. Yeganeh, N. S. Fenty, Y. Chen, A. Simpson, and M. Hatami, "The Future of Education: A Multi-Layered Metaverse Classroom Model for Immersive and Inclusive Learning," 2025, doi: 10.3390/fi17020063.
- [25] D. Filcik, E. Sobiesk, and S. J. Matthews, "Fostering Creativity: Student-Generative AI Teaming in an Open-Ended CS0 Assignment," 2025, doi: 10.1145/3641554.3701853.
- [26] Y. Jiao, D. DeWitt, and R. A. Razak, "Enhancing Efl Learning Through Metaverse-Based Blended Environments: Effectiveness and Student Perspectives," 2025, doi: 10.2139/ssrn.5082187.
- [27] R. A. Ali, M. Soliman, M. R. Weahama, M. Assalihee, and I. Mahmud, "Investigating continuous intention to use metaverse in higher education institutions: a dual-staged structural equation modeling-artificial neural network approach," *Smart Learning Environments*, vol. 12, no. 1, 2025/12// 2025, doi: 10.1186/s40561-024-00357-y.
- [28] M. A. Bahij and S. Sukari, "Perancangan Pendidikan Islam di Masa Depan: Integrasi Teknologi, Kecerdasan Buatan, Web3, dan Metaverse," *Asian Journal of Islamic Studies and Da'wah*, vol. 3, no. 1, pp. 105-118, 2025, doi: 10.58578/ajisd.v3i1.4612.
- [29] T. Ambreen, M. Usman, N. Ikram, and M. Bano, "Evidence in Requirements Engineering: A Systematic Literature Review Protocol," *International Conference on Software Engineering Advances*, pp. 576-580, 2011. [Online]. Available: http://www.thinkmind.org/articles/icsea_2011_25_10_10408.pdf.
- [30] L. English, "A risk-based exploration on the merits of re-orientating asset management towards the influence of and consequences for people at an individual and societal level: a systematic literature review protocol v1," 2025, doi: 10.17504/protocols.io.x54v9rzm4v3e/v1.

- [31] Z. Guevara, D. Mendoza-Tinoco, and D. Silva, "The theoretical peculiarities of energy poverty research: A systematic literature review," 2023, doi: 10.1016/j.erss.2023.103274.
- [32] A. El Saddik, J. Ahmad, M. Khan, S. Abouzahir, and W. Gueaieb, "Unleashing Creativity in the Metaverse: Generative AI and Multimodal Content," *ACM Transactions on Multimedia Computing, Communications and Applications*, 2024.
- [33] M. K. Wyrwicka, E. Więcek-Janka, and Ł. Brzeziński, "Transition to Sustainable Energy System for Smart Cities—Literature Review," *Energies*, 2023, doi: 10.3390/en16217224.
- [34] K. A. Overmann, "Common creativity," 2025, doi: 10.31235/osf.io/ywqes.
- [35] M. A. Ali, S. F. M. Noor, S. Zainudin, and N. S. Ashaari, "Analyzing Learning Persistence Determinants in Virtual Learning Environments Using Mixed Methodology," *TEM Journal*, vol. 13, no. 4, pp. 3468-3478, 2024/11// 2024, doi: 10.18421/TEM134-79.
- [36] C. Jw, "Research design-qualitative, quantitative, and mixed methods approaches," *SAGE, Ca; ofprnia*, 2009.
- [37] A. B. D. Nandiyanto and S. N. Hofifah, "How to conduct paired-t-test SPSS: comprehension in adsorption with bibliometric," *International Journal of Evaluation and Research in Education*, vol. 13, no. 1, pp. 151-158, 2024/2// 2024, doi: 10.11591/ijere.v13i1.27541.

دمج الإبداع الجماعي في بيئة التعليم الميتافيرس الافتراضية

راند اشرف كامل البدري

جامعة سامراء، العراق

الخلاصة:

في ظل التطورات التكنولوجية المتسارعة التي يشهدها العصر الحالي، أصبحت العوالم الافتراضية، ولا سيما الميتافيرس، جزءاً لا يتجزأ من التحول الرقمي في مختلف المجالات، ومنها التعليم. وتُعد هذه التقنيات الحديثة أداة فعالة لتعزيز الإبداع والتعاون بين الطلاب والمعلمين، لا سيما في بيئات التعليم العالي التي تتزايد فيها الحاجة إلى أساليب تعلم مبتكرة تتجاوز الحدود الجغرافية والزمانية. يُسلط هذا البحث الضوء على دور الميتافيرس في تعزيز الإبداع الجماعي داخل الفرق التعليمية، مُركِّزاً على التحديات والفرص التي تواجه تطبيقه في المؤسسات الأكاديمية، لا سيما في ظل ظروف صعبة كضعف البنية التحتية أو عدم الاستقرار السياسي. تهدف هذه الدراسة إلى استكشاف فعالية الميتافيرس كبيئة تعلم افتراضية في تحفيز الإبداع التعاوني بين طلاب جامعة سامراء، من خلال الجمع بين الأساليب الكمية والنوعية. كما تُسلط الضوء على التحديات التقنية والتدريبية التي قد تعيق تحقيق الاستفادة القصوى من هذه التقنية، وتُقدم توصيات عملية لتعزيز تبنيها في المؤسسات التعليمية. تكمن أهمية هذا البحث في تقديمه رؤية شاملة لدمج الميتافيرس في التعليم، وفتح آفاق جديدة للبحث والتطبيق في هذا المجال الواعد.

معلومات البحث:

تاريخ الاستلام: 2025/06/19

تاريخ التعديل: 2025/07/20

تاريخ القبول: 2025/07/25

تاريخ النشر: 2025/09/30

الكلمات المفتاحية:

الذكاء الاصطناعي، العوالم

الافتراضية، ميتافيرس، والإبداع.

معلومات المؤلف

الايمل:

الموبايل: