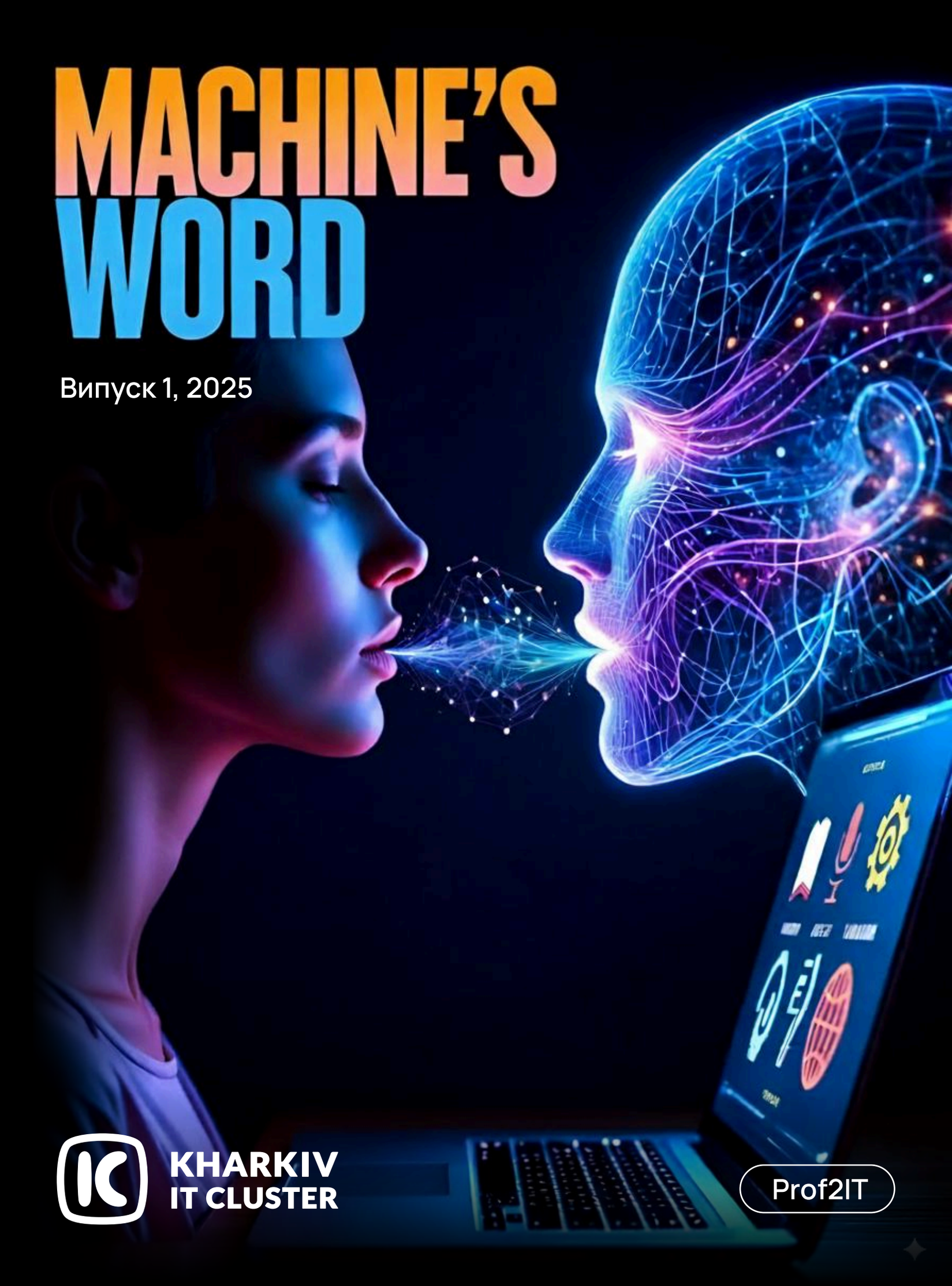
MACHINE'S WORD

Випуск 1, 2025



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ЕЛЕКТРОННА ЗБІРКА МАТЕРІАЛІВ “MACHINE`S WORD”

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за результатами курсу підвищення кваліфікації педагогічних та науково-педагогічних працівників за напрямом: «Спеціалізовані сервіси ШІ для використання при написанні наукових статей» в межах проєкту Prof2IT

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Електронна збірка матеріалів “MACHINE`S WORD” (15 вересня 2025 року) / упорядн.: Шаповал О., Лоєнко О., Дудник О., Каук В. [Електронне видання]. Харків: Харківський ІТ Кластер, 2025. 632с.

Електронна збірка “MACHINE`S WORD” об’єднує наукові праці педагогічних та науково-педагогічних працівників, що присвячені викликам і можливостям застосування штучного інтелекту в освіті, науці, технологіях та суспільстві. Представлені матеріали охоплюють теоретичні дослідження, практичні кейси та інноваційні підходи до використання AI та цифрових інструментів у різних професійних сферах.

Видання адресоване науковцям, викладачам, студентам, ІТ-фахівцям та всім, хто цікавиться розвитком і етичним використанням технологій штучного інтелекту.

Матеріали подано в авторській редакції, за достовірність фактів, цитат, посилань на джерела, власних імен тощо, відповідають автори публікації.

ЗМІСТ

USING AI TO CREATE OPEN-WORLD QUESTS IN MULTIMEDIA EDUCATIONAL COMPLEXES

ВИКОРИСТАННЯ AI ДЛЯ СТВОРЕННЯ ВІДКРИТИХ ПРИГОД У МУЛЬТИМЕДІЙНИХ ОСВІТНІХ КОМПЛЕКСАХ

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Summary

The article examines using artificial intelligence to create open-world quests in multimedia educational complexes, addressing limits of static content and the need for adaptive, agentic learning trajectories. Methodologically, it is conceptual: it synthesizes procedural content generation, machine learning, and large language models, aligning them with open-world game-design principles. It argues that AI serves as a "pedagogical orchestrator," coordinating goals, learner capabilities, presentation, and assessment within quest environments. Personalization covers dynamic variation of difficulty, pacing, and modalities; generation of narratives, tasks, hints, and feedback. It outlines how multimedia, simulations, and VR/AR integrate into quests to raise engagement without losing didactic clarity, and sets requirements for adaptive delivery under computational and accessibility constraints. It presents an implementation framework: principles, ethics, quality control, scalability, and outcome monitoring. Expected effects include higher motivation, development of critical thinking, and support for personal pathways. Novelty lies in aligning AI-generated quests with multimedia complex architecture and treating AI as a co-ordinator of pedagogy, not merely a content generator. Limitations: theoretical emphasis, reliance on prior work, and absence of large-scale empirical validation; ethical and organizational issues are noted as directions for further testing.

Анотація

Стаття аналізує використання штучного інтелекту для створення відкритосвітових квестів у мультимедійних освітніх комплексах. Проблема: статичний контент обмежує навчання; потрібні адаптивні, агентні траєкторії. Методологія має концептуально-оглядовий характер: узагальнено procedural content generation, машинне навчання та великі мовні моделі й поєднано їх із принципами відкритосвітового геймдизайну. Аргументується роль ШІ як «педагогічного оркестратора», що узгоджує цілі, спроможності здобувача, подання й оцінювання у квестових середовищах. Описано персоналізацію: динамічне варіювання складності, темпів і форм подання; генерування наративів, завдань, підказок і зворотного зв'язку за перебігом взаємодії. Пояснено, як мультимедіа, симуляції та VR/AR інтегруються в квести для підсилення залученості без втрати дидактичної чіткості; наведено вимоги до адаптивної доставки з урахуванням обчислювальних і доступнісних обмежень. Подано рамку впровадження: принципи, етичні орієнтири, контроль якості, масштабованість і моніторинг результатів. Очікувані ефекти — зростання мотивації, розвиток критичного мислення, підтримка індивідуальних маршрутів. Новизна — узгодження ШІ-генерації квестів з архітектурою мультимедійних комплексів й трактування ШІ як координатора педагогічних рішень, а не лише генератора контенту. Обмеження: теоретичність, опора на наявні праці, відсутність емпіричної валідації на великих вибірках; етичні й організаційні питання окреслено як напрями подальших перевірок.

Introduction

The rapid evolution of artificial intelligence technologies has fundamentally transformed numerous industries, with education standing at the forefront of this revolutionary change. The emergence of AI-driven educational technologies presents an unprecedented opportunity to create dynamic learning environments that respond to individual student needs, preferences, and learning patterns in real-time. Within this transformative landscape, the concept of open-world quest-based learning has gained significant traction as educators and technologists seek to harness the engaging principles of modern gaming for educational purposes. Open-world games, characterised by non-linear progression, player agency, and emergent storytelling, offer a compelling framework for educational design that encourages exploration, critical thinking, and self-directed learning (Li et al., 2023; Asadzadeh et al., 2024). When combined with the adaptive capabilities of AI systems, these open-world principles can create educational experiences that are both pedagogically sound and inherently engaging.

The integration of AI technologies into educational quest generation represents a paradigm shift from static, pre-designed content to dynamic, responsive learning environments. Large Language Models (LLMs) such as GPT-3 and its successors have demonstrated exceptional capabilities in generating coherent, contextually appropriate content across diverse domains (Gallotta et al., 2024). In educational contexts, these models can generate quest narratives, dialogue, problem scenarios, and adaptive feedback that responds to student actions and learning progress.

Multimedia educational complexes represent sophisticated learning environments that integrate diverse media types, interactive technologies, and immersive experiences to create comprehensive educational ecosystems. These environments leverage interactive simulations, These environments leverage interactive simulations, digital educational games, and multimedia content to provide learners with rich, contextual experiences that enhance understanding and retention, and multimedia content to provide learners with rich, contextual experiences that enhance understanding and retention (Khoroshevska & Khoroshevskyi, 2025; Khoroshevska & Khoroshevskyi, 2025). The integration of AI-generated quests within these multimedia complexes creates opportunities for seamless learning journeys that adapt content presentation, difficulty, and pacing based on real-time assessment of student performance and engagement.

Literature Review and Theoretical Framework

AI Technologies in Educational Game Development

Current research demonstrates that AI technologies in educational gaming can be categorised into several key areas: adaptive content generation, intelligent tutoring systems, and personalised learning pathways (Alharthi, 2025).

Procedural Content Generation (PCG) represents one of the most promising applications of AI in educational game development. Defined as the automatic creation of game content using algorithms, PCG has shown significant potential for increasing player engagement while reducing development costs. The integration of machine learning approaches into PCG has opened new avenues for creating adaptive educational content.

Generative Adversarial Networks (GANs) and transformer-based language models have emerged as particularly effective tools for creating dynamic educational content. These technologies enable the generation of adaptive systems that respond to player input and contribute to engaging learning experiences.

The emergent abilities of LLMs have created new opportunities for both playing and designing educational games. These models can adjust game difficulty, tune parameters in real-time, and generate content that adapts to individual learning styles and preferences. This capability represents a significant advancement over traditional

rule-based systems, enabling more sophisticated and responsive educational experiences.

Multimedia Educational Complexes and Immersive Learning Environments

The effectiveness of multimedia educational environments depends heavily on the thoughtful integration of various technological components (Khoroshevska & Khoroshevskyi, 2025; Khoroshevska et al., 2024). Virtual collaborative environments (Khoroshevska et al., 2024) have proven particularly effective in fields requiring team-based projects, where students can work together in shared virtual spaces while accessing rich multimedia resources and AI-driven support systems (Mallek et al., 2024). This integration creates seamless learning journeys that adapt to student progress and provide contextually appropriate challenges and support.

AI integration within multimedia educational complexes enables sophisticated content adaptation that responds to real-time assessment of student performance, engagement levels, and learning preferences. AI algorithms can modify presentation formats, adjust difficulty levels, and provide personalised feedback that enhances the overall learning experience (Mallek et al., 2024). This adaptive capability ensures that the rich multimedia environments remain focused on educational objectives while maximising student engagement and learning outcomes.

Rethinking the role of AI in educational technologies

AI as a Pedagogical Orchestrator in Quest Generation

The conceptualisation of artificial intelligence as a pedagogical orchestrator represents a fundamental reconceptualisation of AI's role in educational technology, moving beyond simple content generation toward sophisticated learning facilitation. In this capacity, AI functions as an intelligent mediator that coordinates multiple educational elements – learning objectives, student capabilities, content delivery, and assessment mechanisms – within the dynamic framework of open-world quest environments. This orchestration involves complex decision-making processes that must balance educational efficacy with learner autonomy, ensuring that generated quests serve specific pedagogical purposes while maintaining the exploratory freedom characteristic of open-world design.

The pedagogical orchestration function requires AI systems to continuously balance multiple competing demands: maintaining learner engagement while ensuring educational rigour, providing sufficient challenge without creating frustration, and offering personalisation while maintaining curricular coherence. This orchestration involves real-time analysis of learner performance data, environmental factors within the multimedia complex, and predetermined educational outcomes to generate quest experiences that are simultaneously engaging and educationally effective.

Personalisation and Adaptive Learning Through AI-Driven Quests

The integration of artificial intelligence into quest-based learning environments enables unprecedented levels of personalisation that extend far beyond traditional adaptive learning approaches. AI-driven personalisation in educational quests involves the dynamic modification of content, difficulty, pacing, and presentation based on continuous analysis of individual learner characteristics, performance patterns, and engagement indicators. This personalisation operates across multiple dimensions simultaneously, adjusting not only the academic challenge level but also narrative themes, interaction modalities, and collaborative opportunities to align with individual learning preferences and objectives.

Advanced personalisation capabilities include the adaptation of multimedia elements within quest environments to accommodate diverse learning modalities and accessibility requirements. AI systems can modify visual presentations, adjust audio components, and alter interaction mechanisms based on individual learner needs and preferences (Timotheou et al., 2023). This adaptive multimedia approach ensures that the rich, immersive environments characteristic of multimedia educational complexes and courses (Khoroshevska & Khoroshevskyi, 2025; Khoroshevska et al., 2024) remain accessible and effective for learners with varying abilities, learning styles, and technological proficiencies.

Integration of Multimedia Elements in Quest Design

The convergence of AI-generated quests with multimedia educational complexes creates unprecedented opportunities for immersive, multi-sensory learning experiences. This integration requires careful orchestration of diverse media types to enhance rather than overwhelm the learning process.

Contextual Media Integration

AI systems can strategically deploy multimedia elements based on real-time assessment of learner needs and quest context. Digital learning resources that combine text, image, video, and audio have demonstrated positive learning outcomes when properly integrated (Abdulrahaman et al., 2022). The key lies in AI's ability to select and sequence multimedia components that complement rather than compete with the primary learning objectives.

Interactive elements such as videos, quizzes, and simulations can be dynamically woven into quest narratives to create more engaging learning experiences (Khoroshevska & Khoroshevskyi, 2025; Zarifsanaiey et al., 2024). AI systems can analyse learner engagement patterns and preference data to determine optimal media combinations for specific quest segments, ensuring that multimedia enhancement serves pedagogical rather than merely aesthetic purposes.

Immersive Technology Integration

Virtual reality simulations and gamification elements represent powerful tools for creating dynamic learning experiences within open-world educational environments (Zarifsanaiey et al., 2024). Research demonstrates that immersive VR technologies have particularly strong impacts on learning at lower educational levels, suggesting significant potential for quest-based educational applications (Timotheou et al., 2023).

AI can orchestrate the integration of VR elements within larger quest narratives, creating seamless transitions between different levels of immersion based on learning objectives and technological capabilities. This approach allows for graduated exposure to immersive technologies, building learner comfort and competence while maximising educational impact.

Adaptive Media Delivery

The AI system must consider computational limitations and accessibility requirements when integrating multimedia elements into quest design. Effective implementation requires dynamic optimisation of media delivery based on available infrastructure, learner devices, and network capabilities (Zarifsanaiey et al., 2024). This ensures that multimedia enhancement remains accessible across diverse technological contexts.

Conclusion

The integration of artificial intelligence technologies for creating dynamic, personalised open-world quests within multimedia educational complexes represents a transformative approach to education that addresses contemporary learning challenges while preparing students for future technological landscapes. This comprehensive examination has revealed that successful implementation requires careful consideration of pedagogical principles, technological capabilities, and ethical implications to create effective learning environments that balance freedom with educational objectives.

The research demonstrates that AI's role extends beyond simple content generation to function as a sophisticated pedagogical orchestrator capable of adapting learning experiences in real-time based on individual student needs and progress. The combination of procedural content generation, machine learning algorithms, and generative AI technologies enables the creation of educational quests that maintain pedagogical integrity while providing unprecedented levels of personalisation and engagement.

The integration of multimedia elements into educational multimedia complexes leads to improved student engagement, increased motivation and better learning outcomes, especially when combined with well-designed gamification frameworks and immersion technologies.

References

1. Li, M., Ma, S., & Shi, Y. (2023). Examining the effectiveness of gamification as a tool promoting teaching and learning in educational settings: a meta-analysis. *Frontiers in psychology*, 14, 1253549. https://doi.org/10.3389/fpsyg.2023.1253549.

2. Asadzadeh, A., Shahrokhi, H., Shalchi, B., Khamnian, Z., & Rezaei-Hachesu, P. (2024). Serious educational games for children: A comprehensive framework. *Heliyon*, 10(6), e28108. https://doi.org/10.1016/j.heliyon.2024.e28108.

3. Gallotta, R., Todd, G., Zammit, M., Earle, S., Liapis, A., Togelius, J., & Yannakakis, G. N. (2024). *Large Language Models and Games: A Survey and Roadmap* (arXiv:2402.18659v5) [Preprint]. arXiv. https://arxiv.org/abs/2402.18659.

4. Khoroshevska, I., & Khoroshevskyi, O. Multimedia interactive training resources as important educational tools. *SYNTOPIA:* 2 st Conference on Digital Arts 2025, April 2-4 2025. Salamanca, Guanajuato, Mexico. Retrieved August 10, 2025, from https://www.youtube.com/watch?v=4h8OGwLsNKo.

5. Khoroshevska, I., & Khoroshevskyi, O. (2025). Digital training games as components of multimedia educational resource. *Information Technologies and Learning Tools*, 105(1), 52-72. https://doi.org/10.33407/itlt.v105i1.5862.

6. Alharthi S. A. (2025). Generative AI in Game Design: Enhancing Creativity or Constraining Innovation? *Journal of Intelligence*, 13(6), 60. https://doi.org/10.3390/jintelligence13060060.

7. Khoroshevska, I., Khoroshevskyi, O., Hrabovskyi, Y., Lukyanova, V., & Zhytlova, I. (2024). Development of a multimedia training course for user self-development. *Eastern-European Journal of Enterprise Technologies*, 2(2 (128), 48–63. https://doi.org/10.15587/1729-4061.2024.302884.

8. Mallek, F., Mazhar, T., Faisal Abbas Shah, S., Ghadi, Y. Y., & Hamam, H. (2024). A review on cultivating effective learning: synthesizing educational theories and virtual reality for enhanced educational experiences. *PeerJ. Computer science*, 10, e2000. https://doi.org/10.7717/peerj-cs.2000.

9. Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Monés, A. M., & Ioannou, A. (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Education and information technologies*, 28(6), 6695–6726. https://doi.org/10.1007/s10639-022-11431-8.

10. Abdulrahaman, M. D., Faruk, N., Oloyede, A. A., Surajudeen-Bakinde, N. T., Olawoyin, L. A., Mejabi, O. V., Imam-Fulani, Y. O., Fahm, A. O., & Azeez, A. L. (2020). Multimedia tools in the teaching and learning processes: A systematic review. *Heliyon*, 6(11), e05312. https://doi.org/10.1016/j.heliyon.2020.e05312.

11. Zarifsanaiey, N., Farrokhi, M. R., Karimian, Z., Hoseini, S., Chahartangi, F., & Shahraki, H. R. (2024). Lesson learned from assessing teachers' and students' perspectives regarding the quality of e-learning in medical education during the pandemic: a mixed-methods study. *BMC Medical Education*, 24(1), 171. https://doi.org/10.1186/s12909-024-05160-4.

UNDERSTANDING THE DISTINCTIVE FEATURES OF CAPSULE HOSTELS: AN ARCHITECTURAL PERSPECTIVE

РОЗУМІННЯ ВІДМІННІХ ОСОБЛИВОСТЕЙ КАПСУЛЬНИХ ХОСТЕЛІВ: АРХІТЕКТУРНА ПЕРСПЕКТИВА

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Summary

The article outlines the architectural features of capsule hostels as a distinct urban accommodation typology. It traces their origins in Japanese precedents (Capsule Inn Osaka, 1979; K. Kurokawa) and their evolution under pressures of urbanization, land costs, and new mobility patterns. The author systematizes principles of spatial efficiency: vertical and horizontal stacking of modules, standardized capsule dimensions (~2×1×1 m), circulation optimization, and the creation of perceptible volume in shared areas. The paper reviews micro-scale integration of building services (climate control, lighting, power, multimedia) and design innovations: stronger privacy, "hybrid accommodation" balancing the capsule with common spaces, and smart control technologies. It presents the material–technological basis of the type: modularity and prefabrication that accelerate assembly, ensure quality, and enable later reconfiguration. A substantial section addresses regulation: fire safety, density, and egress, sanitation; regulatory heterogeneity drives planning choices (in Japan, capsule