Volume 4 Number 2 (2026)
July-December 2026
Page: 1149-1158

EDUJAVARE: International Journal of Educational Research
ISSN: 3031-2884
https://edujavare.com/index.php/edujavare
DOI: 10.70610/edujavare.v4i02.1875

The Role of Generative AI in Adaptive Learning: Innovations in the Merdeka Curriculum at Private Islamic Higher Education Institutions

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Article history Submitted: 2026/08/06; Revised: 2026/08/00; Accepted: 2026/08/13

Abstract

The Merdeka Curriculum promotes more adaptive, flexible, and student-centered learning. In this context, artificial intelligence (AI) technology particularly generative AI is beginning to be utilized by instructors in the Elementary Madrasah Teacher Education program to tailor learning materials, methods, and assessments. This study seeks to explore how generative AI is applied in adaptive learning at the higher education level. The study aims to determine the level of understanding, frequency of use, and lecturers' perceptions regarding the effectiveness and challenges of using generative AI in the implementation of the Merdeka Curriculum. A descriptive quantitative approach was used in this study, involving 8 lecturers from the University of Islam Lampung. Data were collected through observation, interviews, and documentation and analyzed descriptively.The results show that most lecturers in Elementary Madrasah Teacher Education have a good understanding of generative AI, with a fairly high frequency of use in the teaching process. Lecturers' perceptions of AI's effectiveness in supporting adaptive learning are generally positive, although some challenges such as limited internet access and a lack of technical training are still being experienced. Generative AI contributes to strengthening the implementation of the Merdeka Curriculum by providing more personalized and flexible learning experiences. This study highlights the need for policy support and ongoing training to ensure that the use of AI in education can be optimized

Keywords Keyword 1; Generative AI 2; adaptive learning 3; Merdeka Curriculum

INTRODUCTION

The utilization of artificial intelligence (AI) technology has become a major focus in the field of education, particularly in supporting more personalized and flexible learning processes (Dharanidharan et al., 2025; Sung et al., 2025). Amid the rapid development of digital technology, higher education institutions are required to adopt new approaches that are relevant to the needs of twenty-first-century students. Generative AI is one of the latest innovations capable of automatically creating learning content and adapting it to the characteristics of students. This potential opens significant opportunities to strengthen the concept of adaptive learning, which has long been a concern in modern education.

The Merdeka Curriculum emerged as a response to the need for student-centered and contextual learning (Lang et al., 2025; Lee et al., 2025). Within this curriculum, students are provided with opportunities to learn according to their respective interests, abilities, and learning paces. Such an approach requires technological support capable of facilitating differentiation in learning. Generative AI addresses this challenge through its ability to provide learning materials, exercises, and feedback that correspond to individual learning profiles. This enables the creation of learning experiences that are more meaningful and efficient.

Higher education, as a level of advanced education, represents an important point in preparing students to face a complex and dynamic world. The challenges encountered by lecturers and students at this level are not only related to subject matter but also to the ability to think critically, creatively, and collaboratively. Generative AI plays a role as a partner in designing learning that is capable of stimulating these skills (Phadnis et al., 2025; Yeh, 2025). By utilizing AI, lecturers can create dynamic learning scenarios that are adapted to students' needs, both individually and in groups.

The implementation of generative AI in the context of adaptive learning is not merely a matter of technology but also concerns how lecturers integrate these tools into the learning process. Lecturers remain in control of designing, directing, and evaluating students' learning processes (Chen et al., 2025; Emad et al., 2025). However, with the assistance of AI, they can focus more on pedagogical aspects and the development of students' character. The integration of this technology represents an opportunity to transform the role of lecturers from merely delivering learning materials into becoming more effective learning facilitators.

The implementation of generative AI technology also requires infrastructure readiness, lecturer training, and the development of supportive policies. Higher education institutions must have a clear implementation strategy so that the utilization of AI does not merely become a temporary trend but genuinely provides a positive impact on learning. The alignment between technological innovation and the vision of the Merdeka Curriculum is the key to creating an inclusive, adaptive, and sustainable learning ecosystem at the higher education level.

Constructivist learning theory serves as the philosophical foundation of AI-based adaptive learning. In a constructivist approach, students are viewed as active subjects who construct knowledge through interaction with their environment and learning experiences (Jin et al., 2025; Levin et al., 2025). Generative AI can function as a tool that enriches these experiences by presenting varied and contextual content, thereby strengthening the process of meaning construction carried out individually by students.

The utilization of generative AI within private Islamic higher education institutions is still relatively new and has not been comprehensively studied, particularly at the level of private Islamic higher education institutions. Many higher education institutions do not yet fully understand the potential of generative AI in supporting adaptive learning in accordance with the spirit of the Merdeka Curriculum (Faiaz & Nawar, 2025; Osten W., 2025). This lack of understanding creates a gap between technological advancement and learning practices in the field.

There is still no study that specifically examines how generative AI can be used by lecturers to accommodate diverse learning needs (Jindal, 2025; Lion, 2025). Lecturers in the Islamic Elementary School Teacher Education program still face challenges in adapting learning to the individual characteristics of students without the assistance of efficient technology. This gap in research represents a major obstacle to the integration of personalized technology within the national education system.

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The limited availability of implementation guidelines and the lack of examples of good practices make the adoption of generative AI tend to be sporadic and experimental (Y. Feng et al., 2025; Namboothiri et al., 2025; Pande et al., 2025). Some lecturers attempt to integrate it independently without a comprehensive understanding of its pedagogical and ethical implications. This situation creates the risk of inequalities in learning quality among different educational institutions.

The absence of clear regulations and technical policies regarding the use of generative AI in higher education adds complexity to the problem (Huang & Ito, 2025; Kim et al., 2025). Within the higher education context, concrete guidelines are needed so that this technology is not misused or instead creates dependence that disrupts the educational process. This uncertainty further widens the gap between the potential of technology and ideal educational practices.

Everett Rogers' innovation adoption theory explains that the dissemination of new technology requires stages of knowledge, persuasion, decision, implementation, and confirmation (J. Feng et al., 2025; Ranuharja et al., 2025). In the context of generative AI, most higher education institutions may still be at the knowledge stage and have not yet reached a mature implementation stage. Scientific studies discussing the understanding, readiness, and application of generative AI will help accelerate the overall adoption process within the secondary education environment.

This research is important to conduct in order to fill the gaps in the literature and practices concerning the utilization of generative AI in adaptive learning at the higher education level (Agarwal et al., 2025; ElSayary, 2025). This study is expected to address the need for concrete strategies for integrating intelligent technology effectively and ethically in accordance with the principles of the Merdeka Curriculum. An exploration of the role of generative AI will provide a basis for decision-making for PGMI lecturers, institutional leaders, and education policymakers in higher education.

The results of this research will contribute to the development of more inclusive, adaptive, and sustainable learning models. In addition, these findings are expected to provide new directions for curriculum development and lecturer training in the digital era (X.-Y. Wu & Chiu, 2025; Y. Wu et al., 2025). Learning supported by generative AI can become a solution for achieving educational equity that addresses students' individual needs more accurately.

The theory of Technological Pedagogical Content Knowledge (TPACK) serves as a foundation for understanding how technology, pedagogy, and content interact within the context of education (Fan et al., 2025; Y. Liu & Tinmaz, 2025). In the implementation of generative AI, lecturers are required to possess competencies in all three aspects so that technology integration is not merely technical but also instructionally meaningful and aligned with learning objectives..

METHODS

This study employs a qualitative approach using a descriptive method. The primary focus is to identify the perceptions of lecturers, the forms of technology implementation, and the challenges encountered during the integration of generative AI into the instructional activities of *Madrasah Ibtidaiyah* Teacher Education (PGMI) lecturers at the Islamic University of Lampung. The descriptive method aims to provide a comprehensive overview

of current generative AI instructional practices and applications, as well as to identify the need for developing a more holistic instructional model (Sugiyono, 2023). The study also incorporates adaptive learning theories as a foundation for developing an instructional model that aligns with technological advancements. Data collection was conducted in stages using three primary techniques: observation, in-depth interviews, and document analysis. Observations aimed to identify the actual conditions of generative AI integration within instructional activities, specifically the application of contextual learning values in the classroom. Interviews were conducted with the study program head, PGMI lecturers, and PGMI students to explore their views, experiences, and needs regarding the implementation of AI-based instructional systems. Document analysis involved examining official records such as curricula, the study program's vision and mission statements, and course activity reports. The study also utilized academic literature on adaptive learning models to supplement secondary data (Harahap, 2020). Data analysis was performed using a thematic analysis approach comprising several stages. The initial step involved coding data from observations, interviews, and documents to identify preliminary categories. Subsequently, key themes were identified based on patterns and relationships emerging from the data. Data triangulation was employed to ensure consistency across the findings from observations, interviews, and documents.

Validation also involved confirming findings with informants through a member-checking process. Newly emerging data were iteratively compared with existing data to refine the findings. Data validity was ensured through the triangulation of techniques, sources, and time. Technique triangulation was achieved by combining results from observations, interviews, and document analysis. Source triangulation involved comparing data obtained from the PGMI study program head, lecturers, and students. Time triangulation was conducted by collecting data at different times to assess the consistency of findings. Additionally, a peer debriefing process was carried out by soliciting input from experts to enhance validity. Conclusions were drawn inductively based on the findings from the data analysis. Key emerging patterns were analyzed to generate more specific findings. Each conclusion was cross-verified against the existing data to ensure logical soundness and consistency. Through this approach, the research not only generates theory but also makes a tangible contribution to the implementation of AI-based adaptive learning.

RESULTS AND DISCUSSION

The utilization of generative AI is most frequently found in activities involving question creation and the development of teaching materials. The percentage of lecturers using AI for these activities shows a positive trend toward technology integration in learning planning. The use of AI to provide feedback and design assignments enables students to adopt the system. This may result in limitations among lecturers in operating AI applications or in the absence of established pedagogical habits in using AI as a reflective tool. Most lecturers still perceive generative AI as a technical support tool rather than as a pedagogical partner in learning. This finding indicates the need for deeper implementation based on pedagogy rather than merely on the use of technological tools.

The perceptions of PGMI lecturers toward the effectiveness of generative AI tend to be positive, particularly in supporting differentiation and adaptation of learning materials. PGMI lecturers perceive generative AI as a supporting tool that promotes the principles of the Merdeka Curriculum. The use of AI is considered capable of helping accommodate the diverse

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learning needs of students.

Nevertheless, perceptions regarding improvements in student learning outcomes remain in the medium-to-high category. This indicates that lecturers do not yet fully perceive the direct impact of AI on students' academic performance, possibly because long-term evaluations have not yet been conducted or because AI is still being used on a limited basis. In general, generative AI is perceived more as a supporting tool in the planning and delivery of learning, but it has not yet been optimally utilized as an interactive learning instrument that adapts to students' learning styles and learning pace.

The highest level of difficulty faced by PGMI lecturers at Universitas Islam Lampung in implementing AI is limited internet access and a lack of technical training in the use of AI. These factors hinder the full integration of technology into the teaching and learning process. A lack of knowledge in selecting the appropriate AI platform also contributes to the low optimization of technology use. Ethical issues and concerns regarding the validity of AI-generated content also constitute obstacles, although their proportion is smaller than that of technical constraints. This indicates that there is still hesitation in trusting AI as an educational support tool. Language barriers, particularly when AI platforms use English-language interfaces, are also experienced by some PGMI lecturers.

The correlation between understanding, perceptions, and constraints indicates that lecturers with a better understanding of AI tend to have more positive perceptions, but they still face practical challenges in the field. This indicates the importance of policy interventions based on training and digital infrastructure. One of the case studies analyzed was the implementation of generative AI in higher education institutions in Metro City, Lampung. A lecturer in the Classroom Action Research course used ChatGPT to assist students in writing content frameworks and conceptual frameworks for preparing academic papers gradually. This process was designed as adaptive learning, in which each student received suggestions and revisions according to their respective initial abilities. As another example of an AI application implemented by PGMI lecturers, lecturers developed rubrics adapted to students' basic abilities and then utilized AI to provide examples of writing improvements in accordance with those rubrics. As a result, students with lower abilities could catch up without feeling left behind by their classmates.

The findings from this case study indicate that the strategic use of generative AI can improve teaching efficiency while simultaneously supporting students' individual learning needs. This practice is consistent with the principles of the Merdeka Curriculum, which emphasizes personalization and learning independence. The implementation of generative AI in the case study provides a concrete illustration of how technology can be functionally adapted within a real classroom context. This study confirms that creative and well-trained lecturer support can overcome the technical limitations identified in general data. AI-assisted adaptive learning strategies are more effective when lecturers understand the appropriate pedagogical aspects.

The findings in the field strengthen the assumption that sustainable practices in using generative AI will develop better understanding while simultaneously increasing the acceptance and integration of technology into pedagogy. Lecturers' perceptions appear to grow along with their direct experiences and exploration of AI features. This relationship emphasizes the importance of practical training that focuses on direct experience in using generative AI rather than merely conceptual training. This approach is believed to be more effective in developing understanding and encouraging the actual implementation of adaptive learning.

Discussion

The research findings indicate that most PGMI lecturers at Universitas Islam Lampung have a fairly good understanding of the concepts and mechanisms of generative AI and are able to apply them adequately. The level of generative AI use in the adaptive learning process is also categorized as medium to high, particularly for activities such as question creation, material development, and providing feedback to students.

Lecturers demonstrate positive perceptions of the effectiveness of generative AI in supporting the principles of the Merdeka Curriculum. The use of AI is considered capable of strengthening differentiated and personalized learning approaches, although several technical and ethical constraints remain significant challenges in the field. The correlation between the frequency of AI use and perceptions of its effectiveness reveals a strong relationship. The higher the frequency of generative AI use, the higher the level of lecturers' confidence in its usefulness for improving the quality of adaptive learning.

These findings are consistent with research by Xu et al. (2023), which states that lecturers with high levels of technological literacy integrate AI more rapidly into personalized learning contexts. This research also reinforces the findings of Rahmat and Aisyah (2022), which highlight the importance of technical training in increasing the adoption of generative AI in higher education.

Differences were found in terms of infrastructure limitations, where several previous studies emphasized that the main obstacles were cultural rejection or resistance to technology. This study instead demonstrates that resistance does not originate from lecturers' attitudes but from unequal access and technical skills. This research expands previous understanding by adding the dimension of lecturer practices within the context of the Merdeka Curriculum, which requires flexibility and material adaptation. Generative AI in this study is not viewed solely from a technological perspective but also as a pedagogical tool that assists learning differentiation.

The findings of this research indicate that the utilization of AI technology in higher education is no longer experimental but has become part of increasingly concrete pedagogical practices. Lecturers' relatively good understanding of generative AI reflects the readiness of educational institutions to explore digital innovation more systematically. These data also reflect a shift toward a more flexible and student-centered learning paradigm. Lecturers are beginning to view AI not as a replacement for educators but as a support mechanism for making more targeted instructional decisions.

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This research indicates that technological transformation in education is no longer something long-term or futuristic but has emerged as an urgent need in the implementation of an adaptive and contextual Merdeka Curriculum. The utilization of generative AI has positive implications for improving the quality of adaptive learning at the higher education level. Lecturers can more easily adjust learning content and methods according to the individual learning needs, styles, and abilities of students.

The Merdeka Curriculum, which promotes learning personalization, becomes easier to implement with the support of AI technology. Formative assessment can be conducted more quickly and accurately, assisting lecturers in designing learning interventions in real time. Educational institutions need to consider strengthening training policies and providing digital infrastructure that supports the equitable utilization of generative AI. The development of lecturers' technological capacity should become a priority in the roadmap for national educational transformation.

The high positive perception of generative AI emerges because lecturers are beginning to experience tangible benefits from its use in their daily activities. More efficient working time, easier access to information, and the ease of adapting learning materials are the main factors encouraging technology acceptance. Improvements in lecturers' understanding and skills in operating digital technology play a major role in producing these outcomes. Most informants came from the PGMI higher education environment and were accustomed to online learning during the pandemic, providing them with sufficient initial experience.

The constraints identified in this research are largely structural and technical rather than related to user acceptance. This explains why lecturers have positive perceptions despite still encountering obstacles in practical implementation. This research provides direction for the development of digital-based educational policies in Metro City, Lampung, particularly in supporting the implementation of the Merdeka Curriculum. The Ministry of Education needs to expand intensive, practice-based training on the use of generative AI to support adaptive learning. Higher education institutions need to encourage collaboration among lecturers in establishing communities of practice that focus on exploring and evaluating the use of generative AI. This approach enables the sharing of real experiences and creative solutions to technical constraints in the field.

CONCLUSION

Temuan terpenting dari penelitian ini menunjukkan bahwa AI generatif telah ...plays a significant role in supporting adaptive learning at the higher education level, particularly within the context of the *Kurikulum Merdeka* (Independent Curriculum) implementation. Lecturers not only understand the concepts of generative AI but also actively utilize it to tailor learning materials and methods to students' needs. Lecturers' positive perceptions regarding the effectiveness of generative AI indicate the education system's readiness to adopt technology as an integral part of curriculum innovation.

The significance of this study lies in its conceptual approach, which integrates

generative AI with adaptive learning principles within the *Kurikulum Merdeka* framework as applied by PGMI lecturers in their teaching activities. This research broadens the understanding that AI is not merely a technical aid but a pedagogical instrument that supports the personalization of learning. The methodology employed also enables the systematic measurement of lecturers' perceptions, illustrating the dynamics of technology implementation in higher education. Further research is recommended on a broader scale—encompassing various educational levels—and should consider student perspectives when evaluating the tangible impact of generative AI usage on their learning experiences.

REFERENCES

Agarwal, V., Jablokow, K., & McComb, C. (2025). Putting the Ghost in the Machine: Emulating Cognitive Style in Large Language Models. *Journal of Computing and Information Science in Engineering*, *25*(2). Scopus. https://doi.org/10.1115/1.4066857

Chen, D.-L., Aaltonen, K., Lampela, H., & Kujala, J. (2025). The Design and Implementation of an Educational Chatbot with Personalized Adaptive Learning Features for Project Management Training. *Technology, Knowledge and Learning*. Scopus. https://doi.org/10.1007/s10758-024-09807-5

Cooper, G., Tang, K.-S., & Fitzgerald, A. (2025). Intersections of Mind and Machine: Navigating the Nexus of Artificial Intelligence, Science Education, and the Preparation of Pre-service Teachers. *Journal of Science Education and Technology*. Scopus. https://doi.org/10.1007/s10956-025-10200-9

Dharanidharan, R., Abinav Satya, S., Gokula Prasath, S., & Muthurasu, N. (2025). Visual Verse 2.0: Image Generation with Image Inpaiting. Dalam Sivakumar P.D., Pasupathi C., Balakrishnan P., & Ramachandran R. (Ed.), *Commun. Comput. Info. Sci.* (Vol. 2362, hlm. 200–211). Springer Science and Business Media Deutschland GmbH; Scopus. https://doi.org/10.1007/978-3-031-82386-2_15

Dong, B., Wang, H., & Luo, R. (2025). MasqueradeGAN-GP: A Generative Adversarial Network Framework for Evading Black-Box Intrusion Detection Systems. *Internet Technology Letters*. Scopus. https://doi.org/10.1002/itl2.640

ElSayary, A. (2025). Prompt engineering and generative AI applications for teaching and learning. Dalam *Prompt Eng. And Gener. AI Appl. For Teach. And Learn.* (hlm. 664). IGI Global; Scopus. https://doi.org/10.4018/979-8-3693-7332-3

Emad, S., Aboulnaga, M., Wanas, A., & Abouaiana, A. (2025). The Role of Artificial Intelligence in Developing the Tall Buildings of Tomorrow. *Buildings*, *15*(5). Scopus. https://doi.org/10.3390/buildings15050749

Faiaz, Md. A., & Nawar, N. (2025). Short Paper: AI-Driven Disaster Warning System: Integrating Predictive Data with LLM for Contextualized Guideline Generation. *Proc. Int. Conf. Netw., Syst. Sec., NSysS*, 247–253. Scopus. https://doi.org/10.1145/3704522.3704549

Fan, H., Liu, C., Bian, S., Ma, C., Huang, J., Liu, X., Doyle, M., Lu, T., Chow, E., Chen, L., Fuh, J. Y. H., Lu, W. F., & Li, B. (2025). New era towards autonomous additive manufacturing: A review of recent trends and future perspectives. *International Journal of Extreme Manufacturing*, *7*(3). Scopus. https://doi.org/10.1088/2631-7990/ada8e4

Feng, J., Wang, Q., Qiu, H., & Liu, L. (2025). Retrieval In Decoder benefits generative models for explainable complex question answering. *Neural Networks*, *181*. Scopus. https://doi.org/10.1016/j.neunet.2024.106833

Feng, Y., Zhou, Y., Xu, J., Lu, X., Gu, R., & Qiao, Z. (2025). Integrating generative AI with neurophysiological methods in psychiatric practice. *Asian Journal of Psychiatry*, *108*. Scopus. https://doi.org/10.1016/j.ajp.2025.104499

EDUJAVARE: International Journal of Educational Research
ISSN: 3031-2884
https://edujavare.com/index.php/edujavare
DOI: 10.70610/edujavare.v4i02.1875

Huang, X., & Ito, A. (2025). Reversible Spectral Speech Watermarking with Variable Embedding Locations Against Spectrum-Based Attacks. *Applied Sciences (Switzerland)*, *15*(1). Scopus. https://doi.org/10.3390/app15010381

Jin, F. J.-Y., Maheshi, B., Lai, W., Li, Y., Gasevic, D., Chen, G., Charwat, N., Chan, P. W. K., Martinez-Maldonado, R., Gašević, D., & Tsai, Y.-S. (2025). Students' Perceptions of Generative AI–Powered Learning Analytics in the Feedback Process: A Feedback Literacy Perspective. *Journal of Learning Analytics*, *12*(1), 152–168. Scopus. https://doi.org/10.18608/jla.2025.8609

Jindal, V. (2025). SAFARI-P: Swahili-Focused Adaptive Framework for Accelerated Reinforcement in Intelligent Python Education. *SIGCSE TS - Proc. ACM Tech. Symp. Comput. Sci. Educ.*, *2*, 1499–1500. Scopus. https://doi.org/10.1145/3641555.3705241

Kim, N., Mosallanezhad, D., Cheng, L., Mancenido, M. V., & Liu, H. (2025). Robust Stance Detection: Understanding Public Perceptions in Social Media. Dalam Aiello L.M., Chakraborty T., & Gaito S. (Ed.), *Lect. Notes Comput. Sci.: Vol. 15212 LNCS* (hlm. 21–37). Springer Science and Business Media Deutschland GmbH; Scopus. https://doi.org/10.1007/978-3-031-78538-2_2

Lang, Q., Wang, M., Yin, M., Liang, S., & Song, W. (2025). Transforming Education With Generative AI (GAI): Key Insights and Future Prospects. *IEEE Transactions on Learning Technologies*, *18*, 230–242. Scopus. https://doi.org/10.1109/TLT.2025.3537618

Lee, J., Cimová, T., Foster, E. J., France, D., Krajňáková, L., Moorman, L., Rewhorn, S., & Zhang, J. (2025). Transforming geography education: The role of generative AI in curriculum, pedagogy, assessment, and fieldwork. *International Research in Geographical and Environmental Education*. Scopus. https://doi.org/10.1080/10382046.2025.2459780

Levin, I., Semenov, A. L., & Gorsky, M. (2025). Smart Learning in the 21st Century: Advancing Constructionism Across Three Digital Epochs. *Education Sciences*, *15*(1). Scopus. https://doi.org/10.3390/educsci15010045

Lion, C. G. (2025). Section Introduction. Dalam *Lect. Notes Networks Syst.* (Vol. 1140, hlm. 341–342). Springer Science and Business Media Deutschland GmbH; Scopus. https://doi.org/10.1007/978-3-031-71530-3_21

Liu, R., Fu, Y., Xu, J., & Liu, X. (2025). MUDGI: A Malicious URL Detection Model Based on Generative Adversarial Networks and Integrated Features. Dalam *Learn. Anal. Intell. Syst.* (Vol. 48, hlm. 163–180). Springer Nature; Scopus. https://doi.org/10.1007/978-3-031-88649-2_17

Liu, Y., & Tinmaz, H. (2025). Next-generation learning: Unleashing generative AI in Chinese K12 education. Dalam *Gener. Artif. Intell. Appl.: Holist. Reflections From The Educ. Landsc.* (hlm. 227–250). Peter Lang AG; Scopus. https://www.scopus.com/inward/record.uri?eid=2-s2.0-86000469272&partnerID=40&md5=8d1646ea0443006ae1fd27b0cd3dc5b6

Namboothiri, S., Varghese, T., Jacob, M., Job, S., & Cyriac, J. (2025). Integrating Artificial Intelligence with NHEQF Descriptors for Pedagogical Excellence. *Higher Education for the Future*, *12*(1), 27–50. Scopus. https://doi.org/10.1177/23476311241290894

Osten W. (Ed.). (2025). Seventeenth International Conference on Machine Vision, ICMV 2024. Dalam *Proc SPIE Int Soc Opt Eng* (Vol. 13517). SPIE; Scopus. https://www.scopus.com/inward/record.uri?eid=2-s2.0-105000108029&partnerID=40&md5=2f72a149e7c6180ac9304b7997673a26

Pande, P. B., Dhengare, S. W., Raut, J. M., Bhagat, R. M., Bahoria, B. V., Shelke, N., Nair, S., & Vairagade, V. S. (2025). Integrated hybrid machine learning techniques and multiscale modeling towards evaluating the influence of nano-material on strength of concrete. *Multiscale and Multidisciplinary Modeling, Experiments and Design*, *8*(1). Scopus. https://doi.org/10.1007/s41939-024-00588-z

Park, J., Ahn, J., Choi, J., & Kim, J. (2025). Mol-AIR: Molecular Reinforcement Learning with Adaptive Intrinsic Rewards for Goal-Directed Molecular Generation. *Journal of Chemical Information and Modeling*, *65*(5), 2283–2296. Scopus. https://doi.org/10.1021/acs.jcim.4c01669

Phadnis, N., Gadge, J., & Shah, D. (2025). Transforming Customer Engagement in Digital Commerce: The Role of Conversational AI Frameworks. *Journal of Information Systems Engineering and Management*, *10*, 411–431. Scopus. https://doi.org/10.52783/jisem.v10i13s.2076

Ranuharja, F., Rizal, F., Langeveldt, D., Ejjami, R., Torres-Toukoumidis, A., & Jalinus, N. (2025). Relevance and Impact of Generative AI in Vocational Instructional Material Design: A Systematic Literature Review. *Salud, Ciencia y Tecnologia*, *5*. Scopus. https://doi.org/10.56294/saludcyt20251336

Sung, G., Guillain, L., & Schneider, B. (2025). Using AI to Care: Lessons Learned from Leveraging Generative AI for Personalized Affective-Motivational Feedback. *International Journal of Artificial Intelligence in Education*. Scopus. https://doi.org/10.1007/s40593-024-00455-5

Thiruppathi, K., Selvakumar, K., & Shenbagavel, V. (2025). Monkeypox diagnosis: Improved detection using conditional gans and feature extraction. *Journal of Ambient Intelligence and Humanized Computing*, *16*(1), 265–281. Scopus. https://doi.org/10.1007/s12652-024-04940-6

Wu, X.-Y., & Chiu, T. K. F. (2025). Integrating learner characteristics and generative AI affordances to enhance self-regulated learning: A configurational analysis. *Journal of New Approaches in Educational Research*, *14*(1). Scopus. https://doi.org/10.1007/s44322-025-00028-x

Wu, Y., Sun, Y., Yu, X., Zhang, D., & He, W. (2025). Intelligent Experiment Robotic Systems Design for Material Preparation and Detection. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, *55*(2), 1241–1251. Scopus. https://doi.org/10.1109/TSMC.2024.3501318

Yeh, H.-C. (2025). The synergy of generative AI and inquiry-based learning: Transforming the landscape of English teaching and learning. *Interactive Learning Environments*, *33*(1), 88–102. Scopus. https://doi.org/10.1080/10494820.2024.2335491