PEDAGOGIK | JURNAL PENDIDIKAN
P-ISSN : 2528-5793
E-ISSN : 2354-7960

THE TRANSFORMATION OF LEARNING MODEL BASED ON CRITICAL DIGITAL LITERACY IN HIGHER EDUCATION

Umar Manshur [1]; Fathor Rozi [2]*
[1] Nurul Jadid University, East Java, Indonesia
Correspondence Author: umarmanshur@unuja.ac.id

Received: September 2025	**Accepted:** December 2025	**Published:** December 2025
DOI: https://doi.org/10.33650.pjp.v12i2.12314		

Abstract : *Low literacy and critical thinking skills remain a serious challenge to improving the quality of education in Indonesia. In the context of Islamic boarding schools (pesantren), this challenge is further complicated by the need to integrate Islamic values, the scholarly traditions of Islamic boarding schools, and the demands of 21st-century competencies. Therefore, transforming learning models that integrate critical digital literacy is an urgent need to improve the quality of learning. This study aims to analyze the transformation of critical digital literacy-based learning models in Islamic boarding schools (pesantren). The study employed a qualitative approach with a multi-site case study design. Data were collected through observation, interviews, and documentation, then analyzed using the Miles and Huberman model. The results show the development of critical digital literacy characteristics in students, including the use of digital devices, information management, digital content transformation, and socio-cultural understanding. Furthermore, the evolving learning model is adaptive, with technology integration, information exploration, collaboration, project-based learning, and a shift in the role of lecturers to facilitators. These findings confirm that critical digital literacy is not only technical but also reflective and contextual, integrated with Islamic boarding school values.*

Keywords : *Critical Digital Literacy; Learning Model; Transformation.*

Abstrak : *Rendahnya literasi dan kemampuan berpikir kritis masih menjadi tantangan serius dalam peningkatan kualitas pendidikan di Indonesia. Dalam konteks perguruan tinggi pesantren, tantangan ini menjadi semakin kompleks karena perlu adanya integrasi antara nilai-nilai keislaman, tradisi keilmuan pesantren, dan tuntutan kompetensi abad ke-21. Oleh karena itu, transformasi model pembelajaran yang mengintegrasikan literasi digital kritis menjadi kebutuhan mendesak untuk meningkatkan kualitas pembelajaran. Penelitian ini bertujuan menganalisis transformasi model pembelajaran berbasis literasi digital kritis di perguruan tinggi pesantren. Penelitian menggunakan pendekatan kualitatif dengan desain studi kasus multisitus. Data dikumpulkan melalui observasi, wawancara, dan dokumentasi, kemudian dianalisis menggunakan model Miles dan Huberman. Hasil penelitian menunjukkan terbentuknya karakteristik literasi digital kritis mahasiswa yang meliputi penggunaan perangkat digital, pengelolaan informasi, transformasi konten digital, serta pemahaman sosial budaya. Selain itu, model pembelajaran yang berkembang bersifat adaptif dengan integrasi teknologi, eksplorasi informasi, kolaborasi, pembelajaran berbasis proyek, serta pergeseran peran dosen menjadi fasilitator. Temuan ini menegaskan bahwa literasi digital kritis tidak hanya bersifat teknis, tetapi juga reflektif dan kontekstual yang terintegrasi dengan nilai-nilai pesantren.*

Kata Kunci : *Literasi Digital Kritis; Model Pembelajaran; Transformasi.*

INTRODUCTION

Literacy issues have become a strategic national issue, driven by Indonesia's low performance in global assessments such as the PISA (Planning for Student Admissions). This situation indicates that students' reading, comprehension, and information processing abilities are still suboptimal (Zhang & Lian, 2024). On the other hand, developments in information and communication technology present both opportunities and challenges in education (Faishol & Zuhro, 2024; Mozumder, 2022). Technology enables the creation of independent and virtual learning environments through various digital platforms, but also has the potential to lead to learning disorientation if not managed appropriately (Bin Hasan et al., 2024; Hasanah & Sain, 2025; Tafazoli, 2024). Furthermore, many educational institutions still face limitations in human resources, infrastructure, and teacher-centered learning systems (El Koshiry et al., 2023; Khosravi et al., 2023). As a result, the learning process does not fully foster higher-order thinking skills. Therefore, a digital literacy-based learning transformation is an urgent need to address the challenges of 21st-century education.

Several previous studies have shown that strengthening digital literacy can be achieved through various innovative learning strategies, such as the use of digital media, the integration of a school literacy culture, and the implementation of feedback journaling programs (Alvarado-Bravo et al., 2024; Yong et al., 2024). These studies share a common understanding of the importance of literacy as a foundation for improving critical thinking skills and student learning outcomes. However, most research still focuses on the context of schools or specific community groups, without specifically examining the transformation of learning in Islamic boarding school-based higher education institutions (Mundiri et al., 2021; Shirish et al., 2023; Ubaidillah & Mundiri, 2023). This study differs in its focus on examining the transformation of critical digital literacy-based learning models in Islamic boarding school environments, taking into account inherent traditional values (Safuan et al., 2024; Sailin et al., 2024; Shuhaizam Said et al., 2023). Therefore, this research is expected to fill this gap and provide a new contribution to the development of digital literacy in higher education.

Based on this background, this study focuses on the transformation of critical digital literacy-based learning in Islamic boarding school institutions, with the aim of analyzing how learning models are developed to enhance students' higher-order thinking skills. The uniqueness of this research lies in its effort to integrate traditional Islamic boarding school values with the demands of digital literacy in the modern era. This is crucial because social reality demonstrates that today's students live in a massive flow of digital information, requiring the ability to filter, evaluate, and utilize information wisely. Therefore, this

research focuses not only on the technical aspects of learning but also on developing students' critical and adaptive character in navigating the digital era.

This research is assumed to take place in real-life settings at Nurul Jadid University and Ibrahimy University, Islamic boarding school-based universities that have implemented various learning innovations. In both institutions, learning transformation is evident through the provision of digital facilities, strengthening literacy-based curricula, and developing learning strategies that encourage active student participation. Nevertheless, the transformation process maintains the distinctive values of Islamic boarding schools, such as the balance between tradition and modernity. This uniqueness demonstrates that digital literacy is not only interpreted as technical skills, but also as critical skills in understanding religious and social information circulating in digital media. Therefore, this research assumes that the integration of Islamic boarding school values with critical digital literacy can produce a learning model that is relevant, adaptive, and character-based.

METHOD

This research uses a qualitative approach with a multi-site case study design to in-depth examine the transformation of critical digital literacy-based learning models in Islamic boarding school-based higher education institutions. The qualitative approach was chosen because it allows for a holistic, contextual, and in-depth description of phenomena related to learning practices evolving in real-world settings (Moleong, 2020). The multi-site case study design was used to enable comparative exploration across two research sites with similar characteristics: Nurul Jadid University in Probolinggo and Ibrahimy University. The research focuses on how learning transformations are designed, implemented, and interpreted by educational actors in response to the demands of critical digital literacy in the modern era.

The research locations are Nurul Jadid University in Probolinggo and Ibrahimy University, both universities under the auspices of Islamic boarding schools and have implemented digital technology-based learning governance transformations. The research subjects included university leaders, lecturers, curriculum managers, and students directly involved in the digital literacy-based learning process. Informants were selected using a purposive sampling technique based on their involvement and strategic role in the implementation of digital learning(Yin, 2018). Additionally, a snowball sampling technique was used to identify additional relevant informants. Participant selection criteria included

experience in learning development, the use of digital technology, and involvement in the learning transformation process.

Data collection was conducted through participant observation, in-depth interviews, and documentation studies. Observations focused on digital-based learning practices, lecturer-student interactions, and the use of learning media and platforms. Semi-structured interviews were conducted to explore experiences, perceptions, and strategies used in developing critical digital literacy. Documentation included analysis of the curriculum, learning tools, institutional policies, and archives of learning technology use. All data were collected in the form of field notes, interview transcripts, and digital documents to build a comprehensive database.

Data analysis employed the Miles and Huberman interactive model, which includes data reduction, data presentation, and drawing conclusions. The analysis process began with repeated reading of all data to gain a comprehensive understanding. Next, coding was conducted to identify important themes such as learning design, digital literacy strategies, and the forms of transformation that occurred. Codes with similar meanings were then grouped into categories and developed into main themes. This process was carried out iteratively and reflectively to ensure the validity and consistency of the findings. To ensure data validity, this study employed triangulation of sources and techniques by comparing data from observations, interviews, and documentation. Member checking was also conducted by requesting confirmation from informants regarding the researcher's interpretations. Peer discussions were also conducted to enhance analytical rigor and minimize subjective bias. The entire research process was documented through an audit trail to ensure transparency and traceability.

This study upholds the principles of informed consent, confidentiality, and anonymity of participants. Each informant was provided with an explanation of the research objectives and procedures prior to data collection. Individual and institutional identities were disguised to maintain privacy. The data obtained were used solely for academic purposes. With this methodological approach, the research is expected to yield a comprehensive understanding of the transformation of critical digital literacy-based learning in Islamic boarding schools.

RESULT AND DISCUSSION

The results section is presented before the discussion as two interrelated subsections. The results section presents the research's empirical findings based on field data, while the discussion section interprets these findings by linking them to the theoretical framework

and previous research, thus providing a comprehensive understanding of the phenomenon being studied.

1. The Characteristics of Critical Digital Literacy

The development of contemporary society is marked by accelerated social change triggered by the advancement of the internet as a catalyst for globalization. The open flow of information enables massive cultural exchange across regions and even countries, ultimately giving rise to a new generation with distinct mindsets, attitudes, and social interactions. This situation not only brings positive impacts such as easier access to information and increased social awareness, but also creates challenges such as the weakening of direct social relationships and the tendency for individuals to become immersed in the uncontrolled flow of digital information. This phenomenon also impacts the world of education, including Islamic boarding school-based universities, which must be able to adapt to technological disruption without losing their traditional values.

In the context of Islamic boarding school-based universities, digital literacy transformation does not occur freely, but rather through a process of value filtration by Islamic boarding school (kiai) as cultural brokers. This role is key in maintaining a balance between technology adoption and the preservation of Islamic boarding school values. Therefore, developing digital literacy is not merely technical, but also critical and contextual. Students are required not only to be able to use technology, but also to possess the ability to analyze, evaluate, and utilize information wisely. Research data shows that the characteristics of critical digital literacy of students at Nurul Jadid University can be classified into several main aspects as summarized in the following table.

Table 1: Characteristics of Critical Digital Literacy

No	Interview/ Observation Data	Description	Code
1.	Students actively use platforms such as YouTube, campus e-learning, and video conferencing applications in learning.	Ability to utilize digital devices and platforms to support learning activities	Use of Digital Devices
2.	College assignments include creating videos, podcasts, and other digital content.	Ability to produce and convey information through digital media	Digital Transformation
3	Students use online journals, social media, and Telegram groups as reference sources.	The ability to access, manage, and evaluate digital information	Information Literacy
4	The formation of academic communities such as the "Pojok Surau Study Group"	Ability to understand social and cultural phenomena through digital media	Socio-Cultural Understanding

Table 1 shows that students' critical digital literacy is not limited to technology use but encompasses cognitive, creative, and social dimensions. These findings point to several key characteristics of critical digital literacy developing in Islamic boarding school environments.

Table 2: Empirical Evidence of Student Work Published on Digital Platforms (Academic and Creative Activities)

No	Video Theme	Link
1	Islamic Education Management Study Program at Nurul Jadid University Commemorates the 3rd Diesmaulidiyah	https://www.youtube.com/watch?v=Zj_-KGhuMoc
2	Why should you study at UNUJA	https://www.youtube.com/watch?v=w5wWtZLlNpA
3	Faculty of Islamic Studies UNUJA Holds Faculty Orientation	https://www.youtube.com/watch?v=KsmD511WRpc
4	Pojok Mikro Podcast	https://www.youtube.com/watch?v=EAfqRVbhpQA&t=124s
5	PLP at SMP Bhakti Pertiwi	https://www.youtube.com/watch?v=ryIA0LwxoJs&t=72s

As presented in the table 1 and 2, the existence of these works shows that students are not merely passive users, but are also capable of becoming producers of communicative and educational digital information. The findings of this research are as follows;

First, the ability to use digital tools (digital tools usage). Students demonstrate skills in utilizing various digital platforms such as YouTube, e-learning, and video conferencing applications to support the learning process. This ability is not only operational but also reflects photovisual literacy, namely the ability to understand and produce information in digital visual formats.

Second, information literacy skills. Students possess the ability to manage digital information, from problem identification and content analysis to evaluation and application in academic contexts. Activities such as journal review and utilization of digital sources demonstrate that students not only consume information but also critically process it. Furthermore, branching literacy skills are evident in how students navigate various information sources in a non-linear manner, such as utilizing online journals, social media, and Telegram groups as academic reference sources.

Third, digital transformation skills. Students are able to create, design, and produce meaningful digital content, such as videos, podcasts, and other visual works. This ability demonstrates reproductive literacy, namely the ability to rework digital

information into new, authentic works. This process is often integrated into coursework and student independent initiatives as a form of self-actualization in the digital space.

Fourth, cultural and social understanding skills. Students' digital literacy is also reflected in their ability to understand social and cultural phenomena through digital media. Access to global information enables students to develop cross-cultural insights and social analysis skills. This is reinforced by the formation of academic communities such as the Pojok Surau Study Group, which serves as a critical discussion space based on digital literacy.

Thus, these findings indicate that critical digital literacy in Islamic boarding schools (*pesantren*) is not solely oriented toward technological mastery but also toward developing critical, creative, and contextual thinking skills. The integration of Islamic boarding school values and digital technology makes digital literacy a strategic instrument in developing adaptive, reflective, and competitive students in the global era.

2. Critical Digital Literacy-Based Learning Model

A critical digital literacy-based learning model represents a form of pedagogical transformation that positions the learning environment as a strategic factor in developing students' higher-order thinking skills. The learning environment is no longer understood simply as a physical space, but rather as an ecosystem that integrates digital technology, social interaction, and meaningful learning experiences. Research findings at Nurul Jadid University and Ibrahimy University indicate that learning success is significantly influenced by the institution's ability to create an adaptive, interactive, and technology-based learning environment. A comfortable, flexible, and resource-rich environment has been shown to improve students' concentration, engagement, and critical thinking skills in navigating the complexity of information in the digital age.

From a cognitive development perspective, the environment plays a dominant role compared to other factors such as heredity, maturity, or talent. A learning environment rich in digital stimulation enables students to optimally develop attention, memory, and logical reasoning skills. This aligns with findings that technology-based learning has a positive impact on literacy, language, and problem-solving skills. Therefore, the critical digital literacy-based learning model at these two universities emphasizes not only the use of technology but also how the environment is designed to encourage exploration, reflection, and independent construction of knowledge.

Research data shows that the critical digital literacy-based learning model is implemented through several key components, as summarized in the table 2.

Table 2: Critical Digital Literacy-Based Learning Model

No	Interview/ Observation Data	Description	Code
1.	Lecturers utilize various digital platforms such as e-learning, learning videos, and interactive media.	Integration of technology in delivering learning materials	Technology Integration
2.	Students actively search for, analyze, and discuss information from various digital sources.	Exploration-based learning and information literacy	Information Exploration
3	Learning encourages digital-based discussion, collaboration, and group work.	Strengthening collaborative and communication skills	Digital Collaboration
4	Project-based tasks such as video and digital content creation	Development of creativity and transformation of knowledge	Digital Project
5	Lecturers act as facilitators and guides	The shift in role from teacher-centered to student-centered	Transformation of the Role of Lecturers

Table 2 shows that the developed learning model is oriented not only toward knowledge transfer but also toward strengthening 21st-century competencies. Based on this data, several key characteristics of a critical digital literacy-based learning model are identified. Thus, the critical digital literacy-based learning model as per research data is; *First*, the integration of technology into learning. The learning process utilizes various digital platforms that enable broad and flexible access to information. Technology is used not merely as an aid, but as the primary medium for building interactive and contextual learning experiences. *Second*, information exploration-based learning. Students are encouraged to actively seek, identify, and evaluate information from various digital sources. This activity trains information literacy skills while fostering critical awareness of the validity and relevance of the information obtained. *Third*, strengthening digital collaboration. Learning is designed to encourage interaction between students through online discussions, group work, and knowledge sharing. This aligns with the need for communication and collaboration skills in a digital society. *Fourth*, the development of digital projects. Project-based learning assignments such as creating videos, learning media, or other digital content provide a means for students to apply their knowledge creatively. These activities not only improve technical skills but also critical and innovative thinking skills. *Fifth*, the transformation of the role of lecturers. Lecturers are no longer the sole source of knowledge, but rather act as facilitators who direct, guide, and motivate students in the learning process. This shift creates a more participatory and student-centered learning environment.

Overall, these findings demonstrate that a critical digital literacy-based learning model can create a dynamic, collaborative, and reflective learning environment. The integration of technology, active learning strategies, and reflective and transformational approaches are key to developing students who are not only academically proficient but also possess critical, creative, and adaptive thinking skills to face the challenges of the digital era.

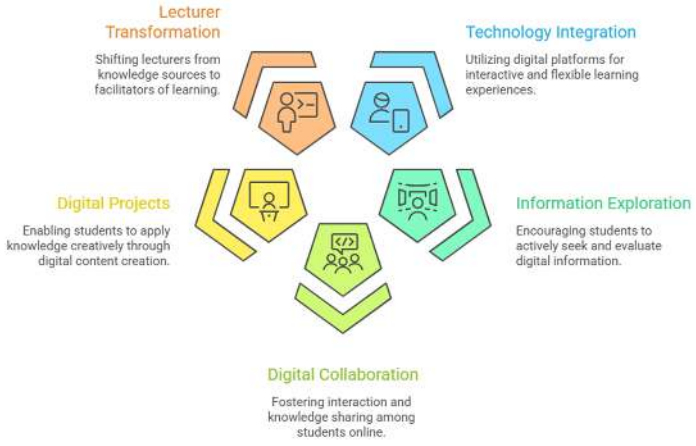


Figure 1: Critical Digital Literacy-Based Learning Model

Based on the data and visualizations above, the research findings indicate that a critical digital literacy-based learning model is built around five main components: lecturer transformation, technology integration, information exploration, digital collaboration, and digital projects. The lecturer transformation serves as the initial foundation, emphasizing a shift from a knowledge center to a learning facilitator that encourages student independence. Furthermore, technology integration demonstrates the use of various digital platforms to create a flexible and interactive learning experience. Information exploration demonstrates that students are encouraged to actively seek out, analyze, and critically evaluate digital information.

Digital collaboration also reflects the interaction and exchange of knowledge between students through various digital media, thereby strengthening social and communication skills. Meanwhile, digital projects provide a concrete form of knowledge application, where students produce technology-based creative work. All of these components are integrated to form a learning ecosystem that focuses not only on technological mastery but also on developing critical, creative, and collaborative thinking skills. Thus, this model reflects a learning transformation that is adaptive, participatory, and relevant to the demands of education in the digital era.

The findings of this study indicate that a critical digital literacy-based learning model in Islamic boarding schools (*pesantren*) has resulted in two major changes: the formation of students' critical digital literacy characteristics and the development of an adaptive, collaborative, and technology-based learning model(Schittko et al., 2026; Tafazoli, 2024). The first change is evident in students' ability to utilize digital devices, critically manage information, transform knowledge into digital works, and understand socio-cultural phenomena through digital media(Füller et al., 2022; McKenzie, 2023). The second change is evident in the learning design, which places the digital learning environment at the center of activities, encouraging information exploration, collaboration, and strengthening the role of lecturers as facilitators(Mccausland et al., 2025; Wang et al., 2024). Thus, the transformation is not merely technical but also touches on cognitive, pedagogical, and cultural aspects of Islamic boarding school-based higher education practices.

The findings indicate a paradigm shift in learning from the conventional, lecturer-centered model to a student-centered model based on critical digital literacy. Students no longer act as recipients of information but as active subjects capable of constructing knowledge through interactions with various digital sources(Li et al., 2024; Nasir et al., 2024; Tadege et al., 2022). A flexible digital learning environment enables students to access, evaluate, and produce information according to their needs and context(Atabik et al., 2024; Copur-Gencturk et al., 2024). Furthermore, the integration of Islamic boarding school values into the learning process demonstrates that digital transformation does not eliminate institutional identity but rather strengthens it through a more contextual and reflective approach.

From a theoretical perspective, these findings align with social constructivism theory, which emphasizes that knowledge is constructed through active interactions between individuals and their environment(Aminulloh et al., 2023; Heru & Bali, 2024). Interactive digital environments enable collaborative knowledge construction. Furthermore, the concept of critical digital literacy, as proposed by Rice & Bailon, (2023), is also evident in students' skills, encompassing photovisual literacy, information literacy, reproductive literacy, and socio-emotional literacy. These findings also relate to transformational learning theory, which emphasizes the importance of critical reflection in transforming individuals' perspectives on information and social reality. Therefore, the learning model developed is not only instructional but also transformative.

The novelty of this research lies in the integration of critical digital literacy with the context of Islamic boarding school education within a unified learning framework. Unlike previous research, which tends to separate technological aspects from cultural values, this study demonstrates that the two can work synergistically. The resulting learning model focuses not only on the use of technology but also on the development of students' critical character through the incorporation of Islamic boarding school values. Furthermore, this study introduces a digital learning environment approach as the primary basis for developing critical digital literacy in higher education.

The practical implications of this research suggest that higher education institutions need to design learning systems that are not solely technology-based but also oriented toward the comprehensive development of critical digital literacy. Lecturers are required to improve their competency in utilizing digital technology, designing project-based learning, and encouraging active student participation. Furthermore, institutions need to provide a supportive digital ecosystem, including access to learning resources, learning platforms, and policies that encourage pedagogical innovation. This approach emphasizes that the success of learning transformation depends not only on technology but also on the readiness of human resources and academic culture.

The findings are relevant to the demands of 21st-century education, which emphasizes the importance of digital literacy, critical thinking, creativity, and collaboration. The critical digital literacy-based learning model in Islamic boarding schools demonstrates that religious-based institutions are also able to adapt to technological developments without losing their identity(Khomsiah et al., 2024; Mukhibat et al., 2024). This provides an important contribution to the global discourse on the integration of technology and local values in education(Fawaid et al., 2025; Mundiri et al., 2025). This model has the potential to be replicated in various other educational contexts, particularly in developing countries with strong social and cultural characteristics.

However, this study has several limitations. First, the study's scope, limited to two Islamic boarding schools, does not fully represent the diverse context of higher education in Indonesia. Second, this study emphasized qualitative aspects and therefore failed to quantitatively measure the impact of critical digital literacy on student learning outcomes. Third, the limited duration of the study did not adequately describe the long-term impact of implementing this learning model. Therefore, further research is recommended to use a mixed methods approach, expand the research locations, and examine the long-term impact on student academic achievement and character development.

CONCLUSION

The research concludes that the transformation of critical digital literacy-based learning in Islamic boarding schools (*pesantren*) not only results in improved students' technical skills in using technology but also develops more complex cognitive, reflective, and social competencies. The characteristics of critical digital literacy are reflected in students' abilities to selectively manage information, creatively produce digital content, and understand socio-cultural dynamics through digital media. At the same time, the developed learning model demonstrates a shift from conventional approaches to student-centered learning, based on exploration, collaboration, and the use of the digital environment as a space for knowledge construction.

Synthetically, the integration of digital technology and Islamic boarding school values is a key element that distinguishes this model from typical digital learning practices.

Digital literacy is not simply defined as instrumental skills, but as critical abilities filtered through cultural and religious values. Thus, the resulting learning transformation is holistic, encompassing pedagogical, cognitive, and cultural aspects simultaneously. These findings confirm that developing critical digital literacy in higher education requires a systemic approach that harmoniously integrates learning design, the digital environment, and institutional identity.

ACKNOWLEDGMENT

The authors gratefully acknowledge that the article entitled *"The Transformation of Learning Model Based on Critical Digital Literacy in Higher Education"* is an output of a research project funded by the Directorate of Islamic Education, Ministry of Religious Affairs of the Republic of Indonesia. The authors sincerely appreciate the financial support and institutional facilitation provided, which have significantly contributed to the completion of this study.

BIBLIOGRAPHY

Alvarado-Bravo, N., Aldana-Trejo, F., Durán-Herrera, V., Rasilla-Rovegno, J., Suarez-Bazalar, R., Torres-Quiroz, A., Paredes-Soria, A., Gonzales-Saldaña, S. H., Tomás-Quispe, G., & Olivares-Zegarra, S. (2024). Artificial Intelligence as a Tool for the Development of Soft Skills: A Bibliometric Review in the Context of Higher Education. *International Journal of Learning, Teaching and Educational Research*, *23*(10), 379–394. https://doi.org/10.26803/ijlter.23.10.18

Aminulloh, A., Baharun, H., Asmawati, A., & Hasanah, F. (2023). Student Egocentric Control through the Student Team Achievement Division Design. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *7*(4), 4599–4608. https://doi.org/10.31004/obsesi.v7i4.4095

Atabik, Nurfuadi, Hidayat, I., Masruri, & Nur, S. (2024). Digitalization of Educational Quality Management in Higher Education. *Revista de Gestao Social e Ambiental* , *18*(7). https://doi.org/10.24857/rgsa.v18n7-133

Bin Hasan, K. M., Sajid, M., Lapina, M. A., Shahid, M., & Kotecha, K. (2024). Blockchain technology meets 6 G wireless networks: A systematic survey. *Alexandria Engineering Journal*, *92*(February), 199–220. https://doi.org/10.1016/j.aej.2024.02.031

Copur-Gencturk, Y., Li, J., Cohen, A. S., & Orrill, C. H. (2024). The impact of an interactive, personalized computer-based teacher professional development program on student performance: A randomized controlled trial. *Computers and Education*, *210*(June 2023), 104963. https://doi.org/10.1016/j.compedu.2023.104963

El Koshiry, A., Eliwa, E., Abd El-Hafeez, T., & Shams, M. Y. (2023). Unlocking the power of blockchain in education: An overview of innovations and outcomes. *Blockchain: Research and Applications*, *4*(4), 100165. https://doi.org/10.1016/j.bcra.2023.100165

Faishol, M., & Zuhro, F. (2024). Dakwah's Communication Strategies in the Digital Age: the Influence of Alaydrus's Platform of Instagram. *Jurnal Kajian Manajemen Dakwah*, *6*(1), 13–26. https://doi.org/10.35905/jkmd.v6i1.8880

Fawaid, A., Baharun, H., Hamzah, M., Rohimah, Munawwaroh, I., & Putri, D. F. (2025). AI-based career management to improve the quality of decision making in higher education. *2025 15th IEEE Integrated STEM Education Conference, ISEC 2025*, 1–8. https://doi.org/10.1109/ISEC64801.2025.11147274

Füller, J., Hutter, K., Wahl, J., Bilgram, V., & Tekic, Z. (2022). How AI revolutionizes innovation management – Perceptions and implementation preferences of AI-based innovators. *Technological Forecasting and Social Change*, *178*(March). https://doi.org/10.1016/j.techfore.2022.121598

Hasanah, R., & Sain, S. H. (2025). Digital Game-Based Learning and the Rise of Edutainment in. *JETech: Journal of Education and Technology*, 86–95.

Heru, M. J. A., & Bali, M. M. E. I. (2024). Crafting Leaders in the Digital Age: How Adaptive Management Strategies Revolutionize Leadership Development in Islamic Schools. *Communautaire: Journal of Community Service*, *3*(1), 79–92. https://doi.org/10.61987/communautaire.v3i1.458

Khomsiah, K., Hidayah, F., Aniati, A., & Hasan Baharun. (2024). Active Learning as a Solution to Student Burnout in Islamic Religious Education: Views from Madrasah. *Jurnal Riset Madrasah Ibtidaiyah (JURMIA)*, *4*(2), 130–145. https://doi.org/10.32665/jurmia.v4i2.3212

Khosravi, H., Denny, P., Moore, S., & Stamper, J. (2023). Learnersourcing in the age of AI: Student, educator and machine partnerships for content creation. *Computers and Education: Artificial Intelligence*, *5*(October 2022), 100151. https://doi.org/10.1016/j.caeai.2023.100151

Lexy, j moelong. (2020). *metode penelitian kualitatif*. Remaja Rosdakarya.

Li, L., Fengchao, Y., & Zhang, E. (2024). A systematic review of learning task design for K-12 AI education: Trends, challenges, and opportunities. *Computers and Education: Artificial Intelligence*, *6*(October 2023). https://doi.org/10.1016/j.caeai.2024.100217

Mccausland, K., Wolf, K., Freeman, B., Leavy, J. E., Leaver, T., Chih, H., Mullan, B. A., Girdler, S., Peaty, G., Chenery, M., & Jancey, J. (2025). Protocol for a wait list randomised controlled trial : Using social media for health promotion , communication and advocacy – A massive open online course. *Contemporary Clinical Trials*, *153*(December 2024), 107920. https://doi.org/10.1016/j.cct.2025.107920

McKenzie, B. (2023). Dungeons and dragons and digital writing: A case study of worldbuilding. *Journal of University Teaching and Learning Practice*, *20*(2). https://doi.org/10.53761/1.20.02.10

Mozumder, M. A. I. (2022). Overview: Technology Roadmap of the Future Trend of Metaverse based on IoT, Blockchain, AI Technique, and Medical Domain Metaverse Activity. In *International Conference on Advanced Communication Technology, ICACT* (Vol. 2022, pp. 256–261). https://doi.org/10.23919/ICACT53585.2022.9728808

Mukhibat, M., Effendi, M., Setyawan, W. H., & Sutoyo, M. (2024). Development and evaluation of religious moderation education curriculum at higher education in Indonesia. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2302308

Mundiri, A., Bali, M. M. E. I., Baharun, H., Holidi, M., Ervansyah, F., Abbas, A. R., Abdullah, D., & Erliana, C. I. (2021). Indigeneity and the Plight of Managing Behaviour; A Collaborative Instructional Model Based on Digital Classroom. *Turkish Online Journal of Qualitative Inquiry (TOJQI)*, *12*(4), 1655–1660.

Mundiri, A., Munawwaroh, I., Hadi, M. I., Baharun, H., Shudiq, W. J. F., & Maulidy, A.

(2025). Artificial Intelligence (AI) Innovation in Education: From Data-Driven Learning to Automated Teaching. *Proceedings of the 2025 IEEE International Conference on Industry 4.0, Artificial Intelligence, and Communications Technology, IAICT 2025*, 173–180. https://doi.org/10.1109/IAICT65714.2025.11100623

Nasir, M., Rizal, S., Basri, & Pabbajah, M. (2024). Revolutionizing Teungku Dayah learning model: exploring the transformative impact of technological advancements on Islamic education in Aceh. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2335720

Rice, M. F., & Bailon, M. (2023). A qualitative analysis of publicly available Standards and Guidance about Digital Literacies in U.S. States. *Education and Information Technologies*, *28*(6), 6927 – 6946. https://doi.org/10.1007/s10639-022-11482-x

Safuan, A., Fanani, A. A., Hidayah, F., Mashuri, I., & Baharun, H. (2024). Communication Shapes Students' Character Through The Values Of Ahlussunah Wal Jamaah In Madrasah. *Al-Tsiqoh : Jurnal Ekonomi Dan Dakwah Islam*, *9*(2), 37–51. https://e-journal.uac.ac.id/index.php/altsiq/article/view/5547

Sailin, M., Masbahuddin, i, M. R., Tohet, M., Rozi, F., Islami, I. M. R., & Dewi, N. E. C. (2024). Integrating Situational Leadership and Traditional Values: Enhancing Student Discipline in Islamic Boarding Schools Through Holistic Training Programs. *Communautaire: Journal of Community Service*, *3*(1), 107–122.

Schittko, M., Planing, P., & Müller, P. (2026). Computers in Human Behavior Reports Stability through human perception : Technology acceptance models ' robustness across various interaction perspectives and comparable technologies. *Computers in Human Behavior Reports*, *21*(September 2025), 100930. https://doi.org/10.1016/j.chbr.2026.100930

Shirish, A., Srivastava, S. C., & Panteli, N. I. K. I. (2023). Management and sustenance of digital transformations in the Irish microbusiness sector: examining the key role of microbusiness owner-manager. *European Journal of Information Systems*, *32*(3), 409–433. https://doi.org/10.1080/0960085X.2023.2166431

Shuhaizam Said, T., Ramli, H., & Damia Natasha, A. (2023). The Adaptation of Malay Philosophy Values through Maritime education Preservation and Conservation Wisdom. In *BIO Web of Conferences* (Vol. 79). https://doi.org/10.1051/bioconf/20237906001

Tadege, A., Seifu, A., & Melese, S. (2022). Teachers' views on values-education: The case of secondary schools in East Gojjam, Ethiopia. *Social Sciences and Humanities Open*, *6*(1), 100284. https://doi.org/10.1016/j.ssaho.2022.100284

Tafazoli, D. (2024). Exploring the potential of generative AI in democratizing English language education. *Computers and Education: Artificial Intelligence*, *7*(March), 100275. https://doi.org/10.1016/j.caeai.2024.100275

Ubaidillah, U., & Mundiri, A. (2023). Empowering Teacher Competence through Guidance in Religion-Moderated Literacy. *GEMEINSCHAFT: Journal of Social and Community Engagement*, *1*(1), 37–49.

Wang, R., Qamruzzaman, M., & Karim, S. (2024). Unveiling the power of education, political stability and ICT in shaping technological innovation in BRI nations. *Heliyon*, *10*(9), e30142. https://doi.org/10.1016/j.heliyon.2024.e30142

Yin, R. K. (2018). *Case study research and applications: Design and methods*. SAGE.

Yong, S. T., Chemmangattuvalappil, N. G., & Foo, D. C. Y. (2024). Students' perception of non-placement work-integrated learning in chemical engineering: Work-related

skills towards the post-pandemic future. *South African Journal of Chemical Engineering*, *47*(November 2023), 322–332. https://doi.org/10.1016/j.sajce.2023.12.008

Zhang, W., & Lian, R. (2024). The impact of reading metacognitive strategies on mathematics learning efficiency and performance: An analysis using PISA 2018 data in China. *Acta Psychologica*, *246*(February), 104247. https://doi.org/10.1016/j.actpsy.2024.104247