Arabiyatuna
Jurnal Bahasa Arab

Vol. 10. No. 1, 2026,
P-ISSN: **2580-5045, E-ISSN: 2580-5053**
DOI: 10.29240/jba.v10i1.15202

Readiness of Arabic Language Teachers to Integrate Large Language Models (LLMs) in their Teaching Practices: Challenges and Opportunities

Harmanto Raharjo[1], Naih Nurjanah[2], Ghufran Akbar[3], Mulyadi[4], Uus Ruswandi[5], Mohamad Erihadiana[6], Aulia Rahmi[7]
[1,2,3,4,5,6,7]UIN Sunan Gunung Djati Bandung, Indonesia
[1]Harmantoraharjo07@gmail.com, [2]naihnurjanah003@gmail.com,
[3]ghufranakbar04@gmail.com, [4]mulyadi.dimas83@gmail.com,
[5]uusruswandi@uinsgd.ac.id, [6]erihadiana@uinsgd.ac.id
[7]auliarahmi3096@gmail.com

Cite this article:
Raharjo, Harmanto., Nurjanah, Naih., Akbar, Ghufran., Mulyadi, Mulyadi., Ruswandi, Uus., Erihadiana, Mohamad, & Rahmi, Aulia. (2026). Readiness of Arabic Language Teachers to Integrate Large Language Models (LLMs) in their Teaching Practices: Challenges and Opportunities. Arabiyatuna: Jurnal Bahasa Arab, 10(1), 207-226. doi: 10.29240/jba.v10i1.15202

Received: 24-11-2025	Revised: 14-04-2026	Accepted: 20-04-2026

Abstract

This study examines Arabic language teachers' readiness to integrate Large Language Models (LLMs) into instructional practices, identifies key challenges, and explores strategic opportunities for pedagogical use. A qualitative library research design was applied using descriptive-analytical and comparative methods based on peer-reviewed literature (2019–2025) on artificial intelligence, language education, and teacher readiness.

Findings indicate that teacher readiness remains at an early, uneven stage, shaped by a socio-technical configuration comprising digital literacy, pedagogical competence, psychological disposition, and institutional support. From a TPACK perspective, technological knowledge is less developed than pedagogical and content knowledge, limiting effective integration of AI in Arabic language learning. Psychological barriers such as technological anxiety and low self-efficacy, along with unequal infrastructure and policy support, further constrain adoption. However, gradual exposure to AI tools fosters experiential learning and incremental development of readiness. Despite challenges, LLMs offer opportunities for

improved learning effectiveness, personalized instruction, the development of higher-order thinking, and the integration of Islamic educational values. The study conceptualizes teacher readiness as a socio-technical and developmental construct. It highlights the need for AI literacy development, curriculum redesign, and institutional policy support to ensure ethical and sustainable integration of LLMs in Arabic language education.

Keywords: Large Language Models, Arabic language teaching, teacher readiness, Islamic education, artificial intelligence.

Introduction

The rapid advancement of Artificial Intelligence (AI) has significantly transformed contemporary education systems, particularly through the emergence of Large Language Models (LLMs) such as GPT-based architectures, BERT, and PaLM. These models are designed to process, understand, and generate human-like language using large-scale datasets and deep learning mechanisms[1]. Recent studies emphasize that LLMs represent a new phase in generative AI, characterized by their capacity to support adaptive learning, contextual communication, and knowledge production in complex educational environments[2]. In this context, AI is no longer merely a technological tool, but has evolved into an intelligent cognitive partner that reshapes pedagogical interaction between teachers, learners, and knowledge systems.

Empirical studies show that LLM-based systems contribute significantly to improved language proficiency, learner engagement, and cognitive development through personalized feedback and interactive learning environments[3]. In language education, particularly Arabic language learning, tools such as ChatGPT are increasingly used for grammar explanations, writing assistance, translation support, and conversational practice[4]. However, a critical review of existing studies reveals that most research continues to focuses on technological performance and learner-centred outcomes, while neglecting pedagogical integration processes and teacher readiness. This integration indicates

---

[1] Muhammad Farrukh Shahzad dkk., "Are Generative AI Technologies Transforming Education for the 21st Century? Research Trends, Challenges, and Benefits," *SAGE Open* 15, no. 3 (2025): 21582440251368594, https://doi.org/10.1177/21582440251368594.

[2] Amir Masoud Rahmani dkk., "The Rise of Large Language Models: Evolution, Applications, and Future Directions," *Engineering Reports* 7, no. 9 (2025): e70368, https://doi.org/10.1002/eng2.70368.

[3] Mirka Saarela dkk., "A Meta-Analysis of Generative AI Effects on Language Proficiency and Affective–Cognitive Outcomes in Language Learning," *Discover Computing* 29, no. 1 (2026): 116, https://doi.org/10.1007/s10791-026-10015-1.

[4] Nasaruddin Nasaruddin, "Using ChatGPT in Teaching Arabic as a Foreign Language," *Arabiyatuna: Jurnal Bahasa Arab* 8, no. 1 (2024): 1, https://doi.org/10.29240/jba.v8i1.9413.

that the current discourse on LLMs remains predominantly technology-driven rather than pedagogy-centred.

From a theoretical standpoint, the integration of LLMs in education can be explained by Constructivist Learning Theory, which posits that knowledge is actively constructed through interaction with the learning environment[5]. Within this framework, AI functions as a cognitive scaffold that supports learners in constructing meaning through dynamic interaction. Complementing this, the Technological Pedagogical Content Knowledge (TPACK) framework emphasizes that effective technology integration depends on alignment among technological knowledge, pedagogical strategies, and content expertise. Recent developments further extend this framework through the concept of AI literacy, which highlights teachers' ability not only to use AI tools but also to critically evaluate, adapt, and ethically integrate them into instructional practices[6].

Nevertheless, scholarly debates regarding the role of AI in education remain divided. Techno-optimist perspectives argue that LLMs enhance learning efficiency, personalization, and accessibility, thereby accelerating educational transformation[7]. Conversely, techno-sceptical perspectives highlight risks such as epistemic bias, reduced critical thinking, and overreliance on automated systems[8]. These contrasting perspectives demonstrate that AI integration is not merely a technical innovation, but a complex pedagogical and epistemological issue that requires contextual and critical engagement.

In Arabic language learning, LLMs offer significant potential to address linguistic complexity, particularly in morphology (ṣarf), syntax (naḥw), semantics, and discourse analysis. Arabic learners frequently encounter difficulties in mastering grammatical structures,[9] developing communicative competence,[10] and

---

[5] Sahkholid Nasution dan Akmal Walad, "The Effectiveness of Constructivism-based Arabic Textbook in Higher Education," *Arabiyatuna : Jurnal Bahasa Arab* 6, no. 1 (2022): 63, https://doi.org/10.29240/jba.v6i1.3572.

[6] Ardis Storm-Mathisen dkk., "Engagement with AI in teacher education—discourses, processes of domestication and dynamics of transformation," *Frontiers in Education* 10 (Januari 2026): 1694082, https://doi.org/10.3389/feduc.2025.1694082.

[7] Attila Kovari, "AI Gem: Context-Aware Transformer Agents as Digital Twin Tutors for Adaptive Learning," *Computers* 14, no. 9 (2025): 367, https://doi.org/10.3390/computers14090367.

[8] Shijing Si dkk., "Detecting Implicit Biases of Large Language Models with Bayesian Hypothesis Testing," *Scientific Reports* 15, no. 1 (2025): 12415, https://doi.org/10.1038/s41598-025-95825-x.

[9] Noza Aflisia et al., "Komparasi Pembelajaran Nahwu Di Pesantren Dan Madrasah," *Al-Fathin: Jurnal Bahasa Dan Sastra Arab* 5, no. 1 (2022): 97–110.

[10] Noza Aflisia and Hazuar Hazuar, "Pengembangan Bahan Ajar Bahasa Arab Berbasis Pendekatan Komunikatif," *Arabiyatuna : Jurnal Bahasa Arab* 4, no. 1 (May 8, 2020): 111, https://doi.org/10.29240/jba.v4i1.1380.

maintaining learning motivation, especially in non-native environments[11]. In addition, Arabic language instruction is often constrained by traditional pedagogical approaches and limited availability of interactive learning resources, which hinder the development of learner-centred instruction[12].

A systematic review of recent literature shows that most studies on AI in education are still dominated by conventional digital tools such as Learning Management Systems (LMS), corpus-based applications, and machine translation systems, rather than advanced generative AI technologies such as LLMs[13]. This indicates that the pedagogical transition toward generative AI in Arabic language education remains underdeveloped, particularly in classroom implementation and instructional design.

More importantly, a critical gap emerges in the literature regarding teacher-centred analysis. Existing studies predominantly emphasize student outcomes and technological effectiveness, while insufficient attention is given to teacher readiness as a multidimensional construct. Teacher readiness in AI integration cannot be reduced to technical skills alone, but must include pedagogical competence, cognitive adaptation, affective acceptance, and ethical awareness[14]. Without adequate readiness, even the most advanced technologies cannot be effectively transformed into meaningful learning experiences.

Empirical evidence indicates that teacher readiness is influenced by multiple interrelated factors, including digital literacy, professional training, institutional support, and prior experience with educational technologies[15]. In Arabic language education contexts, these challenges are more pronounced due to limited exposure to AI-based pedagogies, insufficient training programs, and infrastructural constraints[16]. Consequently, the adoption of LLMs in Arabic language instruction remains uneven, fragmented, and largely experimental across institutions.

---

[11] Sultan Almelhes, "Enhancing Arabic Language Acquisition: Effective Strategies for Addressing Non-Native Learners' Challenges," *Education Sciences* 14, no. 10 (2024): 1116, https://doi.org/10.3390/educsci14101116.

[12] Masriah Masriah dan Yanti Kusnawati, "Development of Augmented Reality Video Media to Improve Mastery of Tahiat Arabiya Arabic Language Course Students," *Arabiyatuna: Jurnal Bahasa Arab* 8, no. 2 (2024): 663–82, https://doi.org/10.29240/jba.v8i2.11056.

[13] Allisa Tazkia Fitri, "Tinjauan Literatur: Integrasi Kecerdasan Buatan (AI) Dalam Pembelajaran Bahasa Arab," *Jurnal Ilmiah Pendidikan Scholastic* 9, no. 1 (2025): 16–26, https://doi.org/10.36057/jips.v9i1.718.

[14] Michal Nissim dan Fathi Shamma, "Supporting Teacher Professionalism for Inclusive Education: Integrating Cognitive, Emotional, and Contextual Dimensions," *Education Sciences* 15, no. 10 (2025): 1317, https://doi.org/10.3390/educsci15101317.

[15] Musa Adekunle Ayanwale dkk., "Large Language Models and GenAI in Education: Insights from Nigerian in-Service Teachers through a Hybrid ANN-PLS-SEM Approach," *F1000Research* 14 (Maret 2025): 258, https://doi.org/10.12688/f1000research.161637.1.

[16] Zuashfiyailina Zuashfiyailina dkk., "Tantangan Kompetensi Pedagogik Digital Guru Bahasa Arab di Era Society 5.0: Systematic Literatur Review," *JIIP - Jurnal Ilmiah Ilmu Pendidikan* 8, no. 12 (2025): 13821–28, https://doi.org/10.54371/jiip.v8i12.10031.

In Indonesian Islamic educational contexts such as madrasah and pesantren, Arabic language learning holds a dual function: as a linguistic system and as a medium for accessing Islamic epistemological knowledge. However, despite its importance, there is still a lack of systematic research examining how Arabic language teachers develop readiness to integrate LLMs in such environments. This absence indicates a significant conceptual and empirical gap in understanding teacher roles in AI-driven educational transformation.

Previous studies in Arabic language education have generally focused on traditional digital innovations such as e-learning platforms, augmented reality media, and constructivist-based instructional materials, rather than advanced generative AI systems[17]. While these studies contribute to understanding digital transformation in Arabic education, they do not sufficiently address LLM integration or teacher readiness in AI-driven learning environments. Furthermore, research on teacher professional development emphasizes pedagogical competence and digital literacy, but rarely connects these competencies to generative AI adoption in classroom practice[18].

A synthesis of the literature reveals a key analytical tension: while AI is widely recognized as improving learning outcomes, its pedagogical success is inconsistent due to insufficient teacher readiness. This contradiction suggests that technological advancement alone is insufficient to guarantee instructional transformation, as human factors—particularly teachers—remain the central mediators of educational innovation.

Responding to this gap, this study positions teacher readiness as the central analytical focus in examining LLM integration in Arabic language learning. Teacher readiness is conceptualized as a multidimensional construct consisting of digital literacy, pedagogical competence, psychological readiness, and institutional support. This conceptualization enables a more comprehensive understanding of how teachers perceive, adapt, and implement AI technologies in real instructional contexts.

The novelty of this research lies in its development of a contextualized teacher readiness framework for LLM integration in Arabic language education within Islamic schooling systems. Unlike previous studies that primarily focus on technological efficiency or learner outcomes, this study foregrounds teachers as key agents in pedagogical transformation. It examines how readiness shapes the success or failure of AI implementation.

This study employs a qualitative case study approach supported by a systematic literature review and empirical field data. The case study design is

---

[17] Wahyudi Buska dan Yogia Prihartini, "The Role of Developing Arabic Language Teachers to Improve Pedagogical Competence in Learning," *Arabiyatuna: Jurnal Bahasa Arab* 9, no. 2 (2025): 667–82, https://doi.org/10.29240/jba.v9i2.14800.

[18] Mustar dkk., "Bridging Traditional Language Pedagogy and AI: Lessons from Arabic Language Programs in Indonesia," *Arabiyatuna: Jurnal Bahasa Arab* 9, no. 2 (2025): 770–85, https://doi.org/10.29240/jba.v9i2.13013.

selected to capture contextual, experiential, and interpretative dimensions of teacher engagement with LLM-based technologies in real instructional settings. Data are collected through semi-structured interviews with Arabic language teachers from MTs, MA, SMA/SMK, and pesantren institutions in Bengkulu, Indonesia.

The selection of participants is based on purposive sampling, targeting teachers who have experience or exposure to digital learning tools and AI-based technologies. The study adopts thematic analysis to identify patterns related to teacher readiness, implementation challenges, and pedagogical opportunities. This collaboration involves systematic coding, categorization, and interpretation of qualitative data.

In line with the analytical framework, this study is structured around four dimensions: (1) functional features of LLMs relevant to Arabic language learning; (2) teacher pedagogical and professional readiness; (3) challenges in implementing LLM-based instruction; and (4) strategic opportunities for AI-enhanced Arabic language learning. These dimensions serve as guiding categories for data collection and analysis.

To ensure analytical rigor, interview instruments are developed based on indicators derived from TPACK and AI literacy frameworks. These include technological competence, pedagogical adaptation, ethical awareness, psychological acceptance, and institutional support. This structured approach ensures consistency between the theoretical foundation, empirical data, and analytical interpretation.

This study contributes both theoretically and practically. Theoretically, it extends the discourse on AI in education by integrating Constructivism, TPACK, and AI literacy into a unified framework of teacher readiness. Practically, it provides evidence-based recommendations for teacher training, curriculum reform, and policy development in Arabic language education within Islamic schooling systems.

Ultimately, this study argues that the success of LLM integration in Arabic language education is not determined solely by technological sophistication, but fundamentally by teacher readiness as the key determinant of pedagogical transformation in the era of artificial intelligence.

Findings and Discussion

The discussion in this study contains theories that assist researchers in analyzing data to produce a brief synthesis of the findings and relationships, as well as to suggest new insights or even generate new conceptual understanding. There are at least three functions of theory that are widely accepted in scientific research, namely: (a) describing, (b) explaining, and (c) predicting. In this section, the results of the study are presented simultaneously with a comprehensive discussion. The findings are organized into several sub-sections to facilitate clarity and systematic interpretation.

Readiness of Arabic Language Teachers in Integrating LLMs

The findings of this study, based on interview data from seven Arabic language teachers across MTs, MAN, SMA/SMK, and Islamic boarding schools in Bengkulu, indicate that teacher readiness in integrating Large Language Models (LLMs) remains at an early and uneven stage. This condition reflects that LLM integration in Arabic language learning is still in a transitional phase characterized by a socio-technical imbalance, where technological availability is not matched by pedagogical adaptation and institutional support[19]. In this regard, teacher readiness should be understood as a multidimensional construct shaped by the interaction of technological competence, pedagogical orientation, psychological disposition, and institutional ecosystem, rather than a linear skill acquisition process[20].

From the perspective of professional role transformation, the data show that teachers have begun to recognize the changing nature of their professional responsibilities in the era of artificial intelligence. One respondent emphasized that teachers are no longer solely responsible for delivering instructional content but are also expected to guide students in the ethical and effective use of technology. This reflects a gradual shift in teacher identity from knowledge transmitters to facilitators, learning designers, and digital mentors within AI-supported learning environments[21]. This finding aligns with studies that highlight the transformation of teacher roles in AI-driven education systems, where educators are repositioned as mediators of digital knowledge rather than sole knowledge sources[22]. However, this transformation remains largely at the level of awareness and has not yet materialized into systematic pedagogical redesign involving LLM integration in classroom practice.

In terms of digital and technological literacy, the majority of respondents demonstrate only basic competence in general digital tools such as WhatsApp and Google Classroom, while showing limited familiarity with AI-based systems such as ChatGPT or other LLM applications. This indicates that teacher readiness is still in the early adoption stage of educational technology diffusion[23]. When

---

[19] Isni Dwi Rahma dkk., "Transformasi Peran Guru Di Era Kecerdasan Buatan: Dari Pengajar Menjadi Fasilitator Digital," *RIGGS: Journal of Artificial Intelligence and Digital Business* 4, no. 2 (2025): 6198–203, https://doi.org/10.31004/riggs.v4i2.1566.

[20] Ahmad Rifian Maula Zaki dan Indana Ainiya Ulya, "Analisis Kesiapan Pedagogis Dan Teknologis Guru Dalam Mengadopsi Ai Sebagai Sarana Pembelajaran Adaptif," *Jurnal Pendidikan Indonesia* 6, no. 7 (2025): 3220–28, https://doi.org/10.59141/japendi.v6i7.8434.

[21] R. Rahmat dkk., "Urgensi Artificial Intelligence (AI) dalam Pembelajaran Bahasa Arab," *AL-MUTSLA* 7, no. 1 (2025): 241–59, https://doi.org/10.46870/jstain.v7i1.1660.

[22] Satrio Satrio, "Integrasi Artificial Intelligence dalam Pembelajaran Bahasa Arab: Peluang, Tantangan, dan Inovasi Pedagogis di Era Digital," *RIGGS: Journal of Artificial Intelligence and Digital Business* 4, no. 2 (2025): 5907–14, https://doi.org/10.31004/riggs.v4i2.1531.

[23] Krismiyati Krismiyati, "Technology readiness segment analysis of teachers in using mobile-based teaching applications: An Indonesian context," *Journal of Technology and Science Education* 15, no. 2 (2025): 588, https://doi.org/10.3926/jotse.3431.

analyzed through the Technological Pedagogical Content Knowledge (TPACK) framework, this condition reveals an imbalance in which technological knowledge (TK) lags behind pedagogical and content knowledge[24]. Consequently, teachers are able to teach Arabic effectively using conventional methods, but experience difficulty in integrating emerging AI systems into instructional design.

Furthermore, the study reveals that professional development opportunities related to AI and LLM integration are still highly limited. Most teachers reported the absence of structured training programs and rely on independent exploration of digital tools. This finding is consistent with research emphasizing that structured pedagogical and technological training is a key determinant in improving teacher readiness for AI adoption in education[25]. Without systematic training, AI utilization remains fragmented, experimental, and infrastructure-lacking, and there is a lack of clear institutional guidance regarding AI integration.

Psychological readiness also emerges as a significant determinant of LLM adoption. Several participants expressed concerns regarding student overdependence on AI and uncertainty in maintaining instructional control. These responses reflect technological anxiety and low self-efficacy, which are widely recognized barriers in technology acceptance literature[26]. Within broader studies on AI in education, such psychological hesitation is often associated with unclear pedagogical guidelines and limited exposure to AI-supported teaching environments[27]. This indicates that readiness is not only a matter of technical competence but also involves affective and cognitive dimensions such as confidence, trust, and perceived pedagogical value of AI.

Institutional factors further explain variations in teacher readiness across different educational settings. The data show significant disparities in infrastructure quality, internet accessibility, and institutional policy support. Teachers in Islamic boarding school (*pesantren)* and rural schools reported limited technological infrastructure and lack of clear institutional guidance regarding AI integration. This finding reinforces the socio-technical perspective of technology

---

[24] Uyu Muawanah dkk., "The Interconnection between Digital Literacy, Artificial Intelligence, and the Use of E-Learning Applications in Enhancing the Sustainability of Regional Languages: Evidence from Indonesia," *Social Sciences & Humanities Open* 10 (2024): 101169, https://doi.org/10.1016/j.ssaho.2024.101169.

[25] Rachel Theresa Laras Pratiwi dan Mahmuddin Yunus, "Manfaat dan Tantangan Penggunaan Artificial Intelligence (AI) bagi Guru dan Peserta Didik di Era Society 5.0," *Journal of Innovation and Teacher Professionalism* 3, no. 2 (2024): 488–94, https://doi.org/10.17977/um084v3i22025p488-494.

[26] I. Komang Edi Santosa dkk., "Pemanfaatan kecerdasan buatan dalam pembelajaran sekolah dasar kesiapan guru dan implikasi etis," *JPGI (Jurnal Penelitian Guru Indonesia)* 10, no. 1 (2025): 80–84, https://doi.org/10.29210/025764jpgi0005.

[27] M. Yemmardotillah dkk., "Tantangan dan Peluang Pendidikan Agama Islam di Era Society 5.0," *Malewa: Journal of Multidisciplinary Educational Research* 2, no. 2 (2024): 75–87, https://doi.org/10.61683/jome.v2i2.127.

adoption, which argues that technological implementation is contingent upon institutional ecosystems rather than individual competence alone[28]. In line with previous studies, institutional readiness is a critical enabler for sustainable AI integration in education systems[29].

Despite these constraints, the findings also reveal emerging adaptive behaviours among teachers who have begun experimenting with AI tools in instructional contexts, such as generating Arabic texts, supporting writing activities, and assisting comprehension through machine translation tools. This indicates that teacher readiness is not static but evolves through iterative exposure, informal experimentation, and experiential learning processes. Such developments align with research highlighting that AI integration in education often begins with exploratory practices before reaching structured pedagogical implementation[30].

From a theoretical synthesis, teacher readiness in integrating LLMs can be conceptualized as a dynamic interaction between competence, perception, and contextual conditions. Limited training constrains technological competence, which subsequently contributes to psychological insecurity in using AI tools. In parallel, weak institutional support slows down the diffusion and normalization of AI-based pedagogical practices. Conversely, exposure to AI tools facilitates experimentation, which gradually strengthens confidence and adaptive capacity.

This pattern demonstrates that readiness is a developmental continuum rather than a binary condition, evolving through recursive interaction between individual agency and structural conditions. In the context of AI literacy, readiness also requires critical evaluation, ethical awareness, and pedagogical adaptation in the use of artificial intelligence technologies.[13] Therefore, teacher readiness should be understood as a multidimensional construct that integrates technical, pedagogical, psychological, and institutional dimensions in a single analytical framework.

In conclusion, the readiness of Arabic language teachers in integrating LLMs remains at an early developmental stage characterized by uneven competence, limited professional development, psychological hesitation, and structural constraints. Nevertheless, the emergence of adaptive experimentation indicates strong potential for progressive transformation. Therefore, teacher readiness should be reconceptualized as a dynamic socio-technical construct that

---

[28] Miswar Saputra dan Murdani Murdani, "Society 5.0 sebagai Tantangan Terhadap Pendidikan Islam," *ISLAMIC PEDAGOGY: Journal of Islamic Education* 1, no. 2 (2023): 132–45, https://doi.org/10.52029/ipjie.v1i2.158.

[29] Haetami Haetami, "AI-Driven Educational Transformation in Indonesia: From Learning Personalization to Institutional Management," *AL-ISHLAH: Jurnal Pendidikan* 17, no. 2 (2025): 1819–32, https://doi.org/10.35445/alishlah.v17i2.7448.

[30] Mustolikh Khabibul Umam dkk., "Transformasi Pembelajaran Bahasa Arab melalui Teknologi Digital dalam Pendidikan Islam," *Educatia : Jurnal Pendidikan dan Agama Islam* 15, no. 1 (2025): 1–22, https://doi.org/10.69879/ks4f8466.

evolves through continuous interaction between training, institutional policy, and experiential engagement with AI technologies.

Challenges in the Implementation of LLMs in Arabic Language Learning

The findings of this study indicate that the integration of Large Language Models (LLMs) in Arabic language learning is confronted by multidimensional and interrelated challenges. Based on interview data with seven Arabic language teachers from MTs, MAN, SMA/SMK, and Islamic boarding schools in Bengkulu, these challenges reflect a socio-technical condition in which technological, pedagogical, psychological, and institutional dimensions interact dynamically[31]. This connection confirms that AI integration in education should be understood as a complex adaptive process rather than a linear technological adoption[32].

First, Pedagogical Challenges

From a pedagogical perspective, the main challenge lies in aligning LLM-generated outputs with the instructional objectives of Arabic language learning. Teachers emphasized that AI outputs are often linguistically accurate but not always appropriate for students' cognitive level or learning context. This indicates a gap between computational language generation and pedagogical contextualization.

In Arabic language instruction, this issue is particularly significant because learning involves not only linguistic structure but also meaning construction within religious and cultural texts. Therefore, teachers remain essential as epistemic mediators who interpret, validate, and contextualize AI-generated outputs.

This condition reflects a misalignment within the Technological Pedagogical Content Knowledge (TPACK) framework, where technological development is not yet fully integrated into pedagogical practice[33]. In this regard, effective AI integration requires instructional redesign rather than mere tool adoption[34].

Second, Technological Challenges

Technological constraints remain a structural barrier in the implementation of LLMs. The findings show limited infrastructure, unstable internet access, and unequal distribution of digital devices, particularly in Islamic boarding school *(pesantren)* and rural schools. These conditions directly affect the feasibility of AI-supported learning environments.

---

[31] Haetami, "AI-Driven Educational Transformation in Indonesia."

[32] Rahmat dkk., "Urgensi Artificial Intelligence (AI) dalam Pembelajaran Bahasa Arab."

[33] Zaki dan Ulya, "Analisis Kesiapan Pedagogis Dan Teknologis Guru Dalam Mengadopsi Ai Sebagai Sarana Pembelajaran Adaptif."

[34] Satrio, "Integrasi Artificial Intelligence dalam Pembelajaran Bahasa Arab."

In addition, teachers limited technological literacy restricts their ability to operationalize LLMs in instructional design. Many educators reported that AI tools are available but not fully understood in terms of pedagogical application.

This aligns with research emphasizing that digital literacy and technological readiness are key determinants of AI adoption in education[35]. However, in practice, unequal infrastructure and competence create disparities in educational transformation across institutions[36].

Thirth, Ethical and Epistemological Challenges

Ethical concerns represent a critical dimension in the use of LLMs in Arabic language learning, particularly in Islamic education. Teachers expressed doubts about the reliability of AI-generated content, especially in relation to religious texts that require high interpretative authority and scholarly validation.

Furthermore, risks such as plagiarism, cognitive dependency, and reduced critical thinking were identified. Students may rely excessively on AI-generated answers without engaging in meaningful learning processes.

These findings align with literature emphasizing AI ethics in education, particularly issues of academic integrity, bias, and epistemic reliability[37]. In this context, AI use must be accompanied by strong ethical and pedagogical governance[38].

Fourth, Psychological and Socio-Cultural Challenges

Psychological readiness significantly influences teacher acceptance of LLMs. Teachers reported uncertainty, lack of confidence, and fear of making errors when using AI in teaching. This reflects technological anxiety and low self-efficacy in digital pedagogy.

From the perspective of the Technology Acceptance Model (TAM), these conditions are associated with low perceived ease of use and uncertain perceived usefulness, which reduce adoption intention[39].

From a socio-cultural perspective, educational traditions also shape technology acceptance. In Islamic boarding schools, classical learning methods remain dominant, while technology is often considered supplementary. This

---

[35] Krismiyati, "Technology readiness segment analysis of teachers in using mobile-based teaching applications."

[36] Muawanah dkk., "The Interconnection between Digital Literacy, Artificial Intelligence, and the Use of E-Learning Applications in Enhancing the Sustainability of Regional Languages."

[37] Edi Santosa dkk., "Pemanfaatan kecerdasan buatan dalam pembelajaran sekolah dasar kesiapan guru dan implikasi etis."

[38] Nadiva Izzah dkk., "Tantangan dan Strategi Kompetensi Guru Pendidikan Islam dan Adaptasi Teknologi dalam Penguatan Nilai Spiritual," *DIKSI: Jurnal Kajian Pendidikan dan Sosial* 6, no. 2 (2025): 114–21, https://doi.org/10.53299/diksi.v6i2.1567.

[39] Pratiwi dan Yunus, "Manfaat dan Tantangan Penggunaan Artificial Intelligence (AI) bagi Guru dan Peserta Didik di Era Society 5.0."

reflects a broader negotiation between tradition and innovation in Islamic education systems[40].

Fifth, Implications and Mitigation Strategies

The findings suggest that overcoming these challenges requires a multi-layered strategy.

First, structured AI literacy training is needed to strengthen teachers' technological and pedagogical competencies. Second, curriculum integration of AI awareness is required to ensure alignment between technology and learning objectives. Third, institutional support must be strengthened through infrastructure improvement and clear policy frameworks. Fourth, ethical guidelines are necessary to ensure responsible use of AI in Islamic educational contexts.

These strategies are consistent with research emphasizing that successful AI integration depends on the synergy between teacher readiness, institutional support, and pedagogical transformation[41].

The findings demonstrate that challenges in LLM integration are systemic and interdependent. Pedagogical limitations are reinforced by technological constraints, while psychological resistance is shaped by both individual perception and institutional context. Socio-cultural traditions further influence the pace of adoption.

Conversely, gradual exposure to LLMs encourages experimentation, which contributes to incremental improvement in teacher readiness. This shows that readiness is not static but develops through iterative interaction between competence, perception, and context.

In conclusion, the challenges of integrating LLMs in Arabic language learning are multidimensional, involving pedagogical, technological, ethical, psychological, and socio-cultural factors. Although these challenges currently limit full implementation, they also provide clear directions for strategic improvement.

Therefore, successful integration of LLMs requires not only technological enhancement but also systemic capacity building, institutional strengthening, and ethical grounding within Islamic education contexts. Teacher readiness must evolve in parallel with institutional readiness to ensure sustainable and meaningful AI integration in Arabic language pedagogy.

---

[40] Nida'ul Khoiroh dkk., "Integrasi Nilai-Nilai Islam Dalam Pembelajaran Bahasa Inggris di MTs. Nahdlatul Muslimin," *Akademika: Jurnal Manajemen Pendidikan Islam* 7, no. 1 (2025): 15–27, https://doi.org/10.51339/akademika.v7i1.3815.

[41] Khabibul Umam dkk., "Transformasi Pembelajaran Bahasa Arab melalui Teknologi Digital dalam Pendidikan Islam."

Opportunities and Strategies for Utilizing LLMs in Arabic Language Learning

Despite the various challenges identified in the previous section, the findings of this study indicate that the integration of Large Language Models (LLMs) in Arabic language learning presents substantial pedagogical and transformative opportunities. Based on interview data from seven Arabic language teachers across MTs, MAN, SMA/SMK, and Islamic boarding schools in Bengkulu, these opportunities are primarily associated with enhanced learning effectiveness, development of 21st-century competencies, reinforcement of value-based education, and the emergence of human–AI collaborative learning environments[42].

From a theoretical perspective, these findings suggest that LLMs function not merely as technological tools, but as mediating systems that reshape instructional processes and learning interactions. In this regard, AI integration should be understood within a socio-technical learning ecosystem where pedagogical goals, teacher agency, and technological affordances interact dynamically.

First, Enhancement of Learning Effectiveness

The data reveal that teachers perceive LLMs as capable of improving the efficiency and effectiveness of Arabic language instruction. Respondent 4 (MAN IC) stated that AI helps students generate Arabic sentences more quickly, particularly at the beginner level. Similarly, Respondent 2 (MAN) noted that AI facilitates the preparation of teaching materials and contextual examples.

These findings indicate that LLMs can support adaptive learning processes by providing immediate linguistic output and feedback, particularly in writing and vocabulary acquisition. Such functionality aligns with the principles of personalized learning, where instructional content is adjusted to learner needs and pace[43]. In addition, prior studies have demonstrated that AI-based systems enhance instructional efficiency by enabling real-time feedback and iterative learning processes[44].

Thus, LLMs may serve as cognitive scaffolding tools that assist both teachers and learners in accelerating language production and comprehension tasks, while maintaining teacher oversight in pedagogical validation.

Second, Development of 21st-Century Skills

Another significant opportunity lies in the potential of LLMs to foster 21st-century competencies among students. Respondent 7 (SMK) emphasized that students are encouraged to compare and revise AI-generated outputs, rather

---

[42] Rahmat dkk., "Urgensi Artificial Intelligence (AI) dalam Pembelajaran Bahasa Arab."

[43] Muawanah dkk., "The Interconnection between Digital Literacy, Artificial Intelligence, and the Use of E-Learning Applications in Enhancing the Sustainability of Regional Languages."

[44] Ilham Mr dkk., "Penggunaan Media Teknologi Artificial Intelligence Dalam Meningkatkan Kemampuan Berbahasa Arab Di PPM Rahmatul Asri," *Journal on Education* 7, no. 1 (2024): 3922–33, https://doi.org/10.31004/joe.v7i1.6994.

than simply accepting answers. This suggests that LLMs can promote analytical engagement when used within structured learning tasks.

Moreover, Respondent 1 (MTs) noted a rise in student involvement following the integration of digital tools into the curriculum. This suggests that AI-powered educational settings have the potential to boost both student motivation and active participation.

From a theoretical standpoint, these findings align with 21st-century skills frameworks that emphasize critical thinking, creativity, communication, and digital literacy as core competencies[45]. When integrated into task-based or inquiry-based learning models, LLMs can function as cognitive partners that stimulate higher-order thinking processes rather than passive knowledge consumption[46].

Thirth, Integration of Islamic Values in Learning

A distinctive opportunity identified in this study is the potential of LLMs to support the integration of Islamic values in Arabic language education. Respondent 6 (*Pesantren*) emphasized that Arabic learning is inseparable from the understanding of Islamic texts and must remain grounded in religious epistemology.

In this context, LLMs can assist teachers in accessing, explaining, and contextualizing Arabic texts, including vocabulary clarification and textual summarization. However, respondents consistently stressed that such use must remain under teacher supervision to ensure theological and linguistic accuracy.

This finding highlights the importance of aligning technological innovation with value-based education principles. Recent studies emphasize that AI integration in Islamic education must be guided by ethical and epistemological frameworks that safeguard religious authenticity and pedagogical integrity[47]. Therefore, LLMs should be positioned as supportive tools rather than authoritative sources in religious learning contexts.

Fourth, Human–AI Collaboration in Learning

The findings further indicate an emerging model of human–AI collaboration in Arabic language instruction. Teachers do not perceive LLMs as replacements, but as complementary tools that assist in instructional and administrative tasks.

Respondent 4 (MAN IC) stated that while AI can support technical processes, teachers remain responsible for guiding, evaluating, and

---

[45] Muhammad Tareh Aziz dkk., "Analisis Kurikulum Bahasa Arab Berbasis 4C (Critical Thinking, Communication, Collaboration, Creativity) untuk Pengembangan Kompetensi Abad 21 pada Siswa," *DAARUS TSAQOFAH Jurnal Pendidikan Pascasarjana Universitas Qomaruddin* 2, no. 1 (2024): 216–22, https://doi.org/10.62740/jppuq.v2i1.258.

[46] Hilma Mustika Fauziyyah dkk., "COLLABORATION AND COMMUNICATION SKILLS OF ELEMENTARY SCHOOL STUDENTS' IN INDONESIAN LANGUAGE LEARNING THROUGH RADEC," *Jurnal Cakrawala Pendas* 10, no. 2 (2024): 182–93, https://doi.org/10.31949/jcp.v10i2.7997.

[47] Izzah dkk., "Tantangan dan Strategi Kompetensi Guru Pendidikan Islam dan Adaptasi Teknologi dalam Penguatan Nilai Spiritual."

contextualizing student learning outcomes. This reflects a shift toward augmented pedagogy, where AI enhances rather than substitutes human instructional roles.

From a theoretical perspective, this aligns with human–AI collaboration frameworks that emphasize distributed cognition between humans and intelligent systems[48]. In such models, teachers retain epistemic authority while leveraging AI to optimize efficiency and instructional design quality.

Fifth, Utilization Strategies and Practical Implications

Based on the findings, several strategic implications can be formulated to optimize LLM utilization in Arabic language learning.

First, structured AI literacy training for teachers is essential to strengthen both technical and pedagogical competencies. Respondent 2 highlighted that training increases confidence in using AI tools effectively.

Second, curriculum adaptation is needed to integrate AI-supported learning activities in a systematic and pedagogically coherent manner. Third, institutional policies must be developed to ensure ethical and responsible use of AI in educational settings. Fourth, infrastructure development is required to reduce disparities in access and technological readiness across institutions.

These strategies are supported by previous research emphasizing that successful AI integration depends on the alignment of teacher readiness, institutional support, and pedagogical redesign[49].

The findings of this study demonstrate that LLMs offer multidimensional opportunities in Arabic language learning. These include enhanced instructional efficiency, development of higher-order thinking skills, reinforcement of Islamic educational values, and the establishment of collaborative human–AI learning systems.

However, the realization of these opportunities depends on systematic capacity building and contextual adaptation. Therefore, LLM integration should be understood not merely as technological adoption, but as a pedagogical transformation process that requires continuous alignment between educational objectives, ethical principles, and technological capabilities.

Conclusion

This study showed that the integration of Large Language Models (LLMs) brings significant transformation to Arabic language learning at pedagogical, technological, and epistemological levels. The findings indicate that Arabic language teachers demonstrate awareness of the importance of digital technology in education; however, their readiness to integrate LLMs remains uneven and is still in an early developmental stage. Interrelated factors, including limited digital literacy, lack of structured professional training, varying psychological readiness,

[48] Haetami, "AI-Driven Educational Transformation in Indonesia."

[49] Zaki dan Ulya, "Analisis Kesiapan Pedagogis Dan Teknologis Guru Dalam Mengadopsi Ai Sebagai Sarana Pembelajaran Adaptif."

and unequal institutional support shape this condition. Although LLMs offer substantial potential to enhance Arabic language instruction, their effective implementation requires careful pedagogical alignment and contextual adaptation within Islamic educational environments.

The findings imply that integrating LLMs into Arabic language learning requires a systemic and multi-level approach rather than a purely technological solution. Teacher professional development should prioritize structured AI literacy programs that integrate both technical competence and pedagogical application. Educational institutions need to strengthen infrastructural readiness and establish clear ethical and operational guidelines for AI use in learning environments. In addition, curriculum development should incorporate AI-supported learning strategies while maintaining the values and epistemological foundations of Islamic education. Finally, future research is recommended to explore classroom-based implementation models of LLMs to bridge the gap between teacher readiness and practical pedagogical transformation.

References

Aflisia, Noza, and Hazuar Hazuar. "Pengembangan Bahan Ajar Bahasa Arab Berbasis Pendekatan Komunikatif." *Arabiyatuna : Jurnal Bahasa Arab* 4, no. 1 (May 8, 2020): 111. https://doi.org/10.29240/jba.v4i1.1380.

Aflisia, Noza, Hendrianto, Nurwadjah Ahmad E.Q, and Andewi Suhartini. "Komparasi Pembelajaran Nahwu Di Pesantren Dan Madrasah." *Al-Fathin: Jurnal Bahasa Dan Sastra Arab* 5, no. 1 (2022): 97–110.

Almelhes, Sultan. "Enhancing Arabic Language Acquisition: Effective Strategies for Addressing Non-Native Learners' Challenges." *Education Sciences* 14, no. 10 (2024): 1116. https://doi.org/10.3390/educsci14101116.

Ayanwale, Musa Adekunle, Owolabi Paul Adelana, Nurudeen Babatunde Bamiro, Stella Oluwakemi Olatunbosun, Kabir Oluwatobi Idowu, dan Kayode A. Adewale. "Large Language Models and GenAI in Education: Insights from Nigerian in-Service Teachers through a Hybrid ANN-PLS-SEM Approach." *F1000Research* 14 (Maret 2025): 258. https://doi.org/10.12688/f1000research.161637.1.

Aziz, Muhammad Tareh, Laili Mas Ulliyah Hasan, dan Muhammad Rido'i. "Analisis Kurikulum Bahasa Arab Berbasis 4C (Critical Thinking, Communication, Collaboration, Creativity) untuk Pengembangan Kompetensi Abad 21 pada Siswa." *DAARUS TSAQOFAH Jurnal Pendidikan Pascasarjana Universitas Qomaruddin* 2, no. 1 (2024): 216–22. https://doi.org/10.62740/jppuq.v2i1.258.

Buska, Wahyudi, dan Yogia Prihartini. "The Role of Developing Arabic Language Teachers to Improve Pedagogical Competence in Learning." *Arabiyatuna: Jurnal Bahasa Arab* 9, no. 2 (2025): 667–82. https://doi.org/10.29240/jba.v9i2.14800.

Edi Santosa, I. Komang, I. Ketut Sudarsana, dan Ni Putu Candra Prastya Dewi. "Pemanfaatan kecerdasan buatan dalam pembelajaran sekolah dasar kesiapan guru dan implikasi etis." *JPGI (Jurnal Penelitian Guru Indonesia)* 10, no. 1 (2025): 80–84. https://doi.org/10.29210/025764jpgi0005.

Fauziyyah, Hilma Mustika, Prana Dwija Iswara, Wahyu Sopandi, dan Atep Sujana. "COLLABORATION AND COMMUNICATION SKILLS OF ELEMENTARY SCHOOL STUDENTS' IN INDONESIAN LANGUAGE LEARNING THROUGH RADEC." *Jurnal Cakrawala Pendas* 10, no. 2 (2024): 182–93. https://doi.org/10.31949/jcp.v10i2.7997.

Fitri, Allisa Tazkia. "Tinjauan Literatur: Integrasi Kecerdasan Buatan (AI) Dalam Pembelajaran Bahasa Arab." *Jurnal Ilmiah Pendidikan Scholastic* 9, no. 1 (2025): 16–26. https://doi.org/10.36057/jips.v9i1.718.

Haetami, Haetami. "AI-Driven Educational Transformation in Indonesia: From Learning Personalization to Institutional Management." *AL-ISHLAH: Jurnal Pendidikan* 17, no. 2 (2025): 1819–32. https://doi.org/10.35445/alishlah.v17i2.7448.

Izzah, Nadiva, Shofi Hilda Nuraini, Sulthan Abyan, Imam Syafi'i, Wahyuni Dwi Ariyanti, dan Zidan Zulqornain Haq. "Tantangan dan Strategi Kompetensi Guru Pendidikan Islam dan Adaptasi Teknologi dalam Penguatan Nilai Spiritual." *DIKSI: Jurnal Kajian Pendidikan dan Sosial* 6, no. 2 (2025): 114–21. https://doi.org/10.53299/diksi.v6i2.1567.

Khabibul Umam, Mustolikh, Zetty Arifah, dan Ricy Fatkhurrokhman. "Transformasi Pembelajaran Bahasa Arab melalui Teknologi Digital dalam Pendidikan Islam." *Educatia : Jurnal Pendidikan dan Agama Islam* 15, no. 1 (2025): 1–22. https://doi.org/10.69879/ks4f8466.

Khoiroh, Nida'ul, Sukarman, Muhammad Najih, dan Siti Umiyati. "Integrasi Nilai-Nilai Islam Dalam Pembelajaran Bahasa Inggris di MTs. Nahdlatul Muslimin." *Akademika: Jurnal Manajemen Pendidikan Islam* 7, no. 1 (2025): 15–27. https://doi.org/10.51339/akademika.v7i1.3815.

Kovari, Attila. "AI Gem: Context-Aware Transformer Agents as Digital Twin Tutors for Adaptive Learning." *Computers* 14, no. 9 (2025): 367. https://doi.org/10.3390/computers14090367.

Krismiyati, Krismiyati. "Technology readiness segment analysis of teachers in using mobile-based teaching applications: An Indonesian context." *Journal of Technology and Science Education* 15, no. 2 (2025): 588. https://doi.org/10.3926/jotse.3431.

Masriah, Masriah, dan Yanti Kusnawati. "Development of Augmented Reality Video Media to Improve Mastery of Tahiat Arabiya Arabic Language Course Students." *Arabiyatuna: Jurnal Bahasa Arab* 8, no. 2 (2024): 663–82. https://doi.org/10.29240/jba.v8i2.11056.

Mr, Ilham, Saepudin Saepudin, Herdah Herdah, Darmawati Darmawati, dan Kaharuddin Ramli. "Penggunaan Media Teknologi Artificial Intelligence Dalam Meningkatkan Kemampuan Berbahasa Arab Di PPM Rahmatul

Asri." *Journal on Education* 7, no. 1 (2024): 3922–33. https://doi.org/10.31004/joe.v7i1.6994.

Muawanah, Uyu, Arita Marini, dan Iva Sarifah. "The Interconnection between Digital Literacy, Artificial Intelligence, and the Use of E-Learning Applications in Enhancing the Sustainability of Regional Languages: Evidence from Indonesia." *Social Sciences & Humanities Open* 10 (2024): 101169. https://doi.org/10.1016/j.ssaho.2024.101169.

Mustar, Raswan, Dina Chabib Uluum, Keysa Tamami, dan Muhammad Ramdhan Bin Mohamad. "Bridging Traditional Language Pedagogy and AI: Lessons from Arabic Language Programs in Indonesia." *Arabiyatuna: Jurnal Bahasa Arab* 9, no. 2 (2025): 770–85. https://doi.org/10.29240/jba.v9i2.13013.

Nasaruddin, Nasaruddin. "Using ChatGPT in Teaching Arabic as a Foreign Language." *Arabiyatuna: Jurnal Bahasa Arab* 8, no. 1 (2024): 1. https://doi.org/10.29240/jba.v8i1.9413.

Nasution, Sahkholid, dan Akmal Walad. "The Effectiveness of Constructivism-based Arabic Textbook in Higher Education." *Arabiyatuna : Jurnal Bahasa Arab* 6, no. 1 (2022): 63. https://doi.org/10.29240/jba.v6i1.3572.

Nissim, Michal, dan Fathi Shamma. "Supporting Teacher Professionalism for Inclusive Education: Integrating Cognitive, Emotional, and Contextual Dimensions." *Education Sciences* 15, no. 10 (2025): 1317. https://doi.org/10.3390/educsci15101317.

Pratiwi, Rachel Theresa Laras, dan Mahmuddin Yunus. "Manfaat dan Tantangan Penggunaan Artificial Intelligence (AI) bagi Guru dan Peserta Didik di Era Society 5.0." *Journal of Innovation and Teacher Professionalism* 3, no. 2 (2024): 488–94. https://doi.org/10.17977/um084v3i22025p488-494.

Rahma, Isni Dwi, Rianti Rahmadania, Tri Rahayu Setya Ningrum, dkk. "Transformasi Peran Guru Di Era Kecerdasan Buatan: Dari Pengajar Menjadi Fasilitator Digital." *RIGGS: Journal of Artificial Intelligence and Digital Business* 4, no. 2 (2025): 6198–203. https://doi.org/10.31004/riggs.v4i2.1566.

Rahmani, Amir Masoud, Atefeh Hemmati, dan Shirin Abbasi. "The Rise of Large Language Models: Evolution, Applications, and Future Directions." *Engineering Reports* 7, no. 9 (2025): e70368. https://doi.org/10.1002/eng2.70368.

Rahmat, R., Andi Abdul Hamzah, dan Kamaluddin Abu Nawas. "Urgensi Artificial Intelligence (AI) dalam Pembelajaran Bahasa Arab." *AL-MUTSLA* 7, no. 1 (2025): 241–59. https://doi.org/10.46870/jstain.v7i1.1660.

Saarela, Mirka, Sachini Gunasekara, dan Prabha Kumarage. "A Meta-Analysis of Generative AI Effects on Language Proficiency and Affective–Cognitive Outcomes in Language Learning." *Discover Computing* 29, no. 1 (2026): 116. https://doi.org/10.1007/s10791-026-10015-1.

Saputra, Miswar, dan Murdani Murdani. "Society 5.0 sebagai Tantangan Terhadap Pendidikan Islam." *ISLAMIC PEDAGOGY: Journal of Islamic Education* 1, no. 2 (2023): 132–45. https://doi.org/10.52029/ipjie.v1i2.158.

Satrio, Satrio. "Integrasi Artificial Intelligence dalam Pembelajaran Bahasa Arab: Peluang, Tantangan, dan Inovasi Pedagogis di Era Digital." *RIGGS: Journal of Artificial Intelligence and Digital Business* 4, no. 2 (2025): 5907–14. https://doi.org/10.31004/riggs.v4i2.1531.

Shahzad, Muhammad Farrukh, Shuo Xu, Xin An, dan Muhammad Asif. "Are Generative AI Technologies Transforming Education for the 21st Century? Research Trends, Challenges, and Benefits." *SAGE Open* 15, no. 3 (2025): 21582440251368594. https://doi.org/10.1177/21582440251368594.

Si, Shijing, Xiaoming Jiang, Qinliang Su, dan Lawrence Carin. "Detecting Implicit Biases of Large Language Models with Bayesian Hypothesis Testing." *Scientific Reports* 15, no. 1 (2025): 12415. https://doi.org/10.1038/s41598-025-95825-x.

Storm-Mathisen, Ardis, Tonje Hilde Giæver, Jo Helle-Valle, Bård Ketil Engen, dan Steinar Karstensen. "Engagement with AI in teacher education—discourses, processes of domestication and dynamics of transformation." *Frontiers in Education* 10 (Januari 2026): 1694082. https://doi.org/10.3389/feduc.2025.1694082.

Yemmardotillah, M., Anita Indria, Asrizallis, dan Rini Indriani. "Tantangan dan Peluang Pendidikan Agama Islam di Era Society 5.0." *Malewa: Journal of Multidisciplinary Educational Research* 2, no. 2 (2024): 75–87. https://doi.org/10.61683/jome.v2i2.127.

Zaki, Ahmad Rifian Maula, dan Indana Ainiya Ulya. "Analisis Kesiapan Pedagogis Dan Teknologis Guru Dalam Mengadopsi Ai Sebagai Sarana Pembelajaran Adaptif." *Jurnal Pendidikan Indonesia* 6, no. 7 (2025): 3220–28. https://doi.org/10.59141/japendi.v6i7.8434.

Zuashfiyailina, Zuashfiyailina, Ismet Rum, Sri Indah Lestari, dan Putri Halimatusa'diah. "Tantangan Kompetensi Pedagogik Digital Guru Bahasa Arab di Era Society 5.0: Systematic Literatur Review." *JIIP - Jurnal Ilmiah Ilmu Pendidikan* 8, no. 12 (2025): 13821–28. https://doi.org/10.54371/jiip.v8i12.10031.

This page belongs to the Arabiyatuna: Jurnal Bahasa Arab