



Digital Nahwu and Sharaf Learning: A Narrative Review of Problems, Challenges, and Opportunities

تعلم النحو و الصرف الرقمي: مراجعة سردية للإشكالات والتحديات والفرص

Ridwan Priyono Saputra^{1*}, Nur Fadilah Amin², Ummu Fadhilah Imran Ibrahim³

^{1,2,3}Muhammadiyah University of Makassar, Indonesia

*Corresponding E-mail: ridwanpriyonosaputra04@gmail.com

ABSTRACT

This study aims to narratively examine the problems, challenges, and opportunities in the development of digital based Nahwu and Sharaf learning through the synthesis of previous research findings. The method employed was a Literature Review (LR) involving 122 documents retrieved from Scopus (106), Google Scholar (11), Crossref (3), and Semantic Scholar (2). The data were analyzed through the stages of identification, thematic classification, and narrative synthesis to obtain an overview of the development of digital Nahwu and Sharaf learning. The findings indicate that the main problems include the complexity of Arabic linguistic structures, the limited accuracy of Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies, as well as user readiness and supporting infrastructure. The implementation challenges encompass pedagogical alignment, educator competence in technology integration (TPACK), student readiness, and the scientific validity of digital learning resources. Meanwhile, development opportunities are identified through the utilization of AI, NLP, mobile applications, interactive multimedia, gamification, and Learning Management Systems (LMS). This study concludes that the development of digital Nahwu and Sharaf learning requires the integration of technological innovation, Arabic linguistic accuracy, and pedagogical principles to support innovation in Arabic language education.

Keywords: Digital Arabic Language Learning; Nahwu; Sharaf; Literature Review; Artificial Intelligence.

مستخلص البحث

تهدف هذه الدراسة إلى بحث الإشكالات والتحديات والفرص المتعلقة بتطوير تعلم النحو والصرف القائم على التكنولوجيا الرقمية من خلال دراسة سردية تستند إلى تركيب نتائج البحوث السابقة. وقد اعتمدت الدراسة منهج مراجعة الأدبيات (Literature Review) من خلال تحليل ١٢٢ وثيقة تم الحصول عليها من قواعد بيانات Scopus (106)، و Google Scholar (11)، و Crossref (3)، و Semantic Scholar (2). وتم تحليل البيانات عبر مراحل التحديد، والتصنيف الموضوعي، والتركيب السردية؛ بهدف الحصول على صورة شاملة حول تطور تعلم النحو والصرف الرقمي. وأظهرت النتائج أن أبرز الإشكالات تتمثل في تعقيد البنية اللغوية العربية، ومحدودية دقة تقنيات الذكاء الاصطناعي (AI) ومعالجة اللغة الطبيعية (NLP)، إضافة إلى جاهزية المستخدمين والبنية التحتية الداعمة. كما تشمل تحديات التنفيذ الملاءمة التربوية، وكفاءة المعلمين في دمج التكنولوجيا (TPACK)، واستعداد المتعلمين، والحفاظ على الصلاحية العلمية لمصادر التعلم الرقمية. وفي المقابل، تبرز فرص التطوير من خلال توظيف الذكاء الاصطناعي، ومعالجة اللغة الطبيعية، والتطبيقات المحمولة، والوسائط المتعددة التفاعلية، والتعلم القائم على الألعاب، وأنظمة إدارة التعلم (LMS). وتخلص الدراسة إلى أن تطوير تعلم النحو والصرف الرقمي يتطلب تكاملاً بين الابتكار التكنولوجي، والدقة اللغوية العربية، والمبادئ التربوية؛ بما يساهم في دعم الابتكار في تعليم اللغة العربية.

الكلمات المفتاحية: تعلم اللغة العربية رقمياً؛ النحو؛ الصرف؛ المراجعة الأدبية؛ الذكاء الاصطناعي.

Citation:

Saputra, R. P., Amin, N. F., & Ibrahim, U. F. I. (2026). Digital Nahwu and Sharaf Learning: A Narrative Review of Problems, Challenges, and Opportunities. *Al-Muyassar: Journal of Arabic Education*, 5 (3), 1318-1331.

INTRODUCTION

The development of digital technology has brought significant changes to educational systems, including Arabic language learning, which is characterized by complex linguistic features, such as orthographic, phonological, morphological, and syntactic systems that present challenges in the learning process (Al-Abdullatif & Alsubaie, 2022; Moustafa, Al-Hamad, Qureshi, & Qadir, 2026). The integration of various digital platforms has the potential to address some challenges in Arabic language learning while simultaneously requiring the transformation of educators' pedagogical competencies (Hanifah, Binti Adam, Faizin, Miftakhul Jannah, & Hanafi, 2024; Wahyuni, Azis, Afiyah, & Afandi, 2026). Digital transformation in learning is no longer limited to replacing conventional media with electronic devices; rather, it has evolved through the integration of various technologies, including mobile applications, interactive multimedia, Artificial Intelligence (AI), Natural Language Processing (NLP), Learning Management Systems (LMS), and adaptive learning systems. In the context of Arabic language learning, language proficiency is not only related to language skills but also involves an understanding of grammatical aspects, particularly *nahwu*, which encompasses sentence structures, relationships among linguistic elements, and *i'rab*, as well as *sharaf*, which relates to word formation changes, *wazan*, and *tashrif*. These characteristics make *nahwu* and *sharaf* subjects that are often perceived as difficult, abstract, and requiring continuous practice (Ahyani, 2021; S. Haq, 2023). The utilization of digital technology offers opportunities for more flexible and interactive learning (Ritonga et al., 2024), although its implementation still faces challenges, particularly regarding technological access and digital literacy (Mustaufiy, 2023). Furthermore, the application of AI and NLP enables the automatic analysis of word forms, *i'rab*, *tarkib*, and *tashrif*; however, the complex morphological characteristics of Arabic remain a challenge in achieving optimal accuracy levels (Almalki, Kateb, & Mosli, 2024; Muharom, 2025; Rosyad & Haq, 2022; Zaman, Safwandi, & Fajriana, 2025). Therefore, the effectiveness of digital *nahwu* and *sharaf* learning does not solely depend on technological availability but also on the ability of these systems to accurately represent grammatical concepts and support students' linguistic reasoning processes.

The successful implementation of digital learning is influenced by various interconnected factors, including pedagogical design, user competence, infrastructure readiness, and institutional support. Several studies have shown that *nahwu* and *sharaf* learning in online and hybrid formats still faces various challenges, such as limited

network access, low levels of learning interaction, and gaps in digital competence between teachers and students (Arif, Mannan, & Darim, 2022; Jamil et al., 2024; Kerras & Essayahi, 2022). Under these conditions, teachers are required to maintain a balance among technological knowledge, pedagogical competence, and subject matter knowledge, as described in the TPACK framework (Vieira, Baelo, & Peres, 2026). However, previous studies on technology integration in Arabic language learning have generally addressed Arabic language digitalization from a broader perspective and have not comprehensively placed nahwu and sharaf as the primary focus of analysis, including studies on digital media mapping and systematic reviews (A. Z. Haq, Akmansyah, Erlina, & Koderi, 2024; Ramadhani & Ali, 2025; Sapawi & Yusoff, 2025). Meanwhile, studies specifically examining the digitalization of nahwu and sharaf remain limited to specific platforms or implementation contexts (Arif et al., 2022; Muharom, 2025; Zaman et al., 2025). This condition indicates a research gap, demonstrating the need for a synthesis that integrates various findings related to technological aspects, pedagogy, material quality, user competence, and the scholarly characteristics of nahwu and sharaf.

Building upon this research gap, the contribution of this study lies in developing a conceptual synthesis of digital nahwu and sharaf learning that integrates the dimensions of Arabic linguistics, pedagogy, technology, user competence, and institutional factors into a unified analytical framework. Unlike previous studies that have generally discussed Arabic language learning technologies from a broader perspective or focused on specific platforms, this study specifically maps the problems, challenges, and opportunities associated with nahwu and sharaf digitalization through a synthesis of existing literature. This mapping provides an integrative perspective on the development of digital Arabic grammar learning systems by considering linguistic accuracy, pedagogical effectiveness, and sustainable implementation.

To clarify the analytical framework, the terms problems, challenges, and opportunities in this study are conceptualized as three interrelated analytical dimensions with distinct conceptual scopes. Problems refer to issues or limitations inherent in digital nahwu and sharaf learning, particularly those related to the complexity of Arabic linguistic structures and the limitations of supporting technologies. Challenges refer to factors that hinder the implementation and development of digital learning, including pedagogical aspects, user competence, infrastructure readiness, and institutional

support. Meanwhile, opportunities refer to potential innovations and future development directions that emerge through the utilization of digital technology to improve the quality of nahwu and sharaf learning.

Based on these conditions, the study entitled “Digital Nahwu and Sharaf Learning: A Narrative Review of Problems, Challenges, and Opportunities” was conducted to provide a comprehensive understanding of the development of digitalization in the learning of these two major branches of Arabic grammar. This study seeks to answer three main research questions: (1) What problems in digital nahwu and sharaf learning have been identified in the literature? (2) What are the main challenges in the development and implementation of digital nahwu and sharaf learning based on the findings reported in the literature? (3) What opportunities and future development directions for digital nahwu and sharaf learning have been identified in the literature? Through this study, a conceptual mapping is expected to be generated by integrating linguistic, pedagogical, technological, psychological, infrastructural, curricular, and institutional aspects as a foundation for developing innovative, flexible, and linguistically accurate Arabic grammar learning systems without neglecting the essential role of educators.

RESEARCH METHOD

This study employed a Literature Review (LR) method with a narrative synthesis approach to identify, examine, and synthesize previous research findings related to the development of digital-based Nahwu and Sharaf learning. This approach was selected because the study aims to obtain a comprehensive understanding of research developments, patterns of findings, problems, implementation challenges, and development opportunities in digital Nahwu and Sharaf learning through the analysis of relevant literature sources.

The research data were obtained through a literature search conducted across four academic databases: Scopus, Google Scholar, Crossref, and Semantic Scholar. The search process identified 122 documents, consisting of 106 documents from Scopus, 11 documents from Google Scholar, 3 documents from Crossref, and 2 documents from Semantic Scholar. The analyzed documents included studies discussing Nahwu and Sharaf learning, digital technology-based Arabic language learning, the utilization of Artificial Intelligence (AI) and Natural Language Processing (NLP), learning applications, online learning, and technological innovations in Arabic language

education.

The research instrument used a literature data extraction sheet to record and manage information from each analyzed article. The extracted data included article identity, publication year, research objectives, methods, study context, technologies utilized, research findings, problems, implementation challenges, and development opportunities in digital learning.

The collected data were subsequently analyzed through three main stages: identification, thematic classification, and narrative synthesis. In the identification stage, key information from each document was recorded based on research characteristics and reported findings. Subsequently, the documents were classified according to major themes related to problems, implementation challenges, and development opportunities in digital Nahwu and Sharaf learning. The final stage involved narrative synthesis to identify patterns, relationships, and trends in previous research findings across linguistic, technological, pedagogical, user readiness, and supporting infrastructure dimensions. The synthesized findings were used to develop a conceptual mapping that connects technological aspects, pedagogical approaches, Nahwu-Sharaf linguistic characteristics, and the needs of contemporary Arabic language learning.

Table 1. Research Question Table

Code	Research Question (RQ)
RQ1	What are the problems of learning nahwu and digital sharaf identified in the literature?
RQ2	What are the main challenges in the development and implementation of digital nahwu and sharaf learning based on literature findings?
RQ3	What are the opportunities and directions for the development of digital nahwu and sharaf learning identified in the literature?

RESULT AND DISCUSSION

1. Distribution of Literature Based on Database Sources and Document Characteristics

Based on the data collection process, we obtained 122 initial documents from four academic database sources: Scopus (106 documents), Google Scholar (11 documents), Crossref (3 documents), and Semantic Scholar (2 documents) (Table 1).

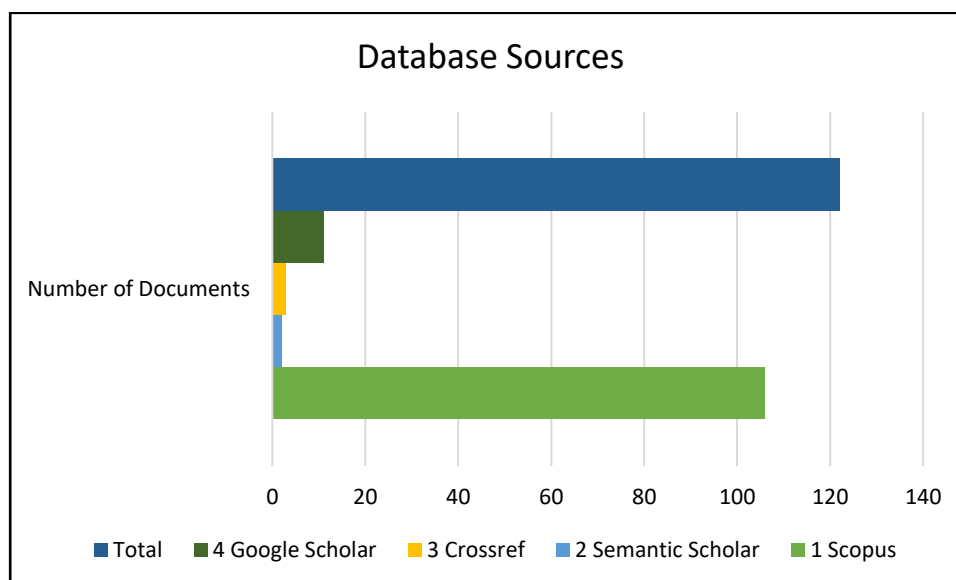


Figure 1. Database Sources

(Source: author's own work)

The reviewed Studies demonstrate considerable methodological diversity, encompassing systematic literature reviews, library research, qualitative and quantitative approaches, and mixed-methods designs. The identified research themes include the adoption of mobile applications, learning management systems (LMS), artificial intelligence (AI) based platforms, chatbots, and interactive multimedia as technological interventions in educational contexts. Some literature directly discusses nahwu and sharaf, while other studies examine Arabic learning technology more generally. We then categorized all documents based on their relevance to the three main research focuses: the problems, challenges, and opportunities in digital nahwu and sharaf learning. The table below presents the distribution of documents by database source.

2. Problems of Digital Nahwu and Sharaf Learning

The literature review results (Table 2) show that problems in learning nahwu and digital sharaf are not limited to device constraints; they are multidimensional, including linguistic, pedagogical, technological, human resources, and institutional aspects. This finding strengthens (S. Haq, 2023) view, which distinguishes Arabic language problems into linguistic problems (structure, grammar, vocabulary, writing systems) and non-linguistic problems (methods, media, facilities, motivation, and educators' competence). In the digital context, these two forms of problems develop because technology is needed not only to deliver material but also to support understanding of complex grammatical concepts.

Table 2. Results of Synthesis of Problematic Forms of Digital Nahwu and Sharaf Learning

Problematic Category	Key Findings
Linguistics	The complexity of i'rab, sentence structure, word changes, wazan, and tashrif.
Pedagogical	The difficulty of presenting abstract concepts in interactive digital learning.
Technology	Limited accuracy of AI, NLP, and Arabic language analysis systems.
Students	The difference in digital literacy, motivation, and independent learning ability.
Educator	Limited ability to integrate technology with pedagogy.
Institutions	Limited facilities, networks, and support for technology implementation.

Linguistically, nahwu and sharaf are highly complex because students must understand the relationship between the form, function, and context of language, not just remember the rules (Ahyani, 2021). This complexity is increasingly evident in the limitations of AI technology in conducting accurate Arabic analysis, especially in the reading of harakat, ma'rifah-nakirah, and word structure (Rosyad & Haq, 2022), as well as in the morphological complexity and variation of word forms that make it difficult for Arabic language processing systems such as AraBERT and LSTM (Almalki et al., 2024). This shows that the main problem with learning nahwu and digital sharaf lies not only in technology availability, but in how well technology can understand the scientific characteristics of Arabic linguistics.

Pedagogically, various Arabic learning applications have increased motivation and learning experience through micro-learning and gamification features, but not all have presented grammatical material comprehensively (Asfihani, Al Anshori, Hafidz, & Efendi, 2025). Digitizing nahwu and sharaf learning therefore requires a more specific pedagogical approach than simply converting conventional teaching materials into digital formats, while maintaining linguistic accuracy through cognitive-linguistic scaffolding and sociocultural contexts (Susiawati & Al Fajr, 2025).

In terms of human resources, digitalization expands access and interactivity, but low digital literacy and user readiness still hamper implementation (Mustaufiy, 2023). Teachers' ability to connect technology, pedagogy, and materials through the TPACK framework strongly influences the success of digital learning (Vieira et al., 2026). In Nahwu and Sharaf, teachers remain important as directors of understanding and guardians of scientific validity, because the results of digital system analysis must remain in accordance with the rules of the Arabic language.

In terms of infrastructure and institutions, the implementation of online nahwu and sharaf learning still faces network disruptions, limited interactions, and difficulties with direct assistance (Arif et al., 2022), while inconsistency in the quality of digital content and uneven digital competence of teachers are also obstacles (Hady, Nasri, Hajras, Hasyim, & Rahmatullah, 2025). Overall, the answer to the first research question shows that the problems of digital nahwu and sharaf learning are multidimensional, including linguistic complexity, limited technological accuracy, content quality, user readiness, and institutional support, so that its development needs to integrate linguistic, pedagogical, technological, and institutional aspects proportionally.

3. Challenges of Implementing Digital Nahwu and Sharaf Learning

The literature analysis results (Table 3) show that developing and implementing digital nahwu and sharaf learning faces complex challenges in technology, pedagogy, human resource readiness, infrastructure, and sustainability. In contrast to language materials that are easier to convey through simple digital content, nahwu and sharaf require a system that can explain the relationship between rules, language forms, and the context of their use, in line with the importance of integrating technology, pedagogy, and materials through the TPACK framework (Vieira et al., 2026). Arif et al. (2022) found that nahwu and sharaf learning through the online system still faces network instability, participant delays, differences in understanding levels, and limited teacher-student interaction, which emphasizes that the move to a digital system requires a learning strategy that maintains the quality of interaction, in line with the findings of Kerras & Essayahi (2022) regarding the problem of concentration, motivation, and involvement of students in online Arabic learning.

Table 3. Challenges of Nahwu and Sharaf Digital Learning Implementation

Challenge Categories	Literature Findings
Infrastructure	Limited devices, internet connections, and technological facilities.
Digital competencies	The need to improve teachers' and students' ability to use technology.
Technology accuracy	Limitations in the accuracy of AI, NLP, and Arabic language analysis systems.
Learning design	The need to align technology with pedagogical strategies.
Learning evaluation	Limitations of automatic evaluation systems for grammatical ability.
The role of teachers	The need to maintain teachers' role in guiding and validating knowledge.

In terms of technological accuracy, AI and NLP still face limitations in producing contextually appropriate analysis because of morphological complexity and variations in Arabic word forms (Almalki et al., 2024), as well as obstacles in reading harakat and word structure (Rosyad & Haq, 2022). Muharom (2025) and Zaman et al. (2025) added that platforms such as NahwuAI and NLP-based chatbot systems can analyze i'rab, tarkib, and tashrif, but still cannot fully handle the diversity of language forms. These analysis errors risk leading learners to incorrect grammatical understandings, so ensuring the technology's linguistic validity remains the main challenge.

In terms of learning design, technology use does not automatically guarantee effective learning without appropriate pedagogical design; while various applications have increased motivation and engagement, they have not fully helped students understand why word forms change and apply rules in depth (Asfihani et al., 2025). Technology should therefore be positioned as a supporting tool that strengthens the learning process, not a substitute for guidance and teacher-student interaction, which are still needed to understand Arabic language rules (Susiawati & Al Fajr, 2025).

In terms of educator competence, teachers have a strategic position in selecting media, designing learning strategies, and validating the results of technology analysis to comply with the rules of the Arabic language, which requires an integration of mastery of technology, pedagogy, and materials (Vieira et al., 2026); the limitations of digital literacy for teachers and students can cause the potential of technology not to be utilized optimally (Mustaufiy, 2023). Student readiness is also a challenge, as online Arabic learning often faces low concentration, motivation, and interaction (Kerras & Essayahi, 2022), which is especially significant in nahwu and sharaf because these materials require

gradual understanding, repeated practice, and error correction that usually relies on direct mentoring.

In terms of infrastructure and institutions, network instability, limited interaction, and mentoring difficulties (Arif et al., 2022), plus inconsistency in the quality of digital content and uneven digital competence of teachers (Hady et al., 2025), indicate that technology cannot be applied effectively without adequate education system support. Overall, the main challenges for developing digital nahwu and sharaf learning include technological accuracy, pedagogical design that maintains depth of understanding, teacher competence, student readiness, and infrastructure and institutional support, which demand a comprehensive approach, not just technological innovation.

4. Opportunities for Digital Nahwu and Sharaf Learning Development

The literature review results (Table 4) show that digital technology development offers strategic opportunities to increase accessibility, flexibility, interactivity, and personalization in nahwu and sharaf learning, while maintaining linguistic accuracy through cognitive and sociocultural contexts (Susiawati & Al Fajr, 2025).

Table 4. Opportunities for the Development of Digital Nahwu and Sharaf Learning

Opportunity Categories	Forms of Development
Artificial Intelligence	Analysis of i'rab, tashrif, correction, and automated feedback.
NLP	Arabic language structure processing and word pattern recognition.
Mobile Learning	Flexible learning through digital apps.
Interactive Multimedia	Visual presentation of the concepts of nahwu and sharaf.
Gamification	Interactive exercises and increased learning engagement.
LMS	Management of materials, assessments, and monitoring of learning development.

The first opportunity comes from using AI and NLP to support more adaptive language analysis. Platforms such as NahwuAI provide independent learning opportunities through the analysis of i'rab, tarkib, and tashrif (Muharom, 2025), while the development of Arabic language processing models such as AraBERT and LSTM is the basis for systems that are better able to handle the morphological characteristics of the Arabic language (Almalki et al., 2024). However, AI development still requires

academic supervision to ensure the results are valid. The analysis follows valid Arabic rules.

This opportunity relates to mobile and interactive multimedia applications that support flexibility and independent learning. Applications such as BISA Nahwu Sharaf provide materials, exercises, videos, dictionaries, and quizzes that allow learners to learn gradually according to their learning pace (Ramadhani & Ali, 2025), while multimedia such as animations and visualization of word form changes help students understand abstract concepts more visually and contextually (Ritonga et al., 2024).

The third opportunity is related to gamification and the Learning Management System (LMS). Gamification can transform *i'rab*, *wazan*, and *tashrif* exercises, which tend to be monotonous, into more engaging learning activities (Asfihani et al., 2025), while the LMS helps organize learning materials, tasks, evaluation, and communication more systematically. However, gamification still needs to be designed so that game elements do not shift the focus away from achieving grammatical competence.

Another opportunity is to integrate AI technologies, learning analytics, gamification, and immersive technology into a single learning system through systematic pedagogical design (Wariyo, Abame, Lolamo, Bekene, & Bekele, 2026), so *nahwu* and *sharaf* learning can become more personalized and adaptive without compromising material validity or user readiness. Overall, opportunities and directions for developing digital *nahwu* and *sharaf* learning include AI and NLP, mobile applications, interactive multimedia, gamification, LMS, and integrating various technologies through planned learning design, while balancing linguistic accuracy, pedagogical effectiveness, and technological flexibility.

CONCLUSION

The study of these 122 documents shows that digitizing *nahwu* and *sharaf* learning still faces multidimensional problems in linguistic, pedagogical, technological, human resources, and institutional aspects. The complexity of *i'rab*, *tarkib*, *wazan*, and *tashrif* is the main challenge for AI and NLP accuracy, while teacher and student digital literacy and infrastructure support also determine implementation success. On the other hand, AI, NLP, mobile applications, interactive multimedia, gamification, and LMS open up more flexible and adaptive learning opportunities, provided linguistic validity is maintained and teachers continue to serve as scientific validators. This research's main contribution is a systematic mapping of the relationship between digital technology and

nahwu-sharaf learning, which has previously been studied separately.

Further research needs to be directed toward empirical studies on the effectiveness of certain technologies, including AI, chatbots, NLP, gamification, and immersive technology, in nahwu and sharaf learning in various educational contexts, as well as the development of technology-pedagogy-material integration models that are in accordance with the scientific characteristics of the Arabic language.

ACKNOWLEDGEMENT

The author would like to express the highest gratitude and appreciation to their parents and elder brother, Sersan Dua Rachmat Prayetno Saputra, A.Md.Kep., for their continuous prayers, support, and motivation throughout the preparation of this article. The author also extends sincere thanks to Resti Amelia, S.P., M.Si., for her valuable contributions, support, and constructive feedback during the writing of this article. Furthermore, the author would like to express appreciation to the Rector of Universitas Muhammadiyah Makassar, the Dean of the Faculty of Islamic Studies, all lecturers, particularly the academic supervisors, for their guidance, assistance, academic support, and the provision of institutional facilities that have contributed to the successful completion of this article.

REFERENCES

- Ahyani, H. (2021). Situation Method dalam Pembelajaran Sharaf di Era Revolusi Industri 4.0. *Al-Fashahah: Journal of Arabic Education, Linguistics, and Literature*, 1(1), 1–15. doi:<https://doi.org/10.59562/al-fashahah.v1i1.14897>
- Al-Abdullatif, A. M., & Alsubaie, M. A. (2022). Using Digital Learning Platforms for Teaching Arabic Literacy: A Post-Pandemic Mobile Learning Scenario in Saudi Arabia. *Sustainability (Switzerland)*, 14(19). doi:<https://doi.org/10.3390/su141911868>
- Almalki, A., Kateb, F., & Mosli, R. (2024). Word Prediction Using Dynamic Skip Connections Along With ARABERT and LSTM in Arabic Language. *ASEAN Journal on Science and Technology for Development*, 41(1). doi:<https://doi.org/10.61931/2224-9028.1569>
- Arif, A., Mannan, M., & Darim, A. (2022). Manajemen Pembelajaran Nahwu Sharaf Menggunakan Metode Tamyiz Pada Masa Pandemi Covid 19. *Kharisma: Jurnal Administrasi Dan Manajemen Pendidikan*, 1(1), 59–68. doi:<https://doi.org/10.59373/kharisma.v1i1.6>
- Asfihani, M. L., Al Anshori, A. Z., Hafidz, M., & Efendi, A. (2025). Pemanfaatan Teknologi Digital dalam Pembelajaran Bahasa Arab: Kajian Literatur Terhadap Aplikasi dan Platform. *AL WARAQAH: Jurnal Pendidikan Bahasa Arab*, 6(2), 254–269. doi:<https://doi.org/10.30863/awrq.v6i2.9975>
- Hady, R., Nasri, U., Hajras, M., Hasyim, M., & Rahmatullah, A. J. (2025). The Revolution of Arabic Language Learning: Integration of Digital Technology in 21st Century Education. *Jurnal Ilmiah Profesi Pendidikan*, 10(2), 1593–1599. doi:<https://doi.org/10.29303/jipp.v10i2.3444>
- Hanifah, U., Binti Adam, Z., Faizin, M., Miftakhul Jannah, I., & Hanafi, Y. (2024). Accelerating the digitalisation of learning post-COVID-19 era to improve the pedagogical competence of pre-service Arabic teachers. *Cogent Education*, 11(1). doi:<https://doi.org/10.1080/2331186X.2024.2413241>
- Haq, A. Z., Akmansyah, M., Erlina, E., & Koderi, K. (2024). Technology integration in arabic language learning: A literature review on the effectiveness of e-learning and mobile applications. *Journal of Research in Instructional*, 4(2), 481–494. doi:<https://doi.org/10.30862/jri.v4i2.473>
- Haq, S. (2023). Pembelajaran Bahasa Arab di Era Digital: Problematika dan Solusi dalam Pengembangan Media. *MUKADIMAH: Jurnal Pendidikan, Sejarah, Dan Ilmu-Ilmu Sosial*, 7(1), 211–222. doi:<https://doi.org/10.30743/mkd.v7i1.6937>
- Jamil, N. J., Rashid, R. A., Sahib, F. H., Ahmad, M., Abd. Kadir, K., Ibrahim, S. H., ... Cho, M. S. (2024). Bridging Gaps in Online Arabic Language Instruction: Addressing Key Challenges in Higher Education Institutions. *Global Journal Al-Thaqafah*, 115–129. doi:<https://doi.org/10.7187/GJATSI122024-8>
- Kerras, N., & Essayahi, M. L. B. (2022). Education and COVID-19: Learning Arabic Language and Perspectives. *Electronic Journal of E-Learning*, 20(1), 36–52. doi:<https://doi.org/10.34190/ejel.20.1.1976>
- Moustafa, A. H. A., Al-Hamad, M. F., Qureshi, M. A., & Qadir, J. (2026). Generative AI for Learning and Teaching Arabic: Opportunities, Challenges, and Ethical Considerations. *IEEE Access*. Institute of Electrical and Electronics Engineers Inc. doi:<https://doi.org/10.1109/ACCESS.2026.3651864>
- Muharom, A. (2025). Inovasi Pembelajaran Bahasa Arab Berbasis Artificial Intelligence: Analisis Platform NahwuAI dan Implikasinya Terhadap Tradisi Nahwu-Sharaf Pesantren. In *Proceeding of International Conference on Islamic Education (ICIED)* (Vol. 10, pp.

- 906–914). doi:<https://doi.org/10.18860/iciied.v10i1.3696>
- Mustaufiy, A. S. H. (2023). Peluang dan tantangan pengembangan literasi digital dalam pembelajaran bahasa Arab pada jenjang pendidikan dasar. *FASHLUNA*, 4(1), 87–100. doi:<https://doi.org/https://doi.org/10.47625/fashluna.v4i1.492>
- Ramadhani, G. P., & Ali, M. (2025). Literature Studies: The Use of Technology as a Media for Learning Arabic in the Digital Era. *Journal of Practice Learning and Educational Development*, 5(3), 762–775. doi:<https://doi.org/10.58737/jpled.v5i3.511>
- Ritonga, M., Mudinillah, A., Wasehudin, W., Julhadi, J., Amrina, A., & Shidqi, M. H. (2024). The effect of technology on Arabic language learning in higher education. *Journal of Education and Learning (EduLearn)*, 18(1), 116–127. doi:<https://doi.org/10.11591/edulearn.v18i1.20867>
- Rosyad, Muh. S., & Haq, M. A. (2022). Efektifitas Situs Berbasis Kecerdasan Buatan Dalam Mendesain Tes Keterampilan Mendengar Toafl. *JALIE: Journal of Applied Linguistics and Islamic Education*, 06(01), 27–44.
- Sapawi, M. S. M., & Yusoff, N. M. R. N. (2025). Integrating technology into the Arabic language curriculum: A systematic review of trends, strategies and cultural dimensions. *Social Sciences and Humanities Open*, 12. doi:<https://doi.org/10.1016/j.ssaho.2025.101974>
- Susiawati, I., & Al Fajr, R. (2025). *From Classical Texts to Digital Platforms: Reconstructing Arabic Language Pedagogy for Multidisciplinary Education Goals*. In *Proceeding of the International Conference on Global Education and Learning* (Vol. 2, pp. 32–45). doi:<https://doi.org/10.62951/icgel.v2i1.146>
- Vieira, I., Baelo, R., & Peres, P. (2026). Analysis of current didactic models in digital education: A systematic literature review. *International Journal of Educational Research Open*, 10. doi:<https://doi.org/10.1016/j.ijedro.2025.100540>
- Wahyuni, I., Azis, A., Afiyah, N., & Afandi, A. A. (2026). Digital Transformation of Arabic Learning Environments in Islamic Higher Education. *Jurnal Pendidikan Islam*, 12(1), 202–216. doi:<https://doi.org/10.15575/jpi.v12i1.54404>
- Wariyo, G. L., Abame, A., Lolamo, A., Bekene, T., & Bekele, J. (2026). Emerging Technologies in Higher Education Course Development: A Systematic Review of Design Frameworks, Learning Outcomes, and Pedagogical Integration. *F1000Research*, 15. doi:<https://doi.org/10.12688/f1000research.179684.1>
- Zaman, Q., Safwandi, & Fajriana. (2025). Supporting Application Fast Learning of Kitab Kuning for Santri' Ula Using Natural Language Processing Methods. *International Journal of Engineering, Science and Information Technology*, 5(1), 278–289. doi:<https://doi.org/10.52088/ijesty.v5i1.713>