



## **INTEGRATION OF DIGITAL TECHNOLOGY TO IMPROVE ARABIC LANGUAGE SKILLS IN ISLAMIC BOARDING SCHOOLS**

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### **Abstract**

*This research is motivated by the need for Islamic boarding schools to adapt to the digital era without losing their traditional values. This study aims to analyze the forms and types of digital technology used in learning Arabic in Islamic boarding schools, assess its effectiveness, and identify challenges in its implementation. This study uses a qualitative approach with a descriptive method through a systematic literature review of Scopus Q1–Q4 and Sinta 1 indexed articles in 2020–2025 with data analysis techniques using thematic analysis to encode, classify, and draw conceptual interpretations of previous research findings. The results of the study show that the integration of various digital media such as game-based learning, mobile-assisted language learning (MALL), interactive multimedia, digital corporations, and artificial intelligence has proven to be effective in increasing students' motivation, participation, and Arabic language competence. In addition, institutional support and improving teachers' digital literacy are key factors for the success of implementation. The effectiveness of Arabic learning in Islamic boarding schools does not only depend on the type of technology used, but also on the alignment between technology, pedagogy, and learning content according to the framework of Technological Pedagogical Content and the Communicative Language Teaching (CLT) Approach.*

**Keywords:** *Digital Technology, Islamic Boarding School Education, Maharah 'Arabiyyah*

## Introduction

Pesantren has a strategic role in efforts to develop and advance education in Indonesia, especially in the era of the industrial revolution 4.0<sup>1</sup>. Curriculum management is an integral part that cannot be separated from pesantren education<sup>2</sup>. Teaching in Islamic boarding schools emphasizes more on mastery of Arabic because it is seen as crucial to understand classical Islamic literature, such as the Qur'an and Hadith<sup>3</sup>. Over time, pesantren developed into two main typologies, namely salaf pesantren and modern pesantren. Salaf Islamic boarding schools maintain the traditional approach through grammatical-translated methods in learning the yellow book, while modern Islamic boarding schools combine contemporary approaches with hands-on methods as an interactive strategy<sup>4</sup>. This shows that Arabic language learning in Islamic boarding schools continues to develop according to needs and maintains its central position in the Islamic education curriculum of Islamic boarding schools<sup>5</sup>.

In order to achieve the SDGs goals, pesantren also need to innovate to have a positive impact on the quality of learning<sup>6</sup>. Islamic boarding schools need to integrate digital technology in the curriculum as an educational strategy in this era without neglecting traditional values<sup>7</sup>. The integration of digital technology is also an urgency in learning Arabic in Islamic boarding schools in order to facilitate an interactive, adaptive, and contextual learning process according to the needs of students<sup>8,9</sup>.

<sup>1</sup> Aulya Hamidah Mansyuri et al., 'Optimalisasi Peran Pesantren dalam Lembaga Pendidikan Islam di Era Modern', *MA'ALIM: Jurnal Pendidikan Islam* 4, no. 1 (2023): 101–12, <https://doi.org/10.21154/maalim.v4i1.6376>.

<sup>2</sup> Alif Anharul Fahmi and Nur Kholid, 'Manajemen Program Pembelajaran Bahasa Arab di Pesantren Darul Quran Aceh (DQA)', *Risalah: Jurnal Pendidikan dan Studi Islam* 10, no. 4 (2024): 1519–34.

<sup>3</sup> Annisa et al., 'Dampak Latar Belakang Pendidikan Pesantren Dan Non-Pesantren Terhadap Kemampuan Bahasa Arab Siswa Di MAS Muhammadiyah 01 Medan', *Al-Muyassar: Journal of Arabic Education* 4, no. 1 (2025): 37–53, <https://doi.org/10.31000/al-muyassar.v4i1.12947>.

<sup>4</sup> Qumaruzzaman, 'Pembelajaran Bahasa Arab Pada Pesantren Salaf Dan Modern Di Madura: Metodologi Dan Strategi', *Qismul Arab: Journal of Arabic Education* 4, no. 1 (2024): 26–33, <https://doi.org/10.62730/qismularab.v4i01.129>.

<sup>5</sup> Sahkholid Nasution et al., 'Learning Arabic Language Sciences Based on Technology in Traditional Islamic Boarding Schools in Indonesia', *Nazhruna: Jurnal Pendidikan Islam* 7, no. 1 (2024): 77–102, <https://doi.org/10.31538/nzh.v7i1.4222>.

<sup>6</sup> Fitria Martanti et al., 'Integration of Learning, Innovation, and SDGs Value in Pesantren: Sustainable Islamic Education Development', *Profetika: Jurnal Studi Islam* 26, no. 2 (2025): 457–70, <https://doi.org/10.23917/profetika.v26i02.11553>.

<sup>7</sup> Ahmad Musaddad, 'Rekonstruksi Kurikulum Pesantren Abad 21: Integrasi Spiritualitas Dan Kompetensi Global', *IslamicEdu Management Journal IEMJ* 02, no. 01 (2025): 34–46.

<sup>8</sup> Weijian Yan et al., 'Integrating Artificial Intelligence and Extended Reality in Language Education: A Systematic Literature Review (2017–2024)', *Education Sciences* 15, no. 8 (2025): 1066, <https://doi.org/10.3390/educsci15081066>.

<sup>9</sup> Muhammad Shaleh Assingkiy and Mustapa Ahmad, 'Integrating Artificial Intelligence into Madrasah Learning: A Mixed-Methods Study of Intelligent Media Development and Implementation', *Cendekiawan: Jurnal Pendidikan Dan Studi Keislaman* 4, no. 1 (2025): 608–18.

The application of digital technology in learning Arabic in Islamic boarding schools still faces various obstacles and has not run optimally<sup>10,11</sup>. Ubaedullah et al. (2025)<sup>12</sup> revealed that the development of educational technology has not been fully balanced by the availability of applications and platforms that are in accordance with the pesantren curriculum. Limited infrastructure ranging from internet access, digital devices, to IT-based language laboratories is still a major challenge, especially in traditional Islamic boarding schools<sup>13</sup>. This condition shows that the readiness of the digital ecosystem in many Islamic boarding schools is not adequate to support the teaching of Arabic effectively.

The use of technology such as Learning Management System (LMS) and mobile learning applications can expand access to learning resources and allow teachers and students to interact collaboratively<sup>14</sup>. The use of digital media such as digital game-based learning, artificial intelligence, and virtual classrooms has been proven to actively increase motivation and Arabic language skills<sup>15</sup>. Quiz-based learning strategies with gamification through online quiz platforms like Kahoot! or Quizizz is able to motivate learning engagement and improve students' Arabic literacy skills<sup>16</sup>. Even virtual classrooms have been tested based on the results of studies during the pandemic showing that virtual classrooms are effective in significantly developing students' Arabic language achievement<sup>17</sup>. The emergence of artificial intelligence (AI) technologies such as chatbots is beginning to explore its potential to support the personalization of Arabic

<sup>10</sup> Rezky Afril et al., 'Learning Arabic in the Digital Era: Challenges and Effective Strategies', *Arabiyati: Journal of Arabic Language Education* 1, no. 1 (2024): 198–220.

<sup>11</sup> Vina Rohmatul Ummah and Hajer Albshkar, 'Navigating Arabic Language Education in Indonesia: Challenges, Methods, and Roles of Teacher Competencies', *Al-Fusha : Arabic Language Education Journal* 7, no. 2 (2025): 103–14, <https://doi.org/10.62097/alfusha.v7i2.2394>.

<sup>12</sup> Dudun Ubaedullah et al., 'Technology in Islamic Education Curriculum: Challenges and Opportunities', *Jurnal Al Burhan* 5, no. 2 (2025): 369–91, <https://doi.org/10.58988/jab.v5i2.609>.

<sup>13</sup> Ali Muchasan et al., 'Pemanfaatan Teknologi di Pesantren (Dampak dan Solusi dalam Konteks Pendidikan)', *Inovatif: Jurnal Penelitian Pendidikan, Agama, dan Kebudayaan* 10, no. 1 (2024): 16–33, <https://doi.org/10.55148/inovatif.v10i1.849>.

<sup>14</sup> Won Sug Shin and Minseok Kang, 'The Use of a Mobile Learning Management System at an Online University and Its Effect on Learning Satisfaction and Achievement', *The International Review of Research in Open and Distributed Learning* 16, no. 3 (2015), <https://doi.org/10.19173/irrodl.v16i3.1984>.

<sup>15</sup> Mohammad Taufiq Abdul Ghani et al., 'The Impact of Mobile Digital Game in Learning Arabic Language at Tertiary Level', *Contemporary Educational Technology* 14, no. 1 (2022): ep344, <https://doi.org/10.30935/cedtech/11480>.

<sup>16</sup> Sultan A. Almelhes, 'Gamification for Teaching the Arabic Language to Non-Native Speakers: A Systematic Literature Review', *Frontiers in Education* 9 (March 2024): 1371955, <https://doi.org/10.3389/feduc.2024.1371955>.

<sup>17</sup> Abdullah Ahmad R Aljenobi, 'The Effectiveness of Using Virtual Classrooms in Developing Elementary School Students' Language Achievement during the COVID-19 Pandemic', *Journal of Positive Psychology & Wellbeing* 6, no. 4 (2022): 15–30.

language learning<sup>18</sup>. These various digital media innovations encourage more active learning and encourage students to participate directly in language practice.

A number of previous studies have examined the use of digital technology in Arabic language learning. Study by Hady et al. (2025)<sup>19</sup> explored the integration of digital technology in two pesantren-based educational institutions and found that the use of technology makes learning Arabic more engaging, accessible, and personalized, as well as increasing student motivation. Ghani et al. (2022)<sup>20</sup> proving that the implementation of digital game-based learning significantly improves students' Arabic communication skills and fosters their confidence in the language. Other research shows that the use of technology-based learning media has a positive impact on improving students' Arabic learning outcomes<sup>21</sup>. A literature review by Wandana et al. (2025) revealed various opportunities for learning Arabic in the digital era, including a more interesting learning process, more innovative methods and adaptive to the learning speed of students, and increased enthusiasm for learning<sup>22</sup>. In addition, a systematic review by<sup>23</sup> affirms that the application of gamification in Arabic language teaching can significantly increase intrinsic motivation and learner engagement.

As already explained, the study focuses on one type of technology and only one specific aspect. There is still limited research that comprehensively discusses the combination of various digital media to improve Arabic language skills in the pesantren environment and the challenges of its implementation. This research fills this gap by analyzing the use of various digital technologies in Arabic language teaching in Islamic boarding schools and their impact on improving students' language skills.

The novelty of this research lies in several aspects. First, this study specifically focuses on the context of pesantren as a typical ecosystem of Islamic education in Indonesia, so as to produce a portrait of the use of digital technology in Arabic language

<sup>18</sup> Abeer S. Alsheddi and Lubna S. Alhenaki, 'English and Arabic Chatbots: A Systematic Literature Review', *International Journal of Advanced Computer Science and Applications* 13, no. 8 (2022), <https://doi.org/10.14569/IJACSA.2022.0130876>.

<sup>19</sup> Rosli Hady et al., 'The Revolution of Arabic Language Learning: Integration of Digital Technology in 21st Century Education', *Jurnal Ilmiah Profesi Pendidikan* 10, no. 2 (2025): 1593–99, <https://doi.org/10.29303/jipp.v10i2.3444>.

<sup>20</sup> Ghani et al., 'The Impact of Mobile Digital Game in Learning Arabic Language at Tertiary Level'.

<sup>21</sup> Nissa Zahra Silmy Damanik and Yahfizham Yahfizham, 'The Effect Of Technology-Based Learning Media On Arabic Learning Outcomes Among Students At Al Kautsar Al Akbar Islamic Boarding School In Medan', *Jurnal Eduslamic* 3, no. 1 (2025): 11–18, <https://doi.org/10.59548/jed.v3i1.399>.

<sup>22</sup> Abdurahman Abdurahman et al., 'Peluang dan Hambatan Digital dalam Pembelajaran Bahasa Arab : Prespektif Guru dan Mahasiswa', *Karakter: Jurnal Riset Ilmu Pendidikan Islam* 2, no. 2 (2025): 322–35, <https://doi.org/10.61132/karakter.v2i2.625>.

<sup>23</sup> Almelhes, 'Gamification for Teaching the Arabic Language to Non-Native Speakers'.

learning that is more contextual and different from previous studies which are generally general and do not distinguish between types of institutions. Second, this research does not only examine one type of media or a specific platform, but presents a comprehensive synthesis of various forms of digital technology such as LMS, MALL applications, quizzes and online games, interactive multimedia, digital corpus, and artificial intelligence in one didactic framework of Arabic language learning. Third, methodologically, this study combines a systematic review of reputable publications of Scopus and SINTA 1 for the 2020–2025 period with the TPACK theoretical framework to map the relationship between the dimensions of technology, pedagogy, and linguistic content in Islamic boarding schools.

This research aims to analyze the forms and types of digital technology used in Arabic language learning in Islamic boarding schools, such as game-based learning, quiz-based learning, mobile learning, and other interactive learning media. In addition, this study aims to assess the effectiveness of the use of digital technology in improving students' Arabic language skills, including the ability to listen (*maharah al-istima'*), speak (*maharah al-kalam*), read (*maharah al-qira'ah*), and write (*maharah al-kitabah*). On the other hand, this study seeks to identify various challenges and obstacles in the implementation of digital technology in the *pesantren* environment.

Theoretically, this research is expected to enrich the literature on the integration of digital technology in Arabic language learning, especially in the context of traditional Islamic education such as Islamic boarding schools. The research findings have the potential to strengthen the concepts of Technological Pedagogical Content Knowledge (TPACK) and Communicative Language Teaching (CLT) by providing empirical evidence of their application in religious institutions. On the practical aspect, the results of this research can be used as a reference for Arabic teachers and *pesantren* managers in selecting, adapting, and integrating appropriate digital technology to increase students' motivation and language competence. The resulting strategy can also be the basis for developing digital literacy training for educators so that the learning transformation process takes place effectively and sustainably.

## **Method**

This study uses a qualitative approach with a descriptive method, namely through the design of a literature study as a data collection strategy. The data sources used are

secondary literature from peer-reviewed scientific articles, including publications in Scopus indexed international journals and SINTA 1-3 accredited national journals. Literature search was carried out systematically through an electronic database with keywords relevant to the research topic. The search results are then selected based on the following inclusion and exclusion criteria.

**Table 1.** Inclusion and Exclusion Criteria

| Aspects               | Inclusion Criteria                                                                                                                                                                   | Exclusion Criteria                                                                                                                                                     |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Types of publications | Scientific articles that have gone through <i>the peer-review</i> process are in the form of Scopus Q1-Q4 indexed international journals and SINTA 1–3 accredited national journals. | Non-scientific articles such as opinions, news, blogs, proceedings without review, theses, theses, or dissertations that have not been published in academic journals. |
| Publication language  | Articles in Arabic, English, or Indonesian.                                                                                                                                          | Articles in languages other than Arabic, English, or Indonesian.                                                                                                       |
| Year of publication   | Articles published in the 2020–2025 range are in accordance with the current digital context and education policies.                                                                 | Articles published before 2020.                                                                                                                                        |
| Field of study        | Focus on Arabic language learning, educational technology, game-based learning, quiz-based learning, AI in education, or language teaching.                                          | Articles that discuss technology outside the context of Arabic language education.                                                                                     |

The results of the literature search were analyzed qualitatively through a combination of document analysis techniques and thematic narrative analysis. First, each article is read in depth and its content is evaluated to extract key information according to the document analysis procedure. Furthermore, the extracted data is categorized inductively to identify the main patterns or themes that emerge between sources. Thematic analysis was chosen because of its flexible nature and is commonly used in qualitative descriptive research. Finally, findings from various sources are synthesized

and presented in a narrative-descriptive manner to build a comprehensive picture of the topic being studied.

## Results and Discussion

### Result

A literature review of various studies indexed by Scopus Q1-Q4 and SINTA 1 confirms that the use of digital technology in Arabic language learning has continued to develop rapidly in the last five years. Various studies focus on web-based learning media innovations, artificial intelligence, and interactive applications designed to improve Arabic language skills in various educational contexts, including Islamic boarding schools, madrasas, and Islamic colleges. The studies presented in the following table present a summary of 17 relevant scientific articles. The preparation of this table aims to provide a comprehensive overview of the latest research directions, achievements, and challenges in the field of Arabic language learning technology.

**Table 2.** Screening Results by Inclusion

| Author & Year                                                | Article Title                                                                                                                    | Rank | Research Methods                                                              | Key Results / Findings                                                                                                                                                                           |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ibrahim Shaboul and Tatiana Glushchenko (2025) <sup>24</sup> | Bridging the gap: The role of Artificial Intelligence in enhancing Arabic language learning, translation, and speech recognition | Q1   | Conceptual study and review of the role of AI in 3 language domains           | This article reviews the potential of AI in improving Arabic language learning, translation, and speech recognition, but emphasizes the importance of adapting technology to the Arabic context. |
| Ahmed Allaithy and Mai Zaki (2025) <sup>25</sup>             | Evaluation of AI-generated reading comprehension materials for Arabic language teaching                                          | Q1   | Systematic evaluation of 5 AI models (ChatGPT, Gemini, CoPilot, JAIS, Diffit) | AI generates diverse reading content, but it finds weaknesses such as the influence of English structure, grammatical errors, and the lack of naturalness of Arabic expressions.                 |

<sup>24</sup> Ibrahim Shaboul and Tatiana Glushchenko, 'View of Bridging the Gap The Role of Artificial Intelligence in Enhancing Arabic Language Learning, Translation, and Speech Recognition', *Research Journal in Advanced Humanities* 6, no. 2 (2025): 1–14, <https://doi.org/10.58256/17f30w24>.

<sup>25</sup> Ahmed Allaithy and Mai Zaki, 'Evaluation of AI-Generated Reading Comprehension Materials for Arabic Language Teaching', *Computer Assisted Language Learning*, 6 March 2025, 1–33, <https://doi.org/10.1080/09588221.2025.2474037>.

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|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Muhammet Abazoglu and Mohammad Issa Alhourani (2025) <sup>26</sup> | The use of language corpora in teaching Arabic to Turkish speakers within the framework of computational linguistics                        | Q1 | Theoretical study and design of an Arabic-Turkish bilingual mini-corpus framework based on computational linguistics | The digital corpus can support the learning of Arabic listening, speaking, reading, and writing skills through authentic input and data-driven learning approaches.                             |
| Ahmad Maghfurin et al. (2025) <sup>27</sup>                        | Mobile assisted learning in Arabic language education: the impact of Duolingo and Memrise on phonology, morphology, and syntax competencies | Q1 | Quantitative, simple regression test, survey and language proficiency test                                           | Duolingo and Memrise are effective in improving phonology, morphology, and syntax; Memrise is a bit superior. This study confirms the effectiveness of mobile apps in Arabic language learning. |
| Roslizawati Saad et al. (2025) <sup>28</sup>                       | The Use of Digital Teaching Tools to Support Arabic Speaking Skills in Secondary School                                                     | Q2 | Systematic Literature Review (SLR),                                                                                  | Digital tools such as MALL apps, simulations, and LMS support Arabic speaking skills: pronunciation, fluency, and oral communication, although implementation research is still limited.        |
| Sana Al-Jamali and Suliman Zakaria (2025) <sup>29</sup>            | Behavioral Determinants of AI-Driven Arabic Language Learning                                                                               | Q2 | Quantitative survey, UTAUT2 model, ordinal regression analysis                                                       | Performance expectations and social influence are the main drivers of the use of AI; However, the usability and literacy constraints of AI are challenges in sustainable adoption.              |

<sup>26</sup> Muhammet Abazoglu and Mohammad Issa Alhourani, 'The Use of Language Corpora in Teaching Arabic to Turkish Speakers within the Framework of Computational Linguistics', *Social Sciences & Humanities Open* 12 (2025): 101947, <https://doi.org/10.1016/j.ssaho.2025.101947>.

<sup>27</sup> Ahmad Maghfurin et al., 'Mobile Assisted Learning in Arabic Language Education: The Impact of Duolingo and Memrise on Phonology, Morphology, and Syntax Competencies', *Innovation in Language Learning and Teaching*, 28 April 2025, 1–23, <https://doi.org/10.1080/17501229.2025.2490110>.

<sup>28</sup> Roslizawati Saad et al., 'The Use of Digital Teaching Tools to Support Arabic Speaking Skills in Secondary School: A Systematic Literature Review', *Educational Process International Journal* 17, no. 1 (2025), <https://doi.org/10.22521/edupij.2025.17.404>.

<sup>29</sup> Sana Al-Jamali and Suliman Zakaria Abdalla, 'Behavioral Determinants of AI-Driven Arabic Language Learning: Insights from the Extended UTAUT2 Model', *Educational Process International Journal* 16, no. 1 (2025), <https://doi.org/10.22521/edupij.2025.16.282>.

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|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Toqeer Ali Syed et al. (2025) <sup>30</sup>          | Revolutionizing Arabic Learning: GNT and AI-Enhanced Metaverse Environments                                                                                 | Q2 | Experimental R&D;                                                                    | The AI+Metaverse platform supports the acquisition of Arabic vocabulary through real-time interactions, 3D environments, and AI avatars; creating an adaptive and engaging multimodal learning experience.                                                                                                                                                         |
| Muflihah et al. (2025) <sup>31</sup>                 | Management of Developing Interactive Multimedia-Based Arabic Teaching Materials: Enhancing Learning for Diverse Students at Indonesian Islamic Universities | Q2 | Quasi-experiments (pre-test and post-test)                                           | The use of interactive multimedia has been proven to increase students' Arabic language engagement and learning outcomes. Post-test scores increased significantly across all campuses (t-count > t-table). Multimedia helps students with diverse backgrounds adapt.                                                                                              |
| Yayan Nurbayan and Anwar Sanusi (2025) <sup>32</sup> | Integrating Character Values and EdTech Media: A Study of Arabic Teachers' Pedagogical Competence in Bandung Raya                                           | Q3 | Mixed-method (single case study), instruments: questionnaire, interview, observation | Most teachers have managed to integrate character values such as religiosity and responsibility in learning, but the use of EdTech media (Google Classroom, Kahoot, Quizizz) is still very low due to limited digital literacy and device access. Professional training and institutional support for the integration of character and technology are recommended. |
| Umi Hijriyah et al. (2025) <sup>33</sup>             | How Effective is SUNO. AI in                                                                                                                                | Q3 | Research & Development                                                               | SUNO Platform. AI significantly improved                                                                                                                                                                                                                                                                                                                           |

<sup>30</sup> Toqeer Ali Syed et al., 'Revolutionizing Arabic Learning: GNT and AI-Enhanced Metaverse Environments', *Frontiers in Computer Science* 7 (September 2025): 1626092, <https://doi.org/10.3389/fcomp.2025.1626092>.

<sup>31</sup> Muflihah et al., 'Management of Developing Interactive Multimedia-Based Arabic Teaching Materials: Enhancing Learning for Diverse Students at Indonesian Islamic Universities', *Munaddhomah: Jurnal Manajemen Pendidikan Islam* 6, no. 1 (2025): 82–98, <https://doi.org/10.31538/munaddhomah.v6i1.1469>.

<sup>32</sup> Yayan Nurbayan and Anwar Sanusi, 'Integrating Character Values and EdTech Media: A Study of Arabic Teachers' Pedagogical Competence in Bandung Raya', *International Journal of Learning, Teaching and Educational Research* 24, no. 8 (2025): 248–71, <https://doi.org/10.26803/ijlter.24.8.11>.

<sup>33</sup> Umi Hijriyah et al., 'How Effective Is SUNO.AI in Enhancing Arabic Listening Skills? An Evaluation of AI-Based Personalized Learning', *International Journal of Information and Education Technology* 15, no. 2 (2025): 391–407, <https://doi.org/10.18178/ijiet.2025.15.2.2251>.

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|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    | Enhancing Arabic Listening Skills? An Evaluation of AI-Based Personalized Learning                               |         | (R&D) using the Hannafin & Peck model and pre-test and post-test tests                         | Arabic listening skills (+25% post-test score, $p < 0.05$ ). The adaptive system and real-time feedback are effective in strengthening the understanding of Arabic dialect and intonation, but are constrained by accent variations and audio noise.                                                                                                                                                                                                                                       |
| Mohd Fauzi Abdul Hamid et al. (2025) <sup>34</sup> | Development of a Web-Based Interactive Infographic Module for Learning Arabic Grammar at a Malaysian University  | Q4      | Design and Development Research (DDR) with the Sidek Module Construction Model approach (2001) | The study developed a web-based interactive infographic module for Arabic grammar learning at Universiti Sultan Zainal Abidin. The module includes four main components: objectives, content, learning activities, and assessment, and is equipped with interactive Wordwall-based exercises, Padlet discussions, and online quizzes. Experts consider this module to be effective, interesting, and relevant to improve students' understanding and can be used for independent learning. |
| Umi Hijriyah et al. (2024) <sup>35</sup>           | Innovative Approaches to Arabic Vocabulary Learning for Islamic Senior High School Students with Lectora Inspire | Sinta 1 | Research and Development (R&D) using the ADDIE model                                           | The research developed AVLI (Arabic Vocabulary on Lectora Inspire) for mufradat learning at Baitul Jannah Integrated Islamic High School. The results of the t-test showed a significant increase in the average score from 65.5                                                                                                                                                                                                                                                           |

<sup>34</sup> Mohd Fauzi Abdul Hamid Et Al., 'Development Of A Web-Based Interactive Infographic Module For Learning Arabic Grammar At A Malaysian University', *Journal Of Education And Learning (Edulearn)* 19, No. 4 (2025): 2302–12, <https://doi.org/10.11591/edulearn.V19i4.22258>.

<sup>35</sup> Umi Hijriyah Et Al., 'Innovative Approaches To Arabic Vocabulary Learning For Islamic Senior High School Students With Lectora Inspire', *Jurnal Pendidikan Islam* 10, No. 2 (2024): 218–33, <https://doi.org/10.15575/jpi.V10i2.28754>.

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|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                           |                                                                                                            |    |                                                                           | (pretest) to 85.5 (posttest) ( $p < 0.05$ ). This media is considered feasible and effective to improve the mastery of Arabic vocabulary and students' motivation to learn.                                                                                                                   |
| Anas Hanandeh et al. (2024) <sup>36</sup>                                 | Artificial Intelligence in Arabic Linguistic Landscape: Opportunities, Challenges, and Future Directions   | Q3 | Systematic Review                                                         | The study highlights the opportunities and challenges of the application of AI in Arabic linguistics, including education, translation, and NLP. AI has great potential to improve Arabic processing and learning, but it is constrained by the availability of resources and annotated data. |
| Sahkholid Nasution et al. (2024) <sup>37</sup>                            | Learning Arabic Language Sciences Based on Technology in Traditional Islamic Boarding Schools in Indonesia | Q1 | Qualitative-descriptive; observations, in-depth interviews, documentation | Traditional Islamic boarding school leaders have accepted technology positively, although its application is still limited. The Foundation supports through the procurement of tools and external cooperation.                                                                                |
| Mohammad Taufiq Abdul Ghani and Wan Ab Aziz Wan Daud (2023) <sup>38</sup> | The Impact of Digital Game-Based Learning Towards Arabic Language Communication                            | Q3 | Quasi-experiment (pre-test and post-test) + semi-structured interview     | Digital game-based learning significantly improves the Arabic communication skills of non-Arab students. Participants showed an increase in post-test scores and a positive attitude towards learning through interactive and fun educational games.                                          |

<sup>36</sup> Anas Hanandeh et al., 'Artificial Intelligence in Arabic Linguistic Landscape: Opportunities, Challenges, and Future Directions', *TEM Journal*, 27 November 2024, 3137–45, <https://doi.org/10.18421/TEM134-48>.

<sup>37</sup> Sahkholid Nasution et al., 'Learning Arabic Language Sciences Based on Technology in Traditional Islamic Boarding Schools in Indonesia', *Nazhruna: Jurnal Pendidikan Islam* 7, no. 1 (2024): 77–102, <https://doi.org/10.31538/nzh.v7i1.4222>.

<sup>38</sup> Mohammad Taufiq Abdul Ghani and Wan Ab Aziz Wan Daud, 'The Impact of Digital Game-Based Learning Towards Arabic Language Communication', *Jurnal Komunikasi: Malaysian Journal of Communication* 39, no. 1 (2023): 407–24, <https://doi.org/10.17576/JKMJC-2023-3901-23>.

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|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mahyudin Ritonga et al. (2023) <sup>39</sup> | Learning for early childhood using the IcanDO platform: Breakthroughs for golden age education in Arabic learning | Q1 | Qualitative observations, interviews, documentation studies     | The IcanDO platform supports early childhood Arabic learning with a playful approach. Improve memory, motivation, and app-based personalized learning.                                                                                                                                             |
| Meliza Budiarti et al. (2022) <sup>40</sup>  | Padlet as an LMS Platform in Arabic Learning in Higher Education                                                  | Q3 | Descriptive qualitative studies, observations and documentation | Padlet LMS is very effective as a collaborative and expressive medium in learning Arabic in college. Its interactive features (assignment uploads, direct evaluation) increase student motivation and participation, despite the constraints of internet connection and lecturers' digital skills. |

Based on the results of the analysis of the entire article, it can be concluded that the use of digital technology has been proven to have a positive impact on improving Arabic language competence, both in terms of receptive skills (listening and reading) and productive skills (speaking and writing). Innovative models such as web-based interactive learning, AI-assisted vocabulary modules, and game-based learning have shown high effectiveness in increasing student motivation, retention, and participation. However, a number of studies also highlight the limitations of digital infrastructure, teacher technology literacy, and curriculum readiness as the main challenges in its implementation.

## Discussion

This study confirms that improving students' Arabic language skills in pesantren is more effective when various digital technologies are orchestrated complementarily, rather than used separately. The gaps identified are the lack of comprehensive studies that combine game/quiz-based learning, mobile learning, interactive multimedia,

<sup>39</sup> Mahyudin Ritonga et al., 'Learning for Early Childhood Using the IcanDO Platform: Breakthroughs for Golden Age Education in Arabic Learning', *Education and Information Technologies* 28, no. 7 (2023): 9171–88, <https://doi.org/10.1007/s10639-022-11575-7>.

corporate, and artificial intelligence. Theoretically, the evidence collected strengthens the framework of Technological Pedagogical Content Knowledge (TPACK) because its effectiveness does not come from "tools" alone, but from the suitability of technology with pedagogy and content, for example, nahwu/şarf visualized through interactive infographics. Similarly, the principle of Communicative Language Teaching (CLT) stands out when digital media is used to trigger meaningful communicative tasks, provide quick feedback, and condition the negotiation of meaning in guided interactions.

In terms of the type of technology, game/quiz-based learning and MALL appear dominant in supporting micro-mastery such as phonology, morphology, syntax, and vocabulary. Quantitative study by Maghfurin et al. (2025)<sup>41</sup> validate the effectiveness of Duolingo and Memrise on phonology, morphology, syntactic competencies. Memrise is a bit superior; This is based on the results of research by Saad et al. (2025)<sup>42</sup> which confirms support for MALL tools, simulations, and LMS for pronunciation, fluency, and oral communication. In the realm of communication, Ghani & David (2023)<sup>43</sup> Showcasing digital game-based learning encourages improved speaking skills and positive attitudes towards interactive communicative practices<sup>44</sup>. These patterns are consistent with the mechanism of retrieval practice and reinforcement of instant feedback that is prevalent in games/quizzes, while facilitating scheduled microlearning<sup>45</sup>.

Interactive multimedia and LMS fill the conceptual gap and strengthen scaffolding for structural materials, especially nahwu. Muflihah et al. (2025)<sup>46</sup> through cross-campus quasi-experiments, it shows increased engagement and learning outcomes when materials are packaged interactively. Development of a web infographic module by Hamid et al. (2025)<sup>47</sup> which experts consider as interesting, relevant, and effective for understanding nahwu and independent learning. At the level of everyday practice, the Padlet that is

<sup>40</sup> Meliza Budiarti et al., 'Padlet as a LMS Platform in Arabic Learning in Higher Education', *Ingénierie Des Systèmes d'Information* 27, no. 4 (2022): 659–64, <https://doi.org/10.18280/isi.270417>.

<sup>41</sup> Maghfurin et al., 'Mobile Assisted Learning in Arabic Language Education'.

<sup>42</sup> Saad et al., 'The Use of Digital Teaching Tools to Support Arabic Speaking Skills in Secondary School'.

<sup>43</sup> Ghani and Daud, 'The Impact of Digital Game-Based Learning Towards Arabic Language Communication'.

<sup>44</sup> Guanzheng Chen and Yuying Fan, 'The Effectiveness of Digital Game-Based Pedagogy in Language Abilities Among Children with Delay', *International Journal of Distance Education Technologies* 23, no. 1 (2025): 1–18, <https://doi.org/10.4018/IJDET.369824>.

<sup>45</sup> John L. Dobson, 'Retrieval Practice Is an Efficient Method of Enhancing the Retention of Anatomy and Physiology Information', *Advances in Physiology Education* 37, no. 2 (2013): 184–91, <https://doi.org/10.1152/advan.00174.2012>.

<sup>46</sup> Muflihah et al., 'Management of Developing Interactive Multimedia-Based Arabic Teaching Materials'.

<sup>47</sup> Hamid et al., 'Development of a Web-Based Interactive Infographic Module for Learning Arabic Grammar at a Malaysian University'.

photographed Budiarti et al. (2022)<sup>48</sup> serves as a simple yet expressive LMS that makes it possible to upload assignments, discussions, and live evaluations. Although lecturer readiness and connectivity are still a record. This series shows how visual representations of both infographics and interactive content make the subject matter more visible in patterns and rules, so that students are better prepared to switch from understanding to production<sup>49,50</sup>.

The use of corporate and data-driven approaches adds a dimension of authentic input and pattern noticing to the game.<sup>51</sup> Exemplify the design of Arabic-Turkish bilingual mini-corpus that can be used across maharabs: *istimā'*, *kalām*, *qirā'ah*, and *kitābah*. This data-driven learning (DDL) approach is pragmatic to build a bank of sentence examples and improve grammatical comprehension<sup>52</sup>, so that students can trace the concordance of patterns and grammatical structures before being asked to write a summary or argumentative text. Corporate integration is also relevant for reading curation<sup>53</sup>, so that the weaknesses of AI-based reading generators that sometimes contain unnaturalness of expressions can be offset by selected authentic text<sup>54</sup>.

In the realm of AI, the picture is ambivalent: useful and demanding at the same time. Review by Shabiralyani et al. (2015)<sup>55</sup> emphasizes the potential of cross-domain AI in learning, translation, speech recognition, but demands strong adaptation to the Arabic context. Reading materials generated by AI models, such as ChatGPT, Gemini, Copilot, JAIS, Diffit reveal quality variations: there are informative outputs, but there are also English structural transfers, grammatical errors, and unnatural expressions<sup>56</sup>. On the other hand, SUNO. AI is able to significantly increase *istimā'* scores ( $\approx +25\%$  on post-

<sup>48</sup> Budiarti et al., 'Padlet as a LMS Platform in Arabic Learning in Higher Education'.

<sup>49</sup> Ghulam Shabiralyani et al., 'Impact of Visual Aids in Enhancing the Learning Process Case Research: District Dera Ghazi Khan.', *Journal of Education and Practice* 6, no. 19 (2015): 226–33.

<sup>50</sup> Lisa Traboco et al., 'Designing Infographics: Visual Representations for Enhancing Education, Communication, and Scientific Research', *Journal of Korean Medical Science* 37, no. 27 (2022): 1–7, <https://doi.org/10.3346/jkms.2022.37.e214>.

<sup>51</sup> Abazoglu and Alhourani, 'The Use of Language Corpora in Teaching Arabic to Turkish Speakers within the Framework of Computational Linguistics'.

<sup>52</sup> A J Holmberg, 'Using Data-Driven Learning for Second Language Academic Writing Acquisition', *JELP: Journal of English Language and Pedagogy* 3, no. 1 (2024): 1–11.

<sup>53</sup> Hanem El-Farahaty, 'Integrating Corpora and AI Tools in the Teaching, Learning, and Assessing of Arabic/English Legal Translation', *International Journal for the Semiotics of Law - Revue Internationale de Sémiotique Juridique* 38, no. 6 (2025): 2031–60, <https://doi.org/10.1007/s11196-025-10281-0>.

<sup>54</sup> Yong-Jik Lee et al., 'University Students' Perceptions of Artificial Intelligence-Based Tools for English Writing Courses', *Online Journal of Communication and Media Technologies* 14, no. 1 (2024): e202412, <https://doi.org/10.30935/ojcm/14195>.

<sup>55</sup> Shabiralyani et al., 'Impact of Visual Aids in Enhancing the Learning Process Case Research: District Dera Ghazi Khan.'

<sup>56</sup> Allaihy and Zaki, 'Evaluation of AI-Generated Reading Comprehension Materials for Arabic Language Teaching'.

tests)<sup>57</sup>; while<sup>58</sup> Showing AI environments and the metaverse enriches vocabulary through 3D interactions and AI avatars. The whole point to an operational conclusion: AI is effective as an augment for personalization and feedback, not as the only source of input<sup>59</sup>.

The effectiveness of the use of digital technology can have an effect on the improvement of the four maharahs seen from the consistency of the pattern. Listening skills (istimā') benefit from adaptive systems and real-time feedback like SUNO. AI; The challenge is the mismatch domain between accent variations, noise so it needs to curate audio fuṣḥā and speed settings. Speaking skills (kalām) are driven by a combination of structured oral exercises with short quiz prompts for noticing and consolidation of formulaic expressions. Reading skills (qirā'ah) require authentic texts organized by level; This is where the corporate and root-pattern glossary help close the weaknesses of AI text. Writing skills (kitābah) are aided by infographic and multimedia modules that break down the production process from clause to paragraph, as shown Hamid et al. (2025)<sup>60</sup> and Muflihah et al. (2025)<sup>61</sup> at the high school level, Lectora Inspire R&D by Hijriyah et al. (2024)<sup>62</sup> it also showed a spike in scores from 65.5 to 85.5 as an indication that the right authoring tools can strengthen motivation as well as learning outcomes.

The challenges of implementation in Islamic boarding schools move from the technical realm to the cultural realm. Nurbayan & Sanusi (2025)<sup>63</sup> found that teachers' digital literacy is still low and the use of EdTech such as Google Classroom, Kahoot, Quizizz is relatively limited. Foundation leaders tend to accept technology positively, but its implementation is gradual due to device factors and internal policies<sup>64</sup>. From a technology adoption perspective, Al-Jamali & Abdalla (2025)<sup>65</sup> the UTAUT2-based study shows performance expectations and social influence are the main drivers, while usability and AI literacy issues hinder sustainability. Therefore, an offline-first strategy is needed in the form of modules and device sharing in digital laboratories relevant to the

<sup>57</sup> Hijriyah et al., 'How Effective Is SUNO.AI in Enhancing Arabic Listening Skills?'

<sup>58</sup> Ali Syed et al., 'Revolutionizing Arabic Learning'.

<sup>59</sup> Manel Guettala et al., 'Generative Artificial Intelligence in Education: Advancing Adaptive and Personalized Learning', *Acta Informatica Pragensia* 13, no. 3 (2024): 460–89, <https://doi.org/10.18267/j.aip.235>.

<sup>60</sup> Hamid et al., 'Development of a Web-Based Interactive Infographic Module for Learning Arabic Grammar at a Malaysian University'.

<sup>61</sup> Muflihah et al., 'Management of Developing Interactive Multimedia-Based Arabic Teaching Materials'.

<sup>62</sup> Hijriyah et al., 'Innovative Approaches To Arabic Vocabulary Learning For Islamic Senior High School Students With Lectora Inspire'.

<sup>63</sup> Nurbayan and Sanusi, 'Integrating Character Values and EdTech Media'.

<sup>64</sup> Nasution et al., 'Learning Arabic Language Sciences Based on Technology in Traditional Islamic Boarding Schools in Indonesia', 2024.

discipline culture of Islamic boarding schools<sup>66</sup>; Digital learning hours can be scheduled, content curated to align with values, and accounts are institutionally managed to maintain privacy.

The MALL meta-analysis reported a consistent positive effect on language achievement, but the magnitude of the impact was largely influenced by the intervention design SUCH as duration, intensity, and teacher role, so that optimal outcomes were achieved if MALL was paired with communicative tasks and formative assessments instead of standing<sup>67,68</sup>. In the game/quiz domain, experimental evidence that assesses Kahoot in nahwu lectures shows a spike in motivation, engagement, and achievement, reinforcing the position of game/quiz-based learning<sup>69</sup>, while the meta-analysis of the gamification of assessments shows meaningful academic effects but does not automatically reach conceptual depth without careful pedagogical design<sup>70</sup>. The use of large language models in education affirms the opportunities for personalization and efficiency and highlights the issues of accuracy, bias, and human-in-the-loop needs that are in line with the quality record of AI materials<sup>71</sup>. Thus, the findings of this study are in line with the mainstream, namely that technology can have an impact when assembled in a teacher-directed learning ecosystem.

## Conclusion

The results of the study show that the integration of digital technology including *game-based learning*, *quiz-based learning*, MALL, interactive multimedia, digital corporate, and artificial intelligence has a significant contribution in increasing the motivation, involvement, and Arabic language competence of students, especially in the micro-aspects of language and understanding of language structures. These findings strengthen the relevance of the Technological Pedagogical Content Knowledge (TPACK)

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<sup>65</sup> Al-Jamali and Abdalla, 'Behavioral Determinants of AI-Driven Arabic Language Learning'.

<sup>66</sup> (Robbaniyah & Lina, 2025)

<sup>67</sup> Yao-Ting Sung et al., 'How Effective Are Mobile Devices for Language Learning? A Meta-Analysis', *Educational Research Review* 16 (October 2015): 68–84, <https://doi.org/10.1016/j.edurev.2015.09.001>.

<sup>68</sup> Jack Burston and Konstantinos Giannakou, 'MALL Language Learning Outcomes: A Comprehensive Meta-Analysis 1994–2019', *ReCALL* 34, no. 2 (2022): 147–68, <https://doi.org/10.1017/S0958344021000240>.

<sup>69</sup> Mohd. Elmagzoub Eltahir et al., 'The Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement and Academic Performance on an Arabic Language Grammar Course in Higher Education', *Education and Information Technologies* 26, no. 3 (2021): 3251–78, <https://doi.org/10.1007/s10639-020-10396-w>.

<sup>70</sup> Yusuf Islam Bolat and Nurullah Taş, 'A Meta-Analysis on the Effect of Gamified-Assessment Tools' on Academic Achievement in Formal Educational Settings', *Education and Information Technologies* 28, no. 5 (2023): 5011–39, <https://doi.org/10.1007/s10639-022-11411-y>.

and Communicative Language Teaching (CLT) approaches in the context of Islamic boarding schools, as well as enriching the scientific discourse on digital transformation in traditional Islamic education. However, this study has limitations because it relies on available literature sources and does not include an empirical analysis of the implementation of multi-technology directly in Islamic boarding schools. Therefore, further research is recommended to conduct long-term implementive studies with an experimental approach or mixed-methods to measure the influence of the integration of various technologies on *the fluency, accuracy, and interactional competence* of students in real learning situations.

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<sup>71</sup> Enkelejda Kasneci et al., 'ChatGPT for Good? On Opportunities and Challenges of Large Language Models for Education', *Learning and Individual Differences* 103 (April 2023): 102274, <https://doi.org/10.1016/j.lindif.2023.102274>.

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