



Trends in the Utilization of Technology in Arabic Language Learning: A Systematic Literature Review (2015-2025)

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Abstract

The rapid advancement of educational technology presents both opportunities and challenges for Arabic language learning. While numerous studies have explored the use of specific technologies, a systematic overview of trends, implications, and challenges is needed. This Systematic Literature Review (SLR) aims to map the landscape of technology utilization in Arabic language learning from 2015 to 2025. Following the PRISMA guidelines, 19 empirical studies were selected and synthesized. The findings reveal a dominant trend towards the use of e-learning platforms/LMS and mobile applications, with gamification and immersive technologies like Augmented Reality emerging as significant innovations. Technology integration consistently shows a positive impact on student motivation and supports the development of all four language skills (*istima', kalam, qira'ah, kitabah*). However, implementation faces multidimensional barriers, including inadequate technical infrastructure, a need for continuous teacher professional development (TPACK), and socio-cultural factors. The study concludes that while technology offers transformative potential, its successful integration requires a proactive approach in curriculum adaptation, robust institutional support, and a pedagogical shift where teachers act as facilitators of learning. This review provides practical implications for educators and policymakers and suggests future research directions, such as longitudinal studies on proficiency and comparative analysis of different technological tools.\

Keywords

Arabic Language Learning; Educational Technology; E-Learning; Systematic Literature Review; Language Skills

مستخلص البحث

يقدم التقدم السريع في تكنولوجيا التعليم فرصًا وتحديات لتعليم اللغة العربية. بينما استكشفت العديد من الدراسات استخدام تقنيات معينة، إلى رسم خريطة لمشهد (SLR) إلا أن هناك حاجة إلى نظرة عامة منهجية للاتجاهات والآثار والتحديات. تهدف هذه المراجعة المنهجية للأدبيات تم اختيار ١٩ دراسة تجريبية وتجميعها. تكشف PRISMA استخدام التكنولوجيا في تعليم اللغة العربية من عام ٢٠١٥ إلى ٢٠٢٥. باتباع إرشادات النتائج عن اتجاه سائد نحو استخدام منصات التعلم الإلكتروني / أنظمة إدارة التعلم وتطبيقات الهاتف المحمول، مع ظهور التلعيب والتقنيات

الغامرة مثل الواقع المعزز كابتكارات مهمة. يُظهر تكامل التكنولوجيا باستمرار تأثيرًا إيجابيًا على دافعية الطلاب ويدعم تطوير المهارات اللغوية الأربع (الاستماع، والكلام، والقراءة، والكتابة). ومع ذلك، يواجه التنفيذ حواجز متعددة الأبعاد، بما في ذلك البنية التحتية التقنية غير الكافية، والحاجة والعوامل الاجتماعية والثقافية. تخلص الدراسة إلى أنه في حين أن التكنولوجيا توفر إمكانات (TPACK) إلى التطوير المهني المستمر للمعلمين تحويلية، فإن تكاملها الناجح يتطلب نهجًا استباقيًا في تكيف المناهج الدراسية، ودعمًا مؤسسيًا قويًا، وتحوّلًا تربويًا حيث يعمل المعلمون كميسرين للتعليم. تقدم هذه المراجعة آثارًا عملية للمعلمين وصانعي السياسات وتقترح اتجاهات بحثية مستقبلية، مثل الدراسات الطولية حول الكفاءة والتحليل المقارن للأدوات التكنولوجية المختلفة.

تعليم اللغة العربية؛ تكنولوجيا التعليم؛ التعلم الإلكتروني؛ مراجعة منهجية للأدبيات؛ المهارات اللغوية

كلمات أساسية

Introduction

The Significance of the Arabic Language in the Digital Era

The Arabic language holds a crucial role in the global landscape, not only as a language of communication for hundreds of millions of speakers worldwide but also as a key language in Islamic studies, diplomacy, and economics. In the midst of the Fourth Industrial Revolution, where digital connectivity has become the norm, the need for competent mastery of Arabic is increasingly pressing. Information and Communication Technology (ICT) has emerged as a disruptive force, transforming how individuals learn, work, and interact. In the context of language education, ICT offers transformative opportunities to overcome classic pedagogical challenges, such as limited access to authentic materials and the lack of immersive learning environments (Ritonga et al., 2016). Consequently, integrating technology into Arabic language learning is no longer merely an additional innovation but a strategic imperative to prepare learners who can compete and contribute on the global stage.

Review of Previous Research

Over the last five years, research on the use of technology in Arabic language learning has expanded rapidly. Various studies have explored the effectiveness of specific digital platforms and tools. For instance, research by Khairani et al. (2021) applied the Technology Acceptance Model (TAM) to measure the reception of e-learning and gamification among university students, demonstrating that perceived ease of use and usefulness positively influence learning attitudes. Other studies focusing on immersive technologies, such as the work by Fauzan et al. (2020), have demonstrated the potential of Augmented Reality (AR) to enhance vocabulary comprehension for elementary school students. In the realm of informal learning, Aminullah et al. (2022) have highlighted the role of social media platforms like TikTok as an engaging means for self-directed learning among the digital generation.

Research Gap Analysis

Although these studies provide valuable insights into the effectiveness of individual technological tools, a significant gap exists in the literature. Most research consists of case studies or small-scale media development projects. To date, there has been no comprehensive systematic review that maps the entire landscape of technology utilization in Arabic language learning over the past decade. This study differs from previous work by not focusing on a single technology. Instead, it aims to synthesize empirical evidence from various studies to identify dominant trends, analyze pedagogical implications holistically, categorize recurring implementation challenges, and systematically evaluate the dynamics of curricular adaptation.

Research Objectives and Contributions

This study aims to identify, evaluate, and synthesize empirical evidence from literature published between 2015 and 2025 on the utilization of technology in Arabic language learning. The contribution of this research is twofold. Theoretically, this review will enrich the understanding of the application of learning theories such as Constructivism and TAM in the context of technology-mediated Arabic language learning. Practically, the findings from this SLR are expected to provide evidence-based guidance for educators, curriculum developers, and policymakers in designing and

implementing effective and relevant Arabic language learning programs that meet the demands of the 21st century.

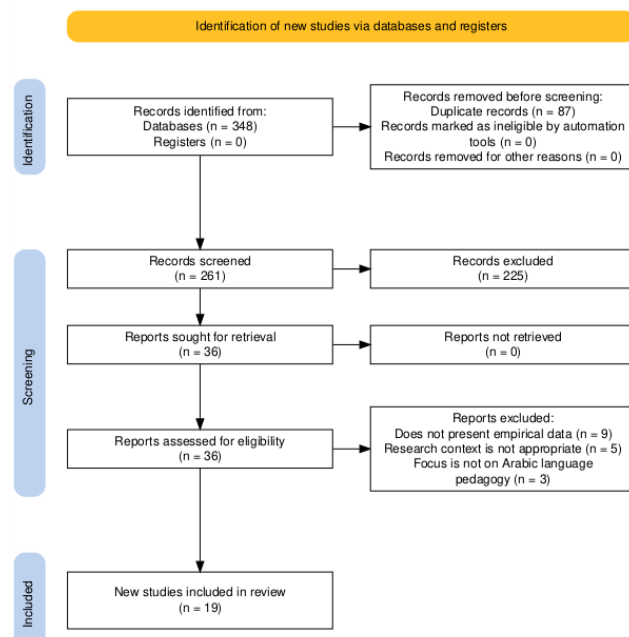
Article Structure

This article is organized into several sections. The introduction outlines the background, objectives, and research questions. The methodology section explains the SLR process undertaken. The results and discussion are presented thematically to answer each research question. Finally, the conclusion summarizes the main findings and presents implications and recommendations for future research.

Methodology

This study employed a Systematic Literature Review (SLR) approach, conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. This approach was chosen for its systematic, transparent, and replicable nature, which allows for an objective and comprehensive synthesis of evidence. The study selection process, as illustrated in the attached PRISMA diagram, began with the identification of **348** records from various academic databases, including Scopus, Google Scholar, ERIC, and SINTA. The keywords used for the literature search included a combination of terms in both Indonesian and Arabic, such as "pembelajaran bahasa Arab" (Arabic language learning), "teknologi pendidikan" (educational technology), "e-learning," "aplikasi mobile" (mobile application), "gamifikasi" (gamification), "تعليم اللغة العربية" (teaching the Arabic language), and "التقنية في تعليم" (technology in education).

The inclusion criteria were focused on peer-reviewed journal articles and conference proceedings published between January 2015 and December 2025. The included studies had to present empirical data and specifically address the application of technology in the pedagogy of Arabic as a foreign language. Articles that did not present empirical data, had an unsuitable research context, or were not focused on Arabic language pedagogy were excluded. Following the removal of duplicates (87 articles), screening of titles and abstracts (225 articles excluded), and full-text eligibility assessment (17 articles excluded), a final set of **19 studies** was selected for synthesis in this review. The justification for this methodology lies in its ability to produce a reliable overview of the current state of research, providing a solid foundation for conclusions and recommendations.



Results

This section presents a synthesis of the findings from the 19 analyzed studies, organized according to the research questions.

3.1. Spectrum and Dominant Trends in Technology Utilization (RQ1)

The literature analysis identified a broad spectrum of technologies, which can be categorized into several main clusters. The most dominant trends are the utilization of **e-learning platforms or Learning Management Systems (LMS)** and **mobile applications**. Platforms such as Google Classroom, Moodle, and institutional e-learning systems became the backbone of instruction, especially during the COVID-19 pandemic, for distributing materials, assignments, and evaluations. Studies by Hamid et al. (2023) and Choiroh (2021) indicate that these platforms were massively adopted from higher education down to the elementary level to ensure learning continuity.

The second highly prominent trend is **mobile-based learning**. These applications are designed for specific purposes, ranging from vocabulary introduction for young children (Putri, 2019) and grammar exercises to interactive speaking skill development. The ease of access and personal nature of mobile devices make them a highly effective medium for independent and flexible learning (Putri & Billah, 2019).

Gamification has also emerged as a strong trend for increasing student engagement and motivation. Platforms like Quizizz, Kahoot!, and Worldwall are frequently used as enjoyable formative assessment tools. Khairani et al. (2021), using the Technology Acceptance Model (TAM) framework, proved that game elements are very well-received by students, ultimately having a positive impact on their learning attitudes and behaviors.

More immersive technologies such as **Augmented Reality (AR)** and the use of **social media** like TikTok for informal learning are also beginning to gain attention. AR is being explored to enhance interactivity, particularly in vocabulary (*mufrodlat*) learning for young learners (Fauzan et al., 2020; Hafitria & Asrofi, 2023). Meanwhile, platforms like TikTok are becoming new spaces for unstructured and engaging self-directed learning (Aminullah et al., 2022). This signifies a shift towards more contextual and integrated learning experiences that align with students' digital lives.

3.3. Multidimensional Barriers to Implementation (RQ3)

Despite its great potential, the implementation of technology in Arabic language learning faces various multidimensional barriers.

- **Technical and Financial Barriers:** The most frequently encountered obstacle is **inadequate infrastructure**. This includes **unstable or uneven internet connectivity** and **limited student access to devices** such as personal computers or smartphones. This issue became particularly critical in the context of distance learning, as reported in a case study at SMPIT Ibadurrahman by Khaerunnisa (2019). The cost of providing devices and internet access also poses a financial burden for some families and institutions.
- **Pedagogical Barriers:** The **readiness and competence of teachers** are major determining

factors. Many studies highlight that teachers are not fully prepared to transition from conventional methods to technology-based learning. A lack of effective training leads to teachers struggling to design innovative instruction and using technology only superficially, for instance, just for sending assignments via WhatsApp.

- **Socio-Cultural Barriers:** At the student level, **low learning motivation** in an online format is a challenge. Distractions from social media or games while using devices are a common problem. Furthermore, a **lack of parental support** in supervising and facilitating learning at home is also a significant inhibitor, as found by Amalia et al. (2023).

3.4. The Central Role and Professional Development of Teachers (RQ4)

The integration of technology fundamentally changes the role of the teacher in Arabic language learning. The literature consistently describes a shift from the **teacher as the primary source of knowledge (sage on the stage) to a facilitator of learning (guide on the side)**. In learning models like *al-ḥāsūb al-ittiṣālī*, the teacher functions as a motivator and mediator, facilitating student interaction with pre-designed digital materials.

This role shift demands **continuous professional development** for teachers. The study by Fitri & Hasibuan (2024) confirms that the success of technology implementation heavily depends on the teacher's understanding and skills in integrating it effectively. The most frequently identified training needs include:

1. **Technical Skills Training:** Mastery of hardware and software, from LMS and content creation applications (like Camtasia, Plotagon) to interactive evaluation platforms.
2. **Pedagogical-Technological Training (TPACK):** Training that focuses not just on "how to use the tool," but on "how to pedagogically integrate the tool" to achieve specific Arabic language learning objectives (Hasan et al., 2024).
3. **Curriculum and Media Design Training:** The ability to design and develop digital teaching materials that are relevant and engaging for students.

3.5. Dynamics of Curricular and Policy Adaptation (RQ5)

Institutional responses to technological demands tend to vary. Many educational institutions have shown a **reactive response**, primarily triggered by emergency situations like the COVID-19 pandemic. Distance learning policies forced schools to adopt technology rapidly, often without thorough planning. This led to a patchwork implementation where ICT was not fundamentally integrated into the curriculum.

However, there are also more **proactive efforts** to design technology-based curricula. The study by Fitri & Hasibuan (2024) at SD IT Alam Talago shows a conscious effort to transform learning by aligning objectives, materials, methods, and evaluations with technological advancements. Research by Ritonga et al. (2016) also highlights the need for a structured learning model to guide teachers, indicating that without a clear framework, ICT integration will remain sporadic. In general, the visible dynamic is a shift from a content-based curriculum to a competency-based curriculum enriched by technology.

3.6. Media Innovations and Development Models (RQ6)

The literature is rich with innovations in learning media specific to Arabic. One prominent model innovation is the *al-ḥāsūb al-ittiṣālī* (**communicative computer**) model, a comprehensive software program that integrates materials for the four language skills with audio-visual elements and interactive evaluations (Ritonga et al., 2016).

Other innovations focus on the use of new technologies such as:

- **Augmented Reality (AR):** Used to visualize vocabulary (*mufrodat*) in the form of 3D objects, making learning more concrete and engaging for young learners (Fauzan et al., 2020).
- **Interactive Mobile Applications:** Various Android applications have been developed for specific purposes, such as educational games for introducing the Hijaiyah alphabet, or apps for young children focusing on everyday objects (Putri, 2019).
- **Video and Animation-Based Media:** The use of YouTube and software like Cartoon Story Maker to create narrative content that aids listening and speaking comprehension (Ilmiani et al., 2020).

In their development process, several studies refer to systematic instructional design models. The **4D model (Define, Design, Develop, Disseminate)** is explicitly mentioned by Gazali & Saefuloh (2019) as a framework for mapping student needs and designing an e-learning model. The **Waterfall model** is also used in the development of AR applications, indicating a more structured and sequential software development approach.

3.7. Contextual Factors in Technology Adoption (RQ7)

The success of technology adoption is heavily influenced by contextual factors. **Educational level** is a primary factor. At the **elementary level (MI/SD)**, the focus of technology is on highly visual, interactive, and game-based media for introducing vocabulary and basic concepts, such as AR applications and animations. At the **secondary level (MTs/SMP)**, technology begins to be used for developing more complex skills and for independent learning, with blended learning being a common model. Meanwhile, in **higher education**, the use of LMS, e-learning, and online resources for research and in-depth learning is more dominant.

Geographical and socio-economic context also plays a crucial role. Studies conducted in Indonesia consistently highlight issues with internet infrastructure and device ownership as major challenges. This indicates that a technological solution that is successful in an urban area with good internet access may not be effectively implemented in rural areas. Therefore, the choice of technology must consider the **availability of resources** and local conditions.

4. Discussion

This section aims to interpret the findings presented above, connect them to the broader structure of knowledge, and derive theoretical implications by referencing recent international literature from the Scopus and Web of Science databases.

4.1. Convergence of Technology Trends in the Arabic Language Learning Ecosystem

The finding that LMS and mobile applications dominate the technology landscape aligns with global trends in Computer-Assisted Language Learning (CALL) and Mobile-Assisted Language Learning (MALL). Research by Botalha and Caeiro (2023), which analyzed the use of Duolingo for Arabic learning, found that gamification features and mobile accessibility are key attractions that drive sustained engagement. This confirms the findings of Khairani et al. (2021) and strengthens the argument that platforms combining structure (like LMS) with flexibility (like mobile apps) create an effective hybrid learning ecosystem. Furthermore, the emergence of AR and social media as learning tools signals a shift towards what Al-Marroof et al. (2021) term "smart learning," where the boundary between formal and informal learning becomes increasingly blurred, and real-world context is dynamically integrated into the learning experience.

4.2. Psychological and Pedagogical Impact on Learners

The positive impact of technology on motivation found in the analyzed studies can be explained through Self-Determination Theory. According to this theory, intrinsic motivation is enhanced when the basic psychological needs for **autonomy, competence, and relatedness** are met (Ryan & Deci, 2020). Technology, as implemented in these studies, directly supports these three needs. Mobile applications and LMS provide learners with the **autonomy** to learn at their own pace. Gamification features and instant feedback enhance a sense of **competence**. Meanwhile, communication tools and social media facilitate **relatedness** with teachers and peers. This finding underscores that the effectiveness of technology lies not in the tool itself, but in its ability to meet the fundamental psychological needs of the learner.

4.3. Implementation Challenges as a Global Phenomenon

The technical and pedagogical barriers identified in the Indonesian context are not anomalies but reflections of global challenges in educational technology implementation. A comprehensive study by Al-Abdullatif and Al-Hazzani (2022) in Saudi Arabia found that despite massive infrastructure investment, the main challenges remain in **teacher digital competence** and effective **pedagogical design**. This indicates that the digital divide is not just about access, but also about skills. The issue of teacher readiness, which consistently appears in the study by Fitri & Hasibuan (2024), aligns with the TPACK (Technological Pedagogical Content Knowledge) framework, which emphasizes that technological knowledge alone is insufficient without deep integration with pedagogy and content (Mishra & Koehler, 2006).

4.4. The Evolving Role of the Teacher and the Urgency of the TPACK Framework

The shift in the teacher's role to that of a facilitator is a logical consequence of adopting constructivist pedagogies supported by technology. In an information-rich learning environment, the teacher's primary task is no longer to transmit knowledge but to design learning experiences, guide student exploration, and provide meaningful feedback. The importance of professional development focused on TPACK has become a major focus in the international CALL literature. Research by Alturki (2021) on pre-service Arabic language teachers in Saudi Arabia showed that

training that explicitly integrates the three knowledge domains (technology, pedagogy, and content) is significantly more effective in preparing teachers to use technology meaningfully in the classroom. This provides a strong justification for educational institutions to move from isolated technical training to more holistic and integrated professional development models.

4.5. Curricular Adaptation: Towards Proactive and Integrated Design

The dynamic of reactive curriculum adaptation, especially in response to crises, highlights systemic challenges in educational innovation. However, the trend towards more proactive design, as seen in the study by Fitri & Hasibuan (2024), aligns with the global movement towards Universal Design for Learning (UDL). The UDL framework promotes the design of flexible curricula from the outset by providing multiple means of representation, action and expression, and engagement to accommodate learner diversity (Rose & Meyer, 2002). Technology integration is a key component of UDL, as it enables personalization and differentiation of instruction on a large scale.

4.6. Media Innovation and the Potential of Immersive Technologies

Media innovations like AR and the *al-ḥāsūb al-ittiṣālī* model show great potential for creating more authentic and immersive learning experiences. Recent research in immersive technologies, such as the use of Virtual Reality (VR) for conversational simulations and virtual cultural visits, demonstrates a significant impact on increasing confidence and intercultural understanding in language learning (El-Sayed & El-Tantawi, 2023). Although these technologies are not yet dominant in the analyzed studies, their emergence signals a future direction where Arabic language learning can become more contextual and multi-sensorially engaging.

4.7. Contextualization of Technology Adoption

Contextual factors, such as educational level and socio-economic conditions, significantly moderate the effectiveness of technological interventions. This emphasizes the importance of a "one size does not fit all" approach. A comparative analysis by Al-Harbi (2021) on MALL adoption in various Arab countries showed that factors like national ICT policies, local pedagogical cultures, and income levels directly influence the types of technology adopted and their success rates. Therefore, any technology implementation initiative must be preceded by a careful needs analysis, as conducted by Gazali & Saefuloh (2019), to ensure that the chosen solution is appropriate for the specific context of the learners and the institution.

Conclusion

Overall Summary

This systematic review concludes that the utilization of technology in Arabic language learning between 2015 and 2025 shows a strong trend towards LMS-based learning, mobile applications, and gamification. Technology has been proven to significantly increase student motivation and provide substantial support for the development of the four language skills. However, its successful implementation is highly dependent on overcoming multidimensional barriers, particularly those related to technical infrastructure and the pedagogical readiness of teachers. The role of the teacher has transformed into that of a facilitator, demanding continuous professional development, while curriculum and policy adaptations still tend to be reactive.

Future Research

Although this review provides a comprehensive overview, several research gaps remain.

1. **Comparative Studies:** More comparative studies are needed to compare the effectiveness of different types of technology (e.g., AR vs. gamified applications) for the same learning objectives.
2. **Longitudinal Research:** Long-term studies are required to measure the impact of technology use on students' Arabic proficiency over time, not just on immediate motivation.
3. **Focus on Higher-Order Skills:** Future research could focus more on how technology can be used to develop critical thinking skills, cultural literacy, and creativity in Arabic.
4. **Inclusive Contexts:** There is a need for more in-depth research on the use of technology for students with special needs in Arabic language learning.

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