

A Bibliometric Analysis of Arabic Grammar in Language Learning: Trends, Patterns, and Research Frontiers

تحليل بيبلومتري لقواعد اللغة العربية في تعلم اللغات:

الاتجاهات والأنماط و آفاق البحث

Septika Rudiamon¹, septika.rudiamon@staialhikmahpariangan.ac.id, Sekolah Tinggi Agama Islam Al-Hikmah Pariangan Batusangkar, Indonesia

Beni Husmansyah², benihusmansyah@iaibsarolangun.ac.id, Institut Agama Islam Abuya Salek Sarolangun, Indonesia

Mu'amar Aziz³, muamar_aziz@staisni.ac.id, Sekolah Tinggi Agama Islam Solok Nan Indah, Indonesia

Muhammad Yusuf Salam⁴, yusufsalam@uinmybatusangkar.ac.id, Universitas Islam Negeri Mahmud Yunus Batusangkar, Indonesia



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Abstract

This study aims to analyze the development of scientific publications on Arabic grammar in language learning, identify trends, patterns, and main themes in related research, and identify opportunities and directions for future research. It applies a descriptive quantitative method using scientific publication data collected from the Scopus database through the Publish or Perish application. The search conducted on April 9, 2026, identified 152 documents with a total of 419 citations. After a filtering process, 10 highly cited articles were selected as the main objects of analysis. The bibliometric analysis follows the Fahimnia framework, including data identification, screening, analysis, and visualization. VOSviewer software was used to map research networks through keyword co-occurrence analysis. The results show that Arabic grammar studies in language learning are still dominated by theoretical and analytical approaches, mainly focusing on aspects such as approach, grammar, and analysis. The visualization reveals several research clusters that highlight connections between learning approaches, language structures, and linguistic analysis, although practical implementation and evaluation aspects remain limited. Additionally, there is a growing trend in the use of technology, including artificial intelligence, machine learning, and digital learning systems in teaching Arabic grammar. The study concludes that this field is still developing, with broad opportunities for innovation, especially in practical applications and technology-based learning models.

Keywords: Arabic Grammar, Bibliometric Analysis, Language Learning

ملخص البحث

تهدف هذه الدراسة إلى تحليل تطور دراسات قواعد اللغة العربية في مجال تعلم اللغات باستخدام منهجية قياسات الاستشهادات، مع التركيز على الاتجاهات والأنماط الحالية،



وتوجهات البحث. وتعتمد الدراسة على منهج وصفي كمي باستخدام بيانات المنشورات العلمية المٌجمعة من قاعدة بيانات سكوبس عبر تطبيق Publish or Perish. وقد أسفر البحث الذي أُجري في 9 أبريل 2026 عن تحديد 152 وثيقة بإجمالي 419 استشهادًا. وبعد عملية فرز، تم اختيار 10 مقالات ذات استشهادات عالية لتكون محور التحليل الرئيسي. ويتبع تحليل قياسات الاستشهادات إطار عمل فهمينيا، الذي يشمل تحديد البيانات، وفرزها، وتحليلها، وعرضها بصريًا. وقد استُخدم برنامج VOSviewer لرسم خرائط شبكات البحث من خلال تحليل تكرار الكلمات المفتاحية. وتُظهر النتائج أن دراسات قواعد اللغة العربية في مجال تعلم اللغات لا تزال تهيمن عليها المناهج النظرية والتحليلية، مع التركيز بشكل أساسي على جوانب مثل المنهج، والقواعد، والتحليل. ويكشف العرض البصري عن عدة مجموعات بحثية تُبرز الروابط بين مناهج التعلم، وبنية اللغة، والتحليل اللغوي، على الرغم من أن جوانب التطبيق العملي والتقييم لا تزال محدودة. إضافةً إلى ذلك، ثمة اتجاه متزايد نحو استخدام التكنولوجيا، بما في ذلك الذكاء الاصطناعي والتعلم الآلي وأنظمة التعلم الرقمي، في تدريس قواعد اللغة العربية. وتخلص الدراسة إلى أن هذا المجال لا يزال في طور التطور، مع وجود فرص واسعة للابتكار، لا سيما في التطبيقات العملية ونماذج التعلم القائمة على التكنولوجيا.

الكلمات المفتاحية: التحليل الببليومتري، تعلم اللغة، قواعد اللغة العربية.

A. INTRODUCTION

The study of Arabic grammar in language learning is a key area within applied linguistics and language education¹, particularly in the context of teaching Arabic as a foreign or second language.² In recent decades, attention to the teaching of Arabic grammar has undergone significant changes in line with the development of language learning paradigms that are increasingly communicative, technology-based, and competency-oriented.³ However, research on Arabic grammar instruction still exhibits fragmentation in approaches, methods, and research focus, necessitating a comprehensive mapping of these research developments.

¹ Ayad Abduljabbar Ahmed, 'The Impact of Artificial Intelligence on Teaching Arabic Grammar: An Analytical Study', in *Intelligent Systems, Blockchain, and Communication Technologies*, ed. by Ahmed Abdelgawad, Akhtar Jamil, and Alaa Ali Hameed, Lecture Notes in Networks and Systems (Springer Nature Switzerland, 2025), MCCLXVIII, pp. 185–94, doi:10.1007/978-3-031-82377-0_17.

² Hend Al-Khalifa, Khaloud Al-Khalefah, and Hesham Haroon, 'Error Analysis of Pretrained Language Models (PLMs) in English-to-Arabic Machine Translation', *Human-Centric Intelligent Systems*, 4.2 (2024), pp. 206–19, doi:10.1007/s44230-024-00061-7.

³ M. A. Ghofur and others, *Transformasi Digital Pendidikan Bahasa Arab*, 1 vol. (Diwan Media Pustaka, 2026) <<https://books.google.co.id/books?id=aHuqEQAAQBAJ>>.

From a phenomenological perspective, there is a global trend in language education moving away from structural approaches that emphasize mastery of rules toward communicative and functional approaches that focus on language use in real-world contexts.⁴ This shift also impacts how grammar is taught, including in Arabic language instruction. On one hand, grammar remains considered a crucial foundation for understanding language structure⁵; on the other hand, grammar instruction is often criticized for being overly theoretical and insufficiently relevant to students' communication needs.⁶ This phenomenon indicates a tension between traditional and modern approaches in the teaching of Arabic grammar that has not yet been fully resolved.

From a sociological perspective, Arabic language learning in various countries, including Indonesia and the Islamic world, still faces various challenges,⁷ such as low motivation to learn, difficulties in understanding the rules of *nahwu* and *sharaf*, and limited pedagogical innovation.⁸ Furthermore, the integration of technology in Arabic language learning, such as the use of digital media and online-based learning, is increasingly on the rise,⁹ but has not yet been fully supported by systematic scientific studies on its effectiveness in the context of grammar instruction. Global developments in education also indicate an increase in the number of scientific publications related to language learning, particularly after 2010,¹⁰ signaling growing academic attention to this issue.

Meanwhile, in terms of the literature, research on Arabic grammar in language learning is scattered across various journals and disciplines, such as linguistics, education, and Islamic studies.¹¹ However, there has not been much research that specifically conducts a comprehensive mapping of the knowledge structure, research trends, and relationships between topics in this field. In fact, bibliometric analysis has proven to be an effective method for identifying publication patterns, collaboration networks, and the development of research

⁴ F. Mu'in, *Linguistik Terapan: Teori Dan Praktik*, 1 vol. (CV Eureka Media Aksara, 2025) <<https://books.google.co.id/books?id=LxOcEQAAQBAJ>>.

⁵ Devon Myers and others, 'Foundation and Large Language Models: Fundamentals, Challenges, Opportunities, and Social Impacts', *Cluster Computing*, 27.1 (2024), pp. 1–26, doi:10.1007/s10586-023-04203-7.

⁶ A. Sudirman and others, *Techniques and Principles in Language Teaching*, 1 vol. (PT. Sonpedia Publishing Indonesia, 2025) <<https://books.google.co.id/books?id=rG5-EQAAQBAJ>>.

⁷ Fahad Ameen, 'Challenges in Vocabulary Learning among Kuwaiti EFL Learners: A Narrative Review', *Discover Education*, 5.1 (2026), p. 233, doi:10.1007/s44217-026-01267-6.

⁸ Juliadin Al-Ghifari and Syaiful Anam, 'Strategi Guru Dalam Mengatasi Kesulitan Siswa Dalam Menulis Bahasa Arab', *Jurnal Miftahul Ilmi: Jurnal Pendidikan Agama Islam*, 2.3 (2025), pp. 132–37, doi:10.59841/miftahulilmi.v2i3.163.

⁹ Osman Solmaz, 'Impacts of Digital Applications on Emergent Multilinguals' Language Learning Experiences: The Case of Duolingo', *Education and Information Technologies*, 30.7 (2025), pp. 9185–214, doi:10.1007/s10639-024-13185-x.

¹⁰ Huiling Ma, Lilliati Ismail, and Weijing Han, 'A Bibliometric Analysis of Artificial Intelligence in Language Teaching and Learning (1990–2023): Evolution, Trends and Future Directions', *Education and Information Technologies*, 29.18 (2024), pp. 25211–35, doi:10.1007/s10639-024-12848-z.

¹¹ Binti Rohmawati and Rahmat Hidayat, 'Peran Pendidikan Bahasa Arab Dalam Khazanah Keilmuan Islam: Kajian Dari Perspektif Sejarah, Keilmuan, Ibadah Dan Era Modern', *EL-Hadhary: Jurnal Penelitian Pendidikan Multidisiplin*, 3.02 (2025), pp. 144–60, doi:10.61693/elhadhary.vol302.2025.144-160.



themes across various fields of study.¹² Furthermore, bibliometrics can guide researchers in exploring future research directions and identifying research gaps that have not been extensively studied

In this context, several bibliometric studies in the fields of education and linguistics have shown that analysis of scientific publication data can reveal research trends, geographic distribution, and the dynamics of scientific collaboration.¹³ For example, bibliometric studies in the fields of language learning and education indicate a significant increase in the number of publications as well as diversification of research topics over the past few decades.¹⁴ However, specific studies on Arabic grammar in language learning remain relatively limited and have not yet been systematically analyzed using a bibliometric approach.¹⁵

The literature review in this study confirms that bibliometric methods have evolved into one of the primary approaches in the analysis of scientific development.¹⁶ Donthu et al. explain that bibliometric analysis can be used for performance analysis and science mapping, including through the analysis of co-citation, co-authorship, and co-occurrence.¹⁷ Additionally, Surya and colleagues developed the VOSviewer software, which enables effective visualization of bibliometric networks.¹⁸ Zakiyyah's research also demonstrates that bibliometrics can identify research theme clusters as well as relationships between concepts within a scientific field,¹⁹ thereby making a significant contribution to shaping future research directions.

Furthermore, Irawan et al. argue that bibliometric analysis can be used to systematically examine the development of a field through the stages of data collection, filtering, analysis, and

¹² Yonna Ananda, Edwin Rizal, and Asep Saeful Rohman, 'Analisis Bibliometrik Artikel Jurnal Bidang Informartion Quality Pada Database Scopus Menggunakan Vosviewer', *Jurnal Pustaka Budaya*, 12.1 (2025), pp. 89–109, doi:10.31849/pb.v12i1.24377.

¹³ Defilia Fatikasari and others, 'Analisis Bibliometrik Tren Penelitian Dan Kolaborasi Global Dalam Bidang Smart Farming (2016–2025)', *TeknoIS: Jurnal Ilmiah Teknologi Informasi Dan Sains <eISSN 2597-8918>*, 16.1 (2026), pp. 1–14, doi:10.36350/jbs.v16i1.329.

¹⁴ Andy Lim Teik Hong and others, 'Language Teacher Cognition in Southeast Asia (2000–2025): A Bibliometric Mapping of Trends, Themes, and Collaborations', *SN Social Sciences*, 5.11 (2025), p. 180, doi:10.1007/s43545-025-01225-3.

¹⁵ Ahmed Adel ElSabagh, Shahira Shaaban Azab, and Hesham Ahmed Hefny, 'A Comprehensive Survey on Arabic Text Augmentation: Approaches, Challenges, and Applications', *Neural Computing and Applications*, 37.10 (2025), pp. 7015–48, doi:10.1007/s00521-025-11020-z.

¹⁶ Mestawot Beyene Tafese and Erika Kopp, 'Education for Sustainable Development: Analyzing Research Trends in Higher Education for Sustainable Development Goals through Bibliometric Analysis', *Discover Sustainability*, 6.1 (2025), p. 51, doi:10.1007/s43621-024-00711-7.

¹⁷ Naveen Donthu and others, 'How to Conduct a Bibliometric Analysis: An Overview and Guidelines', *Journal of Business Research*, 133 (2021), pp. 285–96, doi:10.1016/j.jbusres.2021.04.070.

¹⁸ Rizky Andhika Surya, Faizin Ridho, and Doddy Teguh Yuwono, 'Analisis Bibliometrik Menggunakan Vosviewer Terhadap Trend Digital Forensik Pada Saat Pemilu Indonesia: The Bibliometric Analysis Using VOSviewer on Digital Forensics Trends During the Indonesian Election', *Pencerah Publik*, 11.1 (2024), pp. 33–41, doi:10.33084/pencerah.v11i1.7941.

¹⁹ Fina Nurul Zakiyyah, Yunus Winoto, and Rohanda Rohanda, 'Pemetaan Bibliometrik Terhadap Perkembangan Penelitian Arsitektur Informasi Pada Google Scholar Menggunakan VOSviewer', *Informatio: Journal of Library and Information Science*, 2.1 (2022), p. 43, doi:10.24198/inf.v2i1.37766.

visualization.²⁰ This approach has been widely used in various fields, such as management, health, and education, to understand research dynamics and identify new research opportunities.²¹ Thus, the application of bibliometric analysis in the study of Arabic grammar is expected to make a significant contribution to enriching the literature and clarifying the direction of research in this field.

Based on the above discussion, it can be concluded that there is a research gap in the study of Arabic grammar in language learning, particularly regarding the lack of a comprehensive mapping of global research trends, patterns, and structures. Therefore, this study is crucial to address this gap through a systematic, data-driven bibliometric approach. This study aims to analyze the development of scientific publications on Arabic grammar in language learning, identify trends, patterns, and major themes in related research, and identify opportunities and future research directions (research frontiers).

This study is expected to make theoretical and practical contributions, namely by providing a comprehensive overview of the development of Arabic grammar studies in language education, serving as a reference for researchers in identifying relevant and innovative research topics, supporting the development of more effective and contextual Arabic grammar teaching methods, and providing a foundation for academic decision-making regarding curriculum development and Arabic language research.

B. RESEARCH METHODS

This study uses a descriptive quantitative approach with bibliometric analysis methods to examine the development of research related to Arabic grammar in language learning. This quantitative approach was chosen because this study focuses on processing numerical data in the form of the number of publications, citations, author collaborations, and the occurrence of keywords in scientific literature. Bibliometric analysis allows researchers to systematically and objectively identify patterns, trends, and the intellectual structure of a scientific field through large amounts of scientific publication data.²²

This study refers to the bibliometric analysis framework proposed by Fahimnia, which divides the bibliometric process into four main stages: (1) data identification and collection, (2) data filtering and cleaning, (3) data analysis, and (4) visualization and interpretation of results.²³

²⁰ Muhammad Dedi Irawan, M. faisal Afif Tarigan, and Yustria Handika Siregar, *Analisis Bibliometrik: Pemetaan Tren Penelitian Menggunakan Aplikasi R*, 1 vol. (Deepublish, 2024) <https://books.google.co.id/books?id=x_8xEQAAQBAJ>.

²¹ Otto Regalado-Pezua and Sylvie Christofle, 'Future Research Opportunities on Sustainable Smart Cities: Bibliometric Analysis and Network Visualization', *Discover Sustainability*, 6.1 (2025), p. 187, doi:10.1007/s43621-025-00983-7.

²² R. M. Vysali and Hemamala Krishnan, 'A Bibliometric Analysis of Sustainable Competencies in Higher Education Institutions for Future-Ready Learning', *Discover Sustainability*, 7.1 (2025), p. 41, doi:10.1007/s43621-025-02357-5.

²³ Fabian Lindner, Gerald Reiner, and Sophia Keil, 'A Behavioral Perspective on Visualization in Manufacturing and Operations Management: A Review, Framework, and Research Agenda', *Operations Management Research*, 18.1 (2025), pp. 317–52, doi:10.1007/s12063-024-00534-9.



This model was chosen because it provides a comprehensive, systematic flow for managing bibliographic data from the initial stage to the scientific interpretation of the results.²⁴

The first stage is data identification and collection. In this stage, researchers collected scientific publication data relevant to the topic of "Arabic Grammar in Language Learning" from the internationally reputable database Scopus. Scopus was selected based on its broad international journal coverage and high indexing quality. Search keywords were systematically formulated using Boolean combinations, namely "Arabic Grammar," to ensure data relevance. The publication period ranged from 2000 to April 2026 to capture the dynamics of research developments longitudinally. The downloaded data included bibliographic information such as title, author, year of publication, abstract, keywords, journal source, and number of citations.

The second stage was data screening and cleaning. In this stage, researchers screened for irrelevant documents, duplicate data, and metadata errors (e.g., variations in author or institution names). This process is crucial to increase the validity and reliability of the analysis results. Techniques used included manual checking and the use of data processing software such as Microsoft Excel. Screening was also conducted based on inclusion criteria, such as document type (journal article), language (English), and topic relevance to Arabic grammar learning.

The third stage is data analysis. The analysis was conducted using two main approaches in bibliometrics: performance analysis and science mapping.²⁵ Performance analysis is used to measure research productivity based on the number of publications, citations, most productive authors, leading journals, and country contributions.²⁶ Meanwhile, science mapping is used to identify the intellectual structure of a field of study through network analysis, such as co-authorship, co-citation, and keyword co-occurrence.²⁷ This analysis allows researchers to understand the relationships between research elements and the main themes developing in Arabic grammar studies.

The fourth stage is data visualization and interpretation. In this stage, researchers used VOSviewer software to map and visualize the bibliometric network.²⁸ VOSviewer was chosen for its ability to produce network-based visualizations, density visualizations, and overlay

²⁴ Lujie Huang and Ming Liu, 'The Impact of Technology on Foreign Language Anxiety: A Systematic Review of Empirical Studies from 2004 to 2024', *Humanities and Social Sciences Communications*, 12.1 (2025), p. 1665, doi:10.1057/s41599-025-05921-6.

²⁵ Abderahman Rejeb and others, 'Mapping the Knowledge Domain of Green Procurement: A Review and Bibliometric Analysis', *Environment, Development and Sustainability*, 26.12 (2023), pp. 30027–61, doi:10.1007/s10668-023-03948-w.

²⁶ Kok Fong See, 'Higher Education Efficiency and Productivity Studies: A Bibliometric Analysis for Future Research', *Humanities and Social Sciences Communications*, 13.1 (2026), p. 100, doi:10.1057/s41599-025-06171-2.

²⁷ Marta Ferrer-Serrano, Lucio Fuentelsaz, and M. Pilar Latorre-Martínez, 'Knowledge Transfer and Networks: A Bibliometric Approach Through Performance Analysis, Science Mapping, and Dynamic Network Analysis', *Journal of the Knowledge Economy*, 17.2 (2025), pp. 5237–72, doi:10.1007/s13132-025-02814-6.

²⁸ Md. Nazmus Sakib and others, 'Mapping the Impacts of Neural Networks on Human Resource Management Research: A Bibliometric Analysis', *Future Business Journal*, 11.1 (2025), p. 89, doi:10.1186/s43093-025-00515-9.



visualizations that facilitate intuitive data interpretation.²⁹ Through VOSviewer, researchers can identify research theme clusters, relationships between keywords, and collaborations between authors or institutions.³⁰ The visualization results are then analyzed descriptively to explain research trends, development patterns, and future research opportunities.

By following these four stages, this study is expected to provide a comprehensive overview of the development of Arabic grammar studies in language learning, including dominant research directions, key actors in the field, and potential for further research development.

C. FINDING AND DISCUSSION

Research Findings

Based on data search results using the Publish or Perish application on April 9, 2026, 152 Scopus-indexed documents with a total of 419 citations related to the study of Arabic Grammar in Language Learning were obtained. This data indicates that research on Arabic grammar in the context of learning has a significant presence in the global academic landscape, although it is not yet classified as a high-density research field. The relatively moderate number of citations indicates that this field is still developing and offers ample opportunities for exploration.

Next, through a screening process, the researchers selected the 10 documents with the highest number of citations related to the learning and teaching of Arabic grammar or the Arabic language. This strategy aimed to focus the analysis on works that have a high impact on shaping research directions. Even though the researcher chose 10 of the 152 documents, this would be more directed and focused on the discussion in this study. This approach aligns with the practice in bibliometric studies that prioritize highly cited articles as a proxy for major intellectual contributions in a field.³¹

²⁹ Xiaoxue Yang and others, 'Bibliometric and Thematic Insights into a Decade of Circular Economy Research in Construction', *Discover Applied Sciences*, 7.8 (2025), p. 922, doi:10.1007/s42452-025-07584-z.

³⁰ Kavita Pabreja, Reetu Verma, and Ashok Kumar, 'GenAI: A Scientometric Analysis of Research Trends Using Biblioshiny and VOSviewer', *Discover Artificial Intelligence*, 6.1 (2025), p. 65, doi:10.1007/s44163-025-00760-5.

³¹ Shu Yu and Ke Chen, 'A Bibliometric and Altmetric Analysis of the Top 100 Most Cited Articles in Social Psychology (2000–2024)', *Discover Psychology*, 6.1 (2025), p. 28, doi:10.1007/s44202-025-00557-8.

**Table 1. Citations of Scopus Indexed Documents**

No.	Authors	Title	Year	Cited
1	A. Solyman	Synthetic data with neural machine translation for automatic correction in arabic grammar	2021	43
2	C. Moukrim	An innovative approach to autocorrecting grammatical errors in Arabic texts	2021	19
3	A.A. Nafea	A Brief Review on Preprocessing Text in Arabic Language Dataset: Techniques and Challenges	2024	18
4	Z.M. Mannaa	Computer-assisted <i>i'raab</i> of Arabic sentences for teaching grammar to students	2022	15
5	M. Zaki	Self-correction through corpus-based tasks: Improving writing skills of Arabic learners	2021	7
6	M. Ritonga	SIAKAD machine learning for correcting errors in speaking Arabic	2022	5
7	A.A. Alethary	Automated Arabic-Arabic sign language translation system based on 3D avatar technology	2022	4
8	M.F.A. Hamid	Evaluating Student Acceptance of Interactive Infographics Module for Arabic Grammar Learning Using the Technology Acceptance Model (TAM)	2024	4
9	A.A. Althawab	The Syntactic Structure of an Introductory PP in Standard Arabic: A Non-Transformational Approach	2022	4
10	S. Al-Jamali	Behavioral Determinants of AI-Driven Arabic Language Learning: Insights from the Extended UTAUT2 Model	2025	3

Source: Publish or Perish on Scopus search on April 9, 2026

Based on the table presented, it can be seen that the ten articles with the highest number of citations in the study "Arabic Grammar in Language Learning" demonstrate a strong trend toward integrating technology into Arabic language learning, particularly in grammatical aspects. The highest-cited article was written by A. Solyman in 2021, entitled "Synthetic Data with Neural Machine Translation for Automatic Correction in Arabic Grammar," which received 43 citations. The high number of citations in this study indicates that the Neural Machine Translation (NMT)-based approach and the use of synthetic data are important innovations in the development of automatic correction systems for Arabic grammar.³² This indicates a significant shift towards the use of artificial intelligence in language learning.

Furthermore, research by C. Moukrim (2021), with 19 citations, also emphasizes the importance of auto-correction systems in Arabic texts as a solution to the complexity of grammatical structures. Meanwhile, a study by A.A. Nafea (2024), with 18 citations, highlights the preprocessing aspect of Arabic datasets, which is a crucial foundation for the development of technology-based systems. These findings demonstrate that research focuses not only on the final learning outcomes but also on the linguistic data processing processes that support automated learning systems.

³² Muhammad Azhar and others, 'Revolusi Pembelajaran Bahasa Arab Di Era Digital: Analisis Peran Artificial Intelligence Dalam Pengembangan Kompetensi Berbahasa', *Al-Ma'lumat : Jurnal Ilmu-Ilmu Keislaman*, 3.2 (2025), pp. 58–81, doi:10.56184/jam.v3i2.506.

In terms of technology-based pedagogical aspects, research by Z.M. Mannaa (2022), with 15 citations, demonstrates the importance of computer-assisted learning in helping students understand the concept of *i'rāb* (syntactic analysis in Arabic). This is reinforced by research by M. Zaki (2021), who developed a corpus-based task approach to improve writing skills through a self-correction mechanism. Both studies emphasize that technology integration functions not only as an aid but also as an active learning medium that encourages independent learning.

Furthermore, research by M. Ritonga (2022) and A.A. Alethary (2022) expands the scope of innovation into the realm of machine learning and visual technologies, such as 3D avatars for Arabic sign language translation. Although the number of citations is relatively lower, these two studies point to new directions in developing Arabic language learning that is more inclusive and adaptive to the needs of diverse users.

Meanwhile, research by M.F.A. Hamid (2024) and S. Al-Jamali (2025) highlighted aspects of technology acceptance by users through models such as the Technology Acceptance Model (TAM) and UTAUT2. This suggests that the success of technology implementation in learning is determined not only by system sophistication but also by user psychological and behavioral factors. On the other hand, research by A.A. Althawab (2022) maintains a purely linguistic approach with a focus on Arabic syntactic structure, demonstrating that theoretical studies still have a place in the research landscape.

Overall, the table indicates that current research trends in Arabic grammar in learning are dominated by the integration of technology, particularly artificial intelligence, machine learning, and digital-based learning systems. However, there remains a balance between innovative approaches and theoretical studies. This suggests that the field is in a transition phase toward more modern, adaptive, and technology-based learning, although it still requires strengthening aspects of implementation and empirical evaluation of learning.

The findings reveal several major trends in research on Arabic grammar in language learning. First, there is a clear shift from conventional grammar instruction toward technology-integrated learning systems. Most highly cited studies emphasize the use of artificial intelligence (AI), machine learning, and Neural Machine Translation (NMT) to support Arabic grammar learning and automatic error correction. The study by A. Solyman (2021), which received the highest number of citations, reflects the growing importance of AI-driven approaches in addressing the complexity of Arabic grammatical structures. This trend indicates that Arabic grammar learning is increasingly influenced by developments in computational linguistics and intelligent educational technologies.

Second, the findings show an increasing emphasis on automated language processing and dataset preparation. Studies such as those by C. Moukrim (2021) and A.A. Nafea (2024) demonstrate that preprocessing Arabic linguistic data and developing auto-correction systems are becoming essential components in digital learning environments. Researchers are no longer focusing solely on teaching outcomes but also on the technological infrastructure that enables efficient grammar analysis and correction.



Third, there is a growing trend toward learner-centered and technology-assisted pedagogy. Research on computer-assisted learning, corpus-based tasks, and self-correction mechanisms indicates that digital tools are being designed to encourage learner autonomy, active participation, and individualized learning experiences. Technology is increasingly viewed not merely as a supplementary tool but as an interactive learning environment.

Finally, recent studies also show a trend toward inclusive and adaptive learning technologies. Innovations such as machine learning applications and 3D avatar systems for Arabic sign language translation suggest that researchers are attempting to broaden accessibility and accommodate diverse learner needs.

Several important patterns can be identified from these findings. One dominant pattern is the interdisciplinary nature of current Arabic grammar research. Many studies combine insights from linguistics, education, computer science, and artificial intelligence. This interdisciplinary integration demonstrates that Arabic grammar learning is evolving beyond purely theoretical linguistic studies into a technologically driven research field.

Another pattern is the dominance of applied and solution-oriented research. Most highly cited studies focus on practical applications such as grammar correction systems, corpus-based learning, intelligent tutoring systems, and digital learning platforms. This indicates that researchers prioritize innovations that can directly improve teaching effectiveness and learner performance.

The findings also reveal a balance between technological innovation and traditional linguistic inquiry. Although technology-based studies dominate the citation landscape, theoretical and structural linguistic studies, such as the work of A.A. Althawab (2022), remain relevant. This pattern suggests that technological advancements in Arabic grammar learning still rely heavily on strong linguistic foundations.

In addition, there is a recurring pattern related to user acceptance and behavioral factors. Studies employing models such as TAM and UTAUT2 indicate that researchers increasingly recognize that successful technology integration depends not only on technical sophistication but also on learners' perceptions, motivation, and willingness to adopt technology.

The findings also point to several emerging research frontiers in Arabic grammar and language learning. One major frontier is the development of AI-powered intelligent grammar learning systems. Future research is likely to focus on advanced generative AI, adaptive learning algorithms, and personalized grammar feedback systems capable of responding to learners' proficiency levels and learning behaviors in real time.

Another promising frontier is the expansion of multimodal and immersive learning technologies. The emergence of 3D avatars and visual translation systems suggests opportunities for integrating virtual reality (VR), augmented reality (AR), and interactive simulations into Arabic grammar instruction. Such technologies may create more engaging and accessible learning environments.

A further research frontier involves inclusive and accessibility-oriented language learning. Research on Arabic sign language translation demonstrates growing attention to

learners with special needs. Future studies may explore inclusive digital pedagogies that support diverse linguistic and cognitive backgrounds.

In addition, there is significant potential for research on big linguistic data and Arabic educational corpora. Since preprocessing and dataset quality are increasingly recognized as critical, future studies may focus on developing large-scale annotated Arabic grammar corpora, multilingual datasets, and open-access educational resources to improve AI-based learning systems.

Lastly, future research is likely to emphasize empirical validation and long-term educational impact. While many current studies focus on technological innovation, there is still limited evidence regarding long-term effectiveness, classroom implementation, and measurable learning outcomes. Therefore, future studies should investigate how AI-based and technology-enhanced grammar learning systems influence learner achievement, motivation, retention, and pedagogical practices across different educational contexts.

Research Discussion

Network Visualization Analysis (Network Visualization VOSviewer)

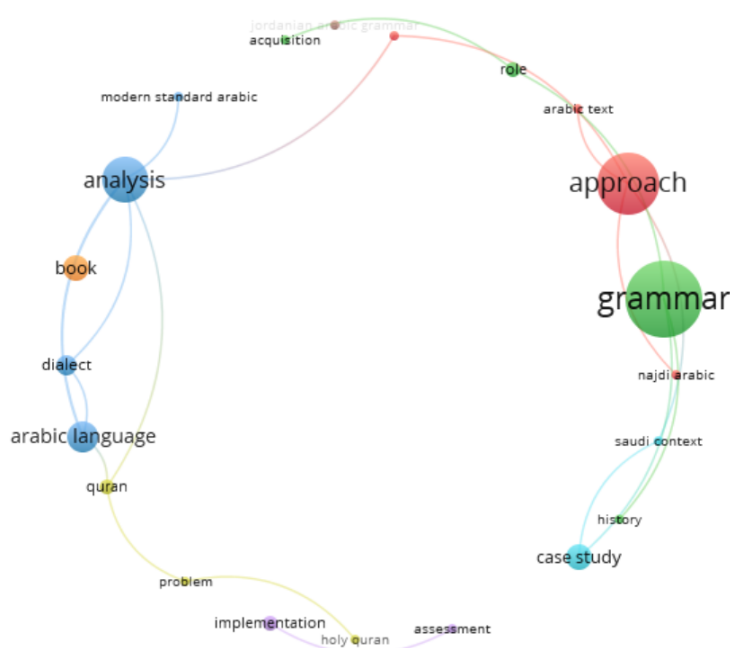


Figure 1. Network Visualization VOSviewer

Source: Publish or Perish and processed via Vosviewer on April 9, 2026

The first visualization shows a network visualization depicting the relationships between keywords (co-occurrence keywords). The map shows several main clusters marked with different colors, reflecting the research themes.

In the red cluster, the keyword "approach" appears as a large node connected to "grammar," "Arabic text," and "role." This indicates that learning approaches are a primary



focus in Arabic grammar research. The emphasis on "approach" indicates a paradigm shift toward exploring more effective and contextual teaching methods.

In the green cluster, the word "grammar" is a key hub in the network, connected to "najdi Arabic" and "Saudi context." This indicates that Arabic grammar research is no longer solely theoretical but is also beginning to focus on sociolinguistic contexts and dialect variations. Furthermore, in the blue cluster (analysis), the word "analysis" is associated with "Arabic language," "dialect," "book," and "Modern Standard Arabic." This cluster demonstrates the dominance of text-based analytical approaches and traditional linguistics. Furthermore, the yellow-purple cluster is relatively small and includes terms like implementation, assessment, and holy Quran. This indicates that the implementation and evaluation aspects of learning are still limited in research. Finally, in the additional cluster, the word "case study" appears as a separate node connected to "history" and "Saudi context," indicating an empirical approach that is beginning to develop but is not yet dominant.

The network structure in the VosViewer data or image shows that research still focuses on three main poles: learning approach, grammar study, and linguistic analysis. The interconnections between clusters indicate integration, but it is still not strong in the implementation aspect. This aligns with the finding that Arabic language research tends to be theoretical rather than applied.

The network visualization results from the VOSviewer analysis show that research studies in the field of Arabic grammar are still dominated by three main axes: learning approaches, grammatical studies, and linguistic analysis. This finding indicates that the research focus tends to remain theoretical and structural, although a shift toward social and pedagogical contexts is beginning to emerge.

First, the dominance of the keyword "approach," closely linked to "grammar," "Arabic text," and "role," indicates that recent research is beginning to emphasize the importance of a more contextual and communicative learning approach. This aligns with communicative language learning theory, which emphasizes that language learning focuses not only on grammatical rules but also on language use in real contexts.³³ This finding also supports previous studies which state that Arabic grammar learning is starting to shift from a traditional deductive approach to a more integrative and text-based approach.³⁴

Second, in the green cluster, the keyword "grammar" associated with "Najdi Arabic" and "Saudi context" indicates an expansion of the study's scope from formal Arabic to dialect variations and sociolinguistic contexts. This aligns with modern sociolinguistic theory, which emphasizes that language cannot be separated from the social context of its use.³⁵ Previous research also shows that the study of Arabic dialectology is growing, especially in the context

³³ Yudha Dwi Purwanti, Farida Yufarlina, and Berlian Pancarrani, 'Pragmatik Dalam Pembelajaran Bahasa Indonesia: Meningkatkan Kemampuan Berkomunikasi Siswa', *Saka Bahasa: Jurnal Sastra, Bahasa, Pendidikan, Dan Budaya*, 2.1 (2025), pp. 21–27, doi:10.23960/sakabahasa.v2i1.785.

³⁴ F. Mu'in and F. Hidayat, *Linguistik Terapan: Teori Dan Praktik*, 1 vol. (CV Eureka Media Aksara, 2025) <<https://books.google.co.id/books?id=LxOceQAAQBAJ>>.

³⁵ Kuntum Chairum Ummah and Aminah Dewi Rahmawati, 'Peran Bahasa Dalam Pembentukan Identitas Nasional Di Kalangan Pemuda: Kajian Sociolinguistik', *Lingua Rima: Jurnal Pendidikan Bahasa Dan Sastra Indonesia*, 14.3 (2025), p. 607, doi:10.31000/lgrm.v14i3.15113.

of regional variations such as the Gulf and Hijaz dialects, which reflect the dynamics of contemporary Arabic.

Third, the blue cluster, dominated by "analysis," "dialect," "book," and "Modern Standard Arabic," shows that text-based analytical approaches remain very dominant in Arabic linguistic research. This reinforces the findings of several previous studies, which stated that philological and structural traditions remain the primary foundations of Arabic language studies, particularly in the analysis of both classical and modern texts.³⁶

Fourth, the yellow-purple cluster, which includes "implementation," "assessment," and "holy Quran," indicates that aspects of implementation and evaluation of learning are still relatively limited. This finding can be compared with language education evaluation theory, which emphasizes the importance of authentic assessment in language learning. However, the low correlation between these keywords indicates that research oriented towards learning practices is still less developed than theoretical studies.³⁷

Furthermore, the emergence of the "case study" node, which stands relatively separate but is connected to "history" and "Saudi context," indicates the beginning of the development of an empirical approach in Arabic language research. However, the node's non-central position indicates that the case study approach has not yet become mainstream in Arabic linguistics research.

Overall, these findings indicate that Arabic language research is still dominated by theoretical and analytical approaches, with emerging integration between learning approaches, linguistic analysis, and social context. However, the interconnectedness between clusters, particularly in the implementation and evaluation aspects, remains weak. This reinforces the conclusion that there is a gap between theoretical studies and practical application in Arabic language learning.

A new finding from this analysis is the indication of an epistemological transition in Arabic language research, from a dominance of structural studies to an integration between linguistics, pedagogy, and sociolinguistic contexts. Although this transition is not yet fully established, the existence of interconnected clusters indicates a direction of increasingly multidisciplinary research development. This opens up opportunities for future research to emphasize implementation, learning evaluation, and the integration of linguistic theory with Arabic language teaching practices in various social contexts.

Density Visualization Analysis

³⁶ Rizamul Malik Akbar and others, 'Tashif Dan Tahrif: Telaah Atas Kesalahan Teks Dalam Tradisi Islam', *Lathaif: Literasi Tafsir, Hadis Dan Filologi*, 4.2 (2025), pp. 136–46, doi:10.31958/lathaif.v4i2.16056.

³⁷ Anita Puspa Meilina, 'Analisis Kesenjangan Pengembangan Kompetensi Pedagogik Guru PGMI: Kajian Kritis Berbasis Teori Konstruktivistik', *Jurnal Manajemen Dan Pendidikan Agama Islam*, 3.3 (2025), pp. 207–19, doi:10.61132/jmpai.v3i3.1114.

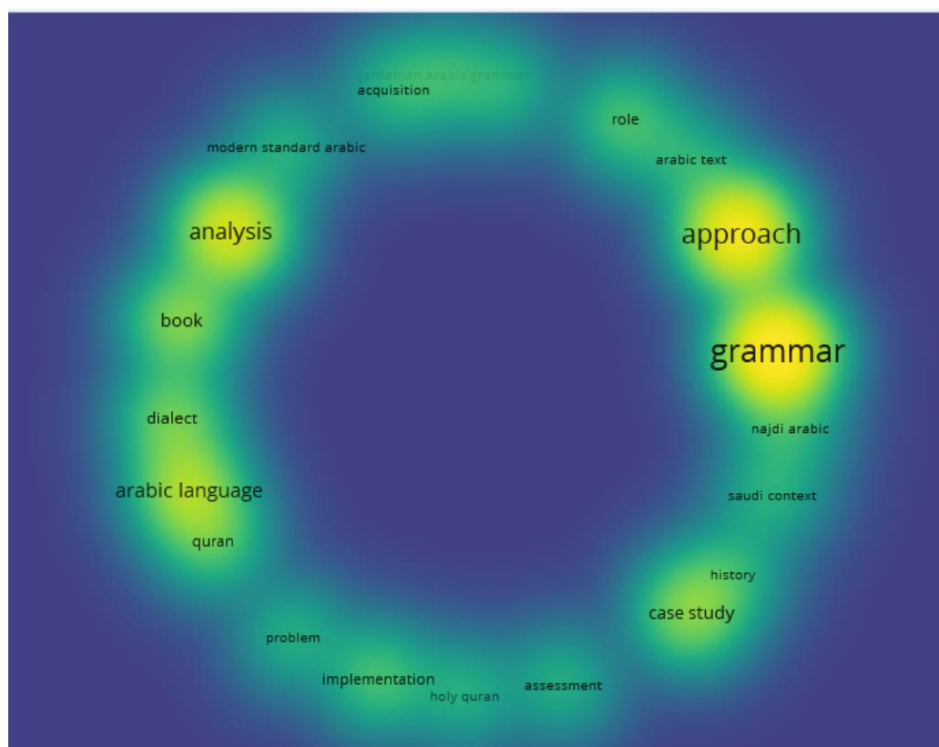


Figure 2. Density Visualization

Source: Publish or Perish and processed via Vosviewer on April 9, 2026

The second visualization shows a density map, which illustrates research intensity based on the frequency of keyword occurrence. Keywords in high-density areas include "grammar" and "approach," which appear as the brightest areas (yellow), and "analysis," which also shows high intensity.

Meanwhile, in low-density areas, "implementation," "assessment," and "problem" appear in the bluish-green area. Similarly, "case study" and "history" also appear relatively less dominant. This indicates that research still focuses less on practical aspects of learning, and that evaluation and measurement of learning effectiveness have not received much attention.

Based on the visualization and bibliometric analysis, several key trends can be identified: research shows a shift from a structural approach to a communicative or functional approach. This is reflected in the dominance of the word "approach" and its association with the context of language use. Furthermore, most research still focuses on text analysis, language structure, and classical grammar studies. The presence of terms like "Najdi Arabic" and "Saudi context" indicates the emergence of studies based on local contexts and dialects. Furthermore, the limited number of evaluative studies, such as those on assessment and implementation, indicates a weakness in practice-based research. Based on the VOSviewer map, future research should focus on integrating structural and functional approaches, developing context-based learning models, utilizing technology in grammar learning, classroom-based research (experimental and action research), and evaluating learning effectiveness (assessment-based studies). This trend is supported by recent research emphasizing the importance of integrating modern pedagogy into Arabic language learning.

D. CONCLUSIONS

Bibliometric analysis results indicate that research on Arabic grammar in the context of learning is still in its infancy, characterized primarily by a predominance of theoretical and analytical studies. This is reflected in the high intensity of research focused on aspects of language structure, linguistic analysis, and the exploration of classical grammatical concepts. These findings indicate that this field remains heavily influenced by the traditions of philology and structural linguistics, leading to a research orientation that tends to emphasize understanding the language system rather than its application in contextual and communicative learning practices.

Furthermore, visualization results using VOSviewer show that research focuses on themes such as approach, grammar, and analysis, demonstrating strong academic attention to the development of learning approaches and the study of language structure. However, aspects of implementation in the classroom context, learning evaluation, and measuring the effectiveness of teaching methods have received relatively little attention. The limited connection between the implementation and evaluation clusters in the network map indicates a gap between theoretical development and learning practice. This situation confirms that research in this field has not yet fully met the practical needs of Arabic language education.

Therefore, future research should focus on strengthening the practical and innovative dimensions of Arabic grammar learning. Developing learning models that integrate structural and functional approaches, utilizing digital technologies such as e-learning and artificial intelligence, and enhancing classroom-based research are crucial. Furthermore, strengthening the evaluation aspect through the development of authentic assessment instruments is also necessary to comprehensively measure learning effectiveness. Thus, future research is expected to not only enrich the theoretical knowledge but also make a tangible contribution to improving the quality of Arabic grammar learning, making it relevant to current demands.

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Declarations

Author Contribution Statement

Septika Rudiamon: Conceptualization; Writing - review and editing; Data curation; Investigation; Formal analysis; Methodology; Writing - original draft.

Muhammad Yusuf Salam: Conceptualization; Validation; Writing - review and editing; Formal analysis; Methodology; Supervision; Validation.

Beni Husmansyah: Data curation; Investigation.

Mu'amar Aziz: Data curation; Investigation.

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In this study, the author declares that there is no conflict of interest.



AI Use Statement

During the writing of this work, the author used ChatGPT and DeepL Translator to facilitate the articulation of ideas and translation into English. After using these tools and services, the author reviewed and edited the content as needed and assumes full responsibility for the content of this publication.

Additional Information

Correspondence and requests for materials should be addressed to: septika.rudiamon@staialhikmahpariangan.ac.id

List the ORCID iD for each author (if available) using the full URL format. ORCID ensures unambiguous author identification and accurate attribution of scholarly work.

[Septika Rudiamon], <https://orcid.org/0009-0004-8735-7906>

[Muhammad Yusuf Salam], <https://orcid.org/0009-0008-3131-2847>

[Beni Husmansyah]

[Mu'amar Aziz]

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