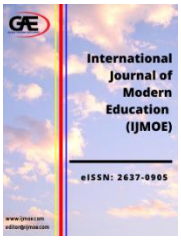
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DIGITAL TRANSFORMATION OF QUR'ANIC EDUCATION: A BIBLIOMETRIC AND THEMATIC EVOLUTION ANALYSIS

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Abstract:

The rapid expansion of digital technologies has created new opportunities for transforming Qur'anic education and reshaping the ways Qur'anic knowledge is accessed, interpreted, taught, and disseminated across contemporary educational contexts. Despite growing scholarly interest, the intellectual development, publication trajectory, thematic structure, and international research landscape of this field remain insufficiently mapped. This study therefore examines research trends related to the digital transformation of Qur'anic education through a bibliometric approach. Bibliographic data were retrieved from the Scopus database using an advanced title-based search centred on the main keyword "Qur'anic," covering English language journal articles published between 2017 and August 2026 within the Arts and Humanities and Social Sciences. Of 1,692 initially identified records, 1,171 were excluded following screening, resulting in a final dataset of 521 articles. Scopus Analyzer was employed to examine publication and citation patterns, OpenRefine was used for data cleaning and standardization, and VOSviewer was applied to visualize keyword co-occurrence and country-level co-authorship networks. The findings reveal substantial growth in scholarly output, increasing from 15 publications (2.88%) in 2017 to a peak of 96 (18.43%) in 2025, while 61 articles (11.71%) had already been published by August 2026. Indonesia emerged as the leading contributor with 131 publications (25.14%), followed by Malaysia with 84 (16.12%) and the United States with 51 (9.79%). Keyword analysis identified Qur'an, translation,

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Islam, and exegesis as prominent conceptual nodes, while international collaboration was particularly strong among major Muslim-majority research centres. Overall, the findings demonstrate an expanding yet thematically diverse research landscape and highlight opportunities for stronger integration of digital technologies, educational innovation, and international collaboration in future Qur'anic education research.

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Keyword:

Bibliometric Analysis; Digital Transformation; Educational Technology; Qur'anic Education; VOSviewer

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Introduction

Digital transformation in Qur'anic education refers to the changing ways the Qur'an is taught, learned, accessed, and managed through digital platforms, mobile applications, interactive media, and online learning systems. Recent research treats this shift not as a minor supplement to conventional instruction, but as a significant educational response to changing student learning patterns, wider internet availability, smartphone adoption, and the broader digitalization of Islamic education (Abdillah et al., 2025; Akem et al., 2025; Jati & Shehu, 2026; Koswara et al., 2026; Taj, 2026). At the same time, the literature consistently argues that digital transformation in Islamic and Qur'anic learning is not simply the digitization of teaching materials, because its success depends on aligning technology with pedagogy, moral formation, and Islamic spiritual values rather than treating innovation as a purely technical process (Bahijah & Khumairoh, 2025; Jati & Shehu, 2026; Koswara et al., 2026; Sari et al., 2024).

Within this context, digital technologies create major opportunities to expand Qur'anic education across geography, time, age, and social background. Studies repeatedly report that e-learning systems, social media, web platforms, and mobile apps improve accessibility, time flexibility, personalized learning, and student motivation, allowing Qur'anic learning to continue beyond the limits of the formal classroom (Abdillah et al., 2025; Akem et al., 2025; Hasanah et al., 2025; Jati & Shehu, 2026; Koswara et al., 2026; Restalia & Khasanah, 2025; Sari et al., 2024; Umar & Tilli, 2025). This expanded access is especially important in Qur'anic education because learners can engage with recitation, translation, tafsir, audio listening, and revision through portable digital tools, while user-centered platform design improves usability and language accessibility for diverse audiences (Taj, 2026; Zaki et al., 2021). More specifically, digital Qur'anic applications increasingly include interactive features such as voice recording, real-time evaluation, reciter options, colour coding, visualization, and

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searchable content, all of which support practice, self-monitoring, and supplementary learning outside teacher-led sessions (Djambek et al., 2024; Zaki et al., 2021).

Research also shows that digital transformation can improve learning outcomes in Qur'anic and Islamic education when it is implemented effectively. A quasi-experimental primary-level study found a statistically significant advantage for students taught through digital transformation in memorization, comprehension, application, and broader Qur'anic and religious understanding compared with those taught through traditional methods (Hamid, 2026). Survey and review evidence similarly indicates that mobile applications are often perceived as user-friendly and educationally valuable, with reported gains in memorization, comprehension, engagement, motivation, learning independence, and student-centered learning (Hakimi et al., 2024; Hasanah et al., 2025; Madjid & Mètode, 2025; Umar & Tilli, 2025; Zh et al., 2024). In Qur'anic learning more specifically, mobile tools such as Qiraat and Tilawati applications are described as supplementary instruments that can improve recitation accuracy, fluency, motivation, and understanding of tajwid or recitation rules, while also supporting anytime-anywhere learning (Djambek et al., 2024; Zaki et al., 2021). Emerging work also suggests that more advanced digital approaches, including AI and deep learning, can support personalized, contextual, and data-driven Islamic learning models through automated feedback and adaptation to learner characteristics (Bahijah & Khumairoh, 2025).

However, the same literature shows that the benefits of digital transformation do not arise automatically. The most consistent barriers across studies are uneven infrastructure, device and internet limitations, curriculum misalignment, low digital literacy among teachers and students, and weak capacity to design engaging, contextually appropriate digital materials (Abdillah et al., 2025; Akem et al., 2025; Bahijah & Khumairoh, 2025; Jati & Shehu, 2026; Maskin et al., 2025; Restalia & Khasanah, 2025; Rulitawati et al., 2025; Umar & Tilli, 2025). Several studies add that teachers often transfer traditional methods onto digital platforms without sufficient pedagogical redesign, which limits interactivity and student engagement and makes online Islamic learning less effective than it could be (Hamid, 2026; Hasanah et al., 2025; Jati & Shehu, 2026; Rulitawati et al., 2025; Zh et al., 2024). Qur'anic education also faces distinctive concerns about authenticity, content reliability, security, data governance, parental hesitation, learner distraction, and the perceived weakening of the spiritual blessings and ethical discipline associated with face-to-face transmission (Hakimi et al., 2024; Koswara et al., 2026; Muhyiddin et al., 2026; Taj, 2026; Zh et al., 2024).

For that reason, the literature increasingly frames effective digital transformation in Qur'anic education as a strategic, ethical, and institutional process rather than a simple matter of device adoption. Recurrent recommendations include sustained teacher training, development of Islamic value-based digital content, clearer educational policies, collaboration among educators, families, developers, and policymakers, and adaptive leadership that can build infrastructure, shape digital culture, and monitor implementation over time (Abdillah et al., 2025; Akem et al., 2025; Hasanah et al., 2025; Maskin et al., 2025; Muhyiddin et al., 2026; Rulitawati et al., 2025; Sari et al., 2024; Umar & Tilli, 2025). Taken together, the evidence suggests that digital transformation is reshaping Qur'anic education into a more accessible, interactive, and adaptive field, but its long-term value depends on preserving authenticity, adab and pedagogical depth while integrating innovation responsibly. In that sense, the digital transformation of Qur'anic education is most promising not when it replaces tradition, but when it extends and strengthens it through well-designed, value-conscious, and educationally grounded practice.

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Research Question

- RQ1: How has the volume of scholarly publications on digital transformation in Qur'anic education evolved from 2017 to August 2026?
- RQ2: Which publications have exerted the greatest scholarly influence on digital transformation in Qur'anic education, as measured by citation impact?
- RQ3: Which countries are the leading contributors to research on digital transformation in Qur'anic education in terms of publication output and citation performance?
- RQ4: What are the dominant and emerging research themes within digital transformation in Qur'anic education, as revealed through keyword co-occurrence analysis?
- RQ5: What patterns of international research collaboration characterize digital transformation in Qur'anic education, as revealed through country-level co-authorship network analysis?

Methodology

Bibliometric analysis provides a systematic and quantitative approach to the collection, organization, and evaluation of bibliographic information derived from scholarly publications (Alves et al., 2021; Assyakur & Rosa, 2022; Verbeek et al., 2002). Beyond conventional descriptive indicators, such as publication sources, temporal publication patterns, and influential authors (Wu & Wu, 2017), bibliometric analysis encompasses more sophisticated techniques, including document co-citation analysis, which facilitates the identification of the intellectual structure and knowledge foundations of a research field. The robustness of such an analysis depends substantially on a rigorous and iterative literature retrieval process involving the careful formulation of search terms, systematic database searching, and comprehensive evaluation of the retrieved records. This methodological procedure enables the construction of a reliable bibliographic dataset and enhances the transparency, reproducibility, and credibility of the resulting findings (Fahimnia et al., 2015).

Accordingly, the present study prioritized influential scholarly publications that provide substantive insights into the theoretical and intellectual foundations underpinning the research domain. Scopus was selected as the primary source for bibliographic data retrieval because of its extensive multidisciplinary coverage, standardized indexing practices, and suitability for large-scale bibliometric analyses (Al-Khoury et al., 2022; di Stefano et al., 2010; Khiste & Paithankar, 2017). To maintain scholarly rigor and ensure consistency in publication quality, the analysis was restricted to peer-reviewed journal articles, while books, lecture notes, and other non-journal document types were excluded (Gu et al., 2019). Using Elsevier's Scopus database, relevant publications published between 2017, and August 2026 were systematically retrieved and compiled to establish the final dataset for subsequent bibliometric and science-mapping analyses.

Data Search Strategy

The bibliometric data collection process was designed to establish a focused, consistent, and reproducible dataset representing the contemporary development of Qur'anic scholarship within the Arts and Humanities and Social Sciences. Scopus was selected as the sole bibliographic database because its structured metadata and standardized indexing provide a suitable foundation for bibliometric and science-mapping analyses. The search was restricted

to publications containing the term "Qur'anic" in the article title, thereby adopting a deliberately precise retrieval strategy intended to maximize topical relevance and minimize the inclusion of studies in which Qur'anic issues were only peripheral. The temporal boundary was set from 2017 to August 2026 to capture approximately a decade of recent scholarly development, while only English-language journal articles classified under Arts and Humanities or Social Sciences were retained. These restrictions were methodologically appropriate for maintaining disciplinary coherence and comparability across the dataset. The initial Scopus search identified 1,692 records. Applying the predetermined eligibility criteria and screening procedures resulted in the removal of 1,171 records that did not satisfy the analytical scope, leaving 521 publications for the final bibliometric analysis. Thus, approximately 30.79% of the initially identified records were retained, while 69.21% were excluded, indicating a substantial refinement from a broad initial corpus to a more analytically focused dataset.

The inclusion of 521 articles provides a sufficiently substantial corpus for examining publication trends, geographical contributions, influential sources and authors, citation structures, keyword relationships, and broader intellectual patterns within the selected research domain. Importantly, the exclusion of 1,171 records should not be interpreted as a limitation in itself; rather, it reflects the application of explicit boundaries intended to improve the conceptual homogeneity and reliability of the bibliometric dataset. Restricting the analysis to journal articles reduces heterogeneity arising from different publication formats, while the English language criterion facilitates consistent bibliographic and keyword analysis. Similarly, limiting the disciplinary coverage to Arts and Humanities and Social Sciences aligns the dataset more closely with the educational, cultural, religious, and societal dimensions of Qur'anic scholarship. Nevertheless, the title only search strategy represents a deliberately conservative methodological choice although it strengthens precision, it may exclude relevant studies that address Qur'anic education or digital transformation without explicitly using "Qur'anic" in their titles. Consequently, the findings should be interpreted as a mapping of a clearly delimited body of explicitly Qur'anic-focused scholarship rather than an exhaustive representation of all potentially relevant research. Overall, the sequential reduction from 1,692 identified records to 521 eligible articles demonstrates a transparent and replicable selection process and establishes a coherent bibliographic foundation for subsequent performance analysis and science mapping.

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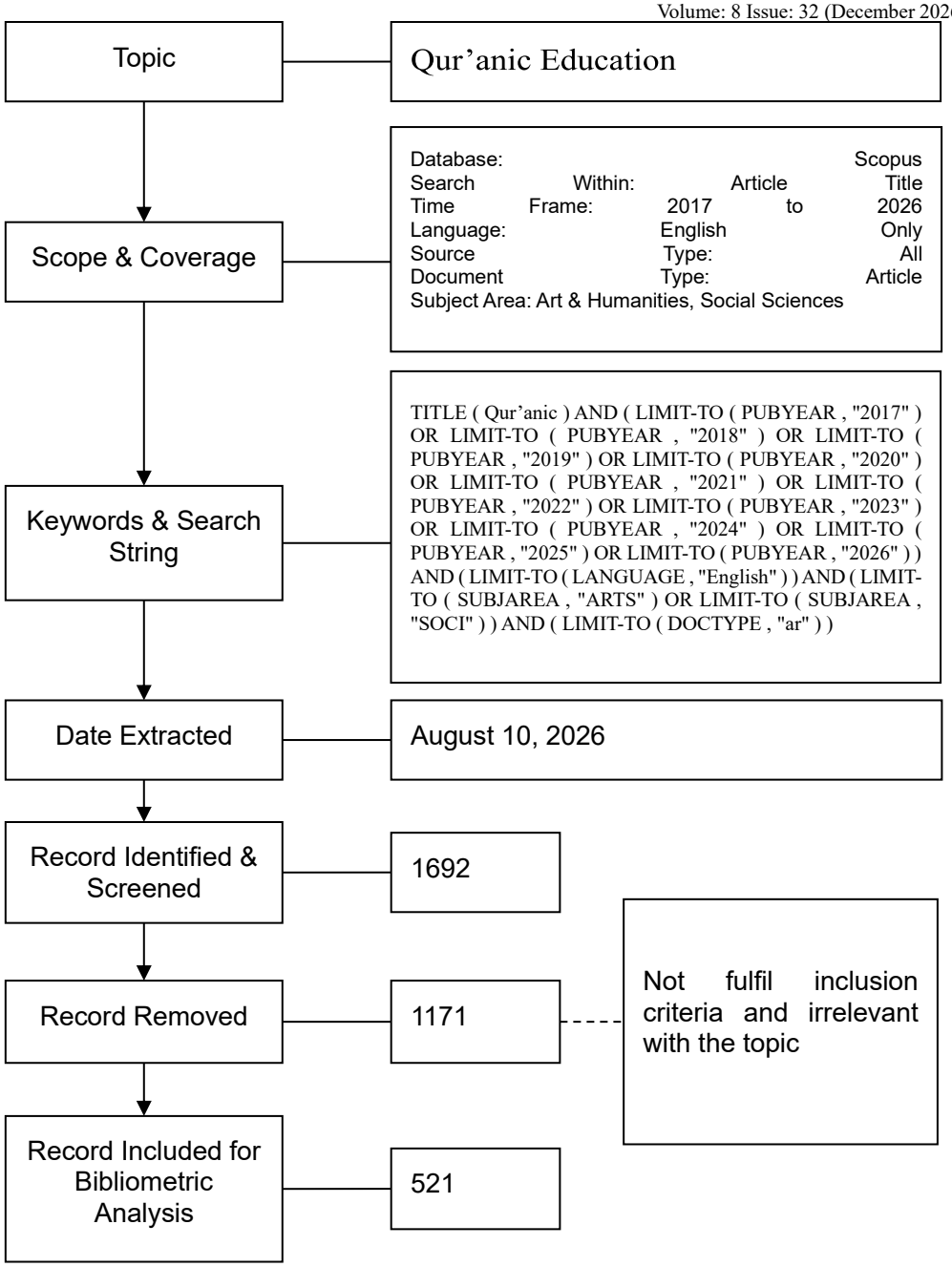


Figure 1. Flow Diagram Of The Search Strategy

(Page, McKenzie, et al., 2021; Page, Moher, et al., 2021)

Data Analysis

VOSviewer is a widely established bibliometric and science-mapping software developed by Nees Jan van Eck and Ludo Waltman at Leiden University, the Netherlands (van Eck & Waltman, 2010, 2017). The software is specifically designed to construct, visualize, and interpret bibliometric networks derived from scientific publications. It supports multiple forms of relational analysis, including co-authorship, co-citation, bibliographic coupling, citation networks, and keyword co-occurrence, thereby enabling researchers to examine the social, intellectual, and conceptual structures of a research domain. Through its network, overlay, and density visualization functions, VOSviewer transforms complex bibliographic relationships into interpretable graphical representations in which the proximity, size, and connectivity of

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items provide insights into their relative importance and interrelationships. Its capacity to process large bibliographic datasets, apply clustering algorithms, calculate network-based indicators, and customize visualization parameters has contributed to its widespread adoption in contemporary bibliometric research.

A particular strength of VOSviewer is its ability to identify and visualize latent structures within large and potentially complex bibliographic networks. Its clustering functionality groups strongly related items into distinct clusters, facilitating the identification of major research communities, thematic concentrations, and patterns of scholarly interaction. Keyword co-occurrence analysis, for example, can reveal the conceptual structure of a research field by identifying frequently interconnected terms, whereas co-authorship and citation-based analyses can illuminate patterns of scientific collaboration and intellectual influence. Network visualization further enables the interpretation of relationships according to the strength of links among individual nodes, while density visualization highlights areas characterized by particularly high concentrations of bibliometric activity. These complementary analytical capabilities make VOSviewer particularly appropriate for identifying established themes, emerging research directions, and structural relationships that may not be readily observable through conventional descriptive bibliometric indicators alone.

In the present study, bibliographic records covering publications from 2017 to August 2026 were retrieved from the Scopus database and prepared for subsequent analysis using VOSviewer version 1.6.20. The extracted metadata included publication year, article title, author information, source title, citation count, and author keywords. VOSviewer mapping and clustering procedures were subsequently employed to construct and examine the bibliometric networks relevant to the objectives of the study. Methodologically, the Visualization of Similarities (VOS) approach positions items within a low-dimensional space such that the distance between two items reflects their degree of relatedness: strongly associated items are generally positioned closer together, whereas items with weaker relationships appear farther apart (van Eck & Waltman, 2010). Although this principle shares certain conceptual similarities with Multidimensional Scaling (MDS) (Appio et al., 2014), the VOS approach employs normalization procedures specifically suited to bibliometric network data. In particular, VOSviewer applies the association-strength normalization method to account for differences in the overall occurrence frequencies of individual items, thereby producing a more meaningful representation of their normalized relationships (Van Eck & Waltman, 2007). The association strength between items (i) and (j) can be expressed as follows:

$$AS_{ij} = \frac{C_{ij}}{w_i w_j}$$

which is “proportional to the ratio between on the one hand the observed number of cooccurrences of i and j and on the other hand the expected number of co-occurrences of i and j under the assumption that co-occurrences of i and j are statistically independent” (Van Eck & Waltman, 2007).

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Result and Discussion

RQ1: How Has The Volume Of Scholarly Publications On Digital Transformation In Qur'anic Education Evolved From 2017 To August 2026?

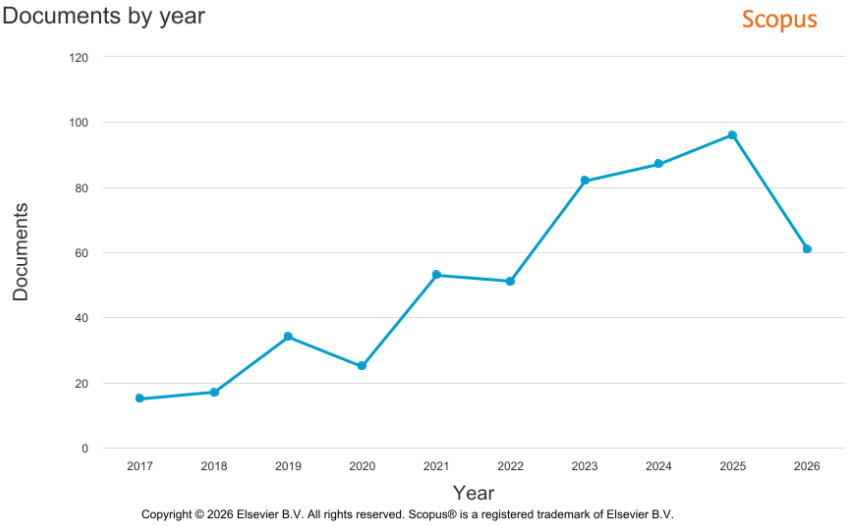


Figure 2: Trend of Research in Augmented Reality by Years

Table 1: Annual Publication Trends in Digital Transformation of Qur'anic Education (2017–August 2026)

Year	Number of Publication	Percentages
2026	61	11.71
2025	96	18.43
2024	87	16.70
2023	82	15.74
2022	51	9.79
2021	53	10.17
2020	25	4.80
2019	34	6.53
2018	17	3.26
2017	15	2.88

The publication trend on Digital Transformation of Qur'anic Education demonstrates a clear long-term expansion in scholarly attention between 2017 and August 2026. The field began from a relatively modest base, with only 15 publications (2.88%) in 2017 and 17 (3.26%) in 2018, before increasing to 34 (6.53%) in 2019. Although publication output temporarily declined to 25 papers (4.80%) in 2020, it subsequently more than doubled to 53 publications (10.17%) in 2021 and remained relatively stable at 51 (9.79%) in 2022. A particularly strong acceleration occurred from 2023 onwards, when output reached 82 publications (15.74%), followed by 87 (16.70%) in 2024 and a peak of 96 (18.43%) in 2025. Overall, the data indicate that research on the digital transformation of Qur'anic education has progressed from an emerging area of inquiry into a more established and rapidly developing research domain. The substantial growth after 2020 may be associated with the wider digitalisation of education, particularly the increased adoption of online learning environments, mobile applications,

multimedia resources, learning management systems, and digitally mediated teaching approaches. In Qur'anic education specifically, these developments have created opportunities to complement conventional face-to-face approaches with digital resources for Qur'anic reading, recitation, tajwid, memorisation, assessment, and personalised learning.

The sharp concentration of publications during 2023–2025 is particularly significant and may reflect a transition from the digitisation of existing Qur'anic learning materials towards more transformative and intelligent forms of technology-enhanced Qur'anic education. Recent developments in artificial intelligence, generative AI, automated speech recognition, voice and pronunciation analysis, adaptive learning, and mobile educational technologies have broadened the possibilities for providing immediate feedback and supporting more individualised Qur'anic learning experiences. Nevertheless, these technologies should be understood as complementary to, rather than substitutes for, established pedagogical traditions such as *talaqqi* and *musyafahah*, particularly where accurate pronunciation, recitation quality, teacher guidance, and religious authority remain essential. The 61 publications recorded for 2026 (11.71%) should also not be interpreted as evidence of a decline, because the dataset covers only January to August 2026 and therefore represents an incomplete publication year. Indeed, 61 publications within the first eight months already correspond to approximately 63.5% of the entire 2025 output, suggesting that scholarly activity remains substantial. Collectively, the pattern indicates that digital transformation is increasingly becoming an important research agenda within Qur'anic education, while simultaneously generating new questions concerning pedagogical effectiveness, technological accuracy, ethical governance, teacher–technology relationships, and the preservation of authentic Qur'anic pedagogical practices in increasingly digital learning environments.

RQ2: Which Publications Have Exerted The Greatest Scholarly Influence On Digital Transformation In Qur'anic Education, As Measured By Citation Impact?

The citation profile of the ten most influential publications reveals a highly interdisciplinary intellectual structure within the broader corpus of Qur'anic research. Al-Tarawneh (Al-Tarawneh, 2020) occupies the leading position with 85 citations for the 2020 study on translating *Muqatta'āt* in Qur'anic oaths, followed closely by Helfaya et al. (Helfaya et al., 2018) with 79 citations for their 2018 examination of Qur'anic ethics and environmental responsibility. Their prominence suggests that highly cited Qur'anic scholarship frequently extends beyond conventional religious studies by engaging with translation studies, ethics, sustainability, and contemporary societal concerns. Bashir et al. (Bashir et al., 2023) ranks third with 46 citations despite being published only in 2023, representing a particularly noteworthy citation performance given its relatively short citation window. The study's focus on Arabic natural language processing (NLP) for Qur'anic research reflects the increasing convergence between Qur'anic studies and computational technologies, while its systematic-review design may have further enhanced its visibility by providing an integrative reference point for subsequent scholarship. Berglund and Gent (Berglund & Gent, 2019), with 21 citations, similarly demonstrate the interdisciplinary character of the field through their investigation of Qur'anic education within non-confessional religious education from an intercultural perspective. Collectively, these leading publications indicate that citation influence is not determined solely by publication age; rather, studies appear to gain greater scholarly visibility when Qur'anic knowledge is connected to broader disciplinary debates and emerging research agendas.

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The remaining highly cited publications further demonstrate the thematic breadth of contemporary Qur'anic scholarship. Furqani and Echchabi (Furqani & Echchabi, 2022) and Hassanein (Hassanein, 2017) each accumulated 17 citations through studies addressing Islamic economics and Qur'anic translation, respectively, while Nurtawab (Nurtawab, 2020) received the same number of citations for research on Qur'anic readings and Malay translations in eighteenth-century Banten manuscripts. More recent studies have extended Qur'anic inquiry into environmental jurisprudence, public health, gender, and socio-legal interpretation: Acim and Suharti (Acim, 2023) received 15 citations for their analysis of *fiqh al-bī'ah*, Baidowi et al. (Baidowi et al., 2021) accumulated 14 citations for examining the theology of health in Qur'anic pesantren during COVID-19, and Muqtada et al. (Muqtada et al., 2024) recorded 14 citations for their 2024 study of women's public leadership in Indonesia and Malaysia. The latter is particularly notable because its citation accumulation occurred within a comparatively short period, suggesting early scholarly attention to contextual and contested applications of Qur'anic interpretation. Overall, the citation pattern indicates that influential Qur'anic research increasingly operates at the intersection of traditional textual scholarship and contemporary concerns—including digital technologies, environmental sustainability, education, economics, health, gender, and intercultural relations. For research on the digital transformation of Qur'anic education, the strong citation performance of the NLP-focused study (Bashir et al., 2023) is especially significant, as it signals growing scholarly recognition of computational approaches to Qur'anic knowledge. At the same time, the prominence of non-technological studies demonstrates that digital transformation should be situated within the broader intellectual and socio-cultural landscape of Qur'anic scholarship rather than treated as an isolated technological phenomenon.

Table 2: Top 10 Most Cited Publications in the Qur'anic Research Dataset (2017–2026)

No.	Authors	Title	Year	Source title	Cited by
1	Al-Tarawneh A. (Al-Tarawneh, 2020)	A Hebrew-skopos approach to translating Muqatta'āt in the Qur'ānic oaths	2020	Hamdard Islamicus	85
2	Helfaya A. et al. (Helfaya et al., 2018)	Qur'anic Ethics for Environmental Responsibility: Implications for Business Practice	2018	Journal of Business Ethics	79
3	Bashir M.H. et al. (Bashir et al., 2023)	Arabic natural language processing for Qur'anic research: a systematic review	2023	Artificial Intelligence Review	46
4	Berglund J. & Gent B. (Berglund & Gent, 2019)	Qur'anic education and non-confessional RE: an intercultural perspective	2019	Intercultural Education	21
5	Furqani H. & Echchabi A. (Furqani & Echchabi, 2022)	Who is Homo Islamicus? A Qurʾānic perspective on the economic agent in Islamic economics	2022	ISRA International Journal of Islamic Finance	17
6	Hassanein H.S.A. (Hassanein, 2017)	Translating aspects of lexical-semantic opposition from	2017	Perspectives: Studies in	17

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		Qur'anic Arabic into English: a cross-linguistic perspective		Translatology	
7	Nurtawab E. (Nurtawab, 2020)	Qur'anic Readings and Malay Translations in 18th-Century Banten Qur'ans A.51 and W.277	2020	Indonesia and the Malay World	17
8	Acim S.A. & Suharti (Acim, 2023)	The Concept Of Fiqh Al-Bī'ah In The Qur'an: A Study of the Quranic Verses on Environment in the Ulamas' Views of Lombok	2023	Ulumuna	15
9	Baidowi A. et al. (Baidowi et al., 2021)	Theology of health of quranic pesantren in the time of COVID-19	2021	HTS Teologiese Studies / Theological Studies	14
10	Muqtada M.R. et al. (Muqtada et al., 2024)	Fiqh Contestation on Women's Public Leadership in Indonesia and Malaysia: Reproducing Qur'anic and Hadith Interpretations	2024	Al-Ihkam: Jurnal Hukum dan Pranata Sosial	14

RQ3: Which Countries Are The Leading Contributors To Research On Digital Transformation In Qur'anic Education In Terms Of Publication Output And Citation Performance?

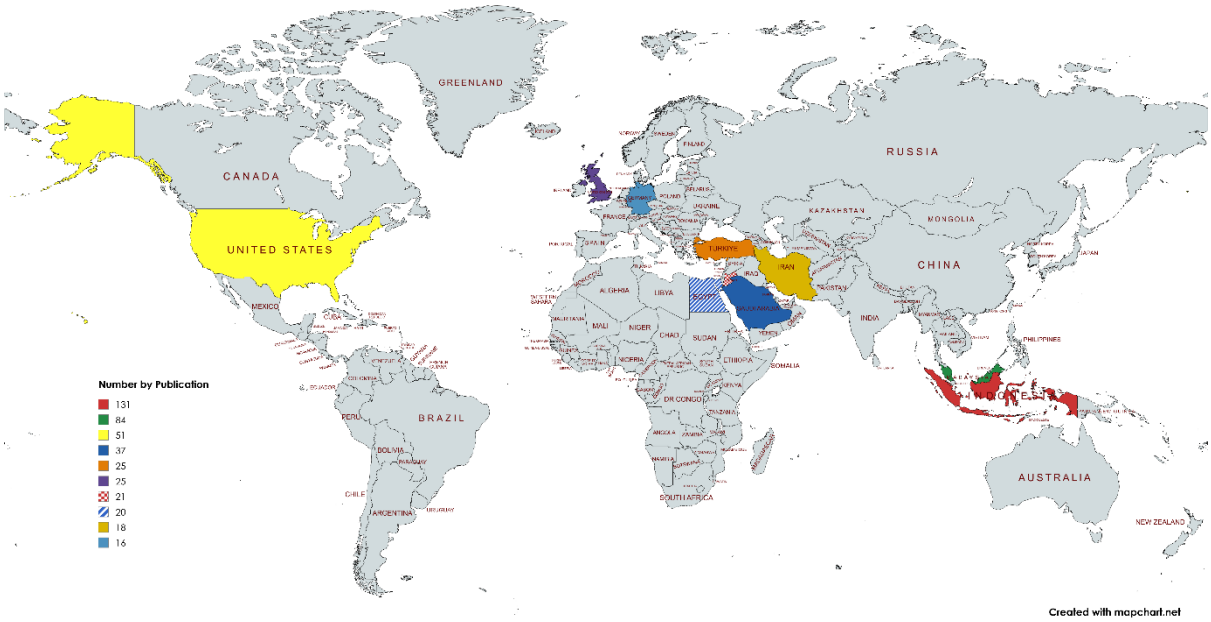


Figure 3: Global Distribution of Research Publications on Digital Transformation of Qur'anic Education

The geographical distribution of publications on Digital Transformation of Qur'anic Education reveals a strong concentration of research in Muslim-majority countries, particularly in Southeast Asia. Indonesia ranks first with 131 publications (25.14%), followed by Malaysia

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with 84 publications (16.12%), meaning that these two countries alone account for 41.26% of the publication output represented in the dataset. Their dominance can reasonably be associated with the extensive Islamic education ecosystems in both countries, encompassing Islamic universities, schools, pesantren, madrasahs, Qur'anic learning institutions, and formal higher education programmes that increasingly incorporate digital technologies into teaching and learning. Indonesia's particularly high output may also reflect its large Muslim population and substantial network of Islamic higher education institutions, which provide a broad institutional base for investigating digital Qur'anic pedagogy. Malaysia's second position similarly suggests a strong research environment connecting Islamic education with educational technology and institutional digitalisation. Beyond Southeast Asia, the **United States ranks third with 51 publications (9.79%)**, followed by **Saudi Arabia with 37 (7.10%)**, while **Turkey and the United Kingdom each contribute 25 publications (4.80%)**. Saudi Arabia's position is understandable given its central role in Islamic and Qur'anic scholarship, whereas the presence of the United States and United Kingdom indicates that research on digital Qur'anic education is not confined to Muslim-majority societies but has also developed within technologically advanced and internationally connected research environments.

The remaining leading contributors Jordan with 21 publications (4.03%), Egypt with 20 (3.84%), Iran with 18 (3.45%), and Germany with 16 (3.07%) further demonstrate the geographical diversity of this research domain. The presence of Jordan, Egypt, and Iran may be linked to their established traditions of Islamic, Arabic, Qur'anic, and higher education scholarship, while their increasing engagement with educational technology provides opportunities to examine how conventional religious instruction can be adapted to digital learning environments. In contrast, the inclusion of Germany, together with the United States and United Kingdom, suggests an important international dimension involving Muslim minority education, migration and diaspora communities, digital humanities, computer-assisted learning, and interdisciplinary technology research. More importantly, the ranking indicates that leadership in this field does not depend solely on technological capacity; rather, publication productivity appears to emerge from the interaction between strong Qur'anic or Islamic educational traditions, institutional research capacity, and increasing adoption of digital technologies. The prominence of Indonesia and Malaysia therefore positions Southeast Asia as a significant research hub for the digital transformation of Qur'anic education, while contributions from Western and Middle Eastern countries indicate that the field is becoming increasingly global and interdisciplinary. This geographical pattern also highlights an opportunity for greater cross-country collaboration, particularly between countries possessing deep expertise in Qur'anic pedagogy and those with advanced capabilities in artificial intelligence, learning analytics, speech technologies, and digital educational design, which could contribute to the next stage of innovation in Qur'anic education.

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RQ4: What Are The Dominant And Emerging Research Themes Within Digital Transformation In Qur'anic Education, As Revealed Through Keyword Co-Occurrence Analysis?

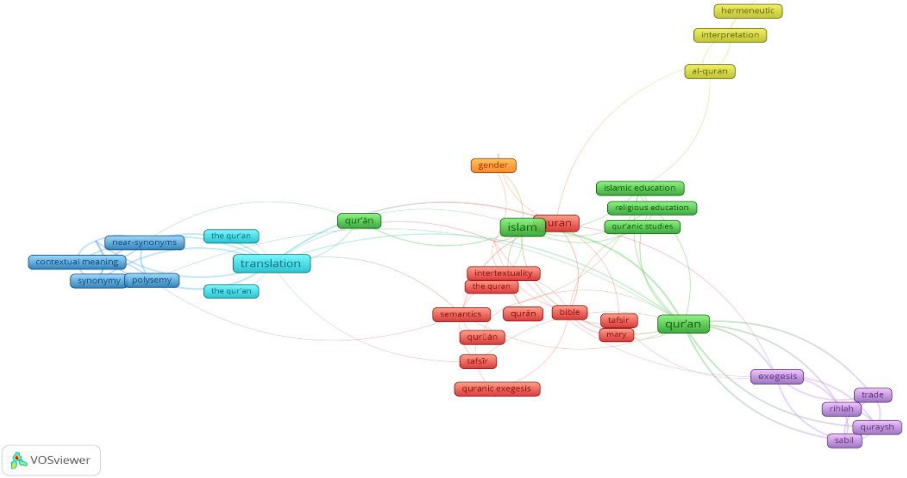


Figure 4: Network Visualization Map of Keywords' Co-Occurrence

The keyword co-occurrence network presented in Figure 4 reveals that the intellectual structure of the literature is strongly anchored in Qur'anic textual studies, translation, interpretation, and Islamic scholarship. Among the keywords, "Qur'an" records the highest frequency with 35 occurrences and a total link strength (TLS) of 61, followed by "translation" with 30 occurrences and a TLS of 51, and "Islam" with 29 occurrences and a TLS of 32. The comparatively high occurrence and connectivity of these terms indicate that they function as central conceptual nodes linking multiple strands of research within the dataset. Particularly noteworthy is the prominence of "translation," which suggests sustained scholarly attention to the linguistic and cross-cultural transmission of Qur'anic meaning. This interpretation is reinforced by the strong connectivity of linguistically oriented terms such as "exegesis" (12 occurrences; TLS = 39), "polysemy" (8; TLS = 34), "near-synonyms" (7; TLS = 32), "contextual meaning" (6; TLS = 30), "denotative meaning" (6; TLS = 30), and "synonymy" (6; TLS = 30). Collectively, these relationships suggest that a substantial component of the research landscape is concerned not merely with the Qur'an as a religious text, but with the methodological challenges of interpreting, translating, and communicating its semantic complexity across linguistic and cultural contexts. The presence of "tafsir," "hermeneutic," "intertextuality," and "Quranic exegesis" further demonstrates that interpretative traditions remain an important intellectual foundation upon which contemporary Qur'anic research is constructed.

At the same time, Figure 4 demonstrates a more dispersed set of themes connecting Qur'anic scholarship with education, society, ethics, law, gender, and geographical contexts. Keywords such as "Islamic education" (7 occurrences; TLS = 10), "religious education" (5; TLS = 8), "ethics" (6; TLS = 7), "gender" (8; TLS = 7), "Islamic law" (8; TLS = 5), and "Indonesia" (9; TLS = 5) indicate an expanding interdisciplinary orientation, although their lower frequencies and link strengths suggest that these themes remain less structurally dominant than translation and textual interpretation. Of particular relevance to the present study, the relatively modest position of "Islamic education" indicates that the educational dimension constitutes an identifiable but not yet dominant research cluster, while explicitly digital or technology-oriented keywords do not appear among the most frequently occurring terms. This pattern

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provides an important justification for investigating the digital transformation of Qur'anic education, as it suggests that technological and educational perspectives remain comparatively fragmented within a literature still dominated by textual, linguistic, and interpretative concerns. A further methodological observation concerns the multiple orthographic variants of the same core concept including "Qur'an," "Quran," "Qur'an," "Qur'ān," "al-Quran," "Qurʾān," and "Qurān" which appear as separate nodes in the network. Their fragmentation may underestimate the true occurrence and connectivity of the central Qur'anic concept and demonstrates the importance of applying a thesaurus-based keyword-cleaning procedure in VOSviewer. Consolidating these variants in subsequent analyses would produce a conceptually cleaner network, strengthen the validity of thematic interpretation, and provide a more accurate representation of the underlying knowledge structure of the field.

Table 3: Most Frequently Occurring Keywords and Their Total Link Strength in Qur'anic Research

Id	Keyword	Occurrences	Total link strength
1164	qur'an	35	61
1586	translation	30	51
625	islam	29	32
1104	quran	26	18
396	exegesis	12	39
1078	qur'an	10	9
1215	qur'ān	10	6
63	al-quran	9	5
146	bible	9	15
590	indonesia	9	5
461	gender	8	7
611	interpretation	8	8
651	islamic law	8	5
1012	polysemy	8	34
1120	quranic exegesis	8	3
1150	qurʾān	8	3
1489	tafsir	8	6
521	hermeneutic	7	5
619	intertextuality	7	3
637	islamic education	7	10
911	near-synonyms	7	32
1146	quraysh	7	35
1148	qurān	7	1
1302	rihlah	7	35
1311	sabil	7	35
1354	semantics	7	9
1576	trade	7	35
240	contextual meaning	6	30
293	denotative meaning	6	30
385	ethics	6	7

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1187	qur'anic exegesis	6	1	
1478	synonymy		6	30
1496	tafsīr		6	5
111	arabic-english deep structures		5	20
381	equivalence across arabic-english languages		5	20
425	fillmore's and al-khuli's semantic roles		5	20
701	krzeszowski's methodology		5	20
796	mary		5	5
1206	qur'anic studies		5	10
1258	religious education		5	8
1355	semanto-syntactic equivalence		5	20
1488	tadabbur		5	1
1542	the qur'an		5	1
1544	the quran		5	4
1549	the qur'an		5	1

RQ5: What Patterns Of International Research Collaboration Characterize Digital Transformation In Qur'anic Education, As Revealed Through Country-Level Co-Authorship Network Analysis?

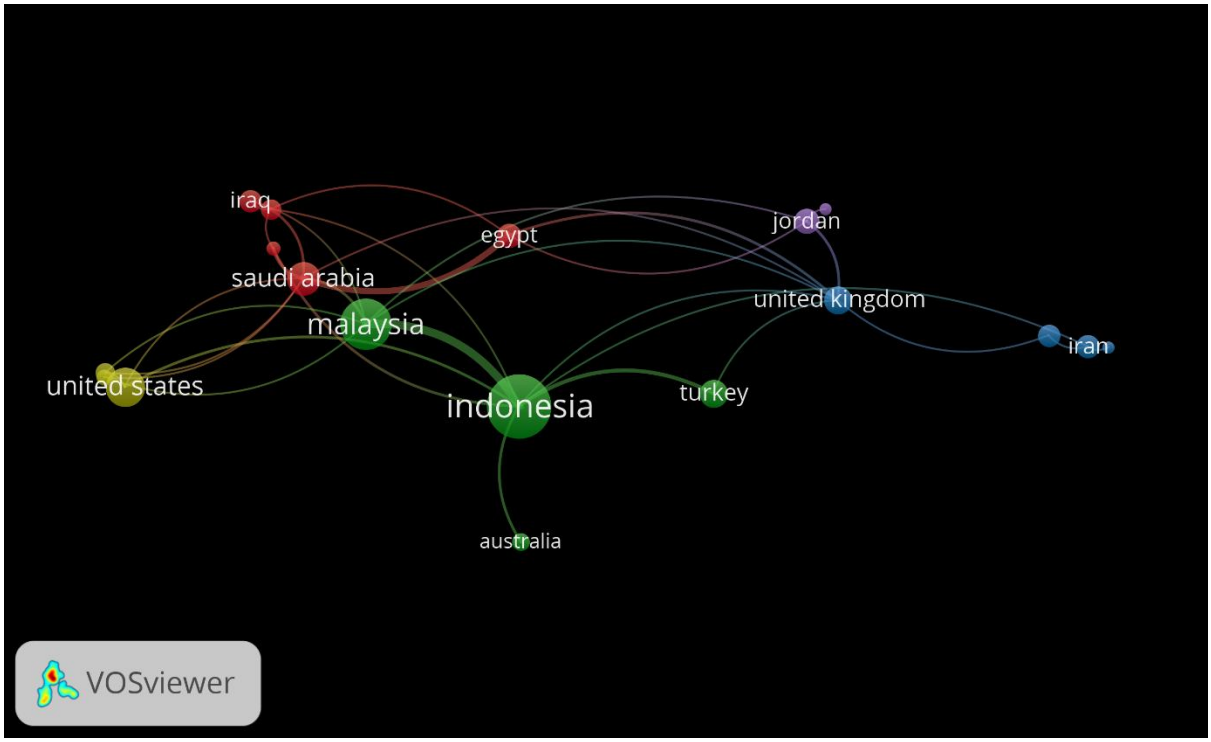


Figure 5: Country Co-Authorship Network Visualization In Qur'anic Research

The country-level co-authorship network presented in Figure 5 demonstrates that international collaboration in Qur'anic research is concentrated around several key national hubs, with Indonesia and Malaysia occupying the most prominent positions. Indonesia records the highest research productivity with 132 documents, 388 citations, and a total link strength (TLS) of 31, followed by Malaysia with 86 documents, 224 citations, and a TLS of 25. These comparatively

high link-strength values indicate that both countries function not only as major publication producers but also as important connectors within the international research network. Saudi Arabia is particularly noteworthy: although its publication output is considerably lower at 37 documents, it achieves a TLS of 21 and 203 citations, demonstrating a relatively strong degree of international collaboration in relation to its publication volume. Egypt exhibits a similar pattern, generating 20 documents but attaining a TLS of 14 and 131 citations. In contrast, the United States produces 51 documents and receives 180 citations but records a substantially lower TLS of 5, suggesting that its relatively high productivity is accompanied by a less intensive pattern of cross-country co-authorship within this specific dataset. The United Kingdom occupies an intermediate position with 25 documents, 163 citations, and a TLS of 9. Collectively, these patterns demonstrate that research productivity and international collaboration are related but distinct dimensions of scholarly performance: a country may generate a substantial number of publications without necessarily developing an equally dense international co-authorship network.

The broader structure illustrated in Figure 5 further indicates that international collaboration remains uneven and potentially fragmented across the field. Countries such as the United Arab Emirates (TLS = 6), Yemen (TLS = 6), Turkey (TLS = 5), Jordan (TLS = 5), Pakistan (TLS = 4), and Qatar (TLS = 4) participate in the network despite having substantially smaller publication portfolios, suggesting emerging or specialized collaborative roles. Conversely, Germany, Iraq, Australia, Iran, Italy, and Kuwait exhibit comparatively weak link strengths, while Israel, the Netherlands, the Russian Federation, Denmark, and France record no international co-authorship links under the applied VOSviewer criteria. This pattern suggests that a considerable proportion of Qur'anic scholarship continues to be produced within nationally or regionally bounded research environments rather than through extensively integrated global networks. The central positions of Indonesia, Malaysia, Saudi Arabia, and Egypt may be explained by the combination of established Islamic scholarly traditions, institutional capacity in Qur'anic and Islamic studies, and collaborative relationships across Muslim-majority research environments. However, for the digital transformation of Qur'anic education, stronger collaboration with countries possessing advanced expertise in artificial intelligence, educational technology, computational linguistics, speech recognition, and learning analytics could substantially enhance the field's methodological and technological development. The network therefore reveals both an established international foundation and a strategic opportunity to move from geographically concentrated collaboration toward more interdisciplinary and cross-regional research partnerships, particularly between centres of Qur'anic scholarship and global centres of digital.

Conclusion

This study mapped the development and knowledge structure of research associated with the Digital Transformation of Qur'anic Education between 2017 and August 2026 through bibliometric and science-mapping approaches. The analysis addressed five main dimensions: the evolution of publication output, citation influence, geographical productivity, dominant and emerging research themes, and patterns of international collaboration. Based on 521 Scopus-indexed journal articles retained from 1,692 initially identified records, the findings indicate a clear expansion of scholarly activity during the study period. Publication output increased from only 15 articles in 2017 to 96 articles in 2025, representing the highest annual output, while 61 publications had already been recorded by August 2026. The substantial growth from 2023 onwards suggests increasing scholarly attention to the changing environment of Qur'anic

scholarship and education in response to broader developments in digital learning, educational technologies, and technology-supported knowledge practices. The lower figure recorded for 2026 should therefore be interpreted cautiously because it represents only a partial publication year.

The bibliometric findings also reveal a geographically concentrated but increasingly international research landscape. Indonesia and Malaysia emerged as the leading contributors, accounting for 131 (25.14%) and 84 (16.12%) publications, respectively, followed by the United States, Saudi Arabia, Turkey, and the United Kingdom. Indonesia and Malaysia together contributed 41.26% of the publications in the dataset, positioning Southeast Asia as an important centre of contemporary Qur'anic scholarship. Citation analysis further demonstrates that intellectual influence extends across multiple disciplinary areas, including translation, environmental ethics, natural language processing, intercultural education, Islamic economics, health, gender, and socio-legal interpretation. This pattern indicates that contemporary Qur'anic research is becoming increasingly interdisciplinary rather than remaining confined to conventional textual or theological inquiry. Of particular importance to digital transformation is the citation visibility of research involving Arabic natural language processing, which indicates an emerging intersection between Qur'anic scholarship and computational methods.
The keyword co-occurrence analysis provides a more detailed picture of the conceptual structure of the literature. The most prominent terms were "Qur'an" with 35 occurrences and a total link strength of 61, "translation" with 30 occurrences and a total link strength of 51, and "Islam" with 29 occurrences and a total link strength of 32. Exegesis, polysemy, near-synonyms, contextual meaning, tafsir, hermeneutics, and interpretation were also visible within the network, demonstrating the continued importance of textual, linguistic, semantic, and interpretative scholarship. In comparison, "Islamic education" recorded only seven occurrences with a total link strength of 10, while explicitly digital and technological concepts did not occupy the most dominant positions in the network. This finding is particularly significant because it suggests that the digital transformation of Qur'anic education remains a developing and comparatively fragmented research direction within the broader Qur'anic literature. Consequently, greater conceptual integration is required between established Qur'anic scholarship and emerging areas such as artificial intelligence, educational technology, automated speech recognition, adaptive learning, learning analytics, mobile learning, and digitally supported recitation instruction.

International co-authorship patterns reinforce this interpretation. Indonesia recorded 132 documents, 388 citations, and the highest total link strength of 31, followed by Malaysia with 86 documents, 224 citations, and a total link strength of 25. Saudi Arabia also demonstrated substantial collaborative connectivity with a total link strength of 21 despite producing fewer documents, while Egypt achieved a total link strength of 14. In contrast, several countries showed limited or no international co-authorship connections under the applied VOSviewer criteria. These results suggest that publication productivity and international connectivity do not necessarily develop at the same rate. The field would therefore benefit from stronger cross-regional partnerships that combine established expertise in Qur'anic pedagogy and Islamic scholarship with capabilities in artificial intelligence, computational linguistics, speech technologies, digital pedagogy, and learning analytics. Such collaboration may facilitate more sophisticated technological solutions while ensuring that digital innovation remains educationally meaningful and appropriate to the distinctive requirements of Qur'anic learning.
The study contributes to the field by providing a consolidated bibliometric perspective on the recent trajectory, intellectual structure, geographical distribution, thematic orientation, and

collaborative characteristics of the selected Qur'anic research corpus. From a practical perspective, the findings suggest that digital transformation should not be approached merely as the conversion of conventional materials into digital formats. Effective transformation requires integration between technology, pedagogy, institutional capacity, and the distinctive values and practices associated with Qur'anic education. Digital tools may extend accessibility, flexibility, personalized learning, and opportunities for practice, but their educational value depends on appropriate pedagogical design and responsible implementation. The existing literature similarly indicates that technology is most beneficial when it strengthens rather than replaces established educational practices and when attention is maintained toward authenticity, *adab*, pedagogical depth, and reliable knowledge transmission.

Several limitations should nevertheless guide interpretation of the findings. The dataset was derived exclusively from Scopus and restricted to English-language journal articles within Arts and Humanities and Social Sciences. More importantly, the search strategy relied on the term "Qur'anic" appearing in article titles. Although this approach increased search precision, it may have excluded relevant studies that discuss Qur'anic education, digital learning, artificial intelligence, mobile technologies, or related innovations without explicitly using this term in their titles. The manuscript itself recognizes that the resulting dataset represents a deliberately bounded corpus of explicitly Qur'anic-focused scholarship rather than an exhaustive representation of all relevant research. Future studies could therefore expand database coverage to other major scholarly indexes, develop more comprehensive search strings incorporating technological and educational terminology, standardize variant keywords before network construction, and conduct longitudinal thematic analyses to determine how emerging digital themes evolve over time.

In conclusion, the bibliometric evidence demonstrates that Qur'anic scholarship has experienced considerable growth and increasing international visibility during the last decade, while its conceptual foundation remains strongly associated with textual interpretation, translation, semantics, and Islamic scholarship. The comparatively weaker representation of explicit digital and educational themes identifies an important space for future development. Bibliometric analysis is valuable in this context because it not only measures scholarly productivity but also reveals where intellectual concentration, fragmentation, collaboration, and emerging opportunities occur. The next stage of research on the Digital Transformation of Qur'anic Education should therefore move toward deeper integration of Qur'anic pedagogical traditions with responsible digital innovation, supported by interdisciplinary and international collaboration. Such development can contribute to a research field in which technological advancement strengthens accessibility and educational effectiveness while maintaining the scholarly authenticity, pedagogical integrity, and value-based foundations of Qur'anic education.

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