



Hologram Technology as the Future of Islamic Learning: A Bibliometric Analysis

Muhammad Buya Al-Madany Abror¹, Nadisah Khairani Nasution², Nur Qamarina Kamari³, Anita Ekantini⁴, Muhammad Hidayat⁵, Muhammad Affan Ramadhan⁶

Universiti Malaya, Kuala Lumpur, Malaysia^{1,2,3,5}

Universitas Islam Negeri Sunan Kalijaga, Yogyakarta, Indonesia⁴

Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia⁶

muhammadbuya28@gmail.com¹/corresponding author

25050589@siswa.um.edu.my²

25052096@siswa.um.edu.my³

anita.ekantini@uin-suka.ac.id⁴

hidayatazami@um.edu.my⁵

m.affan.psc25@mail.umy.ac.id⁶

Abstract

The rapid advancement of digital technologies has transformed educational practices worldwide; however, Islamic religious education, particularly Fiqh instruction, continues to face challenges in conveying abstract concepts through conventional teaching approaches. This study examines research trends in the implementation of holographic technology in Islamic education and investigates its potential for supporting integrative learning. A bibliometric analysis was conducted on 655 documents indexed in Scopus between 1981 and 2026 using the keywords "Technology," "Hologram," "Islamic Learning," "Education," and "Learning." The data were analyzed using VOSviewer to identify publication trends, thematic developments, and collaboration patterns. The findings reveal increasing scholarly interest in hologram-based Islamic religious education, with "Technology," "E-Learning," "Islamic Education," and "Hologram" emerging as the most prominent keywords.

The convergence of these themes highlights the potential of integrative learning approaches that combine Islamic religious instruction with digital innovations to enhance student engagement, conceptual understanding, and learning outcomes. Despite this growing interest, the research landscape remains limited and fragmented, suggesting that the field is still in an early stage of development and requires further investigation to establish robust pedagogical frameworks and implementation strategies. A key limitation of this study is its exclusive reliance on the Scopus database, which may exclude relevant publications indexed elsewhere and consequently limit the comprehensiveness of the bibliometric mapping.

Keywords: Bibliometric Analysis, E-Learning, Hologram, Islamic Education, Technology

A. Introduction

Technology has become very crucial in changing many areas of our life, as economics, manufacturing, healthcare, how we communicate and education (Carayannis & Morawska-Jancelewicz, 2022; Polat, 2025). Its Incredible growth, driven by Continuous creativity and adaptation by many people, is causing a fundamental shift in our Interactions and patterns of activity (Bibri et al., 2023). Technologies such as the Internet, artificial Intelligence devices, and Intelligent systems have had a significant impact on how Individuals communicate, do their work, and obtain Information (Haleem et al., 2022). According to Hamad & Jia (2022), technology, such as Virtual Reality, can reduce students' anxiety and calm them before examinations. In the Aspect of education technology, it has a significant influence. It makes easier for people to access many learning resources and to use more interactive, creative and innovative technology-based learning strategies (Arifah et al., 2024; Singh et al., 2022; Yorulmaz et al., 2025). Abedi (2024), research indicates that integrating technology influences the adoption of innovative teaching methods. And a study by Al-khresheh (2024) found that technology like ChatGPT can be helpful for students studying English. These ChatGPTs can be implemented with the Philosophy of education and offer a new methodology for innovation in English learning.

Although technology has made significant contributions to global learning and facilitated the adoption of more Innovative teaching methods, it has also presented serious challenges in Islamic education, particularly in Fiqh studies. Students frequently have difficulty comprehending abstract topics such as ritual procedures, shari'ah laws, and their practical applications, all of which are difficult

to conceptualize without detailed visualizations (Alam & Mohanty, 2023; Alfina et al., 2023; Hijriyah et al., 2024; Muslimah, 2024). This is significant because the purpose of education is to cultivate well-rounded individuals capable of achieving contentment in this world and the afterlife (Jenuri et al., 2025).

According to Mansir (2020) many educators of Islamic religious education still rely excessively on teaching methods. Furthermore, numerous teachers are satisfied with traditional teaching methods and lacked the necessary skills to use technology effectively (Reksiana et al., 2024). This often leads to students' disengagement in class (Mansir, 2020). This boredom negatively affects learning behaviour and undermines educational progress (Zhao & Wang, 2025). Research by Bin Jamil, Rekan, & Badar (2024), also noted that the curriculum of Islamic religious education is not yet completely standardized. According to Tuna (2022), educators of Islamic religious education in Austria frequently have a negative professional image; when they cultivate a positive image, their professionalism sometimes diminishes. Study by Assalihee, Bakoh, Boonsuk, & Songmuang (2024), also reported that the majority of educators of Islamic religious education at private Islamic schools in the south of Thailand do not have access to professional development, consequently underperforming in Islamic religious education teaching.

Thus, The Implementation of holographic technology in Islamic religious education can create an Innovative, practical, and Immersive approach to complex visualizations, helping students understand them more efficiently and accessibly (Paredes & Vázquez, 2020). Therefore, it is crucial to understand the potential of implementing relevant technological advancements to promote Technology in Islamization, to address potential land challenges, and to address most tech challenges.

Advancements in technology have examined holographic technology and the research has expanded considerably over the past decade. Studies have demonstrated its effectiveness in enhancing students' motivation, engagement, spatial understanding, and learning experiences across diverse disciplines. For example, Paredes & Vázquez (2020) found that hologram-based interventions have improved motivation and attention among engineering students, while Wang et al. (2025) reported that HoloLens 2 has enhanced the accuracy of spatial knowledge acquisition. Similarly, Fokides & Kilintari (2023) and Fokides & Bampoukli (2024) showed that pseudo-hologram technology positively has influenced academic performance and learning enjoyment among elementary school students. In medical

education, Leung & Shi (2024) and Hackett & Proctor (2018) highlighted the benefits of holographic visualization for anatomy learning. Collectively, these studies suggest that holographic technology can facilitate immersive, interactive, and visualization-rich learning environments that improve students' understanding of complex concepts.

Despite these promising findings, the existing literature remains concentrated in fields such as medicine, engineering, and science education, whereas its application in Islamic religious education has received limited scholarly attention. More importantly, previous studies have primarily focused on evaluating the effectiveness of holographic technology in specific learning contexts rather than examining the overall development, collaboration patterns, thematic trends, and research directions within this emerging field. Consequently, there is still a lack of comprehensive understanding regarding how holographic technology has been positioned within Islamic religious education research and how it may contribute to the development of integrative learning approaches.

To address this gap, the present study employs a bibliometric approach to map the intellectual structure of research on holographic technology and Islamic religious education. Specifically, this study analyzes publication trends, influential authors, countries, institutions, collaboration networks, and thematic developments related to the integration of holographic technology into Islamic religious education. By identifying research patterns and emerging themes, this study contributes to the literature by providing a comprehensive overview of the field and highlighting future opportunities for developing integrative, technology-enhanced Islamic religious education.

This study adopted a quantitative bibliometric approach combining performance analysis and science mapping to investigate publication trends, citation patterns, and thematic developments concerning the integration of hologram technology in education, with a focus on educational innovation and technological transformation (Passas, 2024). Scopus was selected as the data source because it is one of the largest and most widely recognized databases for indexing peer-reviewed scientific publications across multiple disciplines. Data collection was conducted in 2026 and limited to documents indexed in Scopus between 1981 and 2026.

The search strategy consisted of two stages. First, a search was conducted using the keywords "Technology", "Hologram", "Education", and "Learning", resulting in 114 documents. Second, a separate search was performed using the

keywords “Technology” and “Islamic Learning”, resulting in 541 documents. These keywords were selected because they represent the core concepts of this study, namely technological innovation, holographic applications, educational contexts, and Islamic learning. The use of two search strings was intended to capture publications from both the holographic technology domain and the Islamic education domain.

The inclusion criteria consisted of: (1) documents indexed in Scopus; (2) publications within the period 1981–2026; (3) documents containing the selected keywords in the title, abstract, or author keywords; and (4) publications related to education, learning, technology, or Islamic learning. Documents unrelated to educational contexts, incomplete records, and non-indexed publications were excluded from the analysis.

After data retrieval, both datasets were exported and screened for duplicate records using document titles, Digital Object Identifiers (DOIs), author names, publication years, and source titles. The screening process indicated that no duplicate documents existed between the two datasets. Consequently, all 655 documents were retained for further analysis. The connection between the two datasets was subsequently examined through keyword mapping, particularly through the occurrence of technology-related concepts such as “E-Learning”, which emerged as a linking theme between holographic technology and Islamic learning studies.

The bibliometric analysis was conducted using VOSviewer. The software was employed to construct and visualize bibliometric networks, identify thematic clusters, and examine relationships among keywords, authors, institutions, and countries (van Eck & Waltman, 2017). Two types of analysis were performed. First, co-occurrence analysis of author keywords was used to identify dominant themes, conceptual structures, and emerging research trends related to holographic technology and Islamic religious education. This analysis enabled the identification of thematic clusters and the relationships among research topics (Carchiolo et al., 2022; Klarin, 2024; Ullah et al., 2022). Second, co-authorship analysis was conducted at the author, institutional, and country levels to examine patterns of scientific collaboration. This analysis identified influential contributors, collaboration networks, and the extent of cooperation among researchers and institutions within the field (Carchiolo et al., 2022; Klarin, 2024; Ullah et al., 2022).

The scope of the analysis was limited to bibliometric indicators derived from Scopus-indexed publications and did not include content analysis of individual articles. Therefore, the findings were interpreted as representing patterns of scientific production and collaboration rather than direct evidence of the effectiveness of holographic technology in educational practice.

B. Result and Discussion

1. Result

To offer a holistic visualization of the time span of research on hologram technology in Islamic religious education, and to gain a deep understanding of the research landscape and trends in this subject, this study complements its data presentation with visual representations in Figures 3 to 7, which provide a more holistic view.

Figures 1 and 2 describe the growth in publications on the implementation of holographic technology in Islamic religious education. Figure 1 provides the increasing number of papers for the keywords "Technology and 'Islamic education" starting in 2008, while the increasing number of papers for the keywords "Hologram", "Technology", "Learning" and "Education" starting in 2018 are provided in Figure 2. Specifically, the publication of papers began with 8 publications for the keywords "Technology" and "Islamic learning", then fluctuated to 18 publications until 2018, increased significantly after 2018, peaking with 77 publications in 2024, and then dropped slightly to 48 publications in 2025. In contrast, documents using the keywords "Technology", "Education", "Hologram" and "Learning" began to rise, from 10 publications in 2018 to a high of 85 in 2024. However, there was a decline 31,76%, with only 58 publications.

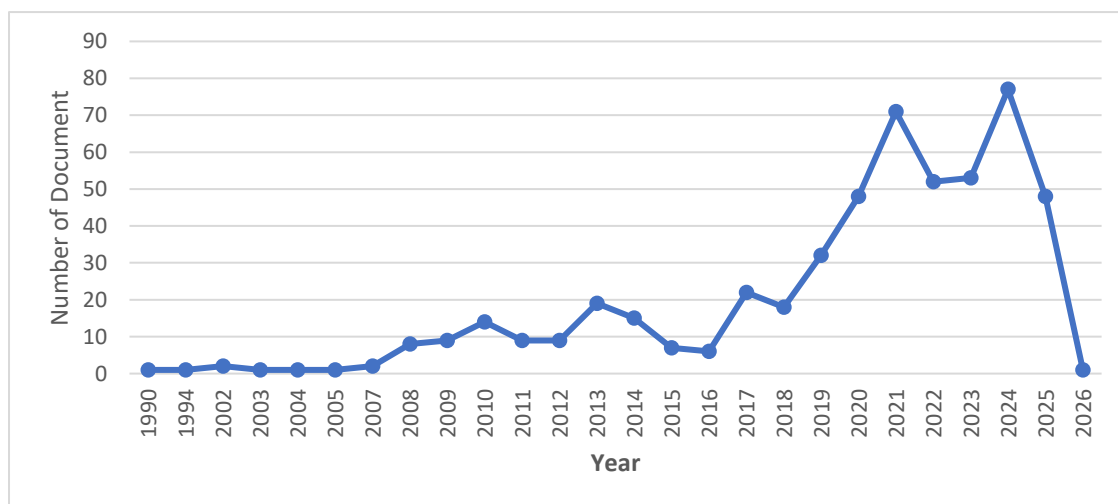


Fig 1. The numerous of documents in Scopus database with the Keywords " Technology" and "Islamic Learning"

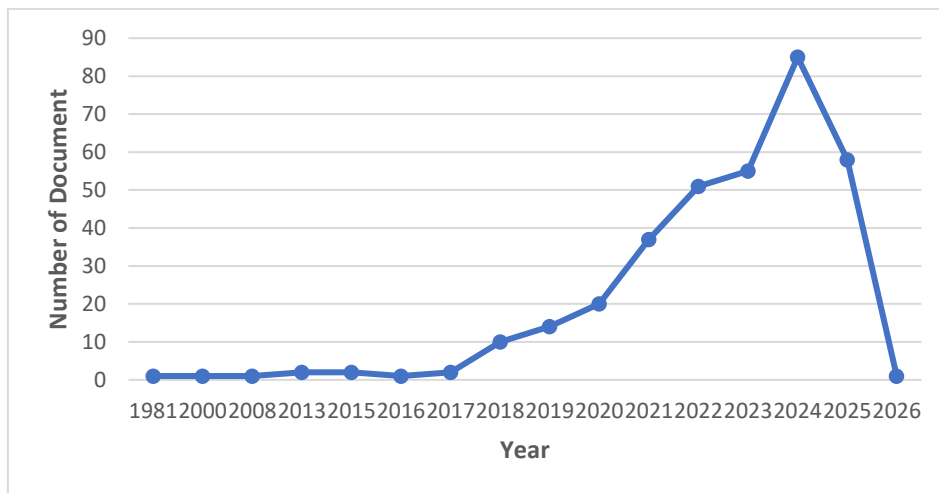


Fig 2. The numerous of documents in Scopus database with the Keywords " Technology", "Hologram", "Education" and "E Learning"

The analysis of 655 publications from a variety of authors, organizations, and countries shows a substantial improvement in journal publications from 1981 to 2024. This trend presents both general and specific keywords, indicating an increase in the number of publications, as well as the progression of authors, organizations, countries contributing to them, and themes. The visualizations of data and networks of publications are as follows:

a. Keywords

The bibliometric analysis of keywords, as demonstrated in Figure 3, provides a key finding.

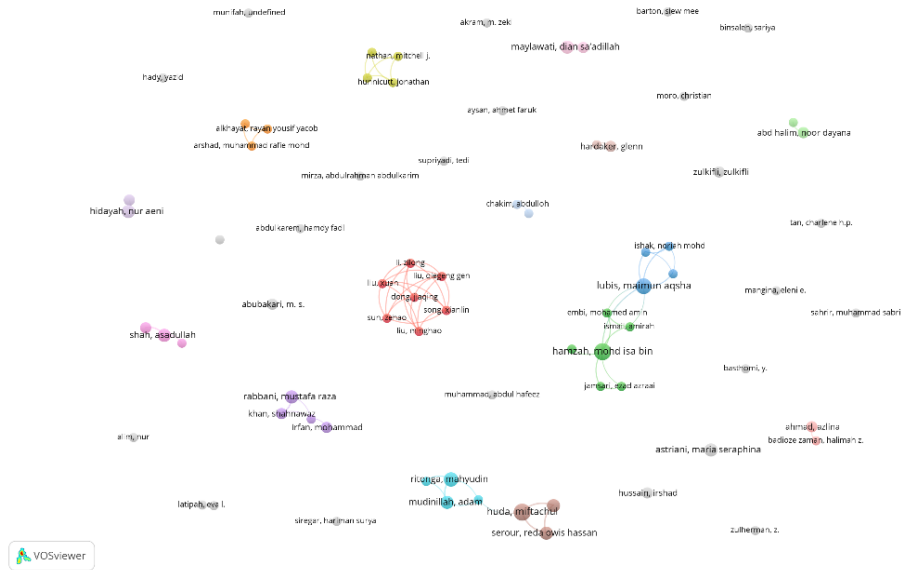


Fig 4. Bibliometric co-authorship analysis by Author

Figure 4 demonstrates the development of relationships among researchers with similar focuses on the themes and subjects of their publications. According to the bibliometric analysis of co-authorship using the quantity of total link strength, the researchers in the Red cluster, such as Jiaqing Dong, Zilong Li, Minghao Liu, Qiegeng Gen Liu, Xuan Liu, Xianlin Song and Zehao Sun, have the strongest total link strength of 12 within the 114 publications areas. Meanwhile, the Green cluster, Mohd Isa bin Hamzah, has a total link strength of 12. In the Blue cluster, Maimun Aqsha Lubis has a total link strength of 10, and in the Brown cluster, Miftachul Huda has a total link strength of 9 within the field of 541 publications, as illustrated in Table 1.

Table 1. 10 authors with the highest Total Link Strength

Rank	Author	Total Link Strength
1	Jiaqing Dong, Zilong Li, Minghao Liu, Qiegeng Gen Liu, Xuan Liu, Xianlin Song and Zehao Sun	12
2	Mohd Isa bin Hamzah	10
3	Maimun Aqsha Lubis	10

The 6 highest of author are showed from viewpoint of citations. The scope of 541 publications using the keyword "Technology" and "Islamic learning", Miftachul Huda and Mohammad Irfan become a most Influential academics and have 53 citations. Following them are Mukhamad Hadi Musolin and Reda Owis Hassan Serour, who have 45 citations, and Mustafa Raza Rabbani with 43 citations. Meanwhile, using the keywords "Technology", "Hologram", "E learning", and "Education" within the field of 144 publications, other researchers also have a significant influence. Noor Dayana Abd Halim has 49 citations, as illustrates in figure 5.

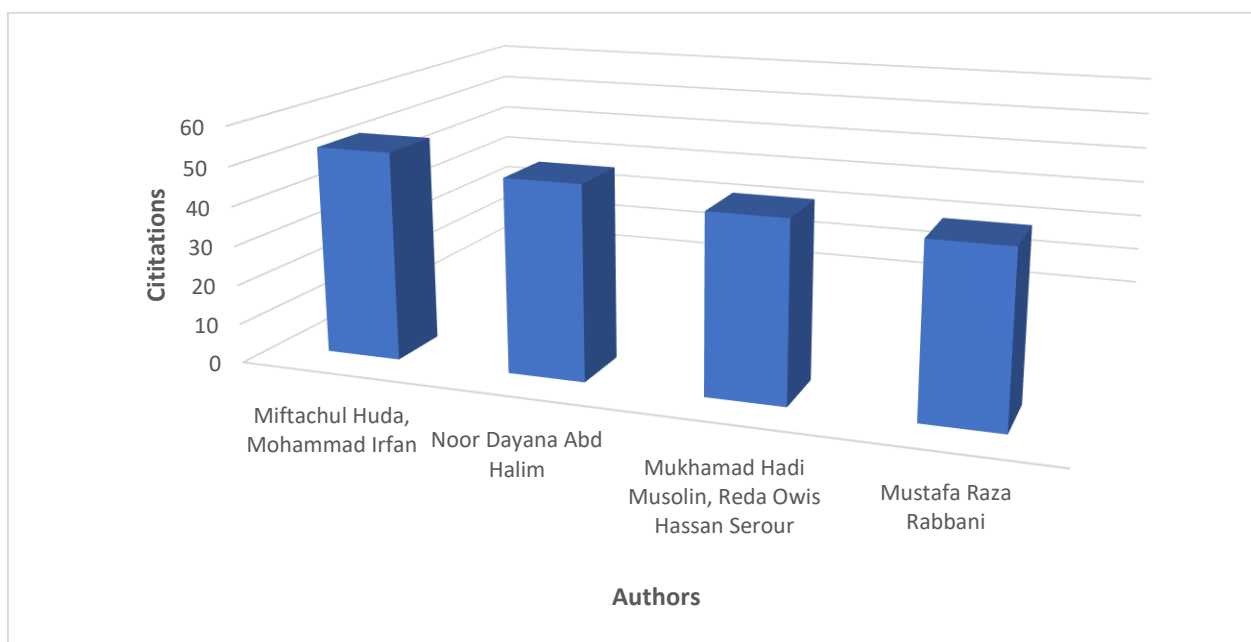


Fig 5. Authors with the highest citations

Furthermore, the 6 highest authors are shown by documents and illustrated in Table 2. The scope of 541 documents with the keywords "Technology" and "Islamic learning", Mohd Isa bin Hamzah and Miftachul Huda are the highest, with 7 Documents. Following them are Maimun Aqsha Lubis, who has 6 documents, Mahyudin Rotonga, who has 5 Documents, and Mukhamad Hadi Musolin, who has 4 Documents. Meanwhile, from the scope of 114 documents within the keywords "Technology", "Education", "Hologram" and "E learning", Asadullah Shah is highlighted with 4 Documents.

Table 2. 6 authors with the highest publications

Rank	Author	Documents
1	Mohd Isa bin Hamzah	7
2	Miftachul Huda	7
3	Maimun Aqsha Lubis	6
4	Mahyudin Ritonga	5
5	Mukhamad Hadi Musolin	4
6	Asadullah Shah	4

c. Countries

Bibliometric analysis can also reveal the origin countries. According to the total link strength viewpoint, Malaysia, with the purple cluster, has the highest score at 57; meanwhile, from other countries, such as Indonesia with a 42 score, Saudi Arabia with a 19 score, Pakistan and the United States with an 11 score, and the United Kingdom with a 10 score.

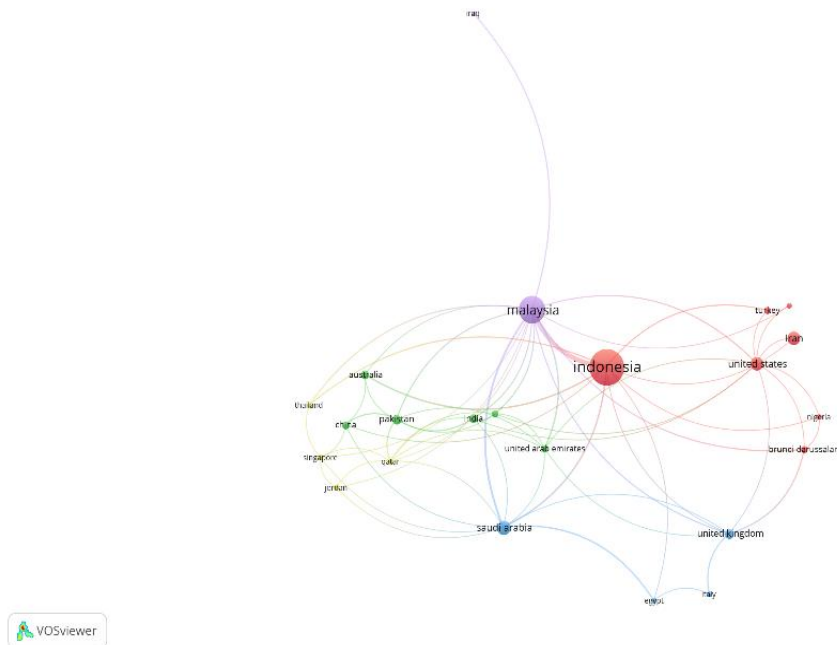


Fig 6. Bibliometric Co-Authorship analysis by country

Table 3. 6 countries with the highest Total Link Strength

Rank	Country	Total Link Strength
1	Malaysia	57
2	Indonesia	42
3	Saudi Arabia	19
4	Pakistan	11
5	United States	11
6	United Kingdom	10

However, when considering the viewpoint of document and citation quantity, Indonesia, with the Red cluster, has been the most productive and impactful country, with 235 publications and 910 citations. Meanwhile, Malaysia, with 142 publications and 658 citations, is in second position; The United States, with 35 publications and 640 citations, is in third; Saudi Arabia, with 39 publications and 234 citations, is in fourth; and Iran, with 35 publications and 169 citations, is in fifth.

Table 4. 5 countries with the highest publications and Citations

Rank	Country	Documents	Citations
1	Indonesia	236	910
2	Malaysia	142	658
3	United States	35	640
4	Saudi Arabia	39	234
5	Iran	35	169

d. Organizations

According to the finding of co-authorship by Bibliometric analysis, particularly using organizations as the viewpoint, the higher education organization from Malaysia is becoming as the superior in studies about technology of holographic and Implementation of e-learning into Islamic religious education; the study by Ramlie & Ali (2024) on the visualization of personalities based on holographic of technology, and Noor, Yusoff, & Yusoff (2018) research on Implementing Augmented Reality and gamification as media learning Into the

Tajwid. Both studies were conducted at Universiti Teknologi MARA with the highest in total link results with 8, and the most Impactful with 199 citations. According to the viewpoint of total link strength, Universiti Kebangsaan Malaysia is in second position with 7 points, Universiti Malaya with 7 points, International Islamic University Malaysia with 6 points and Universitas Negeri Malang with 4 point, while according to the viewpoint of citations, Universitas Pendidikan Sultan Idris is in second place with 118 citations, International Islamic University Malaysia with 96 citations, Universiti Kebangsaan Malaysia with 84 citations and Universiti Malaya with 82 citations.

Table 5. 5 organizations with the highest Total Link Strength

Rank	Organization	Total Link Strength
1	Universiti Teknologi MARA	8
2	Universiti Kebangsaan Malaysia	7
3	Universiti Malaya	7
4	International Islamic Universiti Malaysia	6
5	Universitas Negeri Malang	4

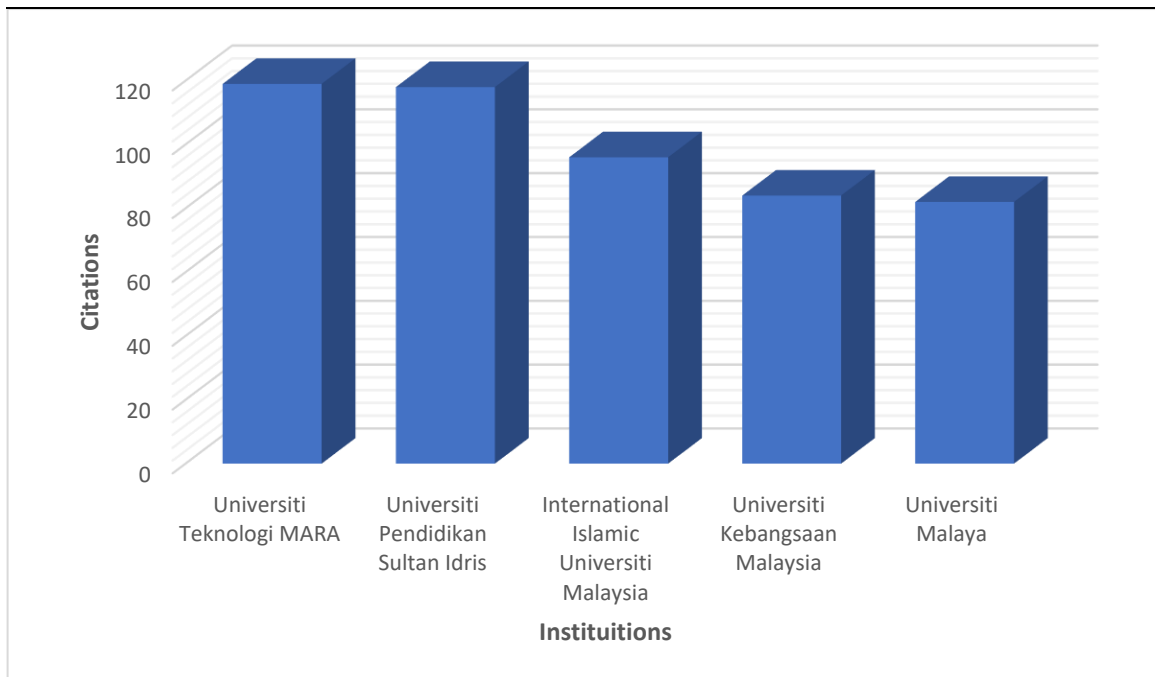


Fig 7. 5 organization with the highest citations

"Technology" (32 occurrences) and "E learning" (72 occurrences) illustrates that holography research is developing alongside the growing digitalization of learning. This analysis emphasizes the positions of hologram in the discussion on Islamic religious education based on technology and a field with significant potential for additional research.

The finding also indicates that studies on holography technology in Islamic religious education are still in their early stages but are beginning to attract attention. Although the keyword "Hologram" is mentioned less frequently than other general keywords, such as "E learning", its connection with the keyword "Islamic learning" suggests its implementation potential. This also indicates that the studies are progressing within the context of the length of the technology transformation in education. The presence of the keywords "Technology" and "E learning" as connectors between "Islamic education" and "Hologram" indicates that holograms are regarded as valuable Innovations for distant, Immersive, and practical learning models. According to Bai & Li, (2022) , who explained that in analysis of co-occurrences, keyword "C" can have direct relations with keyword "A" and keywords "B" meanwhile both of them have no direct relations, keyword "C" acts as connector between both unrelated keywords and becoming a hight structural hole, and in this field keyword "Hologram" and keyword "Islamic education".

Therefore, future studies should explore implementing holographic technology to increase understanding of Islamic religious ideas, enhance the experience of Islamic religious learning, and address temporal and spatial challenges in Islamic religious learning. Furthermore, these findings provide an opportunity for collaboration across multidisciplinary settings, such as between professionals, Islamic religious education experts, and cognitive psychologists, to develop an efficient, ethical, and principled hologram-based model of teaching aligned with Islamic principles. According to the research by Wedi et.al (2025) and Abubakari (2025), the transformation of digital technology has the potential to improve the quality of Islamic religious education.

b. Author Collaboration Patterns in Hologram and Islamic Religious Education Research

According to the co-authorship analysis based on total link strength by author, although these researchers are active within their respective networks, there is no significant collaboration among the red and blue clusters or among the

brown and green clusters. This fragmentation indicates that research on holograms and Islamic religious education is developing independently and has yet to demonstrate substantial interdisciplinary interaction. Nevertheless, the presence of keywords such as “E-Learning” and “Technology” highlights the potential of digital technologies to serve as mediating tools for integrative and collaborative learning across disciplines. In the contexts of Indonesia and Malaysia, emerging educational practices have shown that technology-enhanced learning platforms can facilitate the integration of Islamic religious education with fields such as educational technology, digital media, and instructional design, enabling students to engage with religious content through interactive and immersive learning experiences. Hologram technology, in particular, offers opportunities to support collaborative learning environments by connecting expertise from multiple disciplines, including pedagogy, information technology, and Islamic studies. Therefore, the fragmented collaboration patterns identified in this study suggest substantial opportunities for researchers from different clusters to establish cross-disciplinary partnerships, thereby strengthening the integration of technology within Islamic religious education. Consistent with the findings of Priaulx & Weinel (2018), it is crucial to foster cross-disciplinary collaboration for consolidating these fragmented studies relations.

c. Citation Impact and Influential Authors

The co-authorship analysis of citations by author shows that their research has been frequently cited in studies using these keywords. According to Akrim (2022), Islamic education must adopt technological innovations to align with the global era. Research by Saada (2023), mentioned that the transformation of the economy in the Muslim world has been facilitating the adoption of Information and communication technology, providing a powerful impetus for transformation in Islamic education. These findings suggest that authors who address contemporary educational challenges and provide relevant technological solutions tend to receive higher citation rates because their work offers theoretical and practical insights that can be applied by subsequent researchers. As a result, even though the number of publications in this field remains limited, highly cited authors exert a substantial influence on the development of scientific knowledge by shaping research agendas, guiding future investigations, and providing foundational references for emerging studies. According to studies by Chamorro-Padial & Rodríguez-Sánchez (2023), documents with strong credibility have a greater impact because they offer strong opportunities to improve the dynamics of research communities. Therefore, the

high citation performance observed in this analysis may be explained not only by the quality of the publications themselves but also by their relevance to ongoing discussions regarding technological transformation and innovation in Islamic education.

d. Scholarly Productivity and Author Contributions

According to the co-authorship analysis of documents by author, these findings demonstrate that these researchers' contributions mainly concern the general advancement of hologram technology, which can provide a foundation for specific research in the field of Islamic religious education. According to research by Reichard et al. (2024), the bibliometric analysis illustrates that a researcher's intellectual achievements can provide a foundational basis in a subject area. The dominant position of several researchers underscores the importance of a central group that actively contributes to research on implementing technology in Islamic religious educational practices. Their frequent publication of works not only shows the intensity of their scholarly interest but also highlights the significant role these researchers play in shaping study trends in this subject. Consequently, these researchers' contributions are crucial in mapping the future course of academic development.

e. International Collaboration and Country-Level Research Performance

According to the co-authorship analysis of total link strength by country, it illustrates that Malaysia has very significant international collaboration in research on holographic technology and Islamic religious education, when compared to other countries such as Indonesia, Saudi Arabia, the United States, and the United Kingdom. Though these countries also show substantial collaboration patterns, at a lower frequency than Malaysia. Moreover, based on the co-authorship analysis of documents and citations by country, this finding indicates that Indonesia has the highest number of publications and the most impactful publications in this aspect, followed by Malaysia, the United States, Saudi Arabia, and Iran. Thus, Malaysia can be considered superior in collaboration with the international community, as shown in its total link strength, and Indonesia demonstrates superiority in the quantity of publications and the influence of academia, as shown in its quantity of citations. These distinctions illustrate different strategies of contribution. While Indonesia is the highest in quantity of publication and the most impactful, Malaysia is superior in international collaboration. According to Daud et al. (2023), mentioned that higher education organizations in Malaysia have been increasing involving in

conducting academic studies, which has impactful for forming powerful studies collaboration in future.

If looked into more deeply, it becomes apparent that numerous countries, particularly Malaysia, has been conducting several research projects in the field of Holography. Nevertheless, the majority of this research has been broad in scope. It has not yet addressed specific issues in Islamic religious education, as illustrated by the research of Ramlie et.al (2022). However, numerous research studies in Malaysia have been focusing on the implementation of Augmented Reality in Islamic religious education. One study by Mustafa et.al (2025), found that students who were better prepared to use Islamic religious education through Augmented Reality achieved better academic performance. Meanwhile, this research requires additional experimental studies. It mentions that the technology of Holography has substantial opportunities to offer more realistic immersive and interactive studying environments.

f. Institutional Contributions to Hologram and Islamic Religious Education Research

The findings highlight Universiti Teknologi MARA as the core of collaboration and the influence of academia. Universiti Kebangsaan Malaysia, Universiti Malaya, and International Islamic University Malaysia are also making significant contributions to the development of research and collaboration in this subject. Also, according to the co-authorship analysis of total link strength and citations by organizations, the finding highlights Universiti Teknologi MARA as core of collaboration and influence of academic. Universiti Kebangsaan Malaysia, Universiti Malaya, and Internasional Islamic University Malaysia also significantly have contributed to the development studies and collaboration connections into this subject. Research by Chandran et.al (2014) mentioned that the majority of higher education institutions in Malaysia were actively involved in R&D (Research and Development) collaborations.

g. Organizational Networks and Structural Bridging Roles

According to the co-authorship analysis of documents by organizations, findings show that institutions of higher education in Malaysia are productive in publications and emphasize their commitment to developing innovative and interactive learning technology. Meanwhile, publications by institutions of higher education in Indonesia illustrate the active participation of organizations outside Malaysia. Figure 6 mentions that many universities are not directly connected to

more influential universities, such as Universitas Negeri Malang, Universiti Teknologi Petronas, and Universitas Pendidikan Sultan Idris. Meanwhile, others such Universitas Islam Negeri Syarif Hidayatullah, International Islamic University Malaysia, and Universiti Malaya function as important structures, and bridge linking. According to a study by Jim Wu et.al (2023) identified that having the highest number of documents and playing a structural hole role, acts as a bridge between the networks of other researchers.

Holistically, these findings confirm that the mentioned universities play a crucial role in networks of technological advancement, including holography, within the practice of Islamic religious education. Their documents, dominance, and citations illustrate the visualizations' academic influence and ability for Innovation (Liu et al., 2015). The collaboration of multinational universities demonstrates their global contribution to supporting research in the ASEAN region (Wu & Liu, 2024). Consequently, these universities play as the crucial reference sources for future studies on integrating technologies into education and implementing holographic technology in Islamic religious education.

This study contributes to the literature by providing a comprehensive bibliometric mapping of holographic technology in Islamic religious education, which has not been systematically analyzed in previous studies. Unlike prior research that mainly focuses on the pedagogical effectiveness of hologram-based learning in general education contexts, this study identifies the intellectual structure, thematic evolution, and collaboration patterns within the specific domain of Islamic education.

Theoretically, these findings extend the discourse on technology-enhanced Islamic education by positioning holographic learning within the broader framework of digital pedagogy and integrative learning theory. The emergence of e-learning and technology-related clusters suggests that Islamic education research is gradually shifting toward a more interdisciplinary and technology-integrated paradigm.

Practically, the results provide insights for educators, curriculum developers, and policymakers in Islamic education to explore hologram-based learning as an innovative tool for visualizing abstract religious concepts such as Fiqh. Furthermore, the fragmented collaboration patterns highlight the need for stronger institutional partnerships between universities, researchers, and

technology developers to support the implementation of immersive learning technologies in Islamic education.

C. Conclusion

This study demonstrates that research on hologram technology in Islamic religious education is gradually developing through contributions from influential researchers, institutions, and countries, although collaboration networks remain fragmented. Co-authorship analysis revealed that Indonesia has the highest publication productivity and research impact, while Malaysia exhibits the strongest international collaboration network, with Universiti Teknologi MARA and Universiti Kebangsaan Malaysia playing significant roles in advancing this field. The findings suggest that hologram technology has been considerable potential to support the integration of immersive, interactive, and student-centered learning environments that may enhance affective learning processes and strengthen the effectiveness of Islamic religious education. Furthermore, the increasing prominence of technology-related themes highlights opportunities for developing integrative learning models that combine Islamic studies with educational technology, digital media, and instructional design, while the fragmented collaboration patterns indicate the need for stronger interdisciplinary and international partnerships to establish evidence-based pedagogical frameworks for hologram-assisted learning. Nevertheless, this study has several limitations. The analysis was restricted to publications indexed in Scopus, potentially excluding relevant studies from other databases, and the identification and selection of keywords remained susceptible to subjective interpretation despite the use of VOSviewer. In addition, the fragmented co-authorship structure may not fully represent the actual global research network in this field. Therefore, future studies should expand database coverage, incorporate a wider range of keywords, and employ complementary bibliometric approaches to obtain a more comprehensive understanding of research developments. Future investigations may also explore the integration of holography with emerging educational technologies, such as Artificial Intelligence and Augmented Reality, to foster multidisciplinary collaboration and develop more immersive, practical, and conceptually meaningful learning experiences in Islamic religious education.

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