

Systematic Review Exploring Trends in Islamic Education Research: A Bibliometric Analysis

Adam Latuconsina¹, Ridhwan Latuapo², Muhajir Abd. Rahman³, Rustina N.⁴, La Rajab⁵

Abstract

Islamic Education has a critical role in various aspects of the lives of individuals, societies, and Muslims as a whole; the main objective of this study is to update the current knowledge frontiers around investigations related to research trends on Islamic Education and identify the main research topics and analyze their evolution over time. Bibliometric analysis has been applied in this article: we retrieved 1032 academic articles related to Islamic Education from Scopus after some data cleaning and preparation steps. The R package "Bibliometrix" was mainly used to analyze this content. Our study has two parts, and the performance analysis contains five categories (Annual Scientific Production, Most Relevant Sources, Most Productive Authors, Most Cited Publications, and Most Relevant Keywords). Science mapping includes country collaboration analysis and thematic analysis. We analyze thematic maps by dividing the entire bibliographic dataset into four quadrants to present thematic evolution over time. This study is one of the most comprehensive bibliometric reviews analyzing Islamic education-related studies. We explain how the results will benefit the understanding of academic research interests to improve the quality of current research on Islamic Education.

Keywords: *Islamic Education, Bibliometric Analysis, Research Trends.*

Introduction

Islamic Education is a process of self-understanding that enables individuals to recognize their position in a vertical relationship with Allah and horizontal relationships with fellow human beings (Al-Faruqi, 1992), Malaysian intellectual, defines Islamic Education as the process of acquiring knowledge and wisdom through the mastery of knowledge and skills inspired by the teachings of Islam (Al-Attas, 1972, 2005), another modern Islamic scholar, defines Islamic Education as a conscious effort to develop the total human capabilities based on the concept of man in Islam (Fazrul, 1984, 2020), al-Banna, defines Islamic Education as "the formation of a complete personality that is in harmony with the teachings of Islam in all aspects of life" (Al-Banna, 1974), Islamic philosophers, on the other hand, state that Islamic Education is an effort to achieve human perfection through Education based on Islamic teachings, which focuses not only on material aspects but also on spiritual and metaphysical aspects (Corbin, 2014; Farooqi, 1992; Nasr, 2003), Similarly, Muslim thinkers and poets describe Islamic Education as "the process of

¹ Ambon State Islamic Institute. Email: adam.latuconsina@iainambon.ac.id

² Ambon State Islamic Institute. Email: ridhwan.latuapo@iainambon.ac.id

³ Ambon State Islamic Institute. Email: muhajir.abd.rahman@iainambon.ac.id

⁴ Ambon State Islamic Institute. Email: rustinanurdin@gmail.com

⁵ Ambon State Islamic Institute. Email: larajab@iainambon.ac.id

understanding man's relationship with the universe and exploring man's spiritual and intellectual potentials (Mutahhari & Campbell, 1985; Nabolsi & Carson, 2011; Rohana Hamzah et al., 2010), There is also a definition of Islamic Education as the process of forming and purifying the mind, soul, and human mind within the framework of Islamic teachings (Siddiqov, 2022; Uyuni & Adnan, 2020). Several definitions indicate that Islamic Education involves religious understanding, personality development, and the integration of Islamic values in all aspects of life. This definition also reflects a holistic approach to Education that involves spiritual, moral, intellectual, and practical dimensions.

Some research related to Islamic Education is developing in different ways. Arar found that research on Islamic-based educational leadership has focused on policy, reform, stakeholders, educational leadership models and styles, gender, feminism, and social justice (Arar & Orucu, 2022). Suyadi proposed a curriculum development model for Islamic Education that integrates results-based learning, research, and service to maintain scientific relevance in the era of the Industrial Revolution 4.0 (Suyadi, 2022). Ulfat argues that empirical research can better understand the religious education process and improve the quality of Islamic religious Education (Ulfat, 2020). Meanwhile, Usman evaluated the implementation of scientific and competency development in Islamic education study programs at State Islamic Religious Universities and found that the program had developed in terms of vision, mission, policies, programs, and learning processes (Usman et al., 2017). These studies show that Islamic education research is evolving to address contemporary challenges and problems.

Islamic Education is essential in shaping Muslims' character, morals, and knowledge (Madkur & Muharom Albantani, 2018; Rustan et al., 2018; Taufik, 2020). Along with the changing times, the challenges and complexities in the context of Islamic Education are growing. To address these challenges, researchers have conducted a wide range of research in various aspects of Islamic Education. However, to fully understand the development of research in this field, a comprehensive analysis is needed that illustrates publication trends, topics being discussed, and the contributions of leading researchers. In today's digital information age, bibliometric analysis is one of the powerful approaches to characterize the development of research (Donthu et al., 2021; Duan et al., 2023; Ellegaard & Wallin, 2015; Li & Zhao, 2015). This analysis can provide a visual and quantitative overview of the distribution of publications, collaborations between researchers, and critical foci in the literature. Through bibliometric analysis, it can track changes in trends, identify key contributors, and reveal patterns of collaboration that may not be directly visible. However, despite the massive potential of bibliometric analysis, its use in Islamic Education research is still limited. Therefore, this study aims to conduct a bibliometric analysis of the Islamic Education research literature to help fill this knowledge gap. Through this analysis, it is hoped that new insights into the development of Islamic Education research will emerge, thereby positively contributing to improving curricula, teaching strategies, and the development of Islamic Education as a whole. By understanding publication trends, the most discussed research topics, and the contributions of researchers, educational institutions and Islamic education practitioners can be more focused on developing innovations, filling knowledge gaps, and facing emerging challenges in the field of Islamic Education.

Literature Review

Islamic Education and Its Research Lines

The development of Islamic Education in research trends can be analyzed by paying attention to the number of citations. Citations are essential in developing science and research (Peng et al., 2000; Waltman, 2016). Citation helps form knowledge networks and facilitates communication between researchers (Phelps et al., 2012; Xue, 2018). In

Islamic Education research, most citations are related to Education, which can be like the study of religion in complex societies, just as the study of religion in societies characterized by anthropologists as 'simple,' 'cold,' or 'elementary.' Recognizing this potential, sociologists and social anthropologists have recently shown renewed interest in how schools, significantly higher Education, implicitly define and transmit culturally valued cognitive styles, a set of archetypes that have been deeply internalized' in language and thought (Eickelman, 1978). The development of Islamic Education is to explore the problematic nature of philosophy in Islam by examining the available sources for a systematic exploration of the principles of Islamic Education and the dimensions of Education in Islam, focusing on individual development, social and moral Education, and the acquisition of knowledge containing Islamic and liberal ways of understanding Education and the possibility of future dialog with Western philosophies (Halstead, 2004).

The development of Islamic Education is also influenced by the quality of Education, which, in general, is the main reason for school choice. At the same time, the specific reason for school choice is also Muslim migrant parents, who strongly prefer Islamic Education for their children (Denessen et al., 2005). The development of Islamic Education was affected by doctrinal disputes between Sunnis (who make up the majority of Pakistan's population), and the Shi'a Twelve (who make up between 15% and 25% of the population and must be distinguished from the Islamic Khoja and Bohri Shi'a) has given place to full-fledged sectarian conflict. Sunni and Shi'a militant organizations have carried out assassinations and bombings that have killed political rivals as well as children and innocent people praying in mosques (S. V. R. Nasr, 2000); revivalist solid Islamization movements have recently emerged in several Muslim countries as traditionalist response to modernity. They aspire to imbue all forms of knowledge with traditional Islamic values and resist the secularization and modernization of knowledge. This inspiration arises from a larger political struggle to establish a discourse linking state and religion in new power structures. The movement is rooted in the history of Muslim societies, where religious discourse mediated power and social control (Talbani, 1996). The subsequent development also relates to the Classical Islamic community in Java, Indonesia, trying to negotiate modernization and globalization through the intermediary of pesantren and Higher Education. This negotiation requires imagining and (re)inventing modernity and tradition. By examining how the leadership of a specialized pesantren for university students engages these processes in their curricular goals and practices, this article extends educational theoretical considerations in trans-local processes such as Islamization and globalization (Lukens-Bull, 2001).

The development of Islamic Education cannot be separated from contemporary discussions about Islam and Education in Muslim majority and minority contexts. The first issue relates to the academic conceptualization of the study of Education in the various cultural, intellectual, political, theological, and spiritual traditions of historical and contemporary Islam, the lack of conceptual clarity in the various current descriptions of the field, including 'Muslim Education,' 'Islamic Pedagogy,' 'Islamic Parenting' and 'Islamic Religious Pedagogy,' described and the frequent confusion between Islamic Education and Islamic Studies. The field of Islamic Education Studies has a theological and educational foundation and integrates interdisciplinary methodological designs in the Social Sciences and Humanities. The second part of the investigation draws attention to the lack of new theoretical insights and critical perspectives in Islamic Education. Pedagogical practices in various Muslim formal and informal educational settings do not show much variation and are involved mainly in rewriting existing power relations that shape society. The juxtaposition of inherited Islamic educational culture and borrowed or imposed Western secular educational culture seems to largely shape mutually exclusive, antagonistic, and often rigid thinking in contemporary Muslim societies. The impact of educational culture and institutions on the formation of hateful Islamic religiosity and the reproduction of authoritarian leadership within the wider mainstream Muslim society has

not been adequately explored. This research emphasizes the need for a paradigm shift in addressing this widely recognized crisis in Education. Establishing a transformative educational culture remains essential to facilitating reflective and critical Muslim religiosity and positive socio-economic and political change within Muslim majority and minority societies (Sahin, 2018).

The study of Islamic Education in the Netherlands relates to the constitutional freedoms in the field of Education that allowed a growing number of Muslims to establish state-funded Islamic schools. Since its inception, Islamic Education has been a highly controversial issue. Events such as 9/11 and the murder of Dutch filmmaker Theo van Gogh have sparked discussions, which have turned from open-minded and accommodating to critical and even harmful (Driessen & Merry, 2006). Besides, Education is essential for any Muslim society, as the Prophet made it obligatory for all Muslims. However, the issues of what categories of knowledge are permissible for Muslims, the methods for imparting this knowledge, and what should be imparted (content) are arguably the main challenges in Islamic Education. Many Muslim scholars have looked at the concept of knowledge from various perspectives. In his monumental work, *Ta'lim Al-Muta'allim*, the classical Muslim scholar Al-Zarnūjī, outlined the basic principles of Education in Islam, which have been used as a teaching methodology by many scholars worldwide. This makes his concept of knowledge inseparable from Islamic ethical values. Al-Zarnuji's contribution to knowledge lies in packaging and disseminating Islamic academic heritage, particularly teaching and learning methodologies that are relevant for all levels of Education (M. Huda et al., 2016).

The development of Islamic Education cannot be separated from the management of the education system in schools using the Tebuireng Islamic Boarding School in Jombang, East Java, Indonesia. Since June 2006, Pesantren Tebuireng has been providing Islamic Education. However, in these schools, students from other schools do not have Islamic Education and face difficulties when following the lessons. In addition, the students of Pondok Pesantren Tebuireng are not used to traditional Education, such as science-based subjects: math, chemistry, physics, biology, and management. Therefore, managing the education system at Pondok Pesantren Tebuireng is necessary. All levels of Education in Islamic schools (Pesantren) must provide rational science-based subjects, including math, chemistry, physics, biology, management, and others. In addition, there must be a balance between Islamic and science-based Education (S. Huda et al., 2020).

Table 1 below presents the most influential articles in Islamic Education based on the most citations to facilitate researchers.

Table 1. Summary table of the reviewed scientific literature.

No	Paper	DOI	Total Citations
1	Eickelman DF, 1978, COMP STUD SOC HIST	10.1017/S0010417500012536	176
2	Halstead JM, 2004, COMP EDUC	10.1080/0305006042000284510	175
3	Denessen E, 2005, J EDUC POLICY	10.1080/02680930500108981	97
4	Nasr SVR, 2000, MOD ASIAN STUD	10.1017/S0026749X00003565	92
5	Talbani A, 1996, COMP EDUC REV	10.1086/447356	86
6	Lukens-Bull RA, 2001, ANTHROPOL EDUC Q	10.1525/aeq.2001.32.3.350	64
7	Sahin A, 2018, RELIGIONS	10.3390/rel9110335	52
8	Driessen G, 2006, INTERCHANGE	10.1007/s10780-006-9001-0	51
9	Huda M, 2016, SAGE OPEN	10.1177/2158244016666885	49

10	Huda S, 2020, MANAG SCI LETTERS	10.5267/j.msl.2019.9.018	48
----	---------------------------------	--------------------------	----

Method

Data Collection and Preparation

Data were retrieved from Scopus (Core Collection) with several keywords (topics), namely 'Cultural values and Islamic Education,' 'Cultural values w/3 Islamic Education,' and 'Cultural values w/3 Islamic Education or Islam Education' from 1970 to August 2023. The searched documents (articles, conference proceedings, books, book chapters) were stored with full notes and cited references. The data preparation stage consisted of two parts. First, a keyword data depuration step was performed. For this purpose, we built a de-pluralized corpus using all critical words related to Education, Islam, and Islamic Education.

Bibliometric Analysis Strategy

Strategies used in Bibliometric analysis using the R package "Bibliometrix" (Aria & Cuccurullo, 2017); the results of the baseline analysis of Islamic Education-related research were examined and reported in five categories: Annual Scientific Production, Most Relevant Sources, Most Productive Authors, Most Cited References, and Most Relevant Keywords. At the science mapping stage, country collaboration networks are plotted based on normalizing the strength of association (Leydesdorff, 2005; Metzler et al., 2007; Van Eck & Waltman, 2009). This network was created using the Vosviewer-assisted bibliometric analysis tool (McAllister et al., 2022; van Eck & Waltman, 2010, 2011) by using its clustering algorithm (van Eck & Waltman, 2014; Waltman et al., 2010). To study research topics and their temporal evolution. Bibliometrix allows the plot of thematic maps for each period based on shared word networks and clustering (Aria & Cuccurullo, 2017; Callon et al., 1991).

Results and Discussion

The Scientific Evolution of Islamic Education

Before examining the number of publications, we will first analyze citations using the k-indicator to measure the impact and influence of publications based on the number of citations received by researchers' works (Lanjouw & Schankerman, 1999). A total of 749 academic publications were collected according to our search strategy. There were 323 sources (journals, books, etc.) to publish all retrieved bibliographic data, including 1467 authors. The average number of citations per article was 5.17, and the number of authors per article was 2.4. A total of 28550 references with an annual growth rate of 7.4% were collected. Annual growth rate is a measure that describes the average percentage change of a value or amount from one year to the next (Cummins & Violante, 2002). So, it can be seen that the growth of the Publication of Cultural Values and Islamic Education is 7.4%.

Out of 749 documents over 53 years, are 2046 keywords used by authors on Islamic Education. Wang and Chai have introduced the concept of K indicators to quantitatively describe the discipline's development stage (Wang & Chai, 2018), which is measured by the ratio between the number of keywords. The K indicator of scientific literature related to Islamic Education is 0.37, meaning Islamic Education research is currently at the regular science stage. This stage means the development of the subject over a long period, with the formation of more mature concepts; this stage is expected to move into a post-normal stage with less innovation and scientific vitality as described in mapping Kuhn's paradigm of the scientific revolution (Kuhn, 2020; Moore, 1980).

Annual Scientific Production

The annual scientific production in Figure 1 shows that Islamic Education in the Scopus database began in 1970, publications began consistently in 2005, and the most significant increase in 2020; this reflects scientific developments in specific fields (González-Alcaide et al., 2017). This means there were many new discoveries, discoveries, or advances in knowledge during this time.

Figure 1. Annual Scientific Production

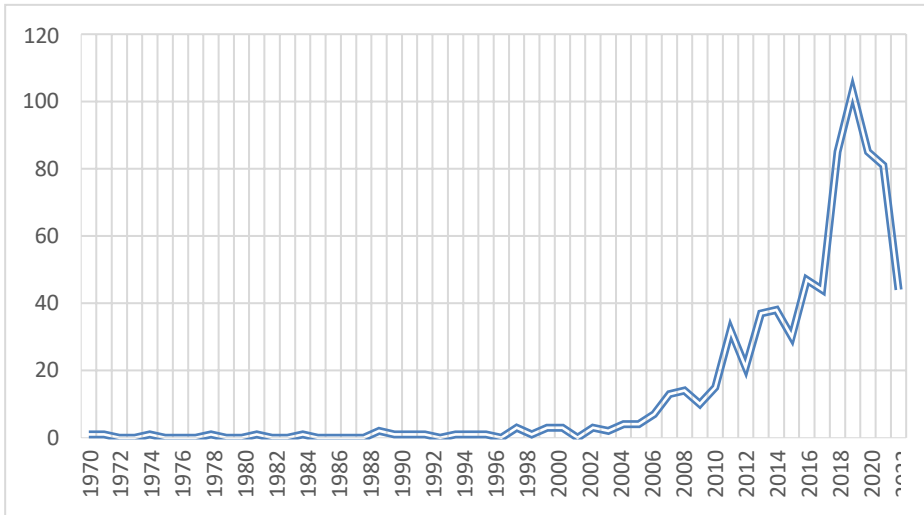
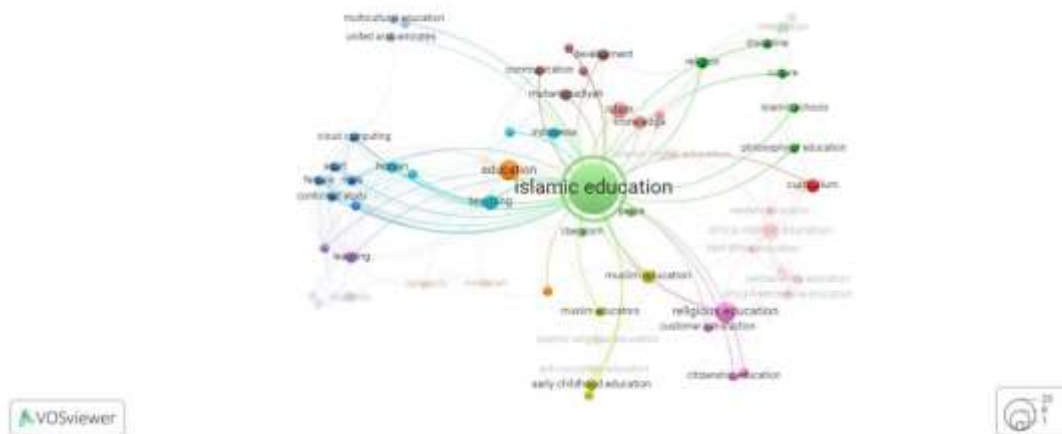


Figure 1 shows that in the period 1970 to August 2023, the highest number of publications was in 2020; the research themes in 2020 are presented in Figure 2 as follows:

Figure 2. Islamic Education Themes in 2020



In Figure 2, it can be seen that the themes discussed during 2020 are very diverse in 9 clusters: the first cluster deals with various Islamic education policies from various countries, the second cluster contains the subject of Islamic Education, the third cluster contains the Islamic education learning system used, the fourth cluster consists of learning methods used in Islamic education learning, the fifth cluster is about values in Islamic Education, the sixth cluster is about the application of the implementation of Islamic education values, the seventh cluster is related to the application of Islamic Education in daily life, the eighth cluster is about the challenge of Islamic Education, and the ninth cluster shows government involvement in Islamic Education. The most

prominent nodes in Islamic Education are religious Education in the first cluster and Education in cluster 7.

Most Relevant Sources

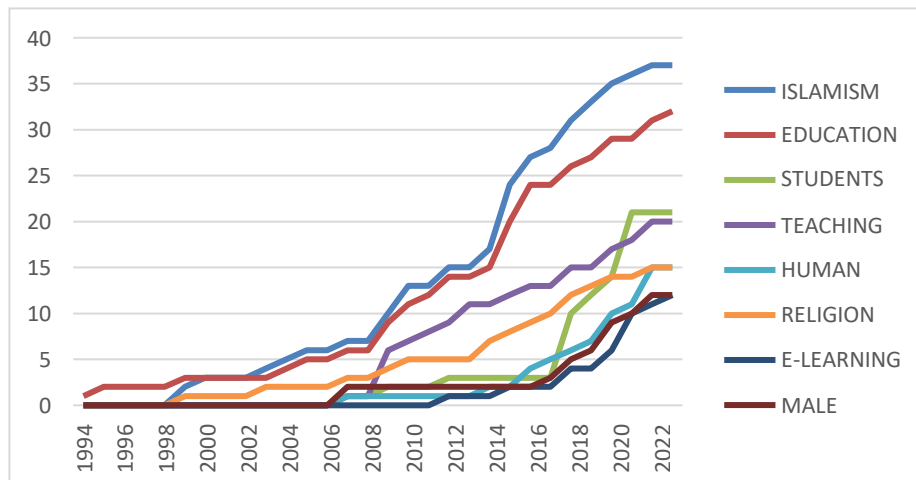
Most Relevant Sources in bibliographic analysis are significant as they provide the most relevant and significant information for the topic or research. (Ellegaard & Wallin, 2015). Table 2 presents the most relevant sources on Islamic Education so that it can facilitate the authors in mapping this writing.

Table 2. 10 most popular articles in Islamic Education

Rank	Sources	Articles
1	Religions	40
2	Jurnal Pendidikan Islam	22
3	International Journal of Innovation, Creativity And Change	15
4	IOP Conference Series: Earth and Environmental Science	15
5	British Journal of Religious Education	14
6	Studia Islamika	14
7	Global Journal Al-Thaqafah	11
8	International Journal of Learning, Teaching, and Educational Research	10
9	Journal of Critical Reviews	10
10	Journal of Indonesian Islam	10

Table 2 shows that 60% of the publications of Islamic Education articles are relevant to Journals on Islamic Education, 30% are related to Education, and only 10% are irrelevant to Islamic Education, namely on Earth and the environment. Figure 3 presents a line diagram of the year-by-year evolution of the previously mentioned subjects: the x-axis represents the year, and the y-axis represents the number of publications under a particular subject. This line diagram clarifies the previous conclusion that most of the published articles are relevant to research related to Islamic Education. Research on Islamic Education published in Islamic Education and Education journals can be identified from the keywords used yearly.

Figure 3. Subject evolution over time



Most Relevant Author

In bibliometric analysis, the most relevant author plays an essential role in identifying and evaluating the quality and impact of a scientific work (Van Raan, 1993). An author is considered relevant if he or she contributes significantly to the analyzed work. The following ten most relevant authors in Islamic Education are presented in Table 3.

Table 3. 10 Most Relevant Author

No	Authors	Articles	Articles Fractionalized
1	Hamzah MI	10	2,87
2	Suyadi	8	2,62
3	Tamuri AH	8	2,53
4	Waghid Y	8	6,50
5	Alkouatli C	7	5,08
6	Berglund J	7	7,00
7	Nor MRM	7	2,17
8	Nuryana Z	7	2,15
9	Saada N	7	6,00
10	Wekke IS	7	1,81

Table 3 shows that the most popular author in the field of Islamic Education is Mohd Isa Bin Hamzah, from Universiti Kebangsaan Malaysia, Bangi, Malaysia has 25 scopus-indexed articles and 10 of them are related to Islamic Education, discussing the perception of religious teachers' readiness to use mobile phones as m-learning and the profile of religious teachers in using mobile phones, and making mobile phones as m-learning (Nawi et al., 2015). For 53 years (1970-2023), the number of authors related to Islamic Education is 1866, and 406 of them are single-authored, still not significant in increasing the number of publications related to Islamic Education. This will be analyzed in Figure 4 with Lotka's Law approach. Lotka's Law graph illustrates the distribution of productivity or contributions from various individuals or entities in a group towards a particular activity or output. This graph usually follows a power distribution pattern and can be read by looking at the shape of the distribution (Potter, 1981; Sen et al., 1996; Subramanyam, 1979). Mathematically, this Law can be expressed as the power distribution equation:

$$N(m) = \frac{C}{m^a}$$

Where.

$N(m)$ is the number of individuals or entities that produce m units or products.

C is a constant

and a is the distribution parameter.

Figure 3 presents the application of Lotka's Law as follows,

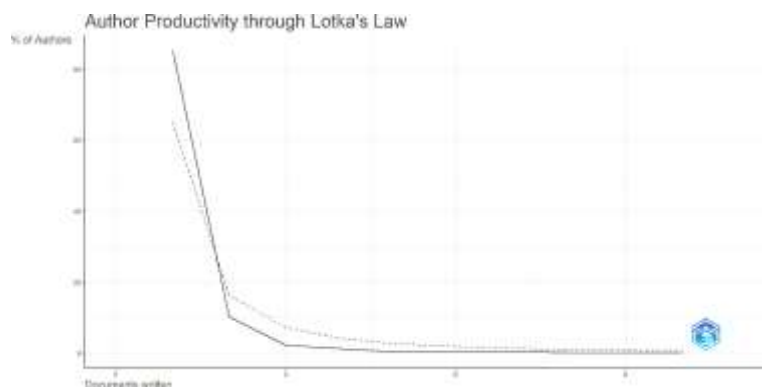


Figure 3. Author Productivity through Lotka's Law

Figure 3 shows that out of 1032 documents, 1592 authors only wrote 1 article, around 85.3%, and only one of 1866 authors wrote as many as 10 articles, or around 0.1%. Lotka's Law states that only a few individuals are highly productive, a moderate number are productive, and the majority are less productive in a field. If applied to authors in a field, this could mean that only a few authors produce many works that receive significant attention, several authors produce a few, and most authors produce little or no works that achieve popularity or attention.

Most Cited References

Most Cited References are essential in bibliometric analysis (Usée et al., 2008; Zhang et al., 2016). Bibliometric analysis involves using quantitative data to understand trends, relationships, and the impact of scholarly work in the literature. Table 4 lists the ten most popular references in research on Islamic Education over 53 years from the Scopus database.

Table 4. 10 Most Cited References

No	Cited References	CT
1	Makdisi G., <i>The Rise of Colleges: Institutions of Learning in Islam and The West</i> , (1981)	30
2	Halstead M., <i>An Islamic Concept of Education</i> , <i>Comparative Education</i> , 40, 4, P.P. 517-529, (2004)	20
3	Sahin A., <i>New Directions in Islamic Education: Pedagogy and Identity Formation</i> , (2013)	18
4	Ramadan T., <i>Western Muslims and The Future of Islam</i> , (2004)	17
5	Alabi, <i>Transmission of Learning in Modern Ilorin</i> .	16
6	Husain S.S., ASHRAF S.A., <i>Crisis in Muslim Education</i> , (1979)	16
7	Shalaby A., <i>History of Muslim Education</i> , (1954)	13
8	Berkey J., <i>The Transmission of Knowledge in Medieval Cairo: A Social History of Islamic Education</i> , (1992)	12
9	Eickelman D.F., <i>The Art of Memory: Islamic Education and Its Social Reproduction</i> , <i>Comparative Studies in Society and History</i> , 20, 4, P.P. 485-516, (1978)	12
10	Hefner R.W., Zaman M.Q., <i>Schooling Islam: The Culture and Politics of Modern Muslim Education</i> , (2007)	12

Table 4 shows that the work "The Rise of Colleges: Institutions of Learning in Islam and the West," written by George Makdisi and published in 1981 (Daniel & Makdisi, 1984), is the most cited reference by the author. This work has significantly impacted my understanding of the history of educational institutions in Islamic and Western cultures. In particular, it discusses the development and role of universities in the educational

traditions of the Islamic and Western worlds. Some of the discussions in this work include (a) History of Higher Education: Dr. Makdisi may review how universities emerged and developed in Islamic and Western cultures. This could include its origins, the purpose of its establishment, and its evolution over time. (b) Comparison Between Islamic and Western Cultures: This work will likely compare how higher education institutions developed in the two cultures. Are there similarities, differences, or mutual influences in the development of higher Education in these two cultures? (c) The Role of Education in Public Life: This work could discuss the role played by higher Education in the development of knowledge, society, and civilization. How universities influence thinking, science, and culture in society. (d) Influences on Modern Education: This work may also discuss the influence of educational institutions in the Islamic world and the West on modern Education and the current education system. (e) Contributions of Specific Individuals and Universities: This work might provide specific examples of colleges or individuals who have played an essential role in the development of Education in both cultures. Furthermore, (f) Intercultural Relationships and Educational Exchange: This work might highlight the relationship between educational institutions in the Islamic world and the West and the exchange of knowledge and culture.

Most Relevant Keywords

The importance of "Most Relevant Keywords" in bibliometric analysis lies in its ability to provide a quick and accurate picture of the topic, focus, and relevance of a collection of scientific publications (Schöbel et al., 2021). The keywords in the research on Islamic Education are presented in Most Frequent Words, WordCluod, and Co-occurrence as follows:

Figure 4(a) WordCloud

Figure 4(b) Co-ocurance

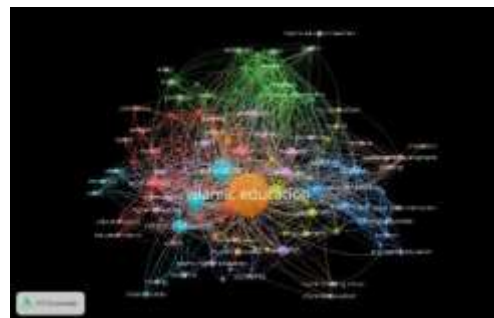
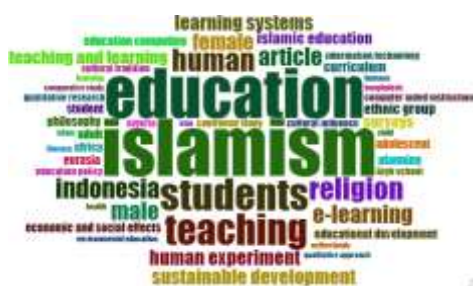
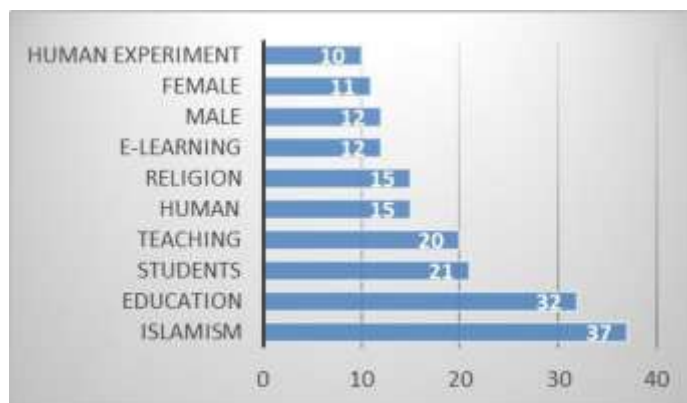


Figure 4(a) Most Frequent Words



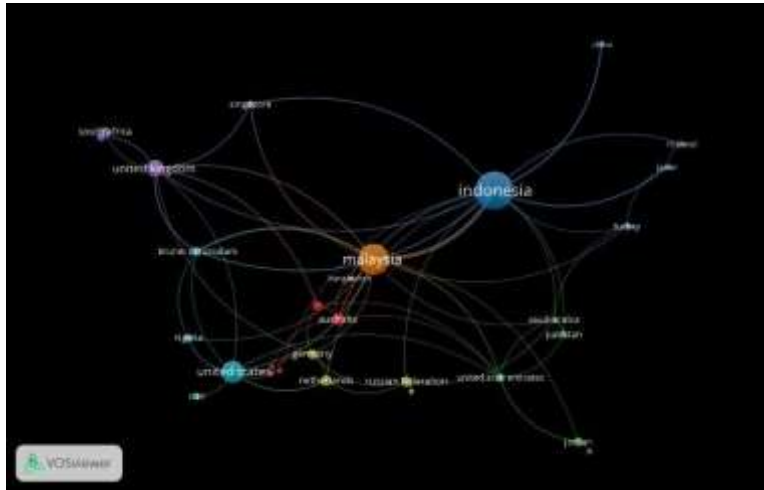
Figures 4(a), 4(b), and 4(c) show some of the keywords used by the most relevant authors. These keywords are mostly related to learning and learning systems. Overall, the authors' keywords reveal similar research trends: learning and learning systems have a significant role in Islamic Education. Education in Islam is not just about transferring

knowledge but also involves developing morals, ethics, and spirituality... Islamic Education plays a central role in shaping and influencing gender norms in Muslim societies (Srimulyani, 2012).

Country Collaboration Network

Vosviewer presents a country collaboration network based on the frequency of co-occurrence. By default, the strength of association is used to normalize the network (Van Eck & Waltman, 2007); this method has also been proven to be one of the best (Van Eck & Waltman, 2009). The clustering algorithm is based on the weighting and variance parameters of the famous modularity function of Newman and Girvan (Newman & Girvan, 2004).

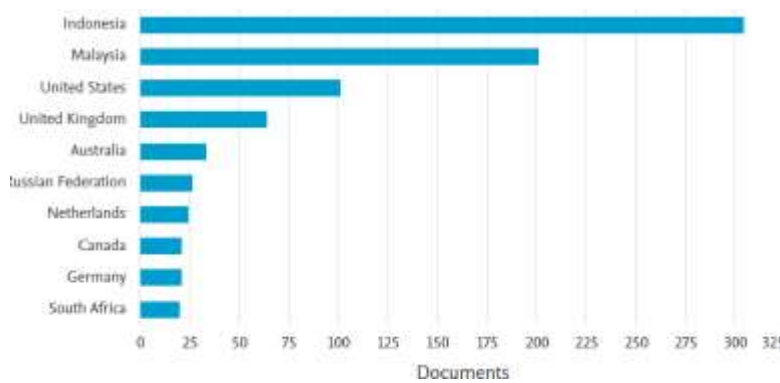
Figure 5. Country collaboration network



In Figure 5, it can be seen that the countries with the most significant nodes are the most influential in research on Islamic Education. Figure 5 shows the collaboration network of the top 32 countries from the bibliographic data obtained and can reflect the level of communication between countries as well as the influential countries that are influential in this field (Hu et al., 2020). Seven clusters (with different node colors) can be found in the network. The nodes' size represents the country's impact on Islamic education-related studies (based on the number of publications). The relationship between the nodes represents the strength of the cooperative relationship between the countries.

Figure 5 provides information on the most productive countries for Islamic Education research. Asian countries such as Indonesia, Malaysia, Brunei, Darussalam, and Singapore are Southeast Asian countries that have a relatively high level of international collaboration. The United Kingdom and the United States are among the most influential countries in Islamic Education. Here are more details about the ten countries in the publication on Islamic Education,

Figure 6. Top 10 most productive countries



Indonesia and Malaysia play a significant role in research on Islamic Education. Both countries have large Muslim populations and a rich Islamic cultural heritage, making them essential places for research on Islamic Education. Some of the reasons why Indonesia and Malaysia are so influential in research on Islamic Education:

Table 5. Reasons Indonesia and Malaysia are Popular in Islamic Education Research

Reason	Indonesia	Malaysia
Residents	Indonesia has the largest Muslim population in the world. With most of its population being Muslim, Indonesia provides a fertile environment for research on Islamic Education.	Malaysia is predominantly Muslim and provides a fertile environment for research on Islamic Education.
Ethnic and Cultural Diversity	Indonesia has diverse ethnicities, cultures, and traditions in Islamic culture.	Malaysia has various ethnicities and religions living side by side.
Universities and Educational Institutions	Islamic religious Education has an essential role in Indonesia. Islamic Education is integrated into the formal and non-formal education systems, and many religious education institutions shape Islamic character and knowledge among students.	Malaysia has various universities and higher education institutions with specialized programs and research centers in Islamic Education.
Pesantren Tradition	Pesantren, a traditional Islamic school, has a long history in Indonesia. Pesantren has made essential contributions to the formation of Islamic Education in Indonesia.	Like Indonesia, Malaysia also has formal Education and pesantren that play an essential role in Islamic Education. A comparison between the two could be a focus of research.
Contemporary Challenges	Indonesia faces various challenges related to Islamic Education, such as harmonization of Islamic values and modernity, Inclusive Education, and technological adaptation in religious Education.	Research in Malaysia could cover issues such as Islamic education curriculum development, responses to modernity, and challenges in tackling extremism.

Thematic Analysis

Thematic analysis is an analytical method used to identify, analyze, and report thematic or motive patterns in qualitative data (Burnard & Younker, 2004; Jansen, 2021). This method is essential in bibliometrics, which measures and analyzes published scientific literature's amount, distribution, and impact.

Figure 7 presents a thematic map of the period 1970-2023. Each circle represents a cluster, and the circle's size indicates the cluster's size (number of terms/keywords dietician). Researchers have also interpreted this diagram more understandably (Callon et al., 1991). The first quadrant (central and developed) is the motor theme space, the second quadrant (Central and undeveloped) is the primary and transversal theme space, the third quadrant (Peripheral and developed) is the highly developed and isolated theme space, and the fourth quadrant (Peripheral and undeveloped) as the emerging or declining theme space (Cobo et al., 2011).

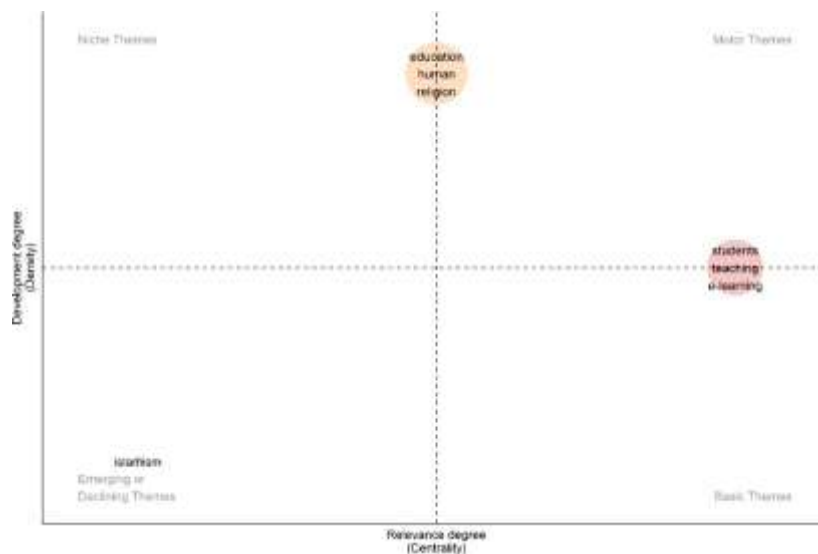


Figure 7. Thematic Map

Figure 7 shows something interesting, namely that the topics of educational research related to religious values for students have been carried out; it can be seen that the keywords "Education," "Human," and "Religion," but in some studies, there are inconsistencies in instilling religious values in students, this is known from the three critical words in quadrants 1 and 2, while Islamic education research to realize Islamism is something that does not always appear as the main topic of discussion. Islamism is a term used to refer to various political, social, and religious movements that advocate a conservative or literal interpretation of Islam as the foundation for social, legal, political, and cultural structures. Approaches and views on "Islamism" can vary depending on the perspectives of scholars, but there are generally a few main themes that often appear in their definitions and analyses (Esposito, John L.; Zubaidah Rahim, Lily; Ghobadzadeh, 2018; Hafez, 2014; Kepel, 2006; Mozafari, 2010; Preljević, 2022; Roy, 2020). There is general agreement that Islamism involves attempts to combine Islam with political and social aspects, but there are differences in how they analyze the roots, goals, and impact of this movement in modern society.

Figure 7 also shows something else interesting, namely that education research related to learning systems is a theme that has been widely discussed but is still very relevant to continue to be discussed in the next period of Islamic education research; this can be seen from "Student," Teaching" and "e-learning" being in quadrant four and quadrant 1. Education systems have a significant role in research on Islamic Education for several key reasons: (a) Provision of Context and Research Focus: The education system sets the framework for research on Islamic Education. Researchers can examine the curriculum,

teaching methods, educational structures, and educational practices within the existing educational system to understand their impact on the understanding and practice of Islam. (b) Implementation of the Islamic Education Curriculum: The education system determines how Islamic education materials are taught and implemented. Research can evaluate the effectiveness of the curriculum and teaching strategies in communicating Islamic values and principles to students. (b) Character and Value Formation: The education system contributes to students' character formation and understanding of Islamic values. Research can analyze how the education system shapes students' morals, ethics, and spiritual awareness. (c) Effect of Educational Environment on Muslim Identity: The education system impacts students' Muslim identity. Research can examine how the educational environment, both formal and informal, shapes students' understanding of religious and cultural identity. (d) The Impact of Education on Religious Understanding: Research on Islamic Education can analyze the extent to which the education system can convey a correct understanding of religion and how this understanding impacts students' behavior and beliefs. (e) Response to Contemporary Challenges: The education system has a role in teaching students how to address contemporary challenges Muslims face. Research can evaluate how Islamic Education responds to issues such as technology, globalization, and extremism. (f) Effectiveness of Teaching Methods: Research can analyze the effectiveness of teaching methods in delivering Islamic lessons. Whether the teaching methods can facilitate a deep and critical understanding of Islamic teachings. (g) Contribution of Islamic Education to Civilization: The Islamic education system has a role in supporting the development of civilization and the progress of society. Research on Islamic Education can examine the contribution of Education to social, economic, and cultural development in the Islamic context. Moreover, (h) Development of Critical Thinking Skills: The education system can help students develop critical and analytical thinking skills in dealing with religious and social issues. Research can measure how much Islamic Education trains students to think critically.

Conclusions

A general approach to analyzing and describing research trends related to Islamic Education has been presented in this article. This study has largely expanded the amount of bibliographic data compared to previous studies. With an overview of the bibliographic data from Scopus, the main thing in this study is the excellence in describing the current research area of Islamic Education cultural values. In short, Islamic Education has become the undisputed center of attention in the academic world. As a discipline that investigates various aspects of Education derived from Islamic teachings, Islamic Education raises essential issues related to how religious knowledge, values, and principles can be integrated into the modern educational context. In the current era of information and technology, bibliometric analysis has become a powerful tool for understanding the dynamics of scientific development, including the field of Islamic Education. The year 1970 was the first year with negative growth. This may signal that research related to cultural values in the sociology of Islamic Education has surpassed the previous period, but future research must further confirm this assumption. Other descriptive results, for example, the most relevant sources and keywords, have also revealed some of the leading research interests related to the scientific literature related to cultural values from the sociology of Islamic Education perspective.

In the science mapping section, we first present the country collaboration network, in which a set of country collaboration patterns have been identified. Asian countries such as Indonesia, Malaysia, Brunei, Darussalam, and Singapore are Southeast Asian countries with relatively high levels of international collaboration. Countries also influential in Islamic Education research are the United Kingdom and the United States. Thirty-two countries divided into the seven most essential clusters in Islamic Education research are

presented as nodes in the network. Detailed information on the ten most productive countries has been presented further in this study. Among the countries, European countries and English-speaking countries have a greater degree of international collaboration.

For the thematic analysis, it is interesting that the topics of educational research related to religious values for students have been widely conducted; it can be seen that the keywords "Education," "Human," and "Religion," but in some studies, there is inconsistency in instilling religious values in students, this is known from the three keywords in the first and second quadrants. In contrast, Islamic educational research realizes that Islamism does not always appear as the main topic of discussion. Another exciting thing is that educational research related to learning systems is a theme that has been discussed a lot but is still very relevant to continue to be discussed in the next period of Islamic education research; this can be seen from "Student," "Teaching" and "e-learning" being in quadrant four and quadrant 1.

Islamic education research in terms of citations of the work "The Rise of Colleges: Institutions of Learning in Islam and the West" written by George Makdisi and published in the year is the most cited reference by the author. This work has had a significant impact on understanding the history of educational institutions in Islamic and Western cultures, while the most discussed study in Islamic education research from the most citations is about Education can be like the study of religion in complex societies, just as the study of religion in societies characterized by anthropologists as 'simple,' 'cold,' or 'elementary.' Recognizing this potential, sociologists and social anthropologists have recently shown renewed interest in how schools, significantly higher Education, implicitly define and transmit culturally valued cognitive styles, a set of archetypes that have been deeply internalized' in language and thought. The development of Islamic Education is to explore the problematic nature of philosophy in Islam by examining the sources available for a systematic exploration of the principles of Islamic Education and the dimensions of Education in Islam, focusing on individual development, social and moral Education, and the acquisition of knowledge that include Islamic and liberal ways of understanding Education and the possibility of future dialogue with Western philosophies.

References

- Al-Attas, S. M. N. (1972). *Islam Dalam Sejarah Dan Kebudayaan Melayu*/Syed Muhammad Naquib al-Attas. ABIM. <http://melayu.library.uitm.edu.my/id/eprint/1942>
- Al-Attas, S. M. N. (2005). Islamic philosophy: An introduction. *Journal of Islamic Philosophy*, 1(1), 11–43.
- Al-Banna, H. (1974). *What is Our Message?* Islamic Publications Lahore. <http://islamic-e-books.com/mh/pdf/what-is-our-message-hassan-al-banna.pdf>
- Al-Faruqi, I. R. (1992). *Al Tawhid: Its Implications on Thought and Life*, *Issues in Islamic Thought* (4) (Issue 4). IIIT.
- Arar, K., & Orucu, D. (2022). The research on educational leadership for refugees since 2009: an international systemic review of empirical evidence. *International Journal of Leadership in Education*, 13(1), 42. <https://doi.org/10.1080/13603124.2022.2068190>
- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Burnard, P., & Younker, B. A. (2004). Problem-solving and creativity: Insights from students' individual composing pathways. *International Journal of Music Education*, 22(1), 59–76. <https://doi.org/10.1177/0255761404042375>

- Callon, M., Courtial, J. P., & Laville, F. (1991). Co-word analysis as a tool for describing the network of interactions between basic and technological research: The case of polymer chemistry. *Scientometrics*, 22(1), 155–205. <https://doi.org/10.1007/BF02019280>
- Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of Informetrics*, 5(1), 146–166. <https://doi.org/10.1016/j.joi.2010.10.002>
- Corbin, H. (2014). History of Islamic philosophy. In *History of Islamic Philosophy* (Vol. 1). Routledge. <https://doi.org/10.4324/9780203870082>
- Cummins, J. G., & Violante, G. L. (2002). Investment-specific technical change in the United States (1947-2000): Measurement and macroeconomic consequences. *Review of Economic Dynamics*, 5(2), 243–284. <https://doi.org/10.1006/redo.2002.0168>
- Daniel, N., & Makdisi, G. (1984). The Rise of Colleges. Institutions of Learning in Islam and the West. *Journal of the American Oriental Society*, 104(3), 586. <https://doi.org/10.2307/601679>
- Denessen, E., Driessen, G., & Slegers, P. (2005). Segregation by choice? A study of group-specific reasons for school choice. *Journal of Education Policy*, 20(3), 347–368. <https://doi.org/10.1080/02680930500108981>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Driessen, G., & Merry, M. S. (2006). Islamic schools in the Netherlands: Expansion or marginalization? *Interchange*, 37(3), 201–223. <https://doi.org/10.1007/s10780-006-9001-0>
- Duan, Y., Zhang, P., Zhang, T., Zhou, L., & Yin, R. (2023). Characterization of global research trends and prospects on platinum-resistant ovarian cancer: a bibliometric analysis. *Frontiers in Oncology*, 13(8), e25789. <https://doi.org/10.3389/fonc.2023.1151871>
- Eickelman, D. F. (1978). The Art of Memory: Islamic Education and its Social Reproduction. *Comparative Studies in Society and History*, 20(4), 485–516. <https://doi.org/10.1017/S0010417500012536>
- Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, 105(3), 1809–1831. <https://doi.org/10.1007/s11192-015-1645-z>
- Esposito, John L.; Zubaidah Rahim, Lily; Ghobadzadeh, N. (2018). The Politics of Islamism. Diverging Visions and Trajectories. In *The Politics of Islamism*. Springer.
- Farooqi, W. A. (1992). Islamic Art and Spirituality. In *Idealistic Studies* (Vol. 22, Issue 3). Suny Press. <https://doi.org/10.5840/idstudies19922231>
- Fazrul, R. (1984). Islam and Modernity. Transformation of an Intellectual Tradition. In *Archives de Sciences Sociales des Religions* (Vol. 58, Issue 2). University of Chicago Press. https://books.google.com/books?hl=en&lr=&id=FJcyIeHeeZwC&oi=fnd&pg=PP10&dq=%22fazlur+rahman%22&ots=giocVTNAGD&sig=Wq-suu3dRmeJsgc_fcUsL5NgeQo
- Fazrul, R. (2020). Islam Sejarah Pemikiran dan Peradaban. Al Mizan. https://books.google.com/books?hl=en&lr=&id=zubsDwAAQBAJ&oi=fnd&pg=PT2&dq=rekonstruksi+penegakan+hukum+di+laut+berbasis+nilai+keadilan&ots=K6Tqq6dVwz&sig=cw_NspfH5NbILRMDhkHy6tMDGo4
- Hafez, F. (2014). Shifting borders: Islamophobia as common ground for building pan-european right-wing unity. *Patterns of Prejudice*, 48(5), 479–499. <https://doi.org/10.1080/0031322X.2014.965877>
- Halstead, J. M. (2004). An Islamic concept of Education. *Comparative Education*, 40(4), 517–529. <https://doi.org/10.1080/0305006042000284510>
- Hu, Y., Yu, Z., Cheng, X., Luo, Y., Wen, C., & Carrera, P. (2020). A bibliometric analysis and visualization of medical data mining research. *Medicine (United States)*, 99(22), 166. <https://doi.org/10.1097/MD.00000000000020338>

- Huda, M., Yusuf, J. Bin, Azmi Jasmi, K., & Nasir Zakaria, G. (2016). Al-Zarnūjī's concept of knowledge (Ilm). *SAGE Open*, 6(3), 2158244016666885.
- Huda, S., Tsani, I., Syazali, M., Umam, R., & Jermisittiparsert, K. (2020). The management of educational system using three Law Auguste Comte: A case of Islamic schools. *Management Science Letters*, 10(3), 617–624. <https://doi.org/10.5267/j.msl.2019.9.018>
- Jansen, S. (2021). Music transcriptions and arrangements of the Cape Malay Choir Board Competition: exploring conceptual processes. University of Pretoria.
- Kepel, G. (2006). *The War for Muslim Minds*. In *The War for Muslim Minds*. Harvard University Press. <https://doi.org/10.4159/9780674274358>
- Kuhn, T. (2020). The structure of scientific revolutions. *Knowledge and Postmodernism in Historical Perspective*, 73(3), 340–355. <https://doi.org/10.5840/philstudies196413082>
- Lanjouw, J. O., & Schankerman, M. (1999). *The Quality of Ideas: Measuring Innovation With Multiple Indicators*. In NBER working paper. National bureau of economic research Cambridge, Mass., USA.
- Leydesdorff, L. (2005). Similarity measures, author cocitation analysis, and information theory. *Journal of the American Society for Information Science and Technology*, 56(7), 769–772. <https://doi.org/10.1002/asi.20130>
- Li, W., & Zhao, Y. (2015). Bibliometric analysis of global environmental assessment research in a 20-year period. *Environmental Impact Assessment Review*, 50, 158–166. <https://doi.org/10.1016/j.eiar.2014.09.012>
- Lukens-Bull, R. A. (2001). Two Sides of the Same Coin: Modernity and Tradition in Islamic Education in Indonesia. *Anthropology & Education Quarterly*, 32(3), 350–372. <https://doi.org/10.1525/aeq.2001.32.3.350>
- Madkur, A., & Muharom Albantani, A. (2018). Instilling Islamic Values in Foreign Language Teaching: An Indonesian Context. *International Conference on Education in Muslim Society (ICEMS 2017)*, 97–103. <https://doi.org/10.2991/icems-17.2018.20>
- McAllister, J. T., Lennertz, L., & Atencio Mojica, Z. (2022). Mapping A Discipline: A Guide to Using VOSviewer for Bibliometric and Visual Analysis. *Science and Technology Libraries*, 41(3), 319–348. <https://doi.org/10.1080/0194262X.2021.1991547>
- Metzler, D., Dumais, S., & Meek, C. (2007). Similarity measures for short segments of text. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 4425 LNCS, 16–27. https://doi.org/10.1007/978-3-540-71496-5_5
- Moore, J. A. (1980). Kuhn's The Structure of Scientific Revolutions Revisited. In *American Biology Teacher* (Vol. 42, Issue 5). Routledge. <https://doi.org/10.2307/4446944>
- Mozafari, A. (2010). Psychoanalysis and the Challenge of Islam. In *American Journal of Islam and Society* (Vol. 27, Issue 3). U of Minnesota Press. <https://doi.org/10.35632/ajis.v27i3.1308>
- Mutahhari, A. M., & Campbell, R. (1985). *Fundamentals of Islamic Thought: God, Man and the Universe*. In eng. trans, R. Campbell, Berkeley, Mezan press, Cairo. Mizan Press Berkeley, California. <http://www.byislam.com/site/wp-content/uploads/2015/04/Fundamentals-of-Islamic-Thought-God-Man-and-the-Universe.pdf>
- Nabolsi, M. M., & Carson, A. M. (2011). Spirituality, illness and personal responsibility: The experience of Jordanian Muslim men with coronary artery disease. *Scandinavian Journal of Caring Sciences*, 25(4), 716–724. <https://doi.org/10.1111/j.1471-6712.2011.00882.x>
- Nasr, S. H. (2003). *Islam: Religion, history, and civilization*.
- Nasr, S. V. R. (2000). The rise of Sunni militancy in Pakistan: The changing role of Islamism and the Ulama in society and politics. *Modern Asian Studies*, 34(1), 139–180. <https://doi.org/10.1017/S0026749X00003565>
- Nawi, A., Hamzah, M. I., & Abdul Rahim, A. A. (2015). Teachers acceptance of mobile learning for teaching and learning in islamic Education: A preliminary study. *Turkish Online Journal of Distance Education*, 16(1), 184–192. <https://doi.org/10.17718/tojde.30611>

- Newman, M. E. J., & Girvan, M. (2004). Finding and evaluating community structure in networks. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, 69(2), 26113. <https://doi.org/10.1103/PhysRevE.69.026113>
- Peng, J., Zhang, L., Drysdale, L., & Fong, G. H. (2000). The transcription factor EPAS-1/hypoxia-inducible factor 2 α plays an important role in vascular remodeling. *Proceedings of the National Academy of Sciences of the United States of America*, 97(15), 8386–8391. <https://doi.org/10.1073/pnas.140087397>
- Phelps, C., Heidl, R., & Wadhwa, A. (2012). Knowledge, Networks, and Knowledge Networks: A Review and Research Agenda. *Journal of Management*, 38(4), 1115–1166. <https://doi.org/10.1177/0149206311432640>
- Potter, W. G. (1981). Lotka's Law revisited.
- Preljević, H. (2022). Islam and the Arab Awakening. In *Context: Journal of Interdisciplinary Studies* (Vol. 2, Issue 2). Oxford University Press, USA. <https://doi.org/10.55425/23036966.2015.2.2.147>
- Rohana Hamzah et al. (2010). Spiritual Education Development Model. *Journal of Islamic and Arabic Education*, 2(2), 1–12.
- Roy, O. (2020). The Failure of Political Islam Revisited. In *Pathways to Contemporary Islam*. Harvard University Press. https://doi.org/10.5117/9789462987593_ch07
- Rustan, E., Hanifah, N., & Kanro, B. (2018). De-radicalization in the Implementation of Islamic Education Curriculum in SMA Masamba South Sulawesi. *Dinamika Ilmu*, 18(2), 271–283. <https://doi.org/10.21093/di.v18i2.1338>
- Sahin, A. (2018). Critical issues in islamic education studies: Rethinking islamic and western liberal secular values of Education. *Religions*, 9(11), 335. <https://doi.org/10.3390/rel9110335>
- Schöbel, S., Saqr, M., & Janson, A. (2021). Two decades of game concepts in digital learning environments – A bibliometric study and research agenda. *Computers and Education*, 173, 104296. <https://doi.org/10.1016/j.compedu.2021.104296>
- Sen, B. K., Taib, C. A. Bin, & Hassan, M. F. Bin. (1996). Library and information science literature and Lotka's Law. *Malaysian Journal of Library and Information Science*, 1(2), 89–93.
- Siddiqov, I. (2022). Dialectical and synergetic features of the development of theological and epistemological views in medieval eastern Islam. *European Journal of Humanities and Educational Advancements*, 3(2), 79–83.
- Srimulyani, E. (2012). Women from Traditional Islamic Educational Institutions in Indonesia : Negotiating Public Spaces. In *Women from Traditional Islamic Educational Institutions in Indonesia : Negotiating Public Spaces*. Amsterdam University Press. https://doi.org/10.26530/oapen_418531
- Subramanyam, K. (1979). Lotka'S Law and the Literature of Computer Science. *IEEE Transactions on Professional Communications*, PC-22(4), 187–189. <https://doi.org/10.1109/tpc.1979.6501759>
- Suyadi, S. (2022). Type developing an Islamic education curriculum on outcomes-based Education as a defensive strategy facing the challenges of industry revolution 4.0. *International Journal of Education and Learning*, 4(1), 41–57. <https://doi.org/10.31763/ijeled.v4i1.440>
- Talbani, A. (1996). Pedagogy, power, and discourse: Transformation of Islamic Education. *Comparative Education Review*, 40(1), 66–82. <https://doi.org/10.1086/447356>
- Taufik, M. (2020). Strategic Role of Islamic Religious Education in Strengthening Character Education in the Era of Industrial Revolution 4.0. *Jurnal Ilmiah Islam Futura*, 20(1), 86–104. <https://doi.org/10.22373/jiif.v20i1.5797>
- Ulfat, F. (2020). Empirical research: Challenges and impulses for Islamic religious Education. *British Journal of Religious Education*, 42(4), 415–423. <https://doi.org/10.1080/01416200.2020.1711513>

- Usée, C., Larivière, V., & Archambault, É. (2008). Conference proceedings as a source of scientific information: A bibliometric analysis. *Journal of the American Society for Information Science and Technology*, 59(11), 1776–1784. <https://doi.org/10.1002/asi.20888>
- Usman, U., Fuad, M., & Munajat, N. (2017). Islamic Educational Transformation: A Study of Scientific and Competence Development in the Study Program of Islamic Education in State Islamic Universities. *Jurnal Pendidikan Islam*, 6(1), 239. <https://doi.org/10.14421/jpi.2017.61.239-263>
- Uyuni, B., & Adnan, M. (2020). The Challenge of Islamic Education in 21st Century. *SALAM: Jurnal Sosial Dan Budaya Syar-I*, 7(11), 1101–1120. <https://doi.org/10.15408/sjsbs.v7i11.18291>
- van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>
- van Eck, N. J., & Waltman, L. (2011). Text mining and visualization using VOSviewer. *ArXiv Preprint ArXiv:1109.2058*. <http://arxiv.org/abs/1109.2058>
- van Eck, N. J., & Waltman, L. (2014). Visualizing Bibliometric Networks. *Measuring Scholarly Impact*, 285–320. https://doi.org/10.1007/978-3-319-10377-8_13
- Van Eck, N. J., & Waltman, L. (2007). Bibliometric mapping of the computational intelligence field. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 15(5), 625–645. <https://doi.org/10.1142/S0218488507004911>
- Van Eck, N. J., & Waltman, L. (2009). How to normalize co-occurrence data? An analysis of some well-known similarity measures. *Journal of the American Society for Information Science and Technology*, 60(8), 1635–1651. <https://doi.org/10.1002/asi.21075>
- Van Raan, A. F. J. (1993). Advanced bibliometric methods to assess research performance and scientific development: basic principles and recent practical applications. *Research Evaluation*, 3(3), 151–166. <https://doi.org/10.1093/rev/3.3.151>
- Waltman, L. (2016). A review of the literature on citation impact indicators. *Journal of Informetrics*, 10(2), 365–391. <https://doi.org/10.1016/j.joi.2016.02.007>
- Waltman, L., van Eck, N. J., & Noyons, E. C. M. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of Informetrics*, 4(4), 629–635. <https://doi.org/10.1016/j.joi.2010.07.002>
- Wang, M., & Chai, L. (2018). Three new bibliometric indicators/approaches derived from keyword analysis. *Scientometrics*, 116(2), 721–750. <https://doi.org/10.1007/s11192-018-2768-9>
- Xue, J. (2018). Understanding knowledge networks and knowledge flows in high technology clusters: the role of heterogeneity of knowledge contents. *Innovation: Organization and Management*, 20(2), 139–163. <https://doi.org/10.1080/14479338.2017.1369355>
- Zhang, X., Chen, H., Wang, W., & Ordóñez de Pablos, P. (2016). What is the role of I.T. in innovation? A bibliometric analysis of research development in I.T. innovation. *Behaviour and Information Technology*, 35(12), 1130–1143. <http://>