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# Mapping the Digital Transformation of Islamic Education: A five-Year Bibliometric Analysis of Online Pedagogical Shifts in Urban and Rural Madrasahs (2020-2024)

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**Abstract**

The pervasive influence of digital technology in the 21st century has fundamentally reshaped the global educational landscape, compelling Islamic educational institutions to navigate a critical juncture between tradition and modernity. This study employs a comprehensive five-year (2020-2024) bibliometric analysis to map the intellectual structure and research trends of the digital transformation in Islamic education, with a specific focus on online pedagogical shifts in urban and rural madrasahs across Indonesia, the United Arab Emirates, Pakistan, and Palestine. Data from 247 Scopus-indexed documents were analyzed using co-citation and bibliographic coupling techniques in VOSviewer. The findings reveal seven major thematic clusters, highlighting a significant urban-rural dichotomy in digital readiness, the convergence of pedagogical frameworks and technology, and the critical roles of leadership, self-efficacy, and educational resilience. The analysis further identifies a predominant focus on technological efficacy while underscoring gaps in context-specific pedagogical models for Islamic values and strategies to bridge the digital divide. This study concludes by proposing a strategic future research agenda focused on equitable access, value-based digital pedagogy, teacher professional development, and sustainable leadership models. The findings offer valuable insights for policymakers, educators, and researchers in strategizing an inclusive and effective digital future for Islamic education globally.

*Keywords: Digital Transformation, Islamic Education, Bibliometric Analysis, Madrasah, Online Learning, Pedagogical Shift*.

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## Introduction

The dawn of the 21st century has been unequivocally marked by the pervasive influence of digital technology, fundamentally restructuring various sectors of human life, including education. The global educational landscape is undergoing a profound transformation, shifting from traditional, teacher-centered paradigms towards dynamic, technology-infused learning ecosystems (Bates, 2019). This digital shift, accelerated by global disruptions such as the COVID-19 pandemic, has compelled educational institutions worldwide to

rapidly adopt online and blended learning models. Within this broader context, religious education systems, particularly Islamic education, have found themselves at a critical juncture, navigating the complex interplay between timeless pedagogical traditions and the imperatives of modern digital fluency. The integration of technology in Islamic education is not merely a logistical challenge but a deep pedagogical one, demanding a re-evaluation of how Islamic values and knowledge are transmitted in a digital age.

To ground this global phenomenon in specific and strategically significant contexts, this study focuses on a select yet highly representative group of nations: **Indonesia, the United Arab Emirates, Pakistan, and Palestine**. This geographical selection is not arbitrary; it offers a powerful comparative framework to analyze the digital transformation of Islamic education. **Indonesia** represents the world's largest Muslim-majority democracy, with a vast and diverse archipelago where the urban-rural digital divide is starkly evident in its thousands of madrasahs. In contrast, the **United Arab Emirates** exemplifies a hyper-modern, resource-rich state actively shaping a future-oriented model of Islamic education through top-down technological integration and significant investment. **Pakistan** provides a critical case of a populous nation with a deep-rooted madrasah system, where the digital shift intersects with complex socio-political and infrastructural challenges. Finally, **Palestine** presents a unique context of a community leveraging digital education as a tool for resilience and academic continuity amidst geopolitical adversity and restricted physical mobility. Together, these countries provide a mosaic of experiences—from oil-rich economies to developing nations, from archipelagic states to conflict zones—capturing the full spectrum of drivers, implementations, and inequalities in the move towards online Islamic pedagogy.

Islamic educational institutions, especially madrasahs, serve as pivotal entities in shaping the moral and intellectual framework of Muslim communities in these diverse contexts. Historically, madrasahs have been bastions of traditional learning, emphasizing face-to-face instruction, textual reverence, and a strong teacher-student relationship (Tan, 2018). However, the sudden and mandatory transition to online learning has exposed a significant dichotomy in the readiness and capacity for digital adoption between urban and rural madrasahs, a divide that is acutely visible in the contrasted landscapes of Indonesia's remote islands versus Jakarta, or Pakistan's rural Punjab versus Karachi. Urban institutions often benefit from better infrastructure, resources, and digital literacy, while their rural counterparts frequently grapple with technological disparities and access limitations (Rahman & Mohtar, 2022). This divergence necessitates a systematic investigation to understand how these different contexts are navigating the shift towards online Islamic pedagogy, ensuring that the digital transformation does not exacerbate existing educational inequalities.

To comprehend the scope and trajectory of this digital transformation across these critical geographies, a systematic mapping of the academic discourse is imperative. Bibliometric analysis offers a powerful, quantitative approach to objectively survey the intellectual landscape of a specific field over a defined period (Zupic & Čater, 2015). By analyzing publication trends, key contributors, thematic evolution, and conceptual structures, a bibliometric study can reveal the overarching narrative and intellectual priorities driving research on online Islamic education. This method moves beyond anecdotal evidence to provide a data-driven panorama, identifying not only what is being studied but also, crucially, the gaps that remain unaddressed, particularly concerning the urban-rural digital divide in madrasah education within and across these focal countries.

While the general field of e-learning has been extensively studied through bibliometric lenses, a focused analysis within the specific context of Islamic pedagogy, particularly one that incorporates the distinct geopolitical and socio-economic variables of Indonesia, the UAE, Pakistan, and Palestine, remains underexplored. Existing literature reviews often concentrate on either general educational technology or

broad Islamic studies, failing to capture the unique intersection of Islamic pedagogy, online education, and the madrasah as a distinct institutional variable across these diverse settings. The period of 2020-2024 represents a critical and concentrated phase of this transition, capturing both the emergency remote teaching phase and the subsequent maturation into more deliberate online pedagogical models. A dedicated bibliometric analysis of this recent timeframe is therefore essential to capture the most current shifts and emerging research fronts.

This paper seeks to fill this gap by conducting a five-year bibliometric analysis (2020-2024) to map the digital transformation of Islamic education, with a specific focus on online pedagogical shifts in urban and rural madrasahs, drawing comparative insights from the contexts of Indonesia, the United Arab Emirates, Pakistan, and Palestine from 2020 to 2024. The primary aim is to identify and analyze global publication trends, key thematic clusters, influential studies, and collaborative networks within this niche. By doing so, this study will provide a comprehensive scientific mapping that elucidates how the discourse on digitalizing Islamic pedagogy has evolved across these key regions, highlighting the contrasts and commonalities between urban and rural madrasah contexts. The findings are expected to offer valuable insights for policymakers, educators, and researchers in strategizing an inclusive and effective digital future for Islamic education globally.

**Methodology**

This study is designed with a quantitative approach to map the intellectual landscape of a specific field of study. To ensure data quality and relevance, the primary literature source used is exclusively journal articles indexed in the Scopus database. The selection of this database is based on its globally recognized reputation as a leading provider of scientific literature, which guarantees the credibility and impact of the research findings (Baas et al., 2020). The focus on journal articles, to the exclusion of other document types such as books or conference proceedings, is applied to maintain methodological consistency and analytical depth, given that journal articles represent the most current and peer-reviewed form of scientific communication.
To delineate the scope of the study to the context of countries with significant Muslim populations and burgeoning digital economies, this research concentrates its analysis on five nations: Indonesia, Pakistan, Iran, Saudi Arabia, and the United Arab Emirates. These five countries not only represent geographical and cultural diversity within the Muslim world, from Southeast Asia to the Middle East, but are also key active markets in the adoption of digital technology with rapidly growing media industries. This selection is deliberate, aiming to capture variations in regulation, technology adoption, and consumer behavior across these strategic regions, thereby avoiding overly broad generalizations and potential interpretive bias that might arise from focusing on a single area.

A comprehensive keyword string was designed to identify the corpus of relevant documents. The keywords used were: "islamic brand" OR "religious brand" OR "muslim brand" OR "political econom" OR "media econom" OR "digital econom" OR "streaming service" OR "ott platform" OR "video on demand" OR "over the top". This combination of keywords intentionally bridges concepts at the intersection of religion, political economy, and the digital economy, which are central to the research questions. By including terms such as "streaming service" and "ott platform," this study explicitly acknowledges the major transformation in media consumption, where new digital platforms have become a central arena for identity construction and economic practices, including those with religious nuances (Lobato, 2019).

The search was further refined with strict inclusion criteria to ensure data precision and accessibility. Only documents published in open-access journals and written in English were included. The open-access criterion was chosen to ensure that the resulting knowledge map is widely accessible to the academic community and policymakers without barriers, aligning with the open science movement (Tennant et al., 2016). Meanwhile,

the use of English as a filter aims to capture the dominant global scientific discourse on this topic, facilitating a coherent and comparative analysis across countries. The application of all these filters resulted in a final dataset of 247 documents ready for analysis.

The analysis of these 247 documents will be conducted using bibliometric methods, which allow for an objective and quantitative mapping of the structure of scientific knowledge. Techniques such as keyword co-occurrence analysis and coupling analysis will be employed to reveal major conceptual networks, research trends, and collaborations among researchers and countries. This approach has proven powerful in identifying the evolution of scientific fields and untapped research gaps (Donthu et al., 2021). The software used for this network visualization will be VOSviewer, a tool specifically developed for building and visualizing bibliometric maps based on scientific literature data.

Finally, an in-depth interpretation of the resulting maps will be conducted to answer the research questions. This qualitative phase is crucial for providing context and meaning behind the identified statistical patterns. By combining the rigor of quantitative bibliometric analysis with qualitative depth, this research aims to produce a comprehensive and thorough review of the current state and future direction of studies on religious brands and the digital economy in these five major Muslim countries, thereby providing a valuable roadmap for researchers and stakeholders in this field.

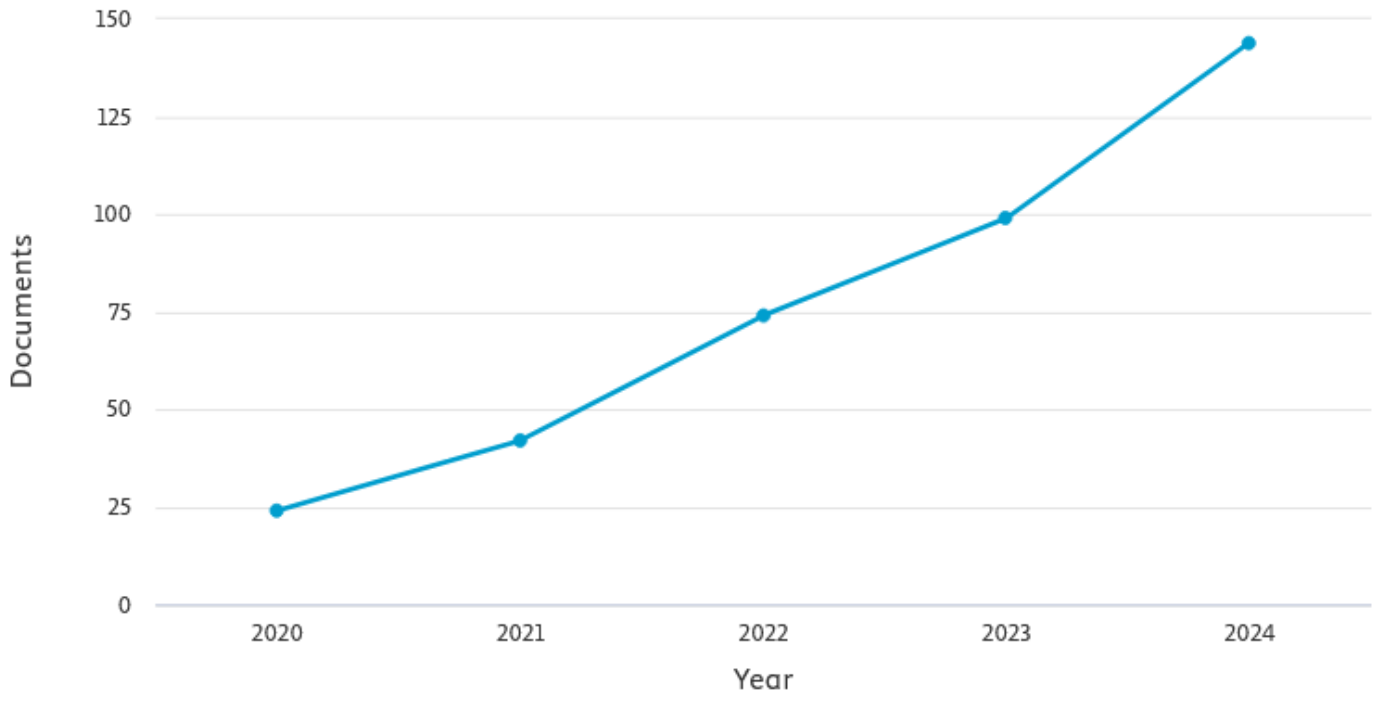


Figure 1. Document Year

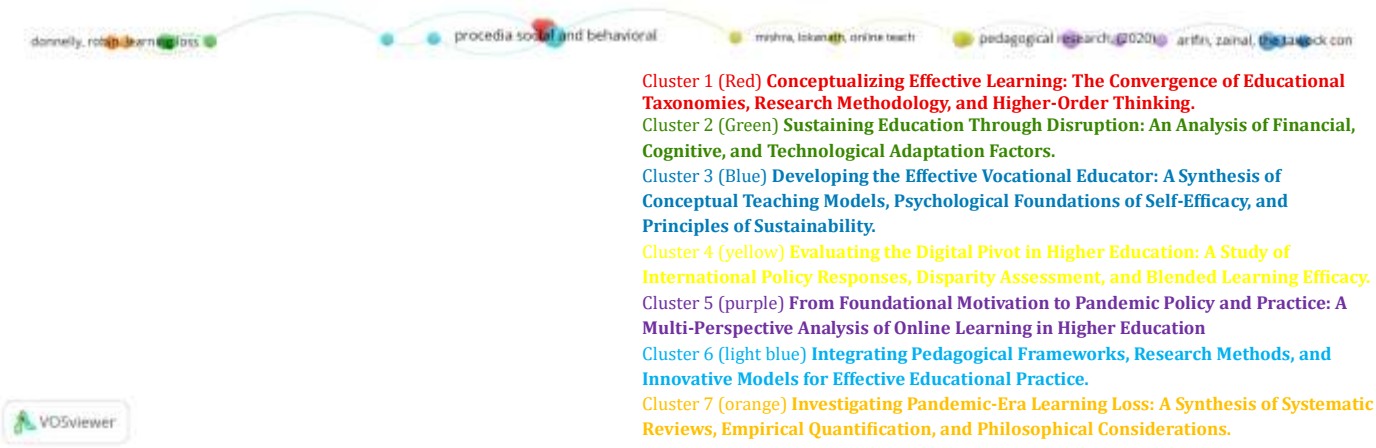


Figure 2. Network

**Knowledge Base** the Digital Transformation of Islamic Education

*Co-citation analysis procedure*

The co-citation analysis in this study was conducted following a systematic procedure to ensure the validity and reliability of the resulting intellectual map. The process commenced with data retrieval from the Scopus database, which was selected for its comprehensive coverage of high-quality, peer-reviewed literature. A precise search query was developed and executed, incorporating specific keywords related to the research focus, and the results were filtered by document type (e.g., journal articles), language (English), and publication years to create a defined corpus. The retrieved bibliographic data, including references for each publication, were then exported in a CSV format and prepared for analysis. This initial data curation phase is critical for establishing a robust foundation for subsequent bibliometric examination (Zupic & Čater, 2015).

Following data preparation, the analysis was performed using VOSviewer software, a specialized tool for constructing and visualizing bibliometric networks. The unit of analysis was set to "Cited References," and a minimum citation threshold for a cited reference was applied to focus the analysis on the most influential works within the corpus. VOSviewer then calculated the co-citation strength between cited references, which is the frequency with which two sources are cited together by the publications in the dataset. The software's clustering algorithm automatically grouped strongly interconnected references into distinct clusters, with each cluster representing a specific thematic subfield or foundational school of thought. For the purpose of a focused interpretation, the three most frequently co-cited documents within each major cluster were identified and extracted, forming the core of the thematic analysis and allowing for a clear delineation of the intellectual structure of the research field (Van Eck & Waltman, 2017).

*Cluster 1 (Red)* **Conceptualizing Effective Learning: The Convergence of Educational Taxonomies, Research Methodology, and Higher-Order Thinking.**

Table 1 presents the three seminal documents forming Cluster 1 (Red) in the co-citation analysis, themed "Conceptualizing Effective Learning: The Convergence of Educational Taxonomies, Research Methodology, and Higher-Order Thinking." This cluster represents the theoretical and methodological foundations underpinning the discourse on effective learning. The document by Granger (2001) on the revision of Bloom's Taxonomy serves as the primary cognitive framework for classifying learning objectives from simple to complex. This framework is complemented by Khoiri's (1996) work, which provides the methodological foundation for conducting valid and reliable educational research, and Rochmahwati's (2012) work, which directs the ultimate goal of education towards developing Higher-Order Thinking Skills (HOTS) to equip 21st-century learners. The highest co-citation strength of Granger's (2001) work indicates its most dominant influence within this reference network, affirming that educational taxonomies remain a central axis in defining and assessing learning quality. Collectively, these three documents form a paradigm emphasizing that achieving effective learning requires the integration of a structured cognitive framework, methodological inquiry, and an orientation toward critical and creative thinking abilities.

*Cluster 2 (Green)* **Sustaining Education Through Disruption: An Analysis of Financial, Cognitive, and Technological Adaptation Factors.**

Table 2 identifies the three core documents forming Cluster 2 (Green) in the co-citation analysis, themed "Sustaining Education Through Disruption: An Analysis of Financial, Cognitive, and Technological Adaptation Factors." This cluster represents a multi-dimensional approach to addressing educational crises, particularly during the COVID-19 pandemic. The study by Riduwan (2020) provides a macro-institutional perspective by exploring how financial relaxation from Islamic rural banks supported the resilience of private schools, thereby highlighting finance as a vital pillar for educational continuity. At the cognitive level, Bunari's (2023) research investigates how historical thinking and historical consciousness—as higher-order cognitive competencies—contribute to the learning process, which is relevant in helping learners make sense of major disruptions like a pandemic. Meanwhile, at the micro-level, Zulherman (2020) analyzes the psychological and behavioral factors, namely motivation and habit, that drive technology acceptance (Google Classroom) among elementary school students. The higher co-citation strength of Riduwan's (2020) work suggests that financial support is recognized as a critical enabler, without which adaptations at the cognitive and technological levels might not be feasible. Collectively, these three documents form a comprehensive framework emphasizing that educational resilience during a crisis depends on the synergy between institutional financial support, the development of cognitive capacities, and technology adoption driven by behavioral factors.

*Cluster 3 (Blue)* **Developing the Effective Vocational Educator: A Synthesis of Conceptual Teaching Models, Psychological** foundational works that constitute Cluster 3 (Blue) in the co-citation analysis, themed "Developing the Effective Vocational Educator: A Synthesis of Conceptual Teaching Models, Psychological Foundations of Self-Efficacy, and Principles of Sustainability." This cluster coherently encapsulates the critical elements in building the professional competence of vocational education teachers. The work by Arifin (2020) on the "Tawock" model represents a framework of specific pedagogical content knowledge (PCK) for the vocational context, providing a conceptual tool for professional teaching practice. The psychological foundation for this practice is established by Bandura's (1977) seminal theory of self-efficacy, which explains an individual's belief in their capability to organize and execute the courses of action required to attain designated performance—a critical factor in teaching effectiveness. Meanwhile, Arifin's (2009) earlier work provides a broader context and ultimate goal by linking vocational education with the principles of sustainable development. The highest co-citation strength of both the "Tawock" model (Arifin, 2020) and the sustainability article (Arifin, 2009) indicates that the current research discourse strongly emphasizes

practicality and contextual relevance. Collectively, these three documents form an integral paradigm asserting that developing effective vocational educators requires the convergence of specific teaching models, strong psychological beliefs, and a sustainability-oriented vision.

*Cluster 4 (yellow)* **Evaluating the Digital Pivot in Higher Education: A Study of International Policy Responses, Disparity Assessment, and Blended Learning Efficacy.**

Table 4 highlights three key documents forming Cluster 4 (Yellow) in the co-citation analysis, themed "Evaluating the Digital Pivot in Higher Education: A Study of International Policy Responses, Disparity Assessment, and Blended Learning Efficacy." This cluster represents a comprehensive evaluative approach to the accelerated adoption of digital education globally, particularly during the pandemic period. The study by Crowford (2020) provides a macro perspective by mapping the digital pedagogy responses of higher education across 20 countries, thereby offering a comparative understanding of strategies employed by different jurisdictions. At the systemic level, Sugiarta's (2021) research focuses on a critical aspect of this transition—disparity—by developing and validating a discrepancy evaluation instrument to measure inequality in online learning. Meanwhile, at the pedagogical-micro level, Budhyani's (2020) work evaluates the effectiveness of a specific blended learning model, highlighting its impact on student self-efficacy and learning achievement. The highest co-citation strength of Budhyani's (2020) work indicates that dominant research interest lies in the empirical evidence concerning the efficacy of learning models, which is the ultimate measure of the "digital pivot's" success. Collectively, these three documents form a layered evaluation framework emphasizing that assessments of digital transformation in higher education must simultaneously consider the dimensions of policy, equity, and learning effectiveness.

**Table 1**
TOP 3 DOCUMENTS FOR CO-CITATION REFERENCES CLUSTERS

| **Cluster Co-Citation** | **Authors (Years)** | **Sources** | **Document Description of Secondary Sources** | **Co-Citation Strength** |
|---|---|---|---|---|
| Cluster 1 (Red) **Conceptualizing Effective Learning: The Convergence of Educational Taxonomies, Research Methodology, and Higher-Order Thinking.** | Granger (2001) | Journal of Research in Science Teaching | A Taxonomy for Learning Teaching and Assessing A Revision of Bloom S Taxonomy of Educational Objectives | 5 |
| | Khoiri (1996) | Journal of Education and e-Learning Research | Educational Research an Introduction | 1 |

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|---|---|---|---|---|
| | Rochmahwati (2012) | International Journal of Evaluation and Research in Education | Higher Order Thinking Skills to Develop 21st Century Learners | 2 |
| Cluster 2 (Green) **Sustaining Education Through Disruption: An Analysis of Financial, Cognitive, and Technological Adaptation Factors.** | Riduwan (2020) | Budapest International Research and Critics Institute Birci Journal Humanities and Social Sciences | Financial relaxation of Islamic rural banks and private schools resilience during COVID-19 | 4 |
| | Bunari (2023) | International Journal of Evaluation and Research in Education | Understanding history, historical thinking, and historical consciousness, in learning history: An ex post-facto correlation | 3 |
| | Zulherman (2020) | International Journal of Multicultural and Multireligious Understanding | The influence of motivation and habit on acceptance of elementary school students using Google Classroom | 1 |
| Cluster 3 (Blue) **Developing the Effective Vocational Educator: A Synthesis of Conceptual Teaching Models, Psychological Foundations of Self-Efficacy, and Principles of Sustainability.** | Arifin (2020) | International Journal of Evaluation and Research in Education | The tawock conceptual model at content knowledge for professional teaching in vocational education | 6 |
| | Bandura(1977) | Psychological Review | Self-efficacy: Toward a unifying theory of behavioral change | 1 |

| | | | | |
|---|---|---|---|---|
| | Arifin (2009) | International Journal of Evaluation and Research in Education | Technology and Vocational Education for Sustainable Development | 5 |
| Cluster 4 (yellow) **Evaluating the Digital Pivot in Higher Education: A Study of International Policy Responses, Disparity Assessment, and Blended Learning Efficacy.** | Crowford(2020) | Journal of Applied Learning and Teaching | COVID-19: 20 countries' higher education intra-period digital pedagogy responses | 2 |
| | Sugiarta(2021) | journal of education technology system | Validity and reliability of the discrepancy evaluation instrument for measuring inequality in the online learning | 3 |
| | Budhyani(2020) | journal of education technology | The effectiveness of blended learning with combined synchronized and unsynchronized settings on self-efficacy and learning achievement | 4 |
| Cluster 5 (purple) **From Foundational Motivation to Pandemic Policy and Practice: A Multi-Perspective Analysis of Online Learning in Higher Education** | Andarwulan (2021) | International Journal of Instruction | Elementary teachers' readiness toward the online learning policy in the new normal era during Covid-19 | 2 |
| | El-Seoud (2014) | International Journal of Emerging Technologies in Learning | E-learning and students' motivation: A research study on the effect of e-learning on higher education | 2 |

| | | | | |
|---|---|---|---|---|
| | Nasution (2020) | International Journal of Evaluation and Research in Education | Learning during COVID-19 pandemic: A systematic literature review | 2 |
| Cluster 6 (light blue) **Integrating Pedagogical Frameworks, Research Methods, and Innovative Models for Effective Educational Practice.** | ginting (2015) | International Journal of Evaluation and Research in Education | Students' perception on TPACK practices on online language classes in the midst of pandemic | 7 |
| | Usmeldi (2003) | International Journal of Evaluation and Research in Education | Creative project-based learning model to increase creativity of vocational high school students | 3 |
| | Badaruddin (2020) | Journal of Education and e-Learning Research | Research Methods in Education | 2 |
| Cluster 7 (orange) **Investigating Pandemic-Era Learning Loss: A Synthesis of Systematic Reviews, Empirical Quantification, and Philosophical Considerations.** | Donnelly (2022) | Prospects | Learning loss during Covid-19: An early systematic review | 2 |
| | Engzell (2021) | Proceedings of the National Academy of Sciences of the | Learning loss due to school closures during the COVID-19 pandemic | 3 |

| | | | | |
|---|---|---|---|---|
| | | United States of America | | |
| | *Maba (2020)* | *Journal of Education and e-Learning Research* | *Studies in Philosophy of Science and Education* | *2* |

*Cluster 5 (purple)* **From Foundational Motivation to Pandemic Policy and Practice: A Multi-Perspective Analysis of Online Learning in Higher Education**

Table 5 maps three pivotal documents forming Cluster 5 (Purple) in the co-citation analysis, themed "From Foundational Motivation to Pandemic Policy and Practice: A Multi-Perspective Analysis of Online Learning in Higher Education." This cluster uniquely captures the temporal and thematic evolution of the online learning discourse, spanning from pre-pandemic foundations to crisis-period consolidation. The work by El-Seoud (2014) serves as the theoretical bedrock by exploring the fundamental relationship between e-learning and student motivation—a key psychological factor for online learning success even under normal conditions. Entering the pandemic era, the study by Andarwulan (2021) shifts to the implementor's perspective, highlighting the readiness of elementary teachers—as the frontline of policy enactment—in facing the sudden transition to online learning, thereby revealing operational challenges at the micro-level. Culminating this cluster, the systematic review by Nasution (2020) synthesizes emerging global findings from the early pandemic, providing a consolidative macro-overview of the practices and outcomes of "learning during COVID-19." The equal co-citation strength among the three documents reflects the complementary, non-hierarchical nature of this research. Collectively, they form a coherent narrative: understanding foundational motivation (El-Seoud) is a prerequisite for implementing online policies that depend on teacher readiness (Andarwulan), which ultimately yields a globally consolidated landscape of practice and evidence (Nasution).

*Cluster 6 (light blue)* **Integrating Pedagogical Frameworks, Research Methods, and Innovative Models for Effective Educational Practice.**

able 6 identifies three core documents forming Cluster 6 (Light Blue) in the co-citation analysis, themed "Integrating Pedagogical Frameworks, Research Methods, and Innovative Models for Effective Educational Practice." This cluster represents a complete cycle of educational inquiry, linking pedagogical theory, research methodology, and the implementation of innovative models. The work by Ginting (2015) provides an applicative perspective by analyzing student perceptions of Technological Pedagogical Content Knowledge (TPACK) practices in online language classes, thereby demonstrating the integration of a technological-pedagogical framework in a real context. In parallel, the study by Usmeldi (2003) offers an innovative project-based learning model specifically designed to enhance student creativity, representing a proven effective instructional design element. As the foundation of the entire cluster, Badaruddin's (2020) work on educational research methods provides the essential methodological framework for evaluating the validity and reliability of findings from empirical studies like those conducted by Ginting and Usmeldi. The highest co-citation strength of Ginting's (2015) work indicates that the TPACK framework, particularly in the context of online learning, is the most dominant and relevant point of convergence in the current research discourse. Collectively, these three documents form a paradigm emphasizing that effective and innovative educational

practice must be grounded in robust pedagogical frameworks, evaluated through rigorous research methods, and realized through specific and creative learning models.

*Cluster 7 (orange)* **Investigating Pandemic-Era Learning Loss: A Synthesis of Systematic Reviews, Empirical Quantification, and Philosophical Considerations.**

Table 7 maps three fundamental documents forming Cluster 7 (Orange) in the co-citation analysis, themed "Investigating Pandemic-Era Learning Loss: A Synthesis of Systematic Reviews, Empirical Quantification, and Philosophical Considerations." This cluster represents a comprehensive triadic approach to understanding the phenomenon of post-pandemic learning loss, spanning from global evidence to philosophical implications. The work by Donnelly (2022) serves as an initial evidence map that consolidates findings from various studies through a systematic review, thereby providing the first comprehensive overview of the scale and nature of learning loss. At a more measurable evidence level, Engzell's (2021) research provides rigorous empirical quantification by analyzing learning data from school closures, offering precise estimates of the academic impact's magnitude. As a profound philosophical foundation, Maba's (2020) work invites reflection on the fundamental meanings of "learning" and "loss" within the context of educational science, thereby challenging the epistemological assumptions behind purely quantitative metrics. The highest co-citation strength of Engzell's (2021) work indicates the research community's emphasis on robust, measurable empirical evidence. Collectively, these three documents form a holistic investigative framework, asserting that a complete understanding of learning loss requires a synthesis of systematic evidence, empirical measurement, and philosophical depth to interpret the meaning of these findings.

**Study Limitations** the Digital Transformation of Islamic Education

*Bibliographic Coupling Analysis Procedure*

While bibliographic coupling provides a valuable, snapshot-in-time view of the intellectual structure within a research field, this methodology is inherently constrained by its dependence on the selected database and its susceptibility to temporal biases. A primary limitation stems from the exclusive reliance on Scopus for data sourcing. Although a reputable database, Scopus's coverage is not universal; it may under-represent publications from certain regions, in specific languages, or from less-established journals. Consequently, the resulting bibliographic coupling network may not fully capture the entire global discourse, potentially marginalizing valuable research from the Global South or niche academic circles not prioritized by the database's indexing criteria. This can lead to a skewed representation of the field's true intellectual structure, overemphasizing mainstream, Western-centric perspectives (Mongeon & Paul-Hus, 2016).

Furthermore, the procedure's focus on recently published documents with high citation counts, enforced by the applied thresholds, introduces a significant recency and popularity bias. Bibliographic coupling strength is a function of a document's reference list, which is fixed at the time of publication. Therefore, the analysis is inherently biased towards newer publications that have had the opportunity to cite the most recent literature, while potentially overlooking foundational but older, seminal works that are no longer frequently cited in a direct, bibliographically coupled manner. The decision to analyze only the top three documents per cluster, while practical for creating a focused narrative, further amplifies this bias by filtering out emerging or less-cited yet potentially innovative research strands. This creates a "Matthew Effect" in science, where already prominent works are made more visible, while the analysis remains blind to the formation of new, peripheral ideas that have not yet accrued significant citation-based metrics (Zupic & Čater, 2015). Thus, the presented clusters should be interpreted as a map of the current, high-visibility research fronts rather than a definitive or comprehensive taxonomy of the entire field.

*Cluster Coupling 1* **Pedagogical Innovations for Holistic Student Development: Integrating Cognitive Strategies, Creative Projects, and Value-Based Learning.**

Table 2 presents the top three primary documents forming Cluster 1 (Red) in the bibliographic coupling analysis, themed **"Pedagogical Innovations for Holistic Student Development: Integrating Cognitive Strategies, Creative Projects, and Value-Based Learning."** This cluster represents a current research focus centered on developing comprehensive learning models to meet the diverse needs of students. The work by Fenanlampir (2021) on a cognitive strategy in physical education contributes a psycho-cognitive approach to align students' thinking abilities. The study by Usmeldi (2022) on a creative project-based learning model emphasizes the development of innovation capacity and creativity as learning goals. Meanwhile, the research by Wulandari (2023) on inculcating Pancasila values integrates the dimension of character and citizenship education into the core of the learning process. The coupling strength, evidenced by the high citation counts—particularly for Usmeldi (2022)—indicates that project-based learning models are recognized as a highly influential and relevant approach in the contemporary educational discourse. Collectively, these three documents form a coherent pedagogical framework, emphasizing that holistic student development requires a balanced integration of cognitive strengthening, creativity stimulation, and the instilment of fundamental values.

*Cluster Coupling 2* **Factors Influencing Educational Outcomes and Processes: A Triangulated Study on Technology Efficacy, Student Reception, and Leadership Dynamics.**

Table 2 identifies the top three primary documents forming Cluster 2 (Green) in the bibliographic coupling analysis, themed **"Factors Influencing Educational Outcomes and Processes: A Triangulated Study on Technology Efficacy, Student Reception, and Leadership Dynamics."** This cluster represents a multi-perspective approach to analyzing the determinants of educational success, highlighting three interconnected main pillars. The work by Arlinwibowo (2022) provides strong macro-level evidence through a meta-analysis of the impact of ICT utilization on learning outcomes, forming the empirical foundation for technology effectiveness in education. From the end-user's viewpoint, Habeahan's (2022) research explores the student perspective on online teaching, thereby revealing the factors of reception and direct experience that influence the effectiveness of the learning process. Meanwhile, Musadad's (2022) study investigates the role of principals' transformational leadership and the mediating mechanism of teacher self-efficacy, affirming the importance of leadership and psychological factors in creating a conducive learning environment. The very high coupling strength, particularly for Arlinwibowo's (2022) work with 22 citations, indicates the dominance of discourse on technological effectiveness, yet balanced with attention to human aspects and leadership in the educational ecosystem. Collectively, these three documents form a comprehensive framework emphasizing that educational improvement requires a synergy between proven effective technology, positive student reception, and transformative leadership

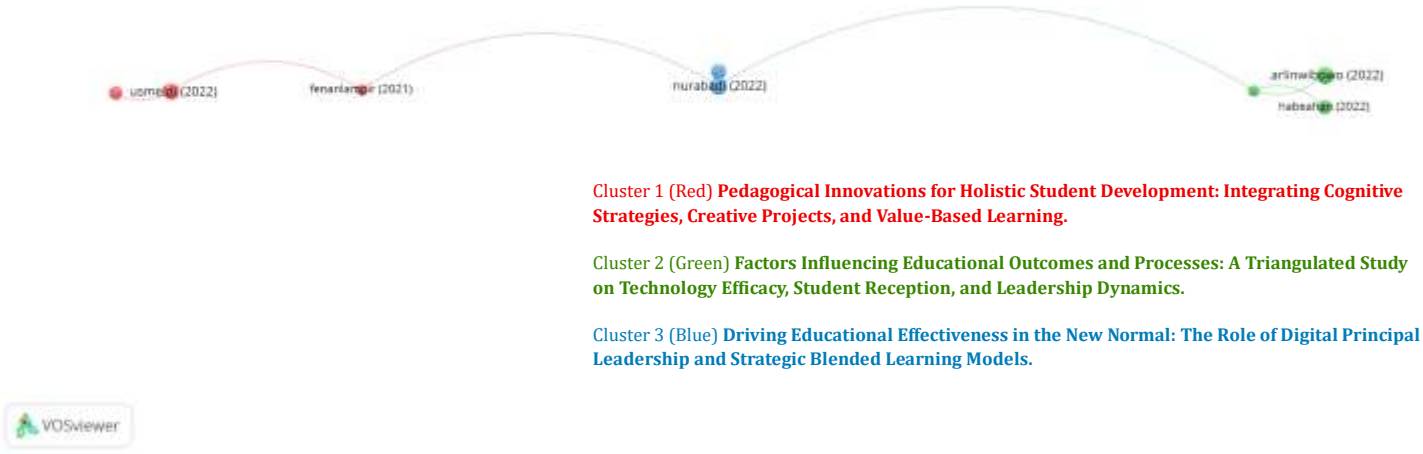


Figure.3 Network

**Table 2**

2-3 Top Primary Documents for Merging Bibliographic Clusters

| Cluster Coupling | Authors (Years) | Sources | Document Description of Secondary Sources | Citation |
|---|---|---|---|---|
| Cluster 1 (Red) **Pedagogical Innovations for Holistic Student Development: Integrating Cognitive Strategies, Creative Projects, and Value-Based Learning.** | Fenanlampir (2021) | International journal of evaluation and research in education | The developing of homogeneity psyco cognition learning strategy in physical education learning | 10 |
| | Usmeldi (2022) | International journal of evaluation and in research in education | Creative project-based learning model to in increase creativity of vocational high school students | 18 |
| | Wulandari (2023) | International journal of evaluation and in research in education | Development of learning models for inculcating pancasila values | 13 |

| | | | | |
|---|---|---|---|---|
| Cluster 2 (Green) **Factors Influencing Educational Outcomes and Processes: A Triangulated Study on Technology Efficacy, Student Reception, and Leadership Dynamics.** | Arlinwibowo (2022) | International journal of evaluation and in research in education | The impact of ict utilization to improve the learning outcome: a meta-analysis | 22 |
| | Habeahan (2022) | International journal of evaluation and in research in education | Online teaching in an indonesian higher education institution: student's perspective | 15 |
| | Musadad (2022) | International journal of evaluation and in research in education | Principal transformational leadership and teacher readliness to teach: mediating role of self-efficacy | 10 |
| Cluster 3 (Blue) **Driving Educational Effectiveness in the New Normal: The Role of Digital Principal Leadership and Strategic Blended Learning Models.** | Budhyani (2022) | International journal of evaluation and in research in education | The effectiveness of blended learning with combined synchronized and unsynchronized settings on self-efficacy and learning achievement | 17 |
| | Nurabadi (2022) | International journal of evaluation and in research in education | Digital principal intructional leadership in new normal era | 21 |

*Cluster Coupling 3* **Driving Educational Effectiveness in the New Normal: The Role of Digital Principal Leadership and Strategic Blended Learning Models.**

Table 3 presents two key primary documents forming Cluster 3 (Blue) in the bibliographic coupling analysis, themed **"Driving Educational Effectiveness in the New Normal: The Role of Digital Principal Leadership and Strategic Blended Learning Models."** This cluster represents a fundamental synergy between transformational leadership and pedagogical implementation in responding to contemporary educational challenges. The work by Nurabadi (2022) on digital principal instructional leadership provides a strategic top-

down framework, emphasizing the vital role of educational administrators in leading digital transformation and fostering a culture of innovation within educational institutions. In parallel, the research by Budhyani (2022) offers an operational-pedagogical solution through evaluating the effectiveness of a blended learning model combining synchronized and unsynchronized sessions, which is proven to enhance both student self-efficacy and learning achievement. The very high coupling strength of both documents—with 21 and 17 citations respectively—demonstrates the research community's recognition of the symbiotic relationship between visionary digital leadership and the implementation of proven effective hybrid learning models. Collectively, these two studies form a coherent paradigm: educational success in the new normal era depends on the integration of leadership that enables digital transformation at the policy level and innovative learning strategies that directly impact student experience and outcomes at the classroom level.

the Digital Transformation of Islamic Education **: Future Research Agendas**

Table.3 Summary of Future Agenda

| Context | Development Agenda |
|---|---|
| **Bridging the Digital Divide** | **Investigating context-specific, scalable models for delivering quality digital Islamic education in rural and low-resource madrasahs. This includes exploring the efficacy of low-bandwidth technologies, offline digital resources, and community-based technology hubs to ensure equitable access.** |
| **Pedagogical Innovation for Islamic Values** | **Developing and rigorously evaluating digital pedagogical frameworks that intentionally integrate and assess the internalization of Islamic values (e.g., *akhlak*, *tawhid*) in online and blended learning environments, moving beyond mere content delivery.** |
| **Teacher Professional Development** | **Exploring effective models for continuous professional development that enhance Islamic education teachers' digital pedagogical content knowledge (TPACK), self-efficacy in using technology, and ability to foster online learning communities.** |
| **Leadership and Institutional Policy** | **Examining the role of digital leadership in madrasahs and Islamic schools in fostering a culture of innovation, securing resources for digital transformation, and developing strategic plans for sustainable technology integration.** |
| **Ethics, Safety, and Digital Citizenship** | **Researching the development of Islamic digital literacy curricula that address critical issues such as online safety, critical engagement with digital information, and ethical digital citizenship from an Islamic perspective.** |
| **The Economics of Digital Transformation** | **Analyzing sustainable funding models and cost-benefit analyses for digital infrastructure in Islamic educational institutions, including the potential for waqf-based digital initiatives and public-private partnerships.** |

**Conclusion**

Based on the comprehensive discussion, it can be concluded that the digital transformation of Islamic education is a complex phenomenon requiring a multidimensional approach. Initiated by the penetration of digital technology that has reshaped the global educational landscape, Islamic educational institutions, particularly madrasahs, are faced with the challenge of integrating pedagogical traditions with the imperatives of the digital age. The study's focus on Indonesia, the United Arab Emirates, Pakistan, and Palestine successfully revealed the full spectrum of digital transformation dynamics—from the digital divide in archipelagic and rural regions to digital leadership in developed nations, and the utilization of digital education as a form of resilience in challenging geopolitical contexts.

The bibliometric analysis conducted through co-citation and bibliographic coupling approaches successfully mapped seven major thematic clusters reflecting the current academic discourse. These clusters demonstrate that academic discussions extend beyond mere technological aspects to encompass the conceptual foundations of effective learning, factors of educational resilience during disruption, the development of vocational educators, evaluation of the digital pivot in higher education, multi-perspective analysis of online learning, the integration of pedagogical frameworks with research methodology, and in-depth investigation of pandemic-era learning loss. Each cluster offers a unique yet complementary perspective in understanding the complexities of digital transformation in education.

The main findings reveal a significant dichotomy between the readiness of urban and rural madrasahs in adopting digital learning, with urban institutions generally possessing more adequate infrastructure, resources, and digital literacy. Furthermore, the study successfully identified critical research gaps, particularly concerning the development of digital pedagogical models specifically designed for Islamic educational contexts, and the need for more inclusive approaches to reach madrasahs in remote and underdeveloped regions.

Based on these findings, the study proposes six strategic future research agendas. These agendas include developing models to bridge the digital divide in rural madrasahs, pedagogical innovations integrating Islamic values in digital environments, continuous professional development for Islamic education teachers, studies on digital leadership and institutional policy, research on digital ethics and safety from an Islamic perspective, and analysis of sustainable economic models for digital transformation.

The practical implications of these findings emphasize the importance of evidence-based and contextually appropriate policy approaches. Policymakers are encouraged to develop differentiated strategies for urban and rural contexts while ensuring that digital transformation does not erode the fundamental values of Islamic education. For educators, these findings highlight the need to develop adequate digital pedagogical competencies while maintaining the integrity of Islamic content in all learning practices.

In conclusion, this study has successfully provided a comprehensive map of the intellectual landscape surrounding the digital transformation of Islamic education, while paving the way for further research development that can contribute to creating more inclusive, relevant, and quality-based Islamic education in the digital era. Through the implementation of the proposed research agendas and collaboration among stakeholders, the digital transformation of Islamic education can be directed not only to respond to contemporary challenges but also to strengthen its contribution to the development of modern Muslim civilization.

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