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Global Trends in Design Thinking Research in Education: A Bibliometric Analysis with Implications for Islamic Education (2015–2025)

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ABSTRACT

This study aims to map global research trends in Design Thinking in education and examine their implications for Islamic education using a bibliometric approach. A total of 511 Scopus-indexed journal articles published between 2015 and 2025 were analyzed using VOSviewer. The analysis examined publication trends, co-authorship networks, citation networks, international collaboration, and keyword co-occurrence. The findings indicate a substantial increase in Design Thinking publications after 2018, reaching a peak in 2023. Despite this growth, scholarly collaboration remains fragmented, with only a small proportion of authors participating in interconnected research networks. The journal Sustainability emerged as the leading publication source, while international research collaboration remained concentrated in Global North countries.Keyword analysis identified seven thematic clusters, revealing a shift from empathy- and cognition-oriented studies toward collaborative pedagogy, digital learning, and educational innovation. These findings suggest that Design Thinking has evolved into a pedagogical approach that supports learner-centered and value-based education. For Islamic education, these findings provide conceptual insights into strengthening collaboration, problem-solving, character education, and social responsibility through innovative learning practices. This study provides a comprehensive bibliometric mapping that may serve as a reference for future research and for the contextual development of Design Thinking in Islamic education.

Keywords: *Design Thinking; Bibliometric Analysis; Educational Research; Knowledge Mapping; Islamic Education*

ABSTRAK

Penelitian ini bertujuan untuk memetakan tren penelitian global mengenai Design Thinking dalam bidang pendidikan serta mengkaji implikasinya terhadap pendidikan Islam melalui pendekatan bibliometrik. Sebanyak 511 artikel jurnal terindeks Scopus yang diterbitkan pada periode 2015–2025 dianalisis menggunakan perangkat lunak VOSviewer. Analisis dilakukan terhadap tren publikasi, jaringan kolaborasi penulis (co-authorship), jaringan sitasi, kolaborasi internasional, dan ko-kemunculan kata kunci (keyword co-occurrence). Hasil penelitian menunjukkan bahwa publikasi mengenai Design Thinking mengalami peningkatan yang signifikan setelah

tahun 2018 dan mencapai puncaknya pada tahun 2023. Meskipun demikian, kolaborasi ilmiah masih bersifat terfragmentasi, dengan hanya sebagian kecil penulis yang tergabung dalam jaringan kolaborasi penelitian yang saling terhubung. Jurnal Sustainability menjadi sumber publikasi yang paling dominan, sedangkan kolaborasi penelitian internasional masih terkonsentrasi di negara-negara Global North. Analisis kata kunci mengidentifikasi tujuh klaster tematik yang menunjukkan pergeseran dari kajian yang berorientasi pada empati dan kognisi menuju pedagogi kolaboratif, pembelajaran digital, dan inovasi pendidikan. Temuan ini menunjukkan bahwa Design Thinking telah berkembang menjadi suatu pendekatan pedagogis yang mendukung pembelajaran berpusat pada peserta didik dan pendidikan berbasis nilai. Dalam konteks pendidikan Islam, temuan ini memberikan wawasan konseptual untuk memperkuat kolaborasi, kemampuan pemecahan masalah, pendidikan karakter, dan tanggung jawab sosial melalui praktik pembelajaran yang inovatif. Penelitian ini menyajikan pemetaan bibliometrik yang komprehensif dan dapat menjadi rujukan bagi penelitian selanjutnya serta pengembangan Design Thinking secara kontekstual dalam pendidikan Islam.
Kata-kata kunci: *Design Thinking*; Analisis Bibliometrik; Penelitian Pendidikan; Pemetaan Pengetahuan; Pendidikan Islam.

1. INTRODUCTION

Design Thinking has experienced rapid growth as a pedagogical approach in educational research over the last decade. Despite its increasing adoption, the expanding body of literature remains fragmented, making it difficult to understand its overall knowledge structure, thematic evolution, and research collaboration patterns. In educational settings, Design Thinking promotes learner-centered learning by fostering empathy, collaboration, creativity, and authentic problem-solving to address twenty-first-century educational challenges.

Originally developed in business innovation and product design (Brown, 2009), Design Thinking has evolved into an educational approach that supports critical thinking, creativity, collaboration, and problem-solving across diverse learning contexts. This adaptation marks a shift from a commercial orientation toward a pedagogical approach, where Design Thinking is utilized to cultivate critical thinking, creativity, collaboration, and complex problem-solving skills. In higher education and Islamic education, this approach is particularly relevant as it enables the integration of cognitive competencies, humanistic values, and the socio-cultural sensitivity of learners.

As its adoption expands, numerous studies have affirmed the effectiveness of Design Thinking as a pedagogical strategy. Razzouk and Shute (2012) demonstrate that this approach empowers learners to navigate complex problems through exploratory and iterative processes. However, the accumulation of Design Thinking research in education has grown rapidly yet remains fragmented across various disciplines and regions. Aris et al. (2021) noted a dominance of Western publications, while other contexts including Islamic education remain under-mapped. Similarly, Fitriyah et al. (2025) indicated a

research concentration in higher education, with limited cross-contextual exploration. This gap is increasingly critical, given that the effectiveness of Design Thinking in assisting teachers to navigate modern educational challenges is often hindered by the lack of integrated design training within teacher education curricula (Calavia et al., 2023). Overall, previous studies have confirmed the educational benefits of Design Thinking. However, existing bibliometric studies remain limited by relatively small datasets, specific educational contexts, and insufficient analysis of long-term thematic evolution and global collaboration. Consequently, the overall development of Design Thinking research in education has not yet been comprehensively understood.

In response to these conditions, this study contributes by addressing the limitations of previous bibliometric reviews, which have generally been small-scale, sectoral, and limited in their temporal scope. Using a Scopus dataset covering the period from 2015 to 2025 period, this research presents a global bibliometric analysis to map the evolution of Design Thinking in education through the analysis of publication trends, scholarly collaborations between authors and countries, and thematic clusters. This approach fills an important gap in our understanding of knowledge structures and the developmental dynamics of Design Thinking, which were previously fragmented and Western-oriented.

Conceptually, Design Thinking has developed into an interdisciplinary field that integrates design principles with educational innovation, making bibliometric mapping essential for understanding its intellectual structure and research evolution. Various seminal studies on design processes and models serve as the foundation for this scientific landscape, which has subsequently expanded through diverse terminologies, research focuses, and application contexts within education. This condition underscores the importance of research mapping to identify developmental patterns, thematic interconnections, and the knowledge structures that constitute the field of Design Thinking as a whole.

Bibliometric analysis provides a systematic approach to identifying publication trends, collaboration patterns, influential studies, and thematic evolution, thereby offering a comprehensive understanding of the development of Design Thinking research (Župič & Čater, 2015; Donthu et al., 2021). Bibliometrics not only measures productivity and citation impact but also uncovers dominant themes, underrepresented contexts, and opportunities for interdisciplinary integration (Aria & Cuccurullo, 2020; Gümüş et al., 2020). Supported by large-scale databases and visualization tools (Van Eck & Waltman, 2017), this approach serves as a strategic instrument for mapping the position of Design Thinking within education and identifying research gaps relevant to the development of pedagogy, curriculum, and value-based education. As presented in Table 1, previous bibliometric studies on Design Thinking differ in terms of publication coverage, dataset size, analytical approaches, and research focus. This comparison provides a systematic

overview of the existing literature, enabling the identification of methodological limitations and research gaps that justify the need for the present study.

Table 1. Comparison of Previous Bibliometric Studies on Design Thinking

No	Authors and Year	Publication Span	N Documents	Database	Tools Used	Key Findings	Limitations
1	Norliyana Md. Aris et al. (2022)	2011–2021	258	Scopus	VOSviewer	Identified growth trends, top authors, and clusters in business context.	Limited to business; dataset < 300; no cross-country collaboration.
2	Fitriyah, Saputro & Sajidan (2025)	2013–2023	175	Scopus	VOSviewer	Mapped design thinking in higher education; identified 4 clusters.	Focus only on education; small dataset; no historical evolution analysis.
3	Micheli et al. (2019)	1990–2018	146	WoS	Co-citation	Synthesized conceptual evolution of design thinking.	Not a full bibliometric mapping; no keyword/co-authorship analysis.
4	Seidel & Fixson (2013)	2001–2011	64	Scopus	Citation analysis	Examined adoption of design thinking in organizations.	Dataset very small; lacks visualization; not full bibliometrics.
5	Arfi et al. (2021)	2000–2020	212	Scopus	Biblioshiny & VOSviewer	Highlighted innovation-related thematic growth.	No global collaboration mapping; limited thematic granularity.

As shown in Table 1, previous bibliometric studies have provided valuable insights into Design Thinking research. Nevertheless, most studies relied on relatively small datasets, focused on specific sectors, covered limited publication periods, and did not comprehensively analyze collaboration networks or thematic evolution. Moreover, the implications of global Design Thinking research for Islamic education remain largely unexplored. Studies Arfi et al. (2021) and Aris et al. (2021) provide offers a relatively broad thematic mapping, yet remains limited to business and innovation contexts and has not yet addressed international collaborations. Fitriyah et al. (2025) focused the study on higher education, but utilizes a smaller dataset and has not yet traced its long-term historical evolution. Micheli (2019) provided a conceptual contribution through co-citation analysis, whereas Seidel et al. (2013) examined the topic using a limited dataset. However, neither study provided a comprehensive bibliometric mapping. This

fragmentation is further underscored by the absence of systematic mapping within the context of Islamic education and the implementation of innovative curricula, such as the Merdeka Curriculum (Kurikulum Merdeka). Indeed, Rochmat et al. (2023) argued that the Merdeka Curriculum is conceptually designed to enhance critical and creative thinking skills to navigate the Society 5.0 era; however, its implementation within Islamic education necessitates a harmonization between 21st-century skill development and holistic religious values. This gap accounts for the scarcity of global studies regarding how innovations such as Design Thinking interact with local educational policies and Islamic values Risdiani, etc. (2023).

This study addresses these limitations by analyzing 511 Scopus-indexed publications published between 2015 and 2025. It provides a comprehensive global mapping of publication trends, author collaboration, journal influence, international collaboration, and thematic evolution while discussing their implications for the development of Islamic education. In contrast to previous studies which are generally small-scale and sectoral this research presents the one of the most comprehensive global mapping, featuring visualizations of author networks, journal influence, and scientific collaboration patterns across 32 countries. Furthermore, this study identifies six collaboration clusters and seven major thematic clusters, surpassing the findings of previous research that typically identified only three to four clusters. This allows for a richer understanding of the intellectual evolution, diversification of application contexts, and the developmental trajectory of Design Thinking research globally.

The findings of this study provide a conceptual foundation for integrating Design Thinking into Islamic education. The identified themes, including collaboration, creativity, empathy, and problem-solving, can support learner-centered pedagogy and value-based education within Islamic educational institutions. The thematic mapping indicates that Design Thinking is increasingly linked to learner-centered learning and character development, extending beyond business and technology. Consequently, Design Thinking has the potential to be positioned as a pedagogical framework that supports the internalization of Islamic values, the reinforcement of akhlaq (character/ethics), and the development of adaptive curricula in madrasas and Islamic higher education.

Therefore, this study aims to map global research trends in Design Thinking in education through bibliometric analysis, identify publication trends, collaboration patterns, and thematic evolution, and discuss their implications for the development of Islamic education.

2. METHOD

This study employed a bibliometric approach to map global research trends in Design Thinking in education using Scopus-indexed publications. Bibliometric analysis

was selected because it enables the systematic examination of publication trends, collaboration networks, citation patterns, and thematic evolution within a research field (Donthu et al., 2021; Glänzel, 2003). By utilizing citation, co-authorship, and keyword co-occurrence analyses, this approach addresses key research gaps, specifically research fragmentation and geographical bias, which have previously limited the generalizability of earlier findings.

Scopus was selected as the primary data source because it provides high-quality peer-reviewed publications with comprehensive international coverage suitable for bibliometric analysis The selection of Scopus strengthens the validity of the global mapping, which is the central focus of this research. Data were retrieved from the Scopus database between February and March 2025. The search strategy followed a transparent and replicable protocol using the following Scopus query:

TITLE-ABS-KEY("design thinking") AND (LIMIT-TO(SUBJAREA, "EDUC") OR LIMIT-TO(SUBJAREA, "SOCI") OR LIMIT-TO(SUBJAREA, "ENGI")) AND (LIMIT-TO(LANGUAGE, "English")) AND (LIMIT-TO(DOCTYPE, "ar")) AND PUBYEAR > 2014 AND PUBYEAR < 2026.

Only English-language journal articles published between 2015 and 2025 were included to ensure data quality and consistency for bibliometric analysis. English-language publications were selected because English is the primary language of international scholarly communication, enabling consistent global research mapping while minimizing linguistic bias. The subject areas of Education, Social Sciences, and Engineering were selected because they represent the primary disciplines in which Design Thinking has been developed and applied in educational contexts. Overall, these criteria were intended to enhance analytical validity, maintain conceptual coherence, and produce a focused, high-quality bibliometric mapping within educational and social research.

The inclusion criteria included English-language journal articles indexed in Scopus, published between 2015 and 2025, and relevant to Design Thinking in educational contexts. Conference papers, book chapters, editorials, non-English publications, and non-empirical documents were excluded. The document selection process followed the PRISMA 2021 guidelines. Initially, 1,988 records were identified through the Scopus database. After screening and eligibility assessment, 511 articles met the inclusion criteria and were included in the bibliometric analysis (Figure 1).

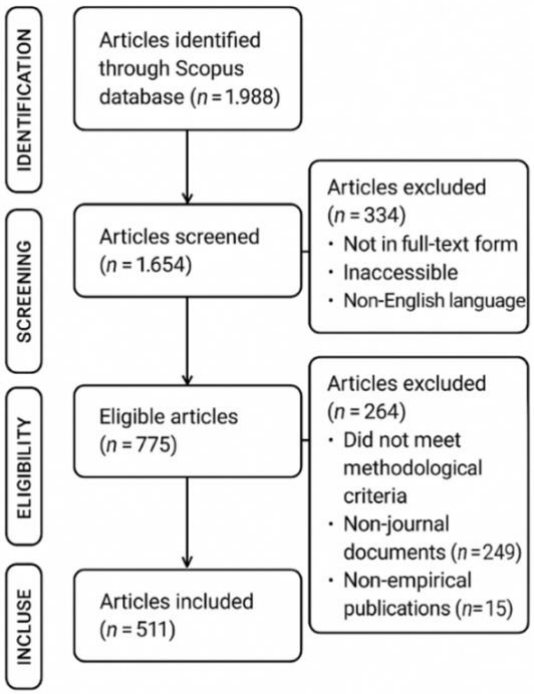


Figure 1. PRISMA 2021 Literature Selection Process

The metadata were exported in CSV format and preprocessed through duplicate removal, author-name normalization, stop-word elimination, and keyword standardization prior to analysis. The analysis employed the full counting method. Minimum thresholds were established at two documents and five citations per author, while keywords with at least five occurrences were included in the co-occurrence analysis.

Keywords with at least five occurrences were included in the co-occurrence analysis to identify stable and recurring research themes while excluding incidental or highly specific terms. These parameters were established to maintain an optimal network density while ensuring that collaboration patterns, thematic relationships, and the intellectual structure of the research field could be clearly visualized and interpreted. The bibliometric analysis included co-authorship, citation, and keyword co-occurrence analyses. The results were visualized using network, overlay, and density maps generated by VOSviewer. These analytical settings enabled a comprehensive exploration of collaboration dynamics, thematic evolution, and the distribution of scholarly influence in Design Thinking research. Overall, these procedures ensured a systematic, transparent, and reproducible bibliometric analysis of global Design Thinking research in education.

3. RESULTS AND DISCUSSION

a. Publication Trends and Developmental Trajectory of Design Thinking

An analysis of 511 Scopus-indexed publications from 2015 to 2025 reveals a significant increase in Design Thinking research, particularly after 2018. The increasing

number of publications indicates growing scholarly interest in Design Thinking within educational research, particularly in response to the growing emphasis on learner-centered and innovation-oriented pedagogies. The post-2018 surge coincides with the strengthening of the 21st-century education agenda, which positions Design Thinking as a pedagogical approach for developing critical thinking, creativity, collaboration, and problem-solving. Within the context of Islamic education, these findings demonstrate that Design Thinking has become an increasingly important topic in educational research, contributing to the development of students' competencies, values, and character, while also providing an empirical basis for mapping research developments, which constitutes the primary objective of this study. The year-to-year progression of article publications is presented in Table 2 below.

Table 2. Development of Scopus-Indexed Publications (2015–2025)

Year	Documents	Percentage (%)
2025	5	0.98%
2024	75	14.67%
2023	116	22.70%
2022	90	17.61%
2021	72	14.09%
2020	58	11.35%
2019	35	6.85%
2018	26	5.09%
2017	10	1.96%
2016	11	2.15%
2015	13	2.54%
Total	**511**	**100%**

The publication trends presented in Table 2 show that the initial 2015–2017 period was characterized by low productivity, ranging from 10 to 13 publications per year. This pattern is consistent with the observations of (Micheli, 2019), who noted that although Design Thinking has attracted industrial interest since the 1990s, its adoption within education and the social sciences remained limited. A significant increase began to emerge in 2018, which subsequently continued steadily until reaching its peak in 2023. This finding aligns with dos Santos GALVÃO (2023), who identified 2023 as the year with the highest global publication output. dos Santos GALVÃO (2023) further emphasized that although Design Thinking originated in technical disciplines, the social sciences now dominate the literature, particularly in relation to innovation and creativity in higher education.

The sharp increase in publications in 2022 (90 articles), peaking in 2023 (116 articles), does not merely represent a quantitative increase but suggests a shift of Design Thinking from a mere design methodology toward a transformative pedagogical framework in education. Unlike traditional instructional approaches focused on

knowledge transmission, Design Thinking is increasingly understood as oriented toward knowledge transmission, Design Thinking is increasingly understood as a human-centered pedagogical paradigm that emphasizes empathy, cross-disciplinary collaboration, reflective iteration, and authentic problem-solving. Within this framework, the learning process is positioned as a social design practice that enables students to become co-designers of knowledge rather than mere recipients of instruction.

This finding extends the argument proposed by Micheli (2019), who primarily described Design Thinking as an approach to managerial and organizational innovation with limited attention to educational contexts. The primary contribution of this study lies in providing a global bibliometric mapping that specifically situates Design Thinking within the educational context during the post-2019 period, thereby capturing new research dynamics that were unobserved in the study by Micheli (2019). Specifically, this research demonstrates that since 2020, there has been a significant acceleration in the utilization of Design Thinking as a response to the global pedagogical crisis, particularly within the context of distance learning and the instability of educational systems.

Consistent with the findings of Scheer et al. (2012) and Rauth et al. (2010), the increase in publications during the pandemic period reflects the adoption of Design Thinking as an adaptive pedagogical tool to address the needs for agile, creative, and complex problem-solving-oriented learning. However, in contrast to previous conceptual studies that were normative in nature, the bibliometric analysis in this research provides large-scale empirical evidence of how this shift has become institutionalized within global scientific knowledge production, including through thematic clusters and cross-country researcher collaboration patterns.

The relative decline in 2024 (75 publications) and the very low figure in 2025 (5 publications) cannot be interpreted as a weakening of the trend; rather, it must be understood as a methodological artifact due to indexing delays. This observation is consistent with Bornmann & Haunschild (2022), who cautioned that bibliometric analyses of the current year tend to underestimate publication output because of indexing delays. Overall, these findings indicate that Design Thinking has evolved from an alternative pedagogical innovation into a mainstream area of educational research, while also highlighting research gaps that remain insufficiently explored in previous bibliometric studies.

b. Collaboration Patterns of Authors, Journals, and Countries in Design Thinking Research

The analysis of authorship patterns not only reveals the distribution of author productivity but also provides important insights into the maturity of Design Thinking as a field of educational research. Although 168 authors contributed to the literature between 2015 and 2025, the resulting collaboration networks are relatively limited, with only 19 authors interconnected within the primary collaborative clusters. This pattern suggests

that knowledge production in this field is still dominated by small, relatively isolated groups rather than a broadly integrated research community.

From the perspective of scientific field development, these conditions reflect the characteristics of a fragmented rather than a mature research field. According to the framework of scientific evolution, a mature field is typically characterized by dense collaboration networks, stronger theoretical consensus, and institutionalized shared research agendas. Conversely, the low and disjointed collaboration observed in this co-authorship map indicates that Design Thinking within the educational context remains in an exploratory and diffuse phase, characterized by diverse conceptual and methodological approaches that have yet to be fully consolidated.

Highly productive authors, such as Avsec, Mentzer, and Wolcott, indeed serve as important knowledge hubs, particularly within the contexts of engineering education and STEM. However, their positions indicate localized thematic leadership rather than a paradigmatic dominance that unifies the field as a whole. The absence of strong cross-cluster collaboration networks suggests that these contributions are developing in parallel rather than cumulatively; thus, the potential for theoretical synthesis has not yet been fully realized.

Consequently, the low level of collaboration is not merely a structural weakness but also reflects a developmental phase that still allows for conceptual and contextual experimentation. This finding simultaneously highlights a future research opportunity: the need for interdisciplinary and cross-regional collaboration to facilitate the transition of Design Thinking in education from a collection of isolated practices and case studies toward a more mature, integrated discipline with high theoretical reach. The distribution of productive authors is displayed in Figure 2 as follows.

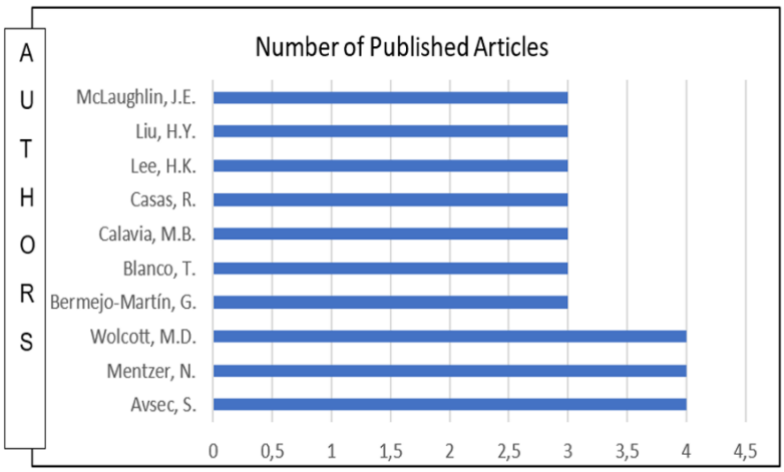
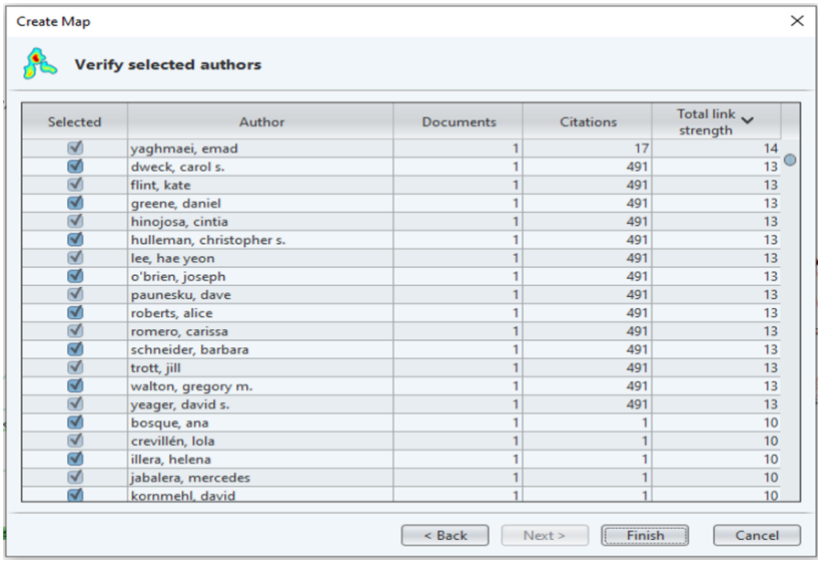


Figure 2. Authors and Total Number of Published Articles

A more detailed assessment of author impact, measured by the number of citations and total link strength, is presented in Table 3, which reveals a considerable discrepancy between publication quantity and overall scholarly influence.

Table 3. Author Contributions and Citation Counts



The variability in citation impact observed in this dataset not only confirms previous theoretical findings but also provides specific empirical evidence within the context of Design Thinking research in education. The analysis reveals that several authors with a relatively limited number of publications occupy central positions in the citation network and garner significantly higher citation counts than other authors who are more quantitatively productive. For instance, although Dweck and Flint contributed relatively few publications, their works occupy central positions in the citation network and exhibit high total link strength, indicating their importance as conceptual references in Design Thinking research related to learning and mindset development.

A similar pattern is observed at the journal level. Certain education and design journals with a moderate volume of Design Thinking publications demonstrate disproportionately high citation impacts due to their positions as seminal references or bridges across thematic clusters. This finding is consistent with the Matthew Effect, where initial visibility and network centrality amplify the accumulation of scholarly recognition; however, it is demonstrated here directly through the citation and co-citation structures within the 2015–2025 dataset.

The primary empirical contribution of this article lies in its ability to demonstrate how the Matthew Effect operates specifically within the educational Design Thinking research ecosystem, rather than merely echoing cross-disciplinary theoretical claims. Unlike previous studies that discuss this phenomenon from a broader or cross-disciplinary perspective (Fortunato et al., 2018), this study concretely maps the authors and journals that function as citation hubs, while simultaneously revealing the structural disparity between productivity and scholarly influence. Consequently, this article enriches the bibliometric literature not only by confirming existing theories but also by providing context-bound, time-specific, data-driven evidence. This, in turn, opens space for critical

reflection on the dynamics of recognition and knowledge distribution within the evolving field of Design Thinking. The co-authorship network analysis, presented in Figure 3, reveals four distinct author clusters. The inter-author collaboration network is presented in Figure 3.

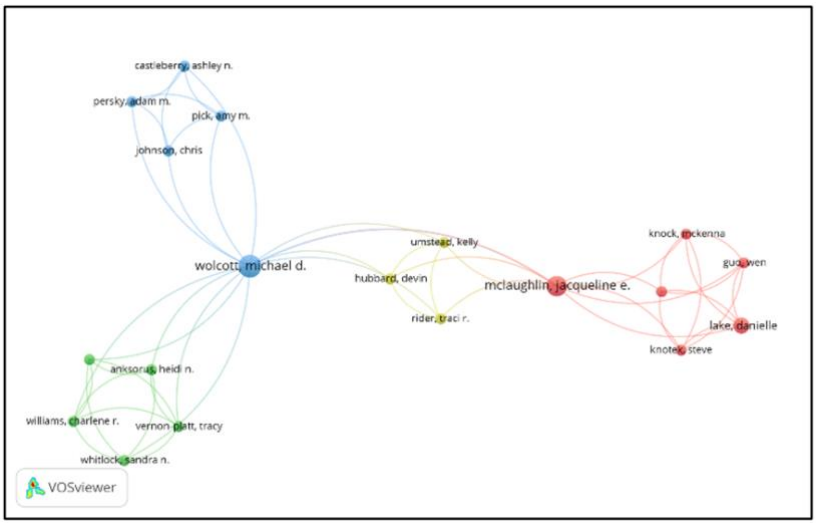


Figure 3. Co-authorship Network Visualization

The visualization demonstrates that only 19 out of 168 authors have established collaborative relationships, indicating that Design Thinking research remains relatively decentralized. This finding is consistent with Seidel et al. (2013), who identified fragmentation as a common characteristic of multidisciplinary research fields. Nonetheless, key nodes, particularly Wolcott and McLaughlin, emerge as primary bridges within the network, reflecting an emerging leadership role. The chronological evolution of authorship is illustrated in Figure 4.

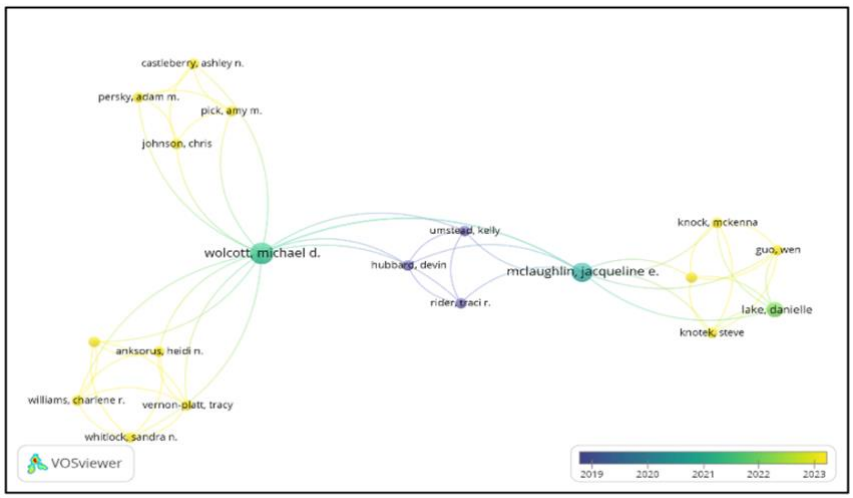


Figure 4. Co-authorship Overlay Visualization

In this context, the yellow nodes represent current research activities (2023–2025), highlighting authors and groups that have emerged in recent years. The density visualization in Figure 5 further illustrates areas of intense scholarly engagement

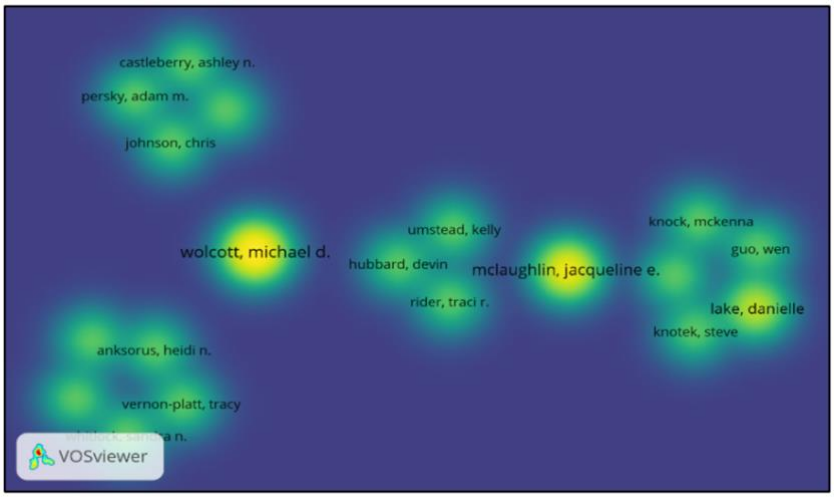


Figure 5. Co-authorship Density Visualization

In Figure 5, Wolcott & Michael D. and McLaughlin & Jacqueline E. stand out with the most intense colors, indicating that their work is highly influenced by surrounding research and that they maintain robust collaborative networks within the field of Design Thinking. The center of the density map is dominated by authors with a strong collaborative footprint. Shiffrin et al. (2018) noted that dense co-authorship zones represent knowledge hubs that significantly influence the thematic direction of a research field.

The analysis of publication sources reveals that Sustainability (Switzerland) occupies a dominant position with 76 articles. This finding should not be interpreted merely as a preference for a specific publication outlet, but rather as an indicator of an epistemological shift in Design Thinking research. The dominance of this journal reflects a repositioning of Design Thinking from a creative-instrumental approach toward a normative knowledge framework aligned with global sustainability agendas, such as sustainable development, social justice, and ecological responsibility. In other words, Design Thinking is no longer positioned solely as a problem-solving technique, but as a value-laden mode of knowledge production.

Epistemologically, the strong presence of Sustainability suggests that Design Thinking research increasingly operates within a problem-driven and solution-oriented paradigm, where the validity of knowledge is measured not only by theoretical coherence but also by its relevance to systemic global challenges. This aligns with the observations of Župič & Čater (2015); however, the findings of this study go further by demonstrating that sustainability serves as a binding ideological framework that unifies diverse approaches to design, education, and social innovation within a single dominant publication ecosystem.

The methodological implication of this dominance is the strengthening of Design Thinking as a transdisciplinary and transformative approach, emphasizing cross-actor collaboration, stakeholder empathy, and an orientation toward long-term social change.

In this context, the resulting innovations are not ideologically neutral; rather, they are directed toward goals of sustainability, inclusivity, and public benefit. This finding indicates that the developmental trajectory of Design Thinking is moving further away from purely market-driven logic and toward innovation rooted in ethics and social responsibility.

In education, particularly in higher education and educational policy, the dominance of sustainability-focused journals shows that Design Thinking is increasingly seen as a strategic approach to prepare students for complex 21st-century challenges. In the context of Islamic education, this finding is relevant as it supports the integration of Design Thinking with values-based education, especially those emphasizing maslahah (public interest), sustainability, and social responsibility. Therefore, Design Thinking can be positioned not only as an innovative learning strategy but also as a policy instrument aligned with sustainable development and character building, thereby bridging pedagogical and policy dimensions. These journals are presented in Figure 6.

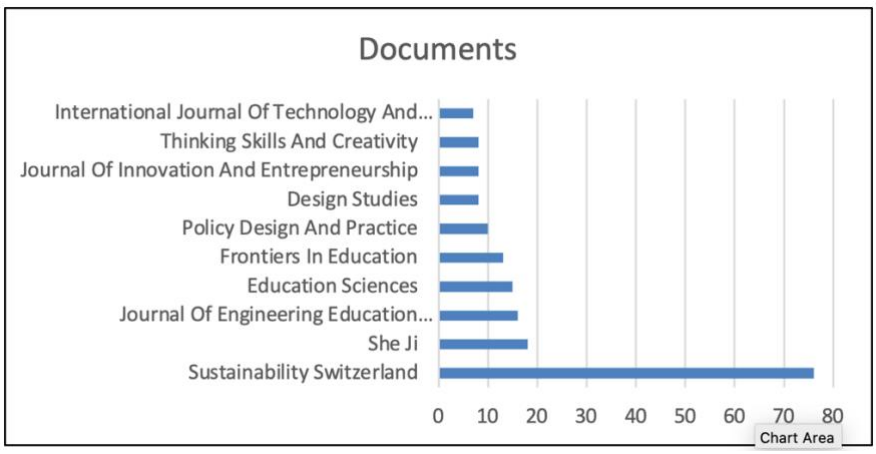


Figure 6. Top Publication Sources in Design Thinking Research

Meanwhile, the patterns of research collaboration between countries can be observed in Figure 7 as follows.

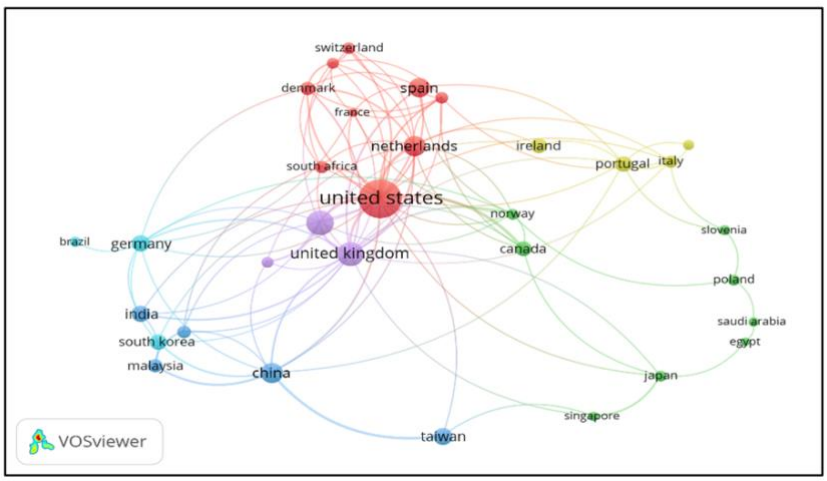


Figure 7. Global Country Collaboration Network Visualization

Based on Figure 7, the cross-country Design Thinking research collaboration network forms six clusters involving 32 countries. The dominance of the United States as the central node cannot be interpreted solely as an advantage in productivity, but rather as a manifestation of structural inequality in global knowledge production and circulation. Global North countries, particularly the United States, the United Kingdom, and Australia, occupy central positions within the collaboration network, giving them an epistemic advantage in setting research agendas, conceptual frameworks, and methodological standards that are subsequently replicated globally.

Conversely, the involvement of Global South countries tends to remain in peripheral positions or as secondary collaborative partners. This pattern reflects what the literature describes as epistemic asymmetry, where access to research funding, academic infrastructure, and reputable journals reinforces the dominance of the Global North, while contributions from the Global South are often fragmented and less visible within the primary networks. Thus, this collaboration map is not merely a representation of scientific relationships, but also of power relations in the production of Design Thinking knowledge.

In this context, Indonesia's position must be interpreted strategically. Although its quantitative contribution has not yet positioned Indonesia as a central node, its involvement in regional and thematic collaborative clusters indicates a potential 'upward trajectory' within the global research landscape. This upgrading strategy can be pursued by focusing on unique local contexts such as values-based education, cultural diversity, and sustainable development challenges which are relatively underexplored in mainstream literature. By positioning Design Thinking as a contextual and transformative approach, Indonesia has the opportunity to contribute not as a follower of Global North paradigms, but as a producer of globally relevant alternative knowledge.

Consequently, these findings affirm that the country collaboration map does not only reveal who is dominant, but also provides an opportunity for critical reflection on the decolonization of knowledge within Design Thinking research. For a country like Indonesia, the challenge is not merely to increase the volume of publications, but to articulate a strategic epistemic position, enabling Design Thinking research to serve as a vehicle for articulating Global South perspectives in global education and innovation discourse. The overlay visualization can be seen in Figure 8.

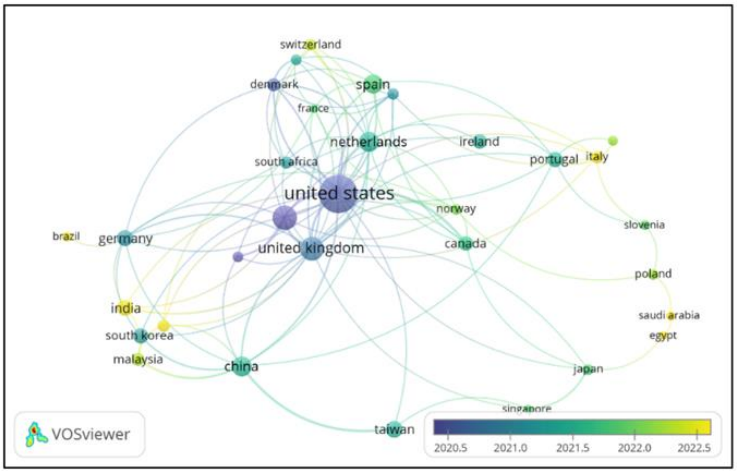


Figure 8. Country Research Overlay Visualization

Several countries, such as Brazil, India, Italy, Saudi Arabia, and Egypt, are represented by bright yellow nodes. In the context of an Overlay Visualization, bright yellow typically indicates more recent publication years. Therefore, it can be concluded that these countries have relatively recent publications within the visualization's timeframe compared to other nations. The density distribution of countries contributing to Design Thinking research is presented in Figure 9.

Figure 9. Country Research Density Visualization

Based on Figure 9, the United States emerges as the region with the highest and brightest color density, signifying a highly significant concentration of Design Thinking publications. The areas surrounding the United States, representing Australia and the United Kingdom, also demonstrate high color density, albeit less intense than that of the United States. European nations such as the Netherlands, Spain, and Germany appear as regions with moderate density, indicating a stable contribution to Design Thinking research. In Asia, China and Taiwan show relatively high color density, although not as pronounced as that observed in Western countries. Other countries such as Thailand and India, despite having similar publication counts, exhibit lower color density, suggesting

that their research may be more dispersed or less integrated within collaborative networks. Countries with lower publication volumes, such as Slovenia and Turkey, appear as regions with very low color density, indicating a smaller contribution to the field. Overall, this density visualization provides a clear overview of global Design Thinking research hubs, with the United States serving as the primary focal point.

c. Main Themes in Design Thinking Research Based on Keyword Co-occurrence Analysis

The keyword co-occurrence analysis identified seven thematic clusters that not only represent a diversity of research topics but also reflect the conceptual architecture of Design Thinking research in education. Among these seven clusters, three major clusters demonstrate the theoretical configurations that most decisively determine the field's developmental trajectory.

The first cluster centers on the concepts of empathy, cognition, and design processes, reflecting the epistemic foundation of Design Thinking as a human-centered approach. This cluster highlights the role of empathy not only as an initial stage of the design process, but as a cognitive mechanism that frames how learners understand problems, users, and social contexts. Theoretically, this cluster resonates with classic Design Thinking models (e.g., empathize–define–ideate) and positions empathy as a bridge between individual cognition and the collective construction of meaning in learning.

The second cluster groups keywords such as collaborative learning, active learning, and problem-solving, indicating a shift in Design Thinking from a design methodology toward a transformative pedagogical approach. This cluster reflects the integration of Design Thinking with constructivist and social-constructivist learning theories, where knowledge is constructed through interaction, meaning negotiation, and cross-disciplinary teamwork. Conceptually, these findings indicate that Design Thinking is no longer positioned as an “add-on” tool, but as a core pedagogical framework that shapes the structure of the learning experience.

The third cluster focuses on innovation and digital transformation, representing a more advanced phase in the evolution of Design Thinking research in education. This cluster illustrates how Design Thinking adapts to technology-based learning contexts, including online learning, digital platform utilization, and technology-assisted learning design. Theoretically, this cluster expands the scope of Design Thinking into the realm of design for learning ecosystems, rather than being limited to product design or localized solutions.

The primary contribution of this analysis, compared to previous bibliometric studies, lies in its interpretation of clusters as theoretical developmental trajectories rather than static thematic groupings. Previous studies have tended to map dominant topics

without explicitly linking them to the evolution of the Design Thinking paradigm. This study demonstrates that these clusters form an evolutionary arc: from cognitive–empathic foundations to collaborative pedagogy, and finally toward digital innovation and systemic learning transformation. Thus, this study contributes by mapping not only "what is being researched" but also how and in what direction Design Thinking in education is conceptually evolving. Figure 10 presents the keyword co-occurrence network visualization, illustrating the thematic structure and the conceptual developmental trajectory of Design Thinking research in education.

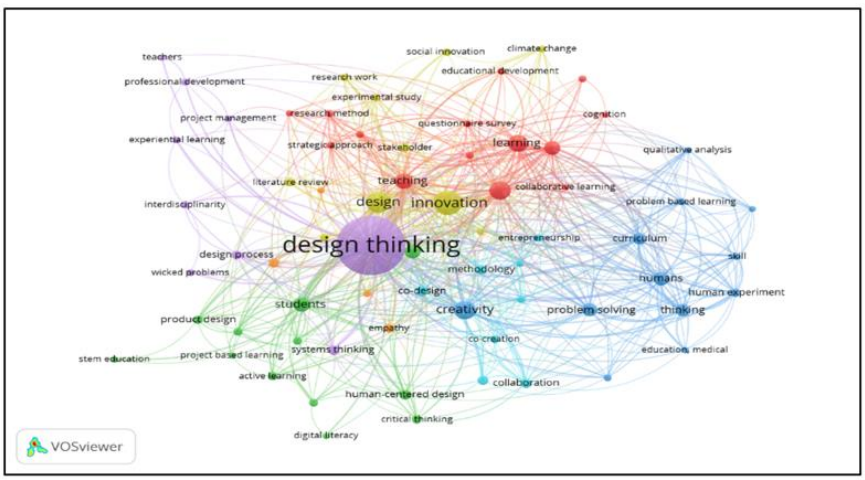


Figure 10. Keyword Co-occurrence Network Visualization

The emergence of seven thematic clusters indicates a thematic expansion that goes beyond previous bibliometric studies, which typically identify only three or four clusters. This growth reflects the increasing diversification of Design Thinking applications, expanding from traditional design education to STEM education, digital pedagogy, and social innovation. The overlay visualization in Figure 11 highlights several emerging themes, such as STEM education, gamification, teacher education, and online learning. The contribution of this study is further demonstrated through the Overlay Visualization analysis, which can be observed in Figure 11 as follows.

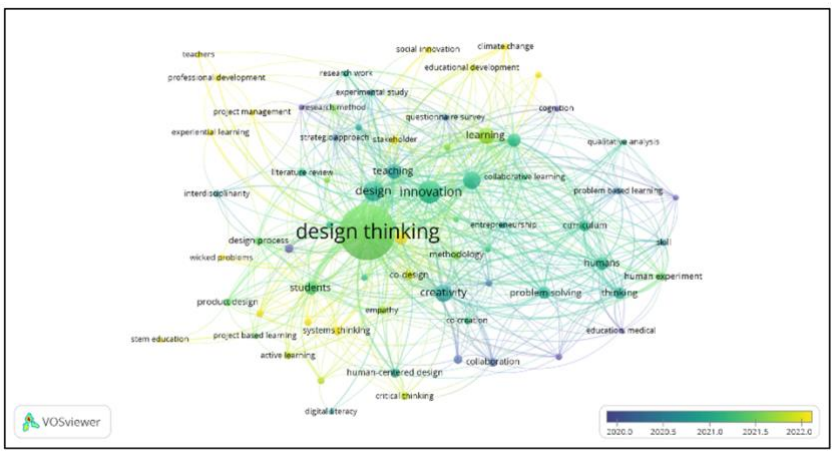


Figure 11. Keyword Co-occurrence Overlay Visualization

A key contribution of this study lies in its ability to identify and validate a shift in Design Thinking research focus by showing a shift from general pedagogical approaches toward the formation of integrated, design-based digital learning ecosystems oriented toward systemic learning transformation. This finding does not merely confirm trends that have been conceptually indicated in previous studies Ng et al. (2022) and Wang et al. (2023) as outlined in the introduction, but also expands upon them through global-scale bibliometric evidence, demonstrating how these topics emerge as high-density areas within the keyword network.

The density visualization in Figure 12 reveals that keywords associated with digital learning, pedagogical innovation, and design processes occupy increasingly central positions, signifying a structural shift in the research landscape of educational Design Thinking. Consequently, the empirical contribution of this study extends beyond mapping emerging topics by demonstrating patterns of thematic consolidation of this article does not end with the mapping of new topics; rather, it lies in demonstrating the patterns of thematic consolidation that mark an advanced phase of the field's development as suggested, but not systematically demonstrated, by the studies cited in the introduction.

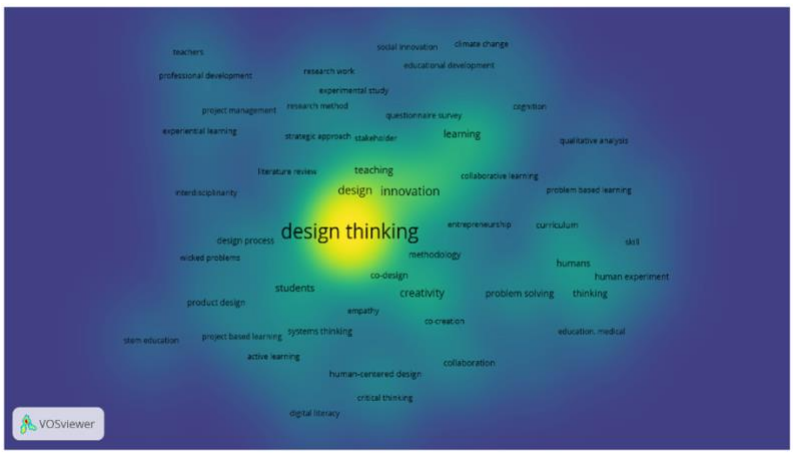


Figure 12. Keyword Co-occurrence Density Visualization

High-density nodes such as 'design thinking,' 'innovation,' 'creativity,' 'education,' and 'problem solving' represent the core pillars of the field. Conversely, lower-density nodes such as 'digital literacy,' 'STEM education,' and 'online learning' indicate areas with growing potential but limited scholarly saturation. These insights reinforce the thematic evolution identified in this study and suggest promising avenues for future exploration, These findings are consistent with the observations of Moruzzi et al. (2023).

4. CONCLUSION

This study mapped 511 Scopus-indexed publications published between 2015 and 2025 and found that Design Thinking research in education increased substantially after 2018, reaching its highest publication output in 2023. The analysis also indicated that

collaboration among researchers remained relatively fragmented, with only a limited proportion of authors connected within the core collaboration network. The journal *Sustainability* was identified as the leading publication source, reflecting the growing attention to sustainability-related issues in Design Thinking research. This study contributes by providing a comprehensive bibliometric mapping of publication trends, collaboration networks, influential publication sources, and the thematic evolution of Design Thinking research in education during the 2015–2025 period. The findings provide a broader understanding of the intellectual structure and thematic development of Design Thinking research. Furthermore, the study provides data-driven evidence of how sustainability serves as a unifying theme across diverse design approaches within the global educational literature, an aspect that has not previously been mapped longitudinally. The identified themes, including empathy, collaboration, creativity, and problem-solving, suggest that Design Thinking has the potential to support learner-centered and value-oriented educational practices. In the context of Islamic education, these findings may provide conceptual insights for integrating collaborative and value-based learning approaches into educational practice. Future studies should examine how Design Thinking can be implemented within Islamic educational settings. Future research should expand bibliometric analyses by incorporating local educational contexts, including Islamic educational institutions, and examining the implementation of Design Thinking through qualitative and quantitative approaches. Additionally, longitudinal studies are needed to examine the effectiveness of Design Thinking in enhancing twenty-first-century skills over time. Strengthening interdisciplinary and international collaboration may also contribute to a more comprehensive understanding of the continued development of Design Thinking research.

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