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DIGITAL LEARNING ORGANIZATION: A BIBLIOMETRIC ANALYSIS (2000 - 2025)

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Abstract:

Digital learning organization (DLO) refers to the culture of knowledge through digital platforms to support continuous learning at the individual, team and organizational levels. In the wake of the rapid digitalization of artificial intelligence (AI) into education, students are widely immersed in the integration of digital technology. However, these digital challenges require teachers to engage in life-long learning, to navigate towards effectiveness in teachers' job scope and to be more adaptable to the transformation in education. This article aims to examine a bibliometric analysis through a scientific data-based on DLO publications. The performance analysis and mapping analysis were employed in this study to provide a comprehensive picture in DLO research, in terms of the patterns of publication, collaboration and interconnection within the DLO field, to identify the trends, establish a strong foundation for literature development and to determine the research gaps in the existing knowledge. In addition, multifaceted indicators are examined through this bibliometric study, including trends, authors, countries and keywords. From the Scopus database (2000 – 2025), 200 scholarly publications were revealed. The results indicate that publications and citations have an increasing trend over the 25 years. This research can provide a foundation for future empirical studies to give a deeper understanding of DLO. By mapping this intellectual structure of DLO, this study enhances the conceptualization of DLO and the relationship between DLO and other constructs.

Keywords:

Bibliometric Analysis, Continuous Professional Learning, Digitalization, Digital Transformation, Learning Organization, Teacher Effectiveness

Introduction

The concept of learning organization has been discussed for decades. It was initiated by Senge (1990). Until now, learning organization have been an exciting topic to be expanded by researchers (Budhiraja et al., 2024). Learning process occurs continuously in an organization at various levels including at individual level, team level and organizational level (Chin, 2015; Kools & Stool, 2017; Tengku Ariffin et al., 2010). In the other words, learning organization is beneficial for the organizations in order to make up a learning culture within the organization (Matei & Lincă, 2024).

As the environment keep changing in line with the digital enhancement towards industrial revolution 4.0 (IR4.), learning becomes the most significant method to ensure the competitive advantages (Soh & Bilal Ali, 2021). Moreover, in order to gain and maintain in the learning part, a culture of knowledge that called learning organization seems capable to make the learning process continuously occurs in an organization (Lazdina, 2023). Thus, some researchers had expanded their study on learning organization in the digital context (Ifenthaler et al., 2021). However, research on digital learning organization is not as widely as the publication of learning organization.

Bibliometric analysis is a method to analyse academic publication quantitatively, that provides a comprehensive observation from the data analysed (Rullyana et al., 2023). Other than that, bibliometric study will be able to provide an in-depth critical view and understanding of the development of the specific field (Hallinger & Kovačević, 2021; Small, 1999; Van Eck & Waltman, 2017). Moreover, bibliometric analysis will expand the network regarding the research from many aspects such as various authors, institution, countries and the most cited publications. In this study, a bibliometric analysis will be executed to analyse DLO through performance analysis and mapping analysis within year 2000 to 2025 of period. This study obtained data from Scopus database and employed VOSViewer for data visualizing.

Literature Review

The concept of learning has been interpreted by various scholars widely. The first concept of learning organization was first introduced by Senge (1990) in his book *The Fifth Discipline: The Art and Practice of the Learning Organization*. In this book, Senge (1990) noted the five core disciplines as the key for an organization to enhance its performance by utilizing the human resources within it. Senge (1990) asserted that system thinking, shared vision, mental models, personal mastery, and team learning are “The Five Disciplines” that are contained in his book

Watkins and Marsick (1993; 1996) are the most popular scholars that expanded the field of learning organization. Watkins and Marsick (1996) introduced the seven dimensions: continuous learning, dialogue and inquiry, team learning support, systems that support learning, empowerment, networking and connections, and strategic leadership for learning. In their study, Marsick and Watkins (2003) provided a framework of seven dimensions that promote synergy at the individual, team and organizational levels (Yang et al., 2004)

As the initial notion of learning organization was applied in the profit-driven sectors (Chin, 2015), the concept later executed in other fields including education fields (Tengku Ariffin et al., 2010). In the previous study, Tengku Ariffin et al. (2010) definition most aligned to

Watkins and Marsick (1996), but applied in school context in Malaysia. In this bibliometric analysis, there are four research questions to be explored:

1. What are the trends in DLO publications? How do the research change in a 25-year period?
2. Who are the most popular authors in DLO research? What is the authorship pattern of the publication?
3. Which countries are most active in DLO? How does this differ across the regions?
4. Which subjects surface from co-occurrence analysis of author keywords in the literature on digital learning organization research, and which subject areas have the highest number of highly cited documents?

The bibliometric analysis is different from systematic reviews which synthesize thematic findings across studies. This bibliometric analysis focused more on the structural mapping of scholarly production in the research of digital learning organizations.

Methodology

Bibliometric study also known as science mapping, aim to examine the entire study that has been published in a field. This procedure is carried out by analyzing bibliographic data on a large scale to understand the structure and relationships in the literature (Hallinger & Kovačević, 2021; Small, 1999; van Eck & Waltman, 2017). This approach is based on scholarly publications (Verbeek et al., 2002) and includes general descriptive statistical analysis such as publication journals, year of publication and classification of primary authors (Li et al., 2017). In addition, it also involves advanced analysis techniques such as document co-citation analysis.

Bibliometric reviews do not assess the quality of study content but rather provide a comprehensive overview of the basic characteristics of knowledge in a particular area, thus complementing other review methods such as critical synthesis and meta-analysis (Hallinger, 2020; Hallinger & Kovačević, 2021). To guarantee the quality of the publications analysed, this study only considered peer-reviewed and highly-rated academic journal articles, leaving aside books and conference proceedings (Liu et al., 2015). In order to identify the search phrases for article retrieval, a screening procedure was employed by querying the Scopus database.

This study obtained data from Scopus database as dated on 22 March 2025 and employed VOSViewer for the purpose of data visualizing. To ensure effective literature reviews and reliable results, an iterative process is required that involves appropriate keyword selection, systematic literature search, and thorough analysis (Fahimnia et al., 2015). Therefore, the researchers limited the data to high-profile publications to gain a strong theoretical perspective. In this study, the keywords used were TITLE-ABS-KEY (digital* AND "learning organi*ation*") AND PUBYEAR > 1999 AND PUBYEAR < 2026.

The bibliometric procedure adopted in this study followed a structured process suggested by Dontu et al. (2021). As illustrated in the flowchart (Figure 1.1), the search result yielded 251 documents initially, and was filtered based on document type to retain only peer-reviewed journal articles, excluding book chapters, books and conference proceedings. A total of 200 journal articles were selected after filtration process. These articles underwent some relevance

screening process before the refined dataset was exported into VOSviewer for the keyword co-occurrence.

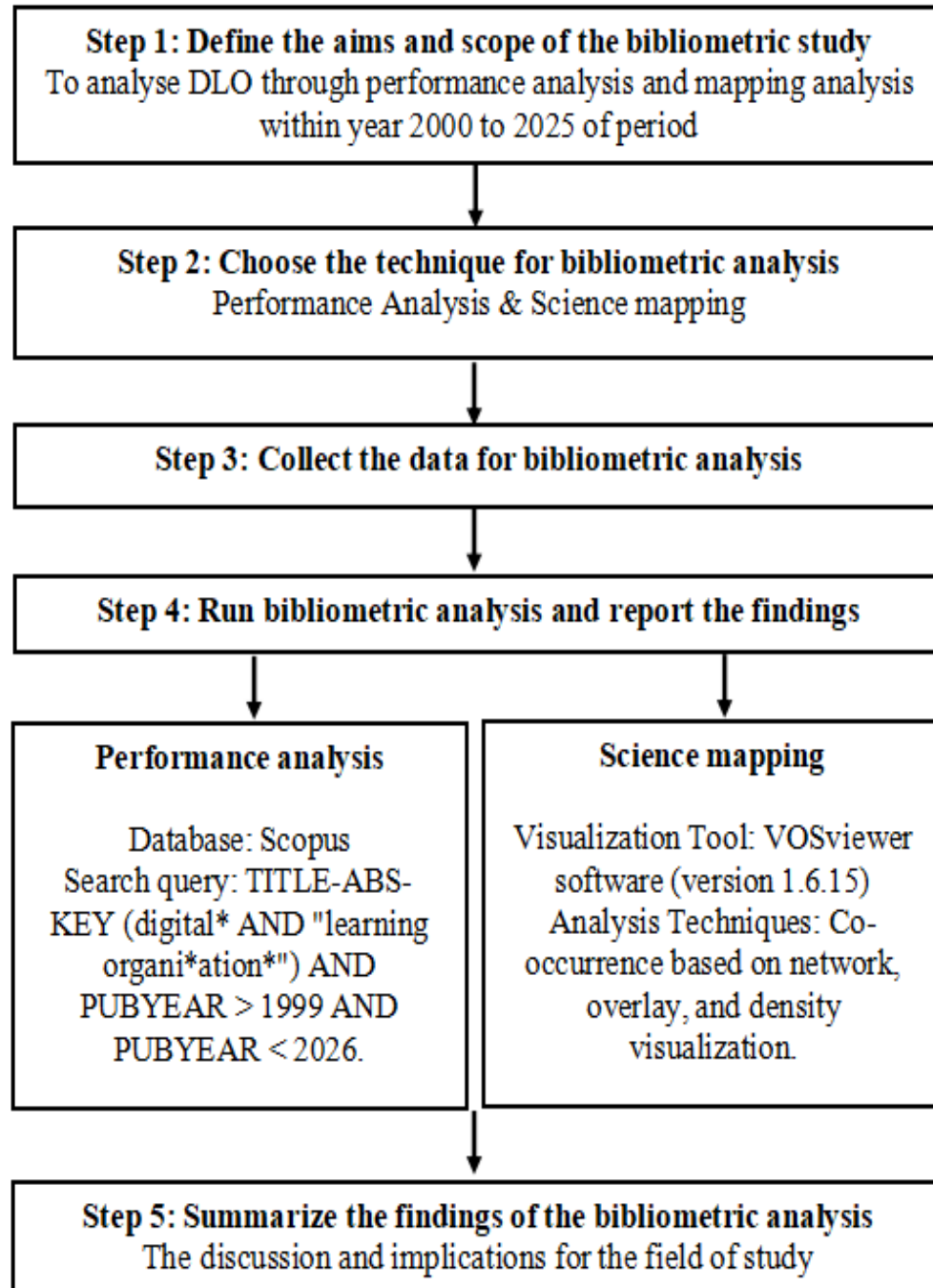
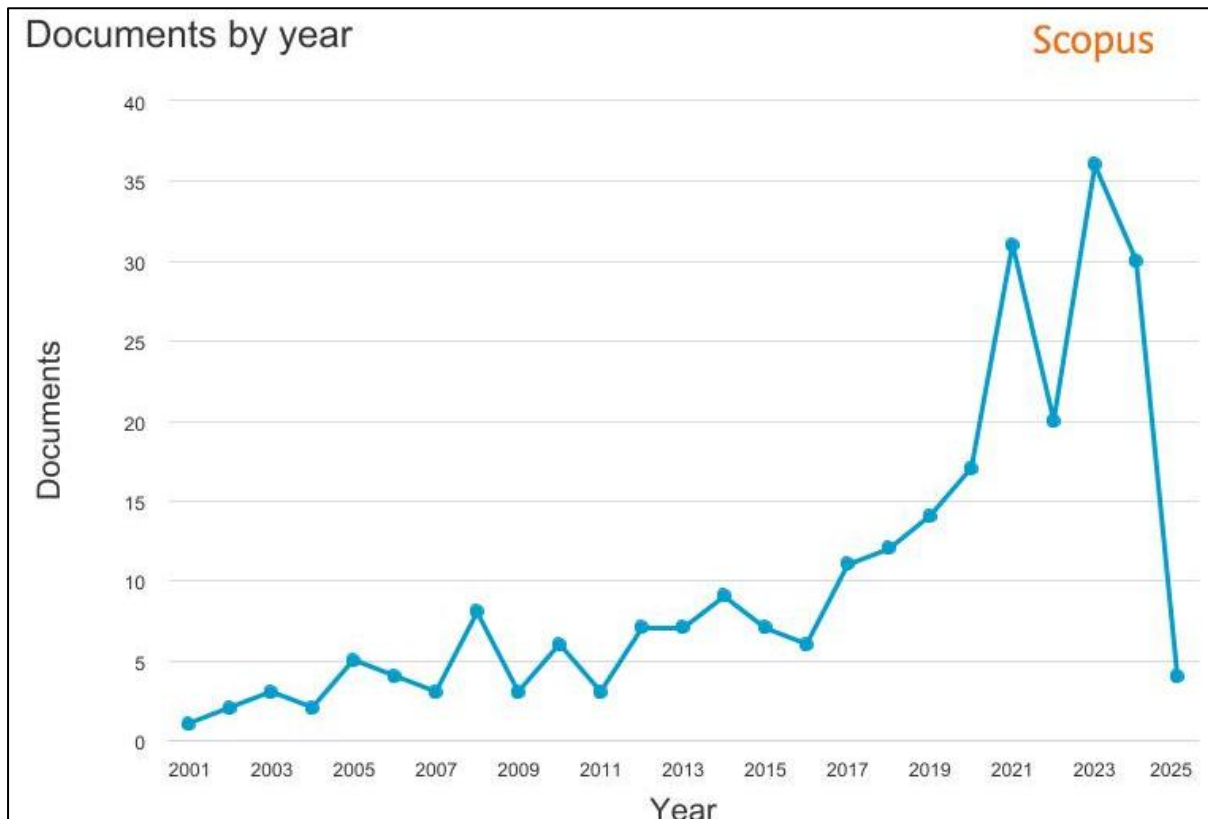


Figure 1: Analysis Procedure in Bibliometric Research

Source: Donthu et al. (2021)

RQ1 – What Are the Trends in DLO Publications? How Do the Research Change In 25-Year Period?**Figure 2: Publication by Year****Table 1: Year of Publication**

YEAR	DOCUMENT
2025	4
2024	30
2023	36
2022	20
2021	31
2020	17
2019	14
2018	12
2017	11

The first part of the study examines the productivity according to the publications by year. Figure 2 reveals a steady rise in publications from 2000 to 2025, indicating an increasing trend of publications published yearly. Although there is a slight reduction in publications in 2024, this figure can provide a good sign for research patterns over time, and indicates growing scholarly interest, which peaked in 2023. As the figure showed an established increasing number of publications, therefore this field has more potential to be more expanded in future's study, and suggesting heightened academic engagement in the field.

However, the sudden decline in 2025 raises questions, likely due to incomplete data, delays in indexing, or shifting research priorities. This drop should be interpreted cautiously, as it may not reflect an actual decrease in scholarly output (Ahmi, 2023). Despite this, the overall trend highlights the expanding relevance of the field, emphasizing the need for continued exploration. Multiple databases and qualitative insights could be incorporated into future research to provide a deeper understanding of the variables influencing these publication trends.

RQ2 – Who Are the Most Popular Authors in DLO Research? What Is the Authorship Pattern of The Publications?

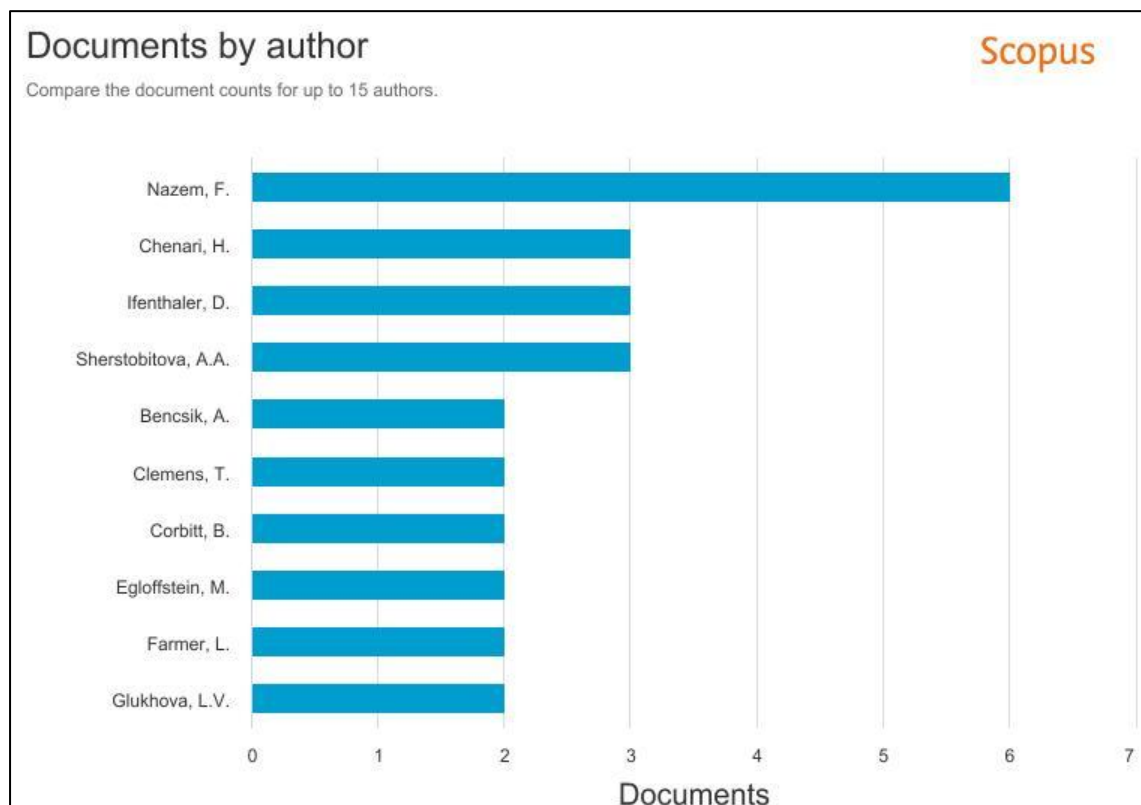


Figure 3: Publications by Author

Table 2: Publications Based on Authors

Author Name	Document
Nazem, F.	6
Chenari, H.	3
Ifenthaler, D.	3
Sherstobitova, A.A.	3
Bencsik, A.	2
Clemens, T.	2
Corbitt, B.	2
Egloffstein, M.	2
Farmer, L.	2
Glukhova, L.V.	2

Gudkova, S.A.	2
Helbig, C.	2

The bibliometric analysis of documents by author, as represented in the diagram, highlights the most prolific contributors to the field within the Scopus database. Among the listed authors, Nazem, F. emerges as the most influential, with the highest number of published documents, significantly surpassing the other contributors (6 documents or 18.8%). Following Nazem, F., Chenari, H., Ifenthaler, D., and Sherstobitova, A.A. exhibit equal contributions, indicating a group of researchers with comparable publication output (3 documents or 9.4%). The remaining authors, including Bencsik, A., Clemens, T., Corbitt, B., Egloffstein, M., Farmer, L., and Glukhova, L.V., each with 2 documents (6.3%). Overall, Nazem, F. is the most frequently contributing author in term of author-wise analysis.

This distribution of scholarly output suggests that a certain individual, such as Nazem, F., has made substantial contributions, the research landscape in this domain remains diverse, with multiple authors contributing at a moderate level. The presence of several researchers with comparable document counts may indicate collaborative efforts or a growing research community focusing on this particular area of study. Future analyses could explore citation impact and co-authorship networks for a better understanding of the influence of these scholars within the field.

RQ3 – Which Countries Are Most Active in DLO Research? How Does This Differ Across the Regions?

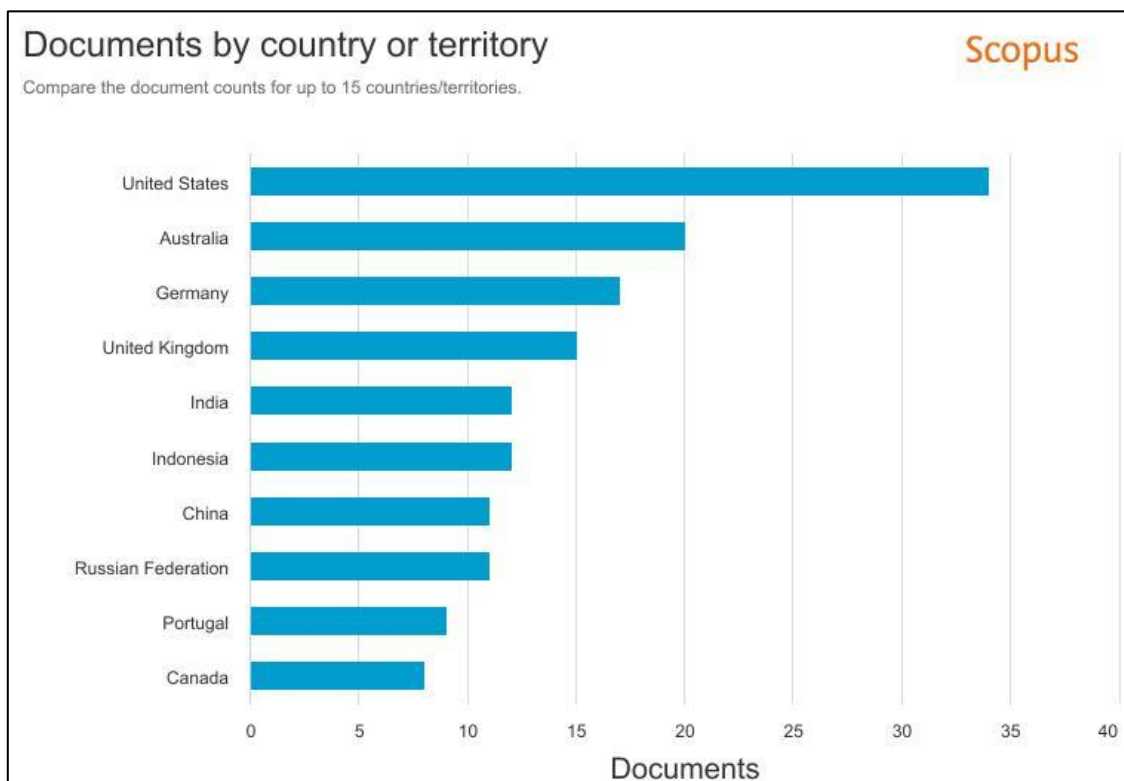


Figure 4: Publication by Country of Territory

Table 3: Publication Production based on Countries

Country/Territory	Document
United States	34
Australia	20
Germany	17
United Kingdom	15
India	12
Indonesia	12
China	11
Russian Federation	11
Portugal	9
Canada	8

The bibliometric analysis of documents by country or territory reveals that the United States leads in research contributions within the Scopus database. This country is the most active contributor in DLO research, with the highest number of documents (34 documents or 22.8%). This is followed by Australia (20 documents or 13.4%) and Germany (17 documents or 11.4%). The United Kingdom contributes significantly with 15 documents (10.1%). Other nations such as India and Indonesia each contribute 12 documents (8.1%), followed by China and the Russian Federation, each with 11 documents (7.4%). Portugal, and Canada also contributed with 9 documents or (6.0%) and 8 documents or (5.4%) completed the top 10 lists. The involvement of Asians and Western nations encompasses the global engagement and interest in DLO.

As shown in Figure 4 and Table 3, the productivity among nations is different. The productivity may vary due to the factors of institutional focus, the extent of academic partnerships, and the availability of research funding. According to Borgman (2010), Marin et al. (2020), and OECD (2023), countries like the United States and Australia indicate robust infrastructures that can facilitate scholarly research, and this shows them as prominent among other countries. Meanwhile, the growing presence of countries like India, Indonesia, and China indicates an expanding research landscape in emerging economies. This trend suggests opportunities for future international collaborations and knowledge exchange, which could further enrich the field and enhance its global impact. In the other words, this distribution of DLO research suggests a strong dominance of Western countries, particularly the United States, while Asian countries show a growing pace in the field.

RQ4 – Which Subject Area from The Co-Occurrence Analysis of Author Keywords in The Literature on DLO Research? Which Subject Areas Have the Highest Number of Highly Cited Documents?

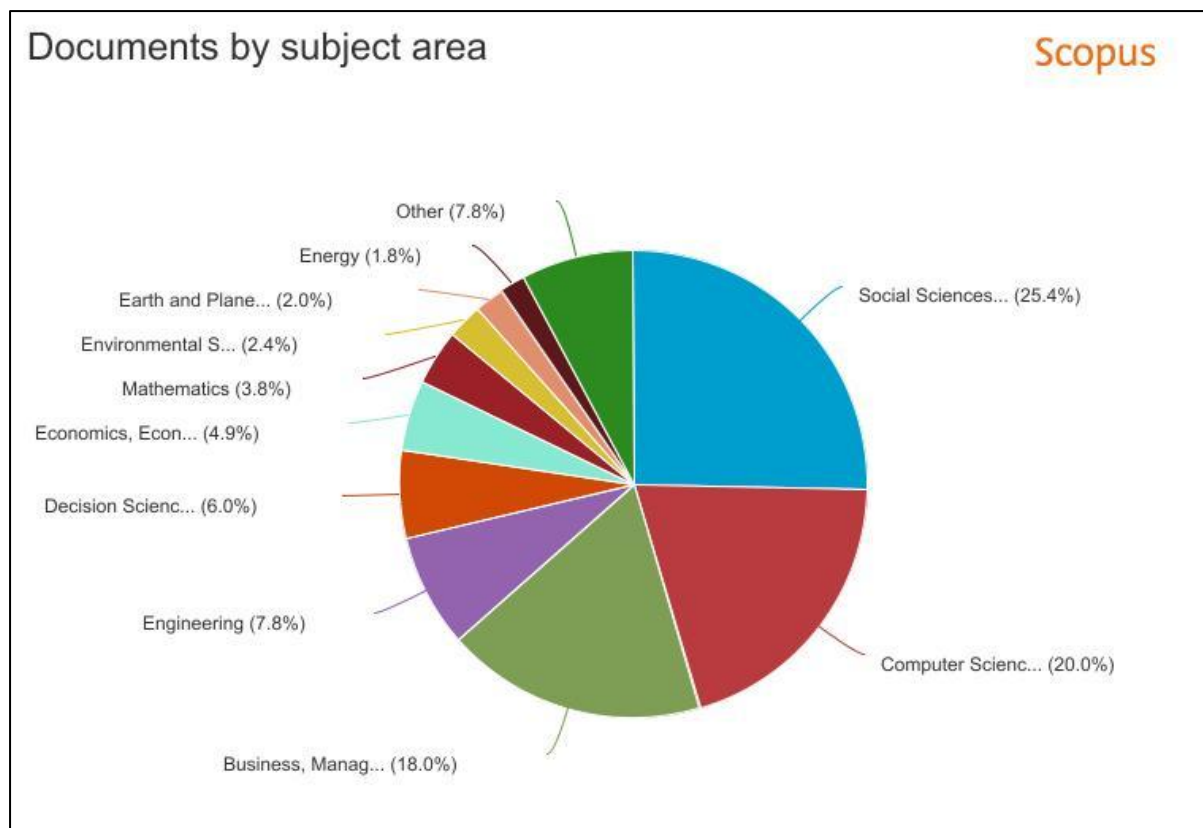


Figure 5: Publications by Subject Area

Table 4: Top Subject Areas of Publications

Subject Area	Document
Social Sciences	114
Computer Science	90
Business, Management And Accounting	81
Engineering	35
Decision Sciences	27
Economics, Econometrics And Finance	22
Mathematics	17
Environmental Science	11
Earth And Planetary Sciences	9
Energy	8

The analysis of documents by subject area indicates that Social Sciences (25.4%) and Computer Science (20.0%) are the most dominant fields, together making up around half of the entire amount of research produced. This suggests that human and technological variables are highly valued in the academic community (Cortés et al., 2021). Business and Management (18.0%) also contributes significantly, reflecting the growing intersection of technology, business, and organizational studies. Other notable fields include Engineering (7.8%), Decision

Sciences (6.0%), and Economics (4.9%), highlighting the multidisciplinary nature of the research landscape.

Mathematics (3.8%), Environmental Science (2.4%), and Earth and Planetary Sciences (2.0%), with Energy (1.8%) representing the least explored discipline. Hajkovicz et al. (2023) suggested that although the focus of research lies in areas such as technology, society and business, the academic interest has also extended to areas such as environmental, scientific, and decision-making disciplines. This was shown in the “other” category (7.8%) in the chart of Figure 5. These findings align with the previous scholars that emphasize the interdisciplinary (Aristonik et al., 2023, Bilal et. al. 2022, and Fauzi (2022).

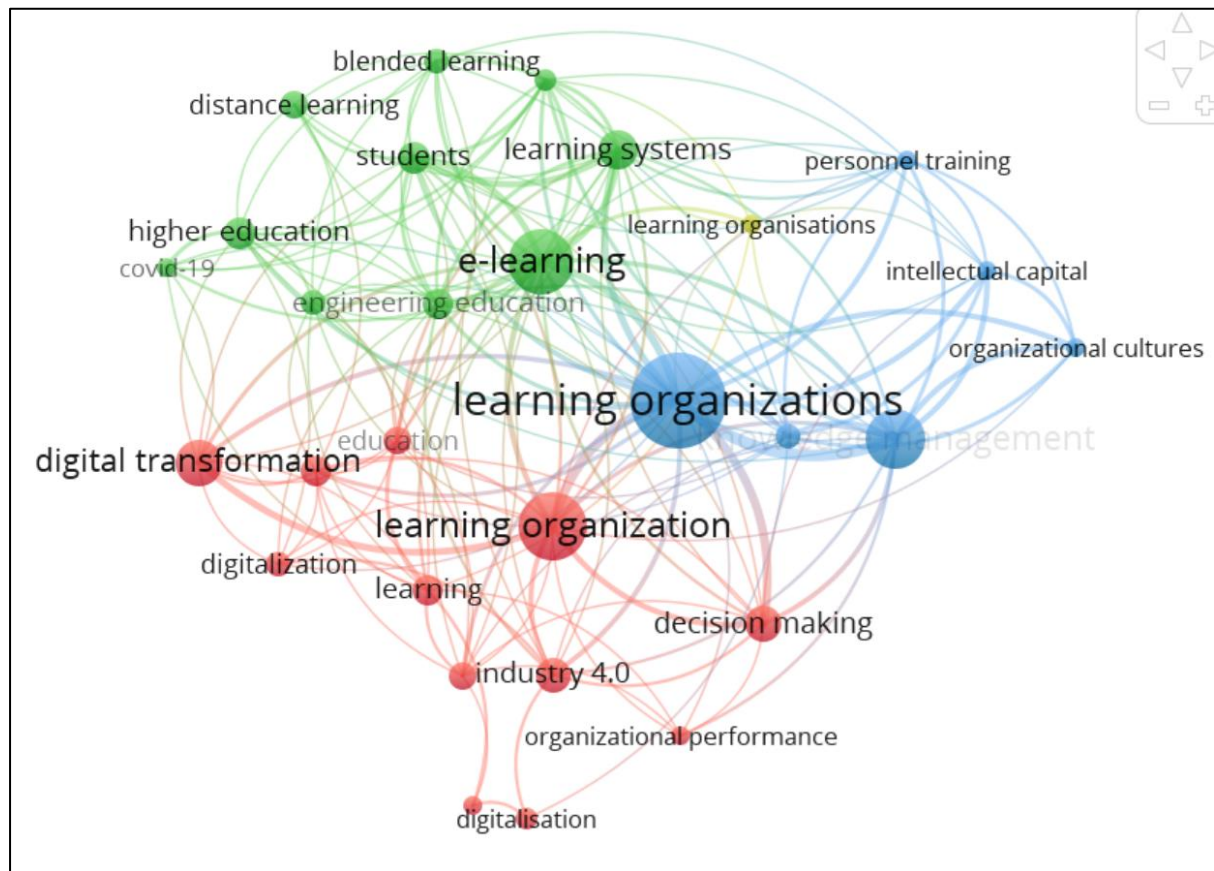


Figure 6: The Co-Occurrence of Visualization

Figure 6 illustrates the thematic structure in visualizing keyword co-occurrence within the learning organization literature. The co-occurrence is generated based on the frequency and co-appearance of authors' keywords. Three clusters emerge using bibliometric mapping, representing research streams dominating the DLO field.

The blue cluster indicates Organization Development and Knowledge Management, which circles core terms such as learning organization, personal training, intellectual capital and organizational. A strong focus on how organizations can enhance learning, control knowledge resources, and build internal capacity (Sahni et al., 2025). The red cluster indicates digital transformation and performance, is encompassed by keywords such as digital transformation, industry 4.0, digitalization, decision making, and organizational performance. This shows an increasing trend of research connecting learning organization with the changes in technology

in the digital era (Aristovnik et al., 2020). The green cluster focus on e-learning, blended-learning, students, distance learning and higher education. This cluster represents the overlapping of learning systems in education. Starting with the presence of COVID-19, recent attention more highlighted to digital trend in education (Zhang et al., 2021).

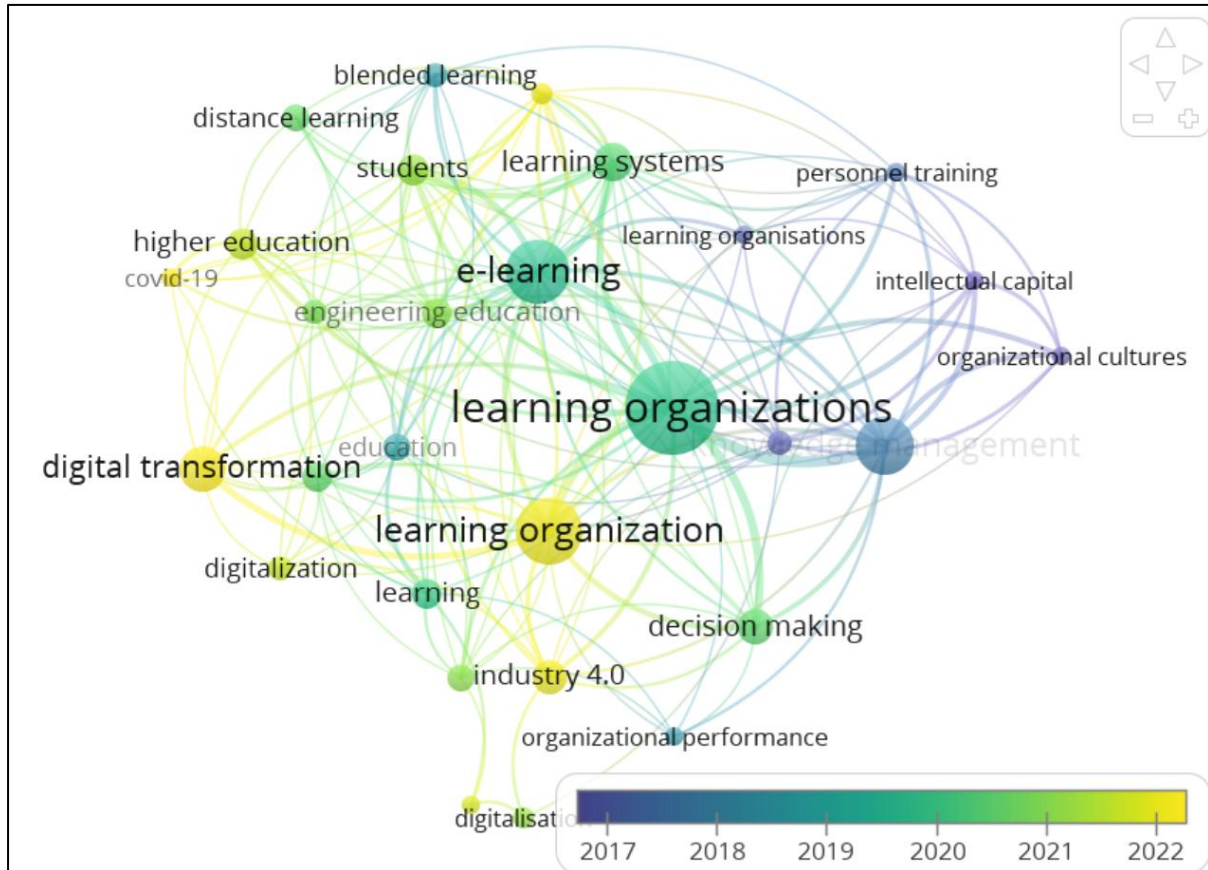


Figure 6: The Network Visualization

Figure 6 visualizes the research issues of learning organization, digital transformation and e-learning. The gradient colour from blue to yellow shows that the occurrences have evolved over time, from 2017 to 2022. “Learning organization” has been sustained as the most popular phrase. It is to indicate its central position in the DLO field. From the observation, the dark blue colour represents the earliest study that highlighted on concepts like “intellectual capital” and “organizational culture”. This encompasses on management techniques and corporate learning (Aini et al., 2020). Over the time, the research has changed to digital learning methods as the most highlighted terms within 2019 to 2020, with the keywords such as “blended-learning”, “e-learning” and “learning systems”. The rises of “higher education” and “COVID-19” has showed attention to how the epidemic and pandemic enhanced the digital learning (; Salakhova et al., 2020; Valverde-Berrocoso et al., 2020). Furthermore, more recent terms like “digital transformation,” “digitalization,” and “industry 4.0” (yellow-green) have become popular, indicating the expanding relationship between organizational learning processes and technology breakthroughs. Even if the phrase “higher education” appears frequently in the bibliometric map to indicate that the academic environment as a whole. However, the current study focuses exclusively on digital learning organizations in educational settings, including within the school education.

This graphic offers important insights regarding the fluidity of research trends from a bibliometric standpoint.

Important insights from a bibliometric standpoint can be observed from the graphic in Figure 7. The figure reflects a shift in research focus from traditional learning organization concepts towards contemporary challenges driven by technology and digital evolution. This can lead to additional investigation for further developments regarding DLO (Barnes, 2020; Koh & Kan, 2021). This could entail monitoring citation trends or determining important writers and works.

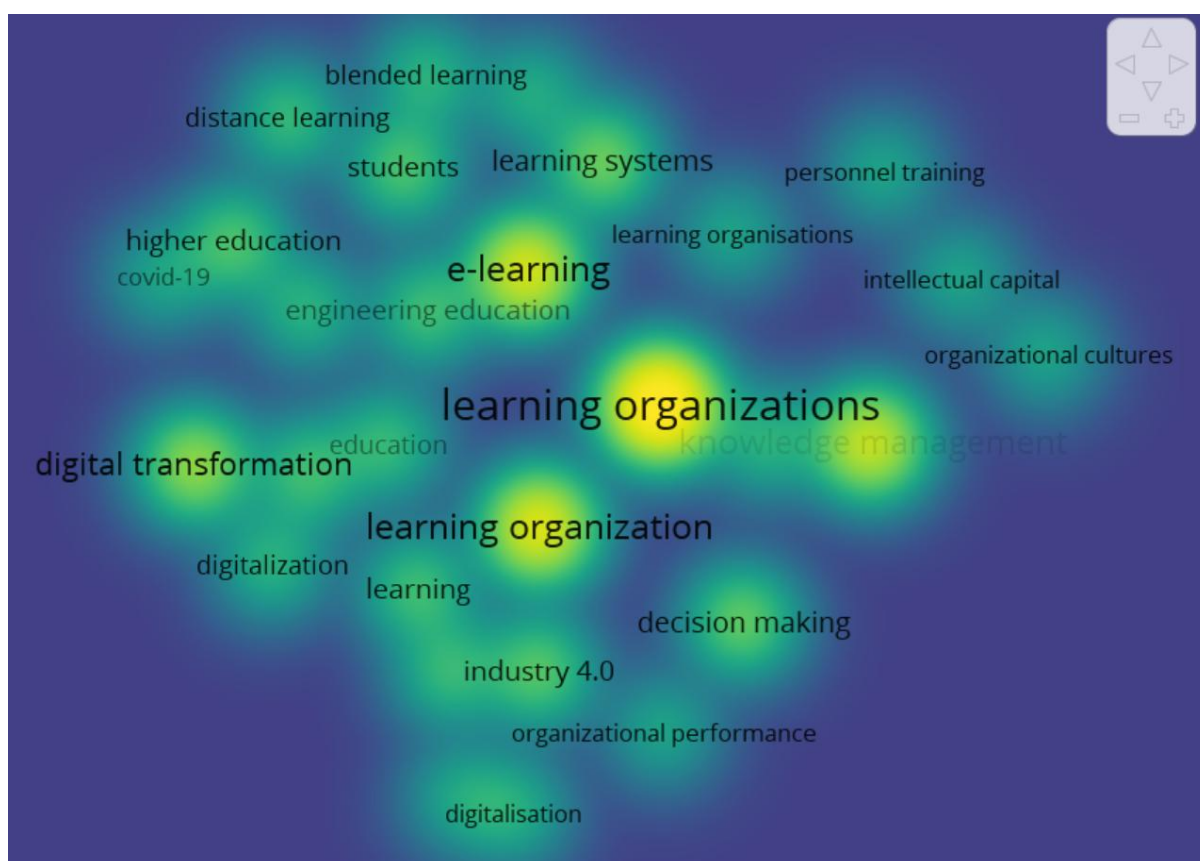


Figure 7: The Density visualization

The heat map indicates the concentration of research activity regarding the keywords such as learning organization, digital transformation and e-learning. The yellow area reflects the frequency and how the topics are interconnected to each other within the bibliometric database.

The density of keyword-related research activity in the fields of learning organization, e-learning, and digital transformation is depicted in this heat map visualization. The bibliometric dataset's frequency and interconnection of a certain topic are indicated by the yellow-green area's intensity. The most common term, "learning organization," is found in the center, suggesting that it continues to be the main focus of the study. Key topics of scholarly interest are highlighted by the closely linked keywords "learning organizations," "e-learning," and "digital transformation." This is consistent with research by Sahni et al. (2025) on the difficulties associated with digital transformation for online instruction and learning in higher education. In their bibliometric analysis, Fauzi (2022) and Bilal et al. (2022) also charted the

associated terms that have grown in popularity over the past few years: virtual learning and e-learning.

Significant research activity is also shown by the heat map around terms like "industry 4.0," "decision-making," and "digitalization," which represent the increased focus on the role of technology in the creation of learning organizations. Furthermore, the mention of "higher education," "students," and "COVID-19" points to a move toward digital teaching methods, especially in light of current international issues. "Organizational culture," "intellectual capital," and "staff training," which are less focused but nevertheless pertinent, show a persistent interest in corporate learning and knowledge management.

This visualization offers important insights about the focus and development of the study issue from a bibliometric standpoint. It assists in locating recurring themes, new developments, and possible gaps in the body of literature. This statement is in line with Bilal et al. (2022) and Özyurt Serim and Bilgili (2023) asserted that digital transformation in education increased during COVID-19, leading to changes method of transferring information through digital resources. Future studies may further explore citation networks, patterns of collaboration, and temporal shifts in research focus to obtain a more thorough comprehension of the advancements in this field.

Conclusion

From this bibliometric study, the objectives of the study were accomplished to provide a comprehensive overview of DLO as a thorough summary. The keyword in co-occurrence and heatmap visualizations encompasses the growing interconnections and density of research activities, the dynamic of the field, and well-developed. The findings encompass the themes of e-learning, digital transformation and organization development. In addition, the findings indicate that the concept of learning organization remains highlighted within the literature, and anchors the theme with emerging areas: digitalization, industry 4.0, decision-making and COVID-19. Those themes drive shifts in digital learning.

The temporal analysis visualized a clear transition from traditional learning organization concepts toward more digital paradigm of learning organization. One of the causes was global pandemic COVID-19 that enhance the terms such as e-learning, blended learning, online learning in the education settings.

Country-level data shows that developed nations such as the United States of America, Australia, Germany, and the United Kingdom contribute the most, supported by strong research infrastructure and funding. However, increasing participation from emerging economies such as India, Indonesia, and China indicates a promising shift toward a more globally inclusive research landscape. Overall, the findings bridged the interdisciplinary research such as social science, computer science, business, education, and decision science.

This distribution suggests that while the primary focus remains on technology, society, and business, there is also a broader academic engagement with environmental, scientific, and decision-making disciplines. These findings highlight the inherently interdisciplinary nature of current research, paving the way for future collaborations across these domains.”

As for limitations of the study, future studies were suggested to integrate bibliometric research with a comprehensive literature review. This might provide not only the publications but also the theories, framework and issues that have emerged over time. As a result, the comparative table and thematic synthesis of previous empirical findings could be added in the methodology context.

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