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Strategic Foresight in Education: A Bibliometric Analysis and Future Research Agenda

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Abstract

This study aims to map the intellectual landscape and research development of *Strategic Foresight in Education* through a bibliometric analysis and to identify future research directions in the field. A bibliometric approach was employed using data retrieved from the Scopus database. A total of 324 journal articles published between 2015 and 2026 were analyzed using Bibliometrix and VOSviewer. The analysis included publication trends, citation analysis, co-authorship networks, author and source co-citation analysis, and keyword co-occurrence analysis. The results indicate that research on *Strategic Foresight in Education* has grown significantly over the last decade, particularly after 2021. Australia, the United Kingdom, the United States, and Finland emerged as the leading contributors to the field. The intellectual structure of the field is primarily shaped by the contributions of Hicks, Slaughter, Inayatullah, and Miller, while *Futures*, *Sustainability*, and *Foresight* serve as key knowledge sources. The conceptual structure reveals strong relationships among themes such as *future thinking*, *future literacy*, *higher education*, *artificial intelligence*, *sustainability*, and *anticipatory governance*. Emerging topics include AI-driven foresight, educational resilience, organizational agility, and higher education transformation. This study contributes to understanding the evolution, intellectual foundations, and conceptual development of *Strategic Foresight in Education* and provides directions for future research and practice in educational management and policy.

Keywords

Strategic Foresight; Education; Bibliometric Analysis; Co-Citation Analysis; Future Literacy; Anticipatory Governance; Artificial Intelligence

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1. INTRODUCTION

The development of digital technologies, artificial intelligence (AI), workplace automation, demographic shifts, and global socioeconomic dynamics has created an increasingly complex and uncertain environment for education systems. Educational institutions are no longer expected merely to respond to ongoing changes; they must also anticipate multiple possible futures that may affect the relevance, quality, and sustainability of educational services. In conditions characterized by volatility, uncertainty, complexity, and ambiguity (VUCA), planning approaches based solely on historical data

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and short-term projections are becoming increasingly inadequate for addressing disruptive change (Miller, 2018; OECD, 2019; UNESCO, 2021).

Against this backdrop, strategic foresight has attracted growing attention as an approach to supporting future-oriented decision-making. Strategic foresight can be understood as a systematic process for exploring possible futures, identifying emerging trends, detecting weak signals of change, and understanding uncertainties that may affect organizations and their environments (Miller, 2018; Vecchiato, 2015). Unlike forecasting, which tends to predict the future based on historical trends, strategic foresight emphasizes the exploration of multiple futures. This enables organizations to develop strategies that are more adaptive, resilient, and responsive to change. Foresight is increasingly regarded as an organizational capability that contributes to innovation, resilience, and organizational performance in dynamic environments (Rohrbeck & Kum, 2018)

In education, strategic foresight is used to support policy formulation, strategic planning, digital transformation, curriculum development, educator capacity-building, and the strengthening of educational organizations' capacity to navigate uncertainty (UNESCO, 2021). Thus, strategic foresight is not merely a tool for imagining the future of education; it is also a mechanism for translating such insights into strategic decisions and actions in the present.

The importance of strategic foresight in education has become more pronounced alongside the global education transformation agenda. In Reimagining Our Futures Together, (UNESCO, 2021) emphasizes the need to build anticipatory capacity so that education systems can respond more effectively to the challenges of the twenty-first century. Similarly, the (OECD, 2019), through its Learning Compass 2030 framework, highlights the importance of future thinking in preparing learners for a constantly changing world. From this perspective, strategic foresight is not simply a planning tool but a strategic approach that can foster innovation, organizational resilience, and the sustainability of education systems. The OECD (2019) further underscores that the capacity to anticipate and adapt to change is a prerequisite for successful educational transformation in the future.

Research on strategic foresight in education remains fragmented. The literature addresses a range of topics, including the future of education, digital transformation, curriculum innovation, educational leadership, sustainable education, future competencies, the resilience of educational organizations, and scenario-based policy development. However, these themes have evolved across different disciplines and often employ different terminology, making it difficult to obtain a comprehensive picture of the field's intellectual structure (UNESCO, 2021). This observation is consistent with the systematic literature review by (Iden et al., 2017), which found that strategic foresight research draws on diverse methodological approaches and theoretical perspectives, resulting in a multidisciplinary and relatively fragmented field.

Scientific publications on strategic foresight in education have tended to increase, particularly following the emergence of the Education 2030 agenda, the digital transformation of education, and the accelerated adoption of AI-based technologies. Nevertheless, few studies have systematically mapped how this body of research has developed, which scholarly actors have exerted the greatest influence, how patterns of collaboration among researchers have emerged, and which concepts have become central to the field. Consequently, the research landscape of strategic foresight in education remains incompletely understood.

Bibliometric mapping of strategic foresight in general has been undertaken by (Chalapud Narváez, 2022), who analyzed the development of research on *prospectiva estratégica*, and by (Judijanto & Azwar, 2025), who examined publication trends, keywords, and scholarly collaboration patterns in strategic foresight. Other studies have also documented growing interest in strategic foresight in relation to organizational innovation, governance, and strategic management (Rohrbeck & Kum, 2018). However, to the best of our knowledge, no bibliometric mapping has specifically focused on the relationship between strategic foresight and the management of educational institutions. As a result, the intellectual structure, thematic evolution, and connections between strategic foresight and key educational management issues—including educational transformation, anticipatory governance, sustainability, future capacity development, and digital transformation—have yet to be comprehensively identified.

In response to this situation, the present study addresses three principal research gaps. First, a literature-mapping gap concerning the development of publications on strategic foresight in educational institutions. Second, a conceptual gap concerning the relationship between strategic foresight and educational transformation, anticipatory governance, educational innovation, and future capacity development. Third, a developmental and collaboration gap concerning the evolution of research themes and collaboration patterns among authors, institutions, and countries. These three gaps are examined through bibliometric analysis, ensuring that the findings are grounded in empirical evidence from a corpus of scholarly publications.

These gaps point to the need for an approach that can systematically and empirically map the development of the literature. Bibliometric analysis is well suited to this purpose because it identifies publication patterns, scholarly influence, collaboration networks, and the conceptual structure of a research field using available bibliographic data (Donthu et al., 2021). In addition to tracing the development of knowledge over time, bibliometric analysis enables objective and transparent mapping of intellectual relationships among concepts, authors, and institutions (Zupic & Čater, 2015).

VOSviewer enables the visualization of relationships among authors, institutions, countries, citations, and keywords, thereby providing a clearer representation of a field's intellectual structure (van Eck & Waltman, 2010). The software is designed to construct and visualize bibliometric networks

based on the Visualization of Similarities (VOS) approach, which groups items into clusters according to their degree of relatedness (Tupan et al., 2018).

In this study, bibliometric analysis using VOSviewer was employed to map keyword networks, scholarly collaboration, and relationships among publications. The analysis was complemented by measures of scholarly productivity, citation impact, and thematic development to identify dominant research areas and topics with potential for further development (Aria & Cuccurullo, 2017; Donthu et al., 2021). The interpretation of the maps was also informed by relevant article reviews. Accordingly, the identification of research gaps and a future research agenda was based not only on network visualizations but also on a substantive understanding of the literature.

Against this background, this study aims to map the development of the literature on strategic foresight in education through a bibliometric analysis of Scopus-indexed publications. Specifically, it addresses the following research questions: (Q1) How have scholarly publications on strategic foresight in education developed over time? (Q2) Which authors, journals, institutions, and countries are the leading contributors to this research field? (Q3) What intellectual structures, collaboration networks, and thematic clusters shape research on strategic foresight in education? (Q4) How have research themes and relationships among concepts in this field evolved? and (Q5) What research gaps and future research directions can be identified to strengthen the application of strategic foresight in strategic educational management?

This study is expected to make an empirical contribution by mapping publication trends and scholarly networks, a conceptual contribution by identifying the relationships between strategic foresight and various dimensions of educational management, and a practical contribution by formulating a future research agenda. Thus, the study does more than describe publication growth; it also provides an academic foundation for understanding how strategic foresight can be developed as an organizational capability and an anticipatory approach to managing educational institutions.

2. METHOD

2.1. Research Design

This study adopts a quantitative approach using bibliometric analysis to map publication trends, conceptual structures, scholarly collaboration networks, and the thematic evolution of research on strategic foresight in education. Bibliometric analysis was selected because it enables systematic examination of publication patterns and relationships among documents, authors, institutions, countries, and concepts based on bibliographic metadata (Donthu et al., 2021; Zupic & Čater, 2015).

Data retrieved from Scopus were analyzed through four bibliometric stages: literature searching, document screening, bibliometric attribute checking, and bibliometric analysis. These stages were

conducted systematically to ensure document relevance, assess metadata completeness, and map patterns and developments in the scholarly publications under investigation (Julia et al., 2020).

2.2. Data Source and Search Strategy

The research data were obtained from the Scopus database. Scopus was selected because it provides scholarly publication metadata that can be used to analyze publication trends, citations, author affiliations, countries of origin, and conceptual relationships.

The search was conducted using the title, abstract, and keyword fields (TITLE-ABS-KEY) to identify relevant documents based on their principal bibliographic information. The search strategy combined terms related to strategic foresight, educational foresight, organizational foresight, organisational foresight, futures thinking, and anticipatory governance with terms relating to education, schools, universities, educational institutions, and higher education. These terms were combined to retrieve potentially relevant publications, including studies that use different terminology to discuss anticipation of the future and strategic decision-making. The initial search string was as follows:

> TITLE-ABS-KEY (("strategic foresight" OR "educational foresight" OR "organizational foresight" OR "organisational foresight" OR "futures thinking" OR "anticipatory governance") AND (education* OR school* OR universit* OR "educational institution*" OR "higher education"))

The search was conducted on October 22, 2026. The initial search string returned 452 documents. The search was then refined by limiting publications to the period 2015–2026, the journal article document type, the Social Sciences subject area, and English-language publications. This process yielded 324 documents relevant to the research topic, which formed the basis of the bibliometric analysis. The data selection summary is presented in Table 1.

Table 1. Summary of Data Selection

Dimension	Criteria
Data source	Scopus
Time frame	2015–2026
Language	Inggris
Keywords	*strategic foresight, educational foresight, organizational foresight, organisational foresight, futures thinking, anticipatory governance*
Document type	Article
Extraction process	Export with complete records and references in CSV format
Sample size	324

Source: Authors' analysis of Scopus data (2026).

2.3. Data Collection and Processing

Data were analyzed using quantitative and qualitative descriptive approaches. First, the Analyze Results feature in Scopus was used to obtain publication statistics and generate graphs. The data were then exported in CSV format and processed using Microsoft Excel for quantitative analysis and VOSviewer to visualize keyword co-occurrence networks, co-authorship patterns, and publication distributions by institution and country. The resulting visualizations were used to identify relationships among concepts and patterns of scholarly collaboration in the literature.

2.4. Bibliometric Analysis Techniques

The analysis used VOSviewer version 1.6.21 to map and visualize bibliometric relationships, together with descriptive analysis of metadata to identify publication trends. VOSviewer can construct maps from bibliographic data to visualize relationships among documents and reveal patterns and meanings embedded in the literature (Han & Gong, 2021; Zhao et al., 2022). In this study, the software was used to analyze and visualize co-citation relationships among authors and publication sources, as well as keyword co-occurrence (Chang et al., 2022). In addition to co-occurrence and co-citation analyses, the study employed co-authorship analysis to identify scholarly collaboration networks among authors, institutions, and countries; bibliographic coupling analysis to map intellectual proximity among documents based on shared references; and citation analysis to measure the scholarly influence and impact of authors, documents, journals, institutions, and countries in Strategic Foresight in Education. The software was selected because it provides three principal visualization modes—network, overlay, and density visualizations—which help identify patterns of relatedness, development, and thematic concentration in the scholarly literature (Dubyna et al., 2022).

3. FINDINGS AND DISCUSSION

3.1. Publication Trends in Research on Strategic Foresight in Education

Publications on Strategic Foresight in Education increased significantly over the 2015–2026 period (Figure 1). During the initial period (2015–2018), publication output remained relatively low, ranging from 4 to 8 documents per year. From 2019 onward, the number of publications increased gradually, reaching 20 documents in 2022. Following a slight decline in 2023, publication output rose sharply in 2024 and continued to increase, reaching a peak of 65 documents in 2026. This pattern indicates growing scholarly interest in applying strategic foresight to education, particularly in relation to digital transformation, the resilience of educational organizations, and the development of future-oriented education systems. The continued upward trajectory suggests that this is an emerging research field with considerable potential for further investigation.

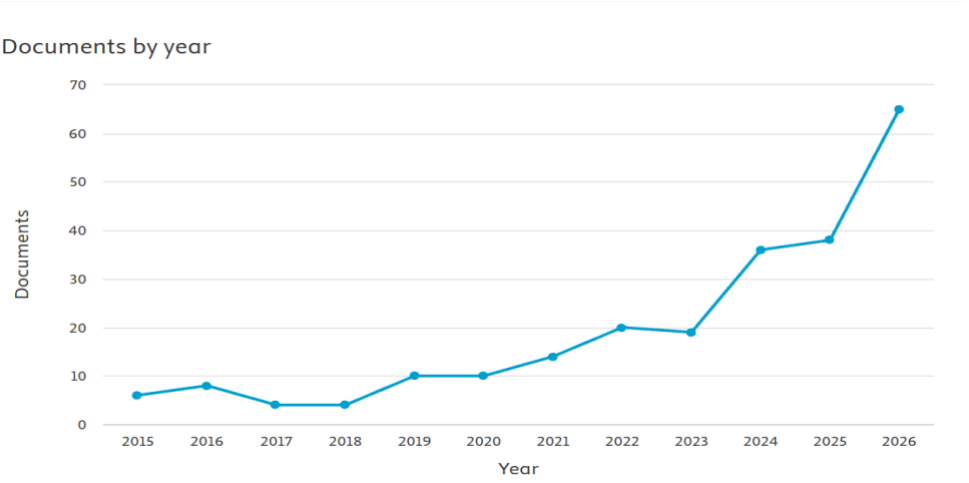

Figure 1. Publication Trends in Research on Strategic Foresight in Education

3.2. Country Collaboration Networks in Research on Strategic Foresight in Education

Australia was the most productive country in research on Strategic Foresight in Education, with 37 publications, followed by the United Kingdom (35 publications), the United States (27 publications), and Finland (23 publications). The collaboration network shows that the United Kingdom and Australia serve as major hubs, with strong connections to numerous other countries. These findings indicate that research on strategic foresight in education is still dominated by developed countries, particularly Anglo-Saxon and Northern European countries. Nevertheless, the growing participation of Asian countries signals an expanding global interest in the importance of foresight approaches for addressing future educational challenges.

Table 2. Distribution of Scholarly Publications on Strategic Foresight in Education by Country

No	Country	Documents	Citations
1	Australia	37	486
2	United Kingdom	35	727
3	United States	27	354
4	Finland	23	497
5	Canada	11	106
6	Italy	11	165
7	China	9	110
8	Netherlands	9	136
9	Taiwan	9	179
10	Spain	8	146

Source: Authors' analysis of Scopus data using VOSviewer (2026).

Figure 2 illustrates international collaboration patterns in research on Strategic Foresight in Education. The overlay visualization indicates that Australia, the United Kingdom, Finland, and

Canada were among the earlier contributors to this research field, whereas Spain, Saudi Arabia, Mexico, and Taiwan have become involved more recently. The color progression from blue to green and yellow suggests that research on strategic foresight in education is undergoing substantial geographical expansion.

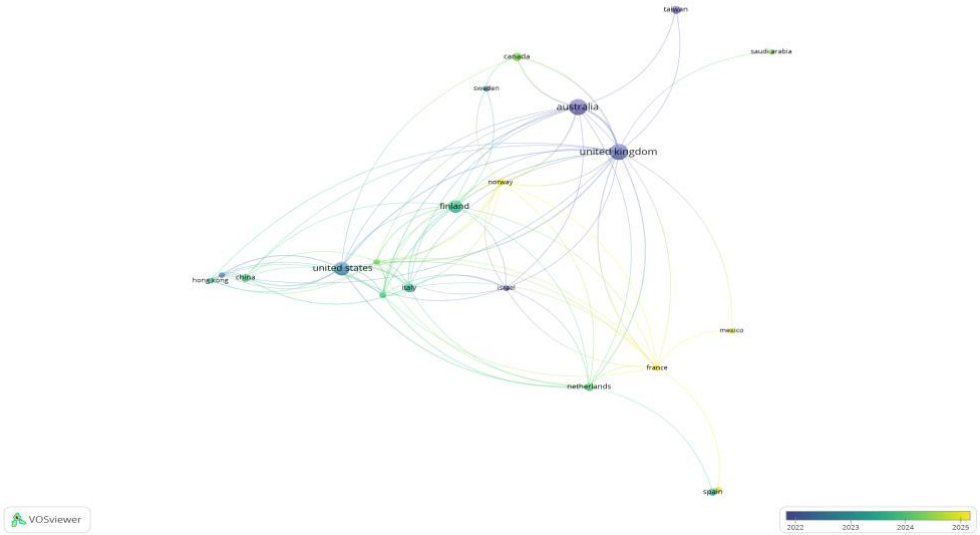

Figure 2. Overlay Visualization of Scholarly Publication Activity in Strategic Foresight in Education

Meanwhile, the network visualization (Figure 3) reveals an integrated collaboration structure, with the United Kingdom and Australia serving as the principal network hubs. The strong connections among countries indicate that the development of this field is substantially shaped by international collaboration and cross-border knowledge exchange. These findings confirm that Strategic Foresight in Education is an emerging research field characterized by expanding global participation and considerable potential to become a major agenda in future education research.

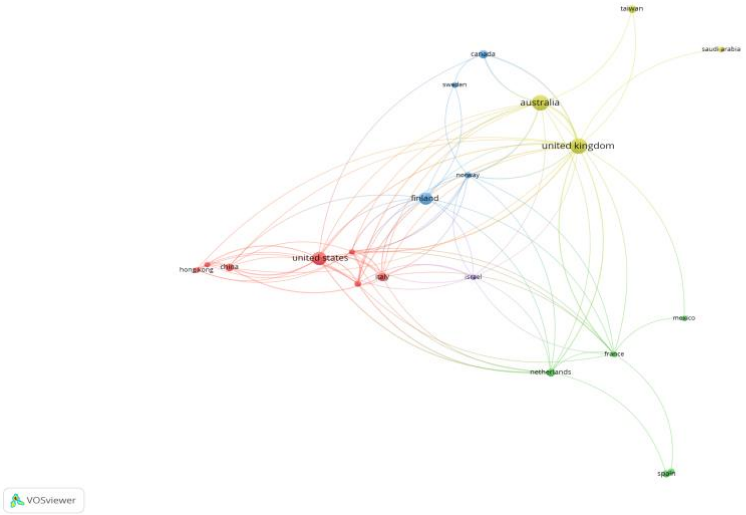

Figure 3. International Collaboration Network in Strategic Foresight in Education

3.3. Leading Authors, Publication Sources, and Institutions in Strategic Foresight in Education

3.3.1. Most Productive Authors

Based on the ten most productive authors (Table 3), Laherto, A. is the most prolific researcher in Strategic Foresight in Education, with six publications. Rasa, T. and Scupelli, P. follow with four publications each, while the remaining seven authors have three publications each. The relatively even distribution of productivity suggests that Strategic Foresight in Education is still a developing field and is not yet dominated by a small group of researchers. This pattern indicates that research in this area is multidisciplinary, drawing on diverse perspectives ranging from futures studies and educational innovation to educational technology and the development of twenty-first-century competencies. This situation leaves considerable scope for further theoretical development and empirical research.

Table 3. Ten Most Productive Authors in Strategic Foresight in Education

No	Author	Documents	Citations
1	Laherto, A.	6	229
2	Rasa, T.	4	106
3	Scupelli, P.	4	14
4	Barbara, A.	3	9
5	Chen, K.H.	3	53
6	Henriksen, D.	3	115
7	Mishra, P.	3	115
8	Postma, A.	3	9
9	Selwyn, N.	3	141
10	Vidergor, H.E.	3	102

Source: Authors' analysis of Scopus data using VOSviewer (2026).

Figure 4 presents the author collaboration structure in Strategic Foresight in Education based on co-authorship analysis. The minimum threshold was set at three documents per author, and only authors meeting this threshold were included in the network visualization. In contrast to the relatively integrated country collaboration network, the author network is still dominated by small groups with limited connectivity.

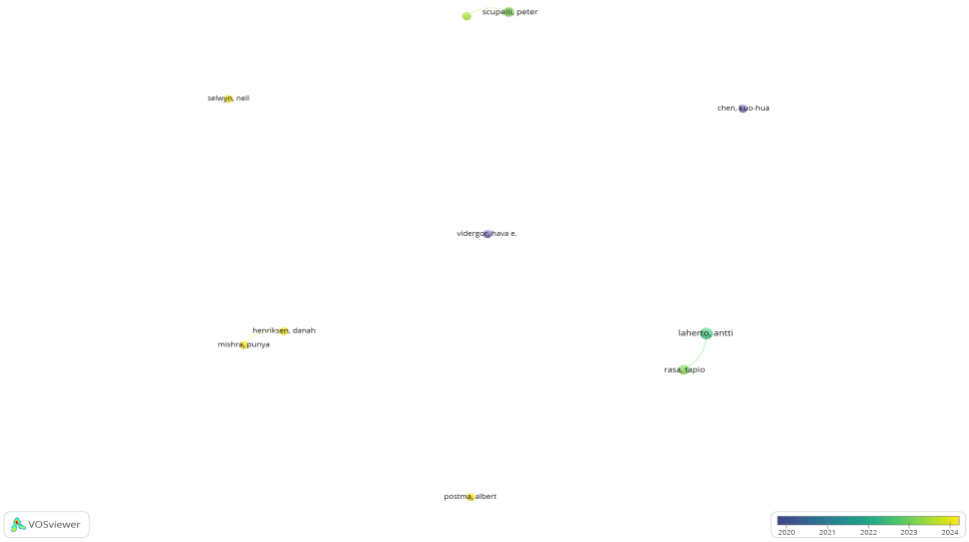

Figure 4. Overlay Visualization of Author Activity in Strategic Foresight in Education

The main clusters are evident in the collaborations between Laherto and Rasa and between Henriksen and Mishra. The overlay visualization indicates that authors such as Chen and Vidergor made relatively early contributions, whereas Laherto, Rasa, Scupelli, and Postma have been more active in recent years. These findings suggest that the development of Strategic Foresight in Education is not dominated by a single academic community; rather, it is progressing through multiple research groups with different areas of focus. This result is consistent with the publication trend and country collaboration analyses, which indicate that the field remains in a growth phase and continues to expand geographically and across disciplinary perspectives.

3.3.2. Leading Publication Sources

The data in Table 4 show that *Futures* is the leading publication source in Strategic Foresight in Education, with 24 documents, followed by the *Journal of Futures Studies*, with 15 documents.

Table 4. Leading Publication Sources in Strategic Foresight in Education

No	Source	Documents	Citations
1	Futures	24	224
2	Journal of Futures Studies	15	97
3	Education Sciences	6	75
4	Frontiers in Education	6	58
5	Sustainability Switzerland	6	159
6	Journal of Tourism Futures	5	16
7	On the Horizon	4	46
8	Research in Science Education	4	64

No	Source	Documents	Citations
9	International Journal of Sustainability in Higher Education	3	8
10	Policy Futures in Education	3	10
11	Techtrends	3	115
12	Thinking Skills and Creativity	3	192

Source: Authors' analysis of Scopus data using VOSviewer (2026).

The annual publication trends (Figure 5) show that the increase in research output after 2021 was driven primarily by growing contributions from education journals such as *Education Sciences*, *Frontiers in Education*, and *Sustainability*. This finding suggests that strategic foresight initially developed within the tradition of futures studies but has gradually become integrated into broader educational research. It is also consistent with the country and author analyses, which indicate that the field's development has been driven by international collaboration and the emergence of research groups focusing on futures literacy, educational innovation, digital transformation, and educational resilience. Overall, this pattern suggests that Strategic Foresight in Education is undergoing conceptual and institutional expansion and has the potential to become a major theme in future education research.

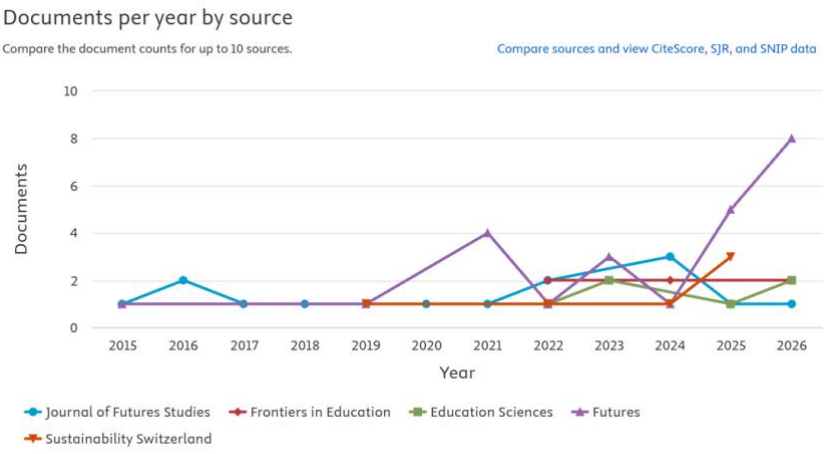

Figure 5. Publication Trends in Strategic Foresight in Education by Source

3.3.3. Most Productive Institutions

As shown in Figure 6, Monash University is the most productive institution in Strategic Foresight in Education, with nine publications, followed by the University of Helsinki, with seven. Other institutions making substantial contributions include the University of Turku, the University of Bristol, the University of Edinburgh, and Griffith University, each with five publications. These findings are consistent with the country analysis, which indicates the leading roles of Australia, Finland, and the United Kingdom in the development of this field. The presence of several Finnish universities among

the leading affiliations also aligns with the productive-author analysis, which highlights the important role of Finnish researchers in developing the concepts of futures literacy and strategic foresight in education. Overall, the affiliation distribution indicates that the development of Strategic Foresight in Education is supported by several international research centers focusing on educational innovation, futures studies, higher education transformation, and the development of future-oriented education systems. These findings further suggest that the field is expanding globally and emerging as a strategic theme in contemporary educational research.

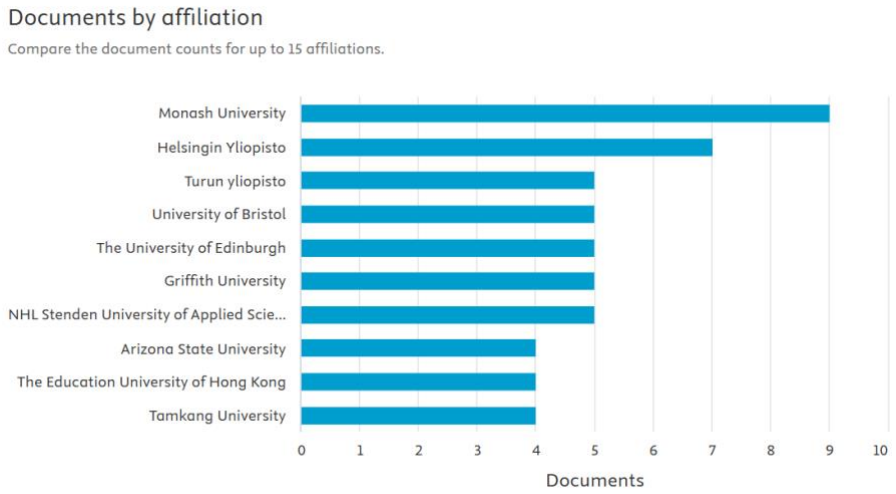

Figure 6. Institutional Affiliations in Scholarly Publications on Strategic Foresight in Education

3.4. Intellectual Structure of Research on Strategic Foresight in Education

3.4.1. Author Co-Citation Analysis

The analysis (Table 5) shows that the co-citation network consists of 11 leading authors with relatively strong connections. Based on Total Link Strength (TLS), Hicks (TLS = 154), Slaughter (TLS = 145), Lloyd (TLS = 135), Inayatullah (TLS = 106), and Miller (TLS = 106) occupy the most central positions in the network, indicating that their works are major references underpinning the theoretical foundations of this field.

Table 5. Authors with the Highest Total Link Strength in the Bibliometric Network

No.	Author	Citations	Total Link Strength
1	Hicks, D.	37	154
2	Slaughter, R. A.	44	145
3	Lloyd, D.	22	135
4	Inayatullah, S.	73	106
5	Miller, R.	45	106
6	Ojala, M.	29	98

No.	Author	Citations	Total Link Strength
7	Clarke, V.	26	53
8	Poli, R.	20	42
9	Vidergor, H. E.	20	42
10	Rieckmann, M.	23	40
11	Facer, K.	26	39

Source: Authors' analysis of Scopus data using VOSviewer (2026).

The co-citation network visualization (Figure 7) reveals two main clusters. The first includes authors such as Miller, Poli, Facer, Clarke, Rieckmann, Vidergor, and Ojala, whose work has made substantial contributions to futures literacy, the future of education, anticipatory capacity, and educational transformation. The second cluster comprises Hicks, Slaughter, Inayatullah, and Lloyd, who have been more prominent in developing futures studies theory, strategic foresight, scenario development, and anticipatory governance. Hicks, Inayatullah, and Ojala serve as bridges between the two clusters, integrating strategic foresight perspectives with research on the future of education. These findings suggest that the intellectual structure of Strategic Foresight in Education has developed through the convergence of two major scholarly traditions: futures studies, which explores multiple possible futures, and strategic foresight, which focuses on using future-oriented insights to inform decision-making, policy, and the transformation of educational institutions.

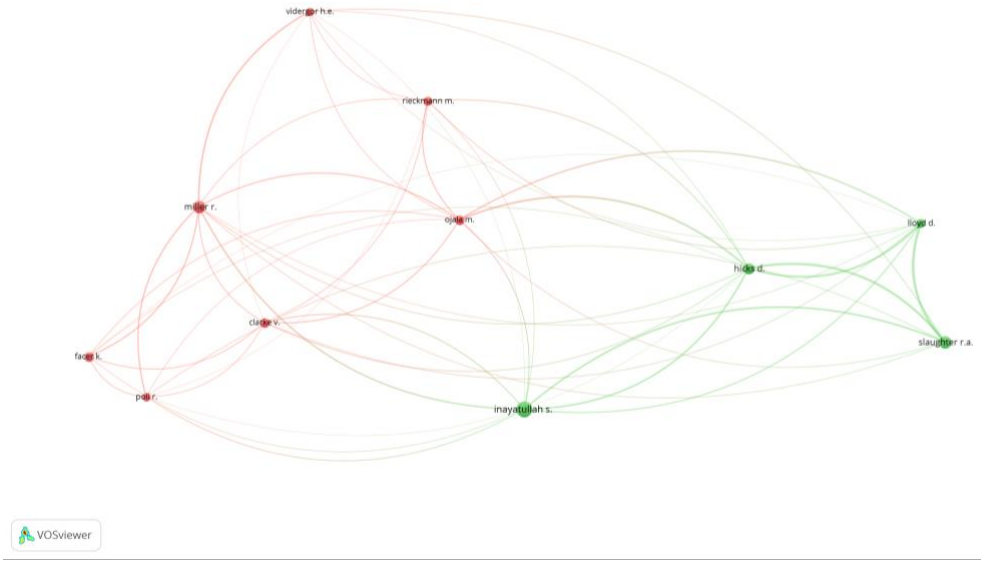

Figure 7. Network Visualization of Author Relationships in Research on Strategic Foresight in Education

3.4.2. Source Co-Citation Analysis

Source co-citation analysis was conducted to identify the journals and publication sources that constitute the principal intellectual foundations of research on Strategic Foresight in Education. The results (Table 6) show that *Futures* is the most central source in the co-citation network, with 338 citations and a Total Link Strength (TLS) of 2,211. It is followed by *Sustainability* (107 citations; TLS = 1,105), *Environmental Education Research* (85 citations; TLS = 841), *Sustainability Science* (48 citations; TLS = 692), and *Foresight* (70 citations; TLS = 627).

Table 6. Sources with the Highest Total Link Strength in the Bibliometric Network

No.	Journal/Source	Citations	Total Link Strength
1	Futures	338	2.211
2	Sustainability	107	1.105
3	Environmental Education Research	85	841
4	Sustainability Science	48	692
5	Foresight	70	627
6	International Journal of Sustainability in Higher Education	46	618
7	Journal of Futures Studies	69	615
8	International Journal of Science Education	34	522
9	Research in Science Education	39	514
10	Technological Forecasting and Social Change	60	513

Source: Authors' analysis of Scopus data using VOSviewer (2026).

3.4.3. Intellectual Structure Clusters

The network visualization (Figure 8) reveals several clusters representing the field's principal knowledge bases. The first cluster is dominated by journals focusing on futures studies and strategic foresight, including *Futures*, the *Journal of Futures Studies*, *Foresight*, and *Technological Forecasting and Social Change*. The second cluster centers on sustainability and educational transformation, represented by *Sustainability*, *Sustainability Science*, and the *International Journal of Sustainability in Higher Education*. The third cluster reflects educational perspectives and the development of future-oriented capabilities, represented by journals such as *Environmental Education Research*, the *International Journal of Science Education*, and *Research in Science Education*. The strong connections among these sources indicate that research on Strategic Foresight in Education has developed through the integration of three major scholarly traditions: futures studies, education, and sustainability.

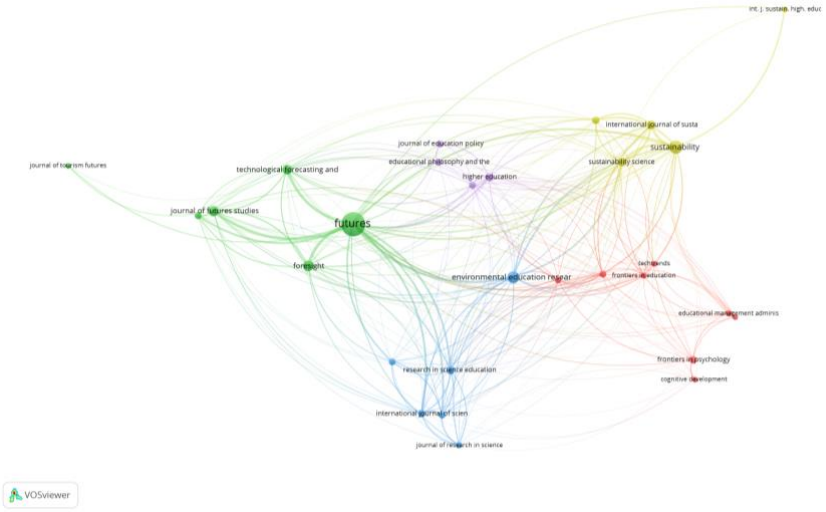

Figure 8. Network Visualization of Journal Relationships in Research on Strategic Foresight in Education

3.5. Conceptual Structure of Research on Strategic Foresight in Education

3.5.1. Keyword Co-Occurrence Analysis

The keyword co-occurrence analysis using VOSviewer (Figure 9) identifies four major clusters in research on Strategic Foresight in Education. The first cluster centers on future thinking, higher education, sustainability, and future literacy, indicating a focus on developing future competencies and sustainable education. The second cluster comprises strategic foresight, futures studies, scenario planning, and future prospects, representing the theoretical foundations of the field. The third cluster connects artificial intelligence, education, technology, and generative AI, reflecting growing attention to the implications of technology for the future of education. The fourth cluster focuses on governance approaches, decision-making, and scenarios, underscoring the role of strategic foresight in supporting educational governance and policy formulation.

Overall, the strong relationships among the keywords future thinking, strategic foresight, artificial intelligence, and education indicate that research in this field is moving toward greater integration of futures studies, digital transformation, sustainability, and educational innovation. These findings demonstrate that Strategic Foresight in Education has developed into a multidisciplinary research field with increasing relevance to the complexity and uncertainty of the twenty-first century.

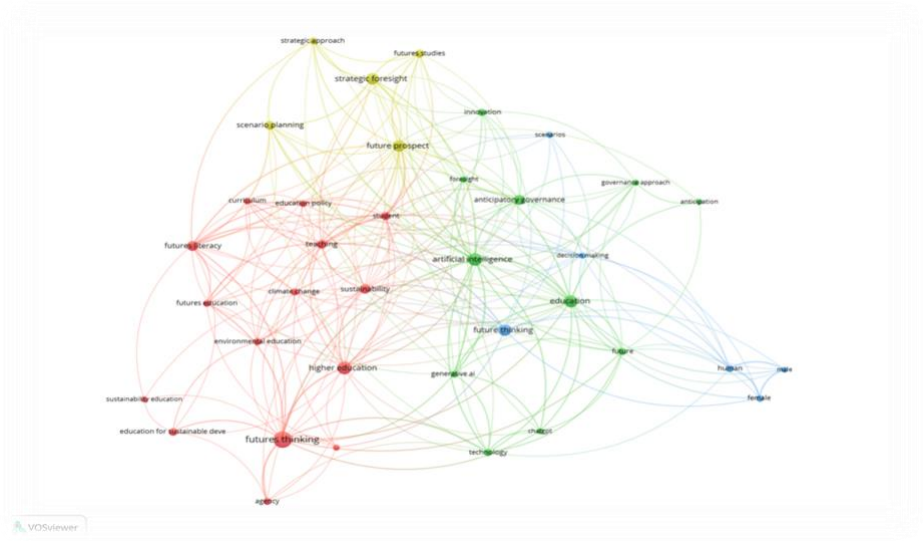

Figure 9. Network Visualization Based on Keyword Co-Occurrence

3.5.2. Overlay Visualization

The overlay visualization (Figure 10) indicates a shift in the focus of Strategic Foresight in Education research from conceptual themes such as strategic foresight, futures studies, and scenario planning toward more applied issues, including future thinking, sustainability, higher education, and artificial intelligence. The most recent themes are represented by the keywords artificial intelligence, generative AI, ChatGPT, anticipatory governance, and decision-making, indicating growing attention to the effects of digital transformation on the future of education.

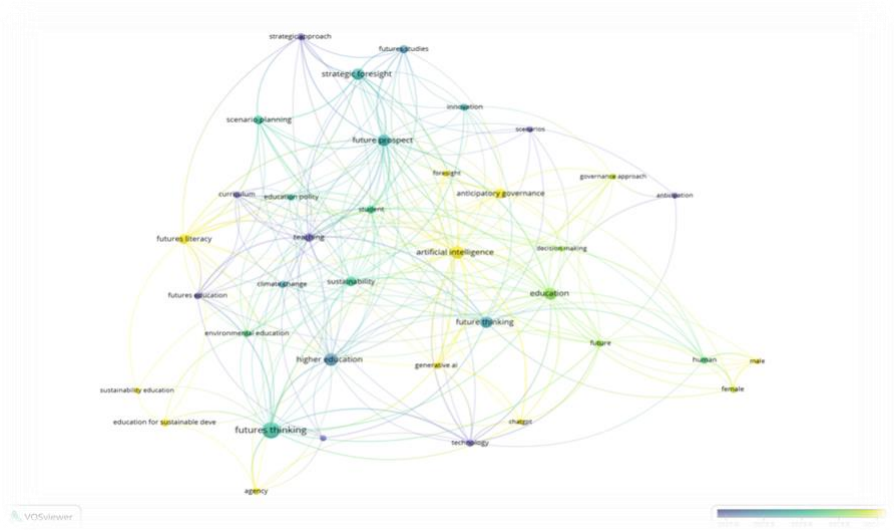

Figure 10. Overlay Visualization Based on Keyword Co-Occurrence

3.5.3. Density Visualization

The density visualization (Figure 11) shows that futures thinking, artificial intelligence, higher education, and education are the areas with the highest research density and form the core of the field's knowledge structure. Overall, these findings illustrate the evolution of Strategic Foresight in Education

from a focus on developing foresight theory toward applying foresight to support AI-enabled educational transformation, the development of future competencies, anticipatory governance, and sustainable education. Themes such as AI-driven education, anticipatory governance, future literacy, educational agency, and higher education transformation are likely to become major research priorities in the future.

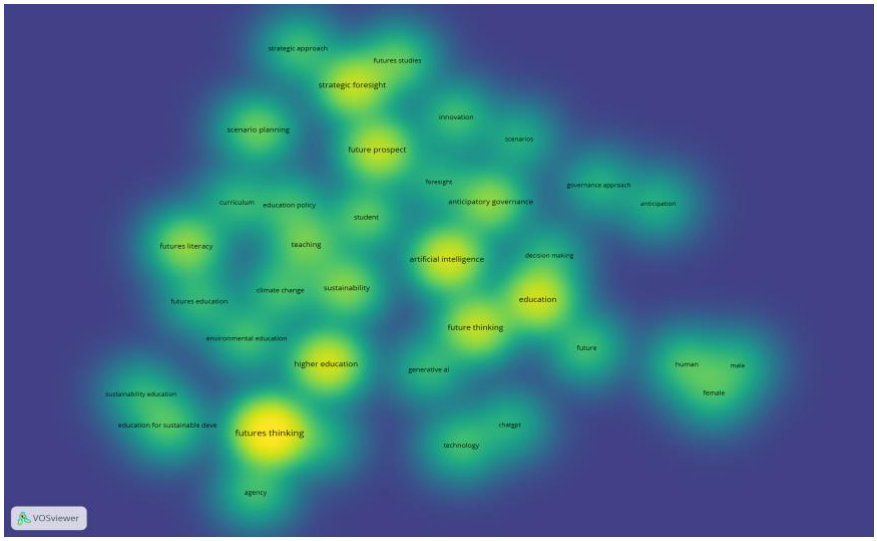

Figure 11. Density Visualization Based on Keyword Co-Occurrence

3.6. Discussion

3.6.1. Conceptual Evolution and Emerging Directions in Research on Strategic Foresight in Education

The bibliometric findings indicate that Strategic Foresight in Education has evolved from a topic centered on futures studies and scenario planning into a multidisciplinary field integrating digital transformation, sustainability, and the governance of future education. The surge in publications after 2021 suggests that educational institutions increasingly need to build anticipatory capacity to navigate the complexity and uncertainty arising from technological developments, social change, and global dynamics. This finding is consistent with UNESCO's argument that futures literacy is a strategic competency that enables individuals and organizations to use the future as a means of understanding and acting in the present (UNESCO, 2021).

The overlay visualization reveals a shift in research focus from established themes such as strategic foresight, scenario planning, and futures studies toward more applied themes, including artificial intelligence, generative AI, future thinking, and anticipatory governance. This shift suggests that strategic foresight is increasingly viewed as an organizational capability that supports innovation, adaptation, and readiness for change, rather than merely as an approach to predicting the future (Rohrbeck & Kum, 2018).

3.6.2. Thematic Connections among Strategic Foresight, Leadership, Policy, and Educational Transformation

The keyword network analysis reveals conceptual connections between strategic foresight and issues relating to digital transformation, sustainability, decision-making, and educational governance. The links among future thinking, future literacy, higher education, and sustainability indicate that the development of future-oriented thinking capabilities has become an important component of the educational transformation agenda. This finding is consistent with the Learning Compass 2030 framework, which positions anticipatory competencies and the ability to navigate complexity as central elements of twenty-first-century education.

Furthermore, the close relationship among artificial intelligence, education, and technology indicates that digital transformation has become one of the principal drivers shaping this field. The OECD emphasizes that AI has the potential to fundamentally transform education systems, learning models, and future competency requirements. This finding is reinforced by the growing number of publications on generative AI, ChatGPT, and AI-based educational governance in recent years, suggesting that foresight is increasingly being used to anticipate the effects of technology on higher education and schools (Bouguettaya et al., 2025).

At the same time, the emergence of the keywords anticipatory governance and decision-making points to a connection between strategic foresight and educational policy formulation. (Kallo & Välimaa, 2025), in their study of anticipatory governance in Finnish higher education, demonstrate the relevance of future-oriented practices—such as developing visions and policy road maps—for responding to challenges characterized by substantial uncertainty. In the context of the present study, the relationship among these keywords can be interpreted as an indication of growing interest in more proactive, long-term policy approaches. However, relationships in bibliometric maps indicate conceptual associations among publications; they do not, in themselves, establish causal relationships.

3.6.3. Theoretical Contributions and Practical Implications for Future-Oriented Education

Theoretically, this study confirms that strategic foresight has evolved into a conceptual framework connecting futures studies, educational transformation, anticipatory governance, sustainability, and technological innovation. The prominence of future thinking, future literacy, and artificial intelligence indicates the emergence of a new paradigm that positions anticipatory capacity as a foundation for the development of future education. These findings extend the understanding of strategic foresight beyond a planning instrument to encompass a dynamic capability that enhances organizational readiness to respond to environmental change.

From a practical perspective, the findings underscore the need to integrate foresight into educational planning, curriculum development, and strategic decision-making. Educational institutions

need to develop foresight capabilities through environmental scanning, horizon scanning, and scenario planning to strengthen organizational resilience and adaptability. In addition, the emergence of AI and future literacy as research themes highlights the importance of curricula that go beyond digital literacy to include future thinking, decision-making under uncertainty, and lifelong learning (OECD, 2025). (Yusuf et al., 2024) also demonstrate the importance of considering pedagogical, ethical, and institutional adoption dimensions when developing the use of generative AI in education. Accordingly, strategic foresight should be integrated with governance and human capacity development to ensure that technological transformation remains aligned with educational goals.

3.6.4. Knowledge Gaps, Research Limitations, and a Future Research Agenda

Despite its rapid growth, research on strategic foresight in education remains dominated by developed countries such as Australia, the United Kingdom, the United States, and Finland. This pattern points to a significant geographical gap, as educational contexts in developing countries remain relatively underrepresented in the literature. Moreover, most of the studies identified are conceptual and exploratory, while empirical research on the effects of foresight on educational leadership, organizational resilience, school innovation, and policy effectiveness remains limited.

The overlay visualization identifies several promising themes for future research: artificial intelligence-driven foresight, anticipatory governance, future literacy, educational resilience, organizational agility, and higher education transformation. These directions are relevant to (Yusuf et al., 2024), who identify diverse themes and research gaps in the use of generative AI in education, and (Baroudi, 2026), who examines anticipatory governance and leadership in the implementation of AI in higher education. (Kallo & Välimaa, 2025) study also provides insights into anticipatory practices in higher education governance. Building on these connections, future studies should develop empirical models to explain how strategic foresight strengthens educational institutions' capacity to navigate uncertainty, foster innovation, enhance organizational resilience, and build adaptive and sustainable education systems. Cross-national and cross-institutional investigations are also needed to assess the extent to which foresight models and practices can be applied across different educational contexts.

This study has several limitations. First, the data were drawn exclusively from Scopus; therefore, publications indexed in other databases, such as Web of Science, Dimensions, and Google Scholar, were not included. Second, the mapping results are strongly influenced by the search strategy, keywords, and inclusion criteria used, meaning that some relevant studies may not have been identified. Third, bibliometric analysis focuses on publication patterns and bibliographic relationships and therefore cannot provide an in-depth account of the substantive quality, implementation effectiveness, or actual impact of strategic foresight on educational institution performance. Future research should therefore

combine bibliometric approaches with systematic literature reviews, content analysis, or empirical studies to develop a more comprehensive understanding.

4. CONCLUSION

This study mapped the scholarly landscape of Strategic Foresight in Education through a bibliometric analysis of Scopus-indexed publications. The results show that this research area grew significantly between 2015 and 2026 and has developed into an increasingly multidisciplinary field. Its intellectual structure is shaped by connections among strategic foresight, future thinking, future literacy, higher education, sustainability, artificial intelligence, and anticipatory governance. These findings indicate that strategic foresight is no longer understood solely as an approach within futures studies; it has evolved into a strategic capability that supports digital transformation, educational innovation, anticipatory governance, and the strengthening of educational organizational resilience. The leading contributions from Australia, the United Kingdom, the United States, and Finland also indicate that the field's development remains concentrated in countries with strong traditions in futures studies and educational innovation.

Theoretically, this study provides a comprehensive account of the conceptual evolution, knowledge structure, and scholarly collaboration patterns in Strategic Foresight in Education. Practically, the findings underscore the importance of integrating foresight into educational leadership, strategic planning, and institutional governance to strengthen the capacity to adapt to increasingly complex and uncertain change. The study also identifies several themes with the potential to shape the future research agenda, including AI-driven foresight, anticipatory governance, future literacy, educational resilience, organizational agility, and higher education transformation. Future studies should extend empirical investigations to developing countries and develop conceptual models and empirical tests explaining how strategic foresight contributes to innovation, resilience, and the sustainability of educational institutions in the era of digital transformation.

REFERENCES

Aria, M., & Cuccurullo, C. (2017). bibliometrix : An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Baroudi, S. (2026). Anticipatory governance and leadership for AI implementation in higher education: A scoping review. *International Journal of Educational Technology in Higher Education*, *23*(1), 39. https://doi.org/10.1186/s41239-026-00616-7

Bouguettaya, S., Pupo, F., Chen, M., & Fortino, G. (2025). A Meta-Survey of Generative AI in Education: Trends, Challenges, and Research Directions. *Big Data and Cognitive Computing*, *9*(9), 237. https://doi.org/10.3390/bdcc9090237

Chalapud Narváez, E. D. (2022). Evolución de la prospectiva estratégica: un análisis bibliométrico. *RHS-Revista Humanismo y Sociedad*, *10*(2). https://doi.org/10.22209/rhs.v10n2a01

Chang, L., Watanabe, T., Xu, H., & Han, J. (2022). Knowledge Mapping on Nepal's Protected Areas Using CiteSpace and VOSviewer. *Land*, *11*(7), 1109. https://doi.org/10.3390/land11071109

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Dubyna, M., Popelo, O., Kholiavko, N., Zhavoronok, A., Fedyshyn, M., & Yakushko, I. (2022). Mapping the Literature on Financial Behavior: a Bibliometric Analysis Using the VOSviewer Program. *WSEAS TRANSACTIONS ON BUSINESS AND ECONOMICS*, *19*, 231–246. https://doi.org/10.37394/23207.2022.19.22

Han, L., & Gong, Z. (2021). Visual Analysis of Construction Waste Research Based on VOSviewer. *E3S Web of Conferences*, *237*, 04016. https://doi.org/10.1051/e3sconf/202123704016

Iden, J., Methlie, L. B., & Christensen, G. E. (2017). The nature of strategic foresight research: A systematic literature review. *Technological Forecasting and Social Change*, *116*, 87–97. https://doi.org/10.1016/j.techfore.2016.11.002

Judijanto, L., & Azwar, E. (2025). Analisis Tren Penelitian Strategic Foresight Berdasarkan Publikasi di Database Scopus. *Sanskara Manajemen Dan Bisnis*, *4*(01), 144–157. https://doi.org/10.58812/smb.v4i01.676

Julia, J., Supriatna, E., Isrokatun, I., Aisyah, I., Hakim, A., & Odebode, A. A. (2020). Moral Education (2010-2019): A Bibliometric Study (Part 2). *Universal Journal of Educational Research*, *8*(7), 2954–2968. https://doi.org/10.13189/ujer.2020.080724

Kallo, J., & Välimaa, J. (2025). Anticipatory governance in government: the case of Finnish higher education. *Higher Education*, *89*(2), 367–385. https://doi.org/10.1007/s10734-024-01211-3

Miller, R. (2018). *Transforming the Future Anticipation in the 21st century*. http://taylorandfrancis.com

OECD. (2019). *Well-being 2030 Action OECD FUTURE OF EDUCATION AND SKILLS 2030 A SERIES OF CONCEPT NOTES*.

OECD. (2025). *Foresight Toolkit for Resilient Public Policy*. OECD Publishing. https://doi.org/10.1787/bcdd9304-en

Rohrbeck, R., & Kum, M. E. (2018). Corporate foresight and its impact on firm performance: A longitudinal analysis. *Technological Forecasting and Social Change*, *129*, 105–116. https://doi.org/10.1016/j.techfore.2017.12.013

Tupan, T., Rahayu, R. N., Rachmawati, R., & Rahayu, E. S. R. (2018). ANALISIS BIBLIOMETRIK PERKEMBANGAN PENELITIAN BIDANG ILMU INSTRUMENTASI. *BACA: JURNAL DOKUMENTASI DAN INFORMASI*, *39*(2), 135. https://doi.org/10.14203/j.baca.v39i2.413

UNESCO. (2021). *Reimagining our futures together : a new social contract for education*. Educational and Cultural Organization of the United Nations.

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Vecchiato, R. (2015). Strategic planning and organizational flexibility in turbulent environments. *Foresight*, *17*(3), 257–273. https://doi.org/10.1108/FS-05-2014-0032

Yusuf, A., Pervin, N., Román-González, M., & Noor, N. M. (2024). Generative <scp>AI</scp> in education and research: A systematic mapping review. *Review of Education*, *12*(2). https://doi.org/10.1002/rev3.3489

Zhao, Q., Cheah, K. S. L., & Jin, X. (2022). A Bibliometric Review of Career Education from Contemporary Literature with Vosviewer and Biblioshiny. *Journal of Curriculum and Teaching*, *11*(8), 259. https://doi.org/10.5430/jct.v11n8p259

Zupic, I., & Čater, T. (2015). Bibliometric Methods in Management and Organization. *Organizational Research Methods*, *18*(3), 429–472. https://doi.org/10.1177/1094428114562629