Research Paper

Trends and Patterns of Educational Investment: A Bibliometric Analysis

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ABSTRACT

Purpose- The aim of this research is to examine existing literature and upcoming research trends and to develop a comprehensive outline of the knowledge framework in the domain of educational spending through bibliometric analysis. **Design/methodology/approach-** This study presents an extensive bibliometric examination by using performance analysis and science mapping of academic literature on educational expenditure. It consists of 434 publications indexed in the Web of Science from 2000 to 2025 after the exclusion criterion. By using the advanced bibliometric visualization tool VOSviewer and applying various analytical techniques such as co-citation, co-authorship, bibliographic coupling, and keyword co-occurrence analysis. **Findings-** The study reveals the core characteristics of the existing body of knowledge on educational expenditure, identifying the most influential publications, institutions, journals, countries, and authors, as well as the evolution of key research themes over time. The study concludes by discussing the dominant research topics, authors, journals and highlighting emerging areas that need further exploration in future studies related to educational expenditure. **Research limitations/implications-** The study is limited to publications indexed in the Web of Science database, which may exclude relevant studies from other databases such as Scopus or Google Scholar. Additionally, the analysis is confined to bibliometric techniques, which provide quantitative insights but do not capture the qualitative depth of research content. We have considered the existing literature published during 2000-2025. **Originality/value-** This study provides one of the most comprehensive bibliometric analyses of educational expenditure research covering a 25-year period (2000–2025). By integrating performance analysis and science mapping through advanced visualization tools like VOSviewer, it offers novel insights into the intellectual structure, influential contributors, and emerging themes within this field.

Keywords: Educational Expenditure, Public Expenditure, Private Expenditure, Performance Analysis, Science Mapping

Education spending has experienced a notable structural change globally in recent decades, paralleling wider economic, social, and political developments. The education system has progressively adopted mixed financing approaches with private households and government agencies. This approach is commonly known as cost-sharing and it alters the dynamics surrounding of access, equity, and quality of education

(Carpentier, 2012). Global evidence indicates that although public funding continues to be the foundation of educational investment. Its proportion has either stabilized or diminished in numerous countries resulting in increased private contributions. For example, Estevan (2015) found that increased public spending on education substantially decreases private school enrollment in Canada, highlighting the substitutive dynamic between public investment and private demand. Similarly, Wolf & Zohlnhöfer (2009) found that in nations marked by income disparity, minimal public investment, and market-driven welfare systems, private educational expenditures tend to increase. Demonstrating how institutional frameworks influence patterns of educational investment. This shift is even more evident in developing nations. The previous studies indicate that although absolute public spending as a percentage of GDP has grown. It still falls short of recommended international standards leading to a financing gap that families increasingly fill (Tripathi, 2019; Tilak, 2001). An increasing dependence on family spending particularly for professional and English-medium education has intensified socio-economic and regional inequalities (Tripathi, 2019). Comparative studies indicate that in regions such as Asia and Africa decreasing proportions of government investment in areas like education and agriculture have limited the development of human capital and hindered productivity growth (Fan & Rao, 2003).

Carpentier (2012) & Knight (2015) observed a worldwide trend towards privatization and cost-sharing educational expenditure with tuition fees and out-of-pocket expenses representing an increasing share of total educational spending. Similarly, global research on higher education financing shows that governments are increasingly relying on revenue from tuition and private partnerships to support growth (Tilak, 2014; Estevan, 2015). Concurrently, political, economic, and demographic factors continue to influence priorities for public spending. Comparative studies by Lee et al. (2003) show that national income, governance frameworks, and democratic engagement have a considerable impact on education budgets. Economic prosperity, a younger population, and liberal political ideologies typically lead to increased funding (Bailey & Dynarski, 2011; Lee, 2003). However, budgetary limits and competing social expenditures often restrict governments' ability to sustain or enhance education's proportion of GDP. Collectively, these studies highlight a distinct structural transformation from state-centered funding models to mixed financing approaches in education. While public spending remains vital for promoting equity and national development. The increasing role of private funding reflects both economic liberalization and the growing view of education as a personal investment in human capital. This resulting hybrid system introduces new challenges striking a balance between efficiency and equity as well as accessibility and sustainability in the changing global context of educational finance.

Research Trends and the Need for Synthesis
Given the multifaceted nature of the public-private educational expenditure nexus research output has proliferated. Thousands of journal articles, working papers, and policy briefs now analyze public and private educational expenditure by considering different regions, castes, religions, gender, and educational levels. The diverse research findings enrich the area of educational expenditure but they also do not provide a unified conclusion. So, the key challenges scholars and policymakers face are to make sense from the vast and diverse literature. Questions arise, such as which countries, institutions, and scholars have contributed most to the debate? What are the most influential journals and highly cited works in the field? How have research themes evolved over time, particularly before and after major crises, including COVID–19? And which topics are emerging as future hotspots for study? Addressing these questions necessitates both conventional literature reviews and

systematic data-informed methods that can chart the intellectual landscape of the discipline. Bibliometric analysis is essential in this context.

Bibliometric Analysis as a Methodological Contribution

Bibliometrics analysis employs quantitative methods to examine the existing body of published knowledge (Pritchard, 1969). In contrast to narrative reviews, which can provide a selective or subjective summary of trends in publications, citation trends, and thematic groupings. By utilizing databases like Web of Science and Scopus, researchers can trace the development of a discipline over multiple decades. Additionally, visualization tools such as VOSviewer and Biblioshiny enable the creation of co-authorship networks, maps of keyword co-occurrence, and structures of co-citation, providing insights into the organization and interconnections within the discipline (Van Erk & Waltman, 2010). In the field of economics, bibliometric analyses have gained popularity for evaluating areas like financial inclusion (Aria & Cuccurullo, 2017), climate change (Wang et al., 2018), monetary policy (Bayer et al., 2019), and inequality (Martin-Martin et al., 2010). Nonetheless, in spite of the extensive research available on educational expenditure, there have been relatively few efforts to account for the transition and public-private partnership through bibliometric methods. The majority of current surveys concentrate on meta-analytical findings (Panizza & Presbitero, 2014) or theoretical overviews (Krugman, 1988; Pattillo et al., 2002), which creates a void in comprehending the intellectual framework and research trends within the field.

This study is situated at the crossroads of economic theory and bibliometrics. It does not seek to determine if educational investment has risen or decreased. Instead, its aim is to offer a precise summary of how this discussion has been influenced within academic literature and to identify potential emerging directions.

Objectives of the Present Study

- **RQ1.** Examine the trends in publications over time in parallel with the development of educational spending. Also, identify the leading authors, institutions, and countries that contribute to the body of literature.
- **RQ2.** Highlight the key sources (journals) and frequently cited articles that have significantly impacted educational spending.
- **RQ3.** Visualize cooperative networks between authors and organizations.
- **RQ4.** Explore keywords' co-occurrence patterns to identify dominant and emerging research themes.
- **RQ5.** Provide insights into future research directions by identifying gaps and underexplored areas.

By achieving these objectives this study makes a valuable contribution to both the economics literature and bibliometric scholarship. It does not only synthesize existing information but also provides a roadmap for future investigations. The current paper is structured as follows: Section 1 presents the introduction, Section 2 outlines the methodology, which includes database selection, search strategy, and bibliometric indicators. Section 3 reports the analysis results, encompassing productivity, impact, and network visualizations. Section 4 discusses the findings in relation to current theoretical and empirical debates. Section 5 addresses limitations, such as database coverage and citation lags. Finally, Section 6 concludes with implications for scholars and policymakers, along with recommendations for future research avenues.

DATA AND METHODOLOGY

The primary goal of the present research is to provide a precise background of the educational expenditure through bibliometric analysis. We retrieved the Web of Science core collection database covering the years from 2000 to 2025. The high quality and reliability of the Web of Science publication database attract researchers to use its database. This study aims to explore the trends in educational expenditures over time. Taking into account the keywords or phrases used in our search, we have ensured to cover all relevant algorithms related to public and private educational spending. Therefore, topic keywords such as "public expenditure" Or "public investment" OR "government expenditure" OR "government investment" OR "household expenditure" OR "household investment" OR "private expenditure" OR "private investment" AND "education" were searched in the WOS core collection.

PRISAM flowchart

Identification of Studies via Web of Science Databases

Data Retrieved for the Study

Total record retrieved for the keywords TOPIC: (("public expenditure" OR "public investment" OR "government expenditure" OR "government investment" OR "household expenditure" OR "household investment" OR "private expenditure" OR "private investment") AND "education"

Screening

Total number of documents screened for the study
(n = 1128)
Time frame of the data from 1989 to 2025

Published documents excluded after scrutiny based on various criterion
(n = 694)

Eligible number of documents after screening
(n = 434)

Data Included for the Study

Total number of articles, paper, reports included for bibliometric analysis
(n= 434)
Time period from 2000 to 2025

The initial search strings provide around 1128 documents which was published till the searched date, 6th October 2025. We have adopted the exclusion criterion for the refinement of results. The precise output retrieved from the database has been illustrated through

PRISMA flowchart. While a complete description of the exclusion criterion has been mentioned in Table 1. We have excluded all years before 2000 due to few numbers of publications and considered the documents published during the period from 2000 to 2025. Following this, articles (including early access publications) and review papers were included for consideration, while proceeding papers and retracted papers were excluded from the article list. We selected a limited area of interest from WOS categories such as economics, education educational research, development studies, political science, sociology, and social science interdisciplinary are included from the WOS category. For the bibliometric analysis, only publications in the English language were considered. Around 694 documents excluded from the list applying the various exclusion criterion and finally we have considered 434 documents for bibliometric analysis in the present study. We have followed the search procedures given by Cristina Bota-Avram (2023), Page et al. (2021), Alshater et al. (2021), Caputo et al. (2021), and Khan et al. (2020). After filtering, the plain text file from the database was extracted for analysis using VOSviewer software.

Table 1. Description of the search procedure

Category	Criteria	Article Selection (inclusion & exclusion)
Keywords Searched	Topic: "public expenditure" OR "public investment" OR "government expenditure" OR "government investment" OR "household expenditure" OR "household investment" OR "private expenditure" OR "private investment" AND "education"	1128
Time Period (Years)	Time spanning from 2000-2025 considered. While years before 2000 were excluded from the analysis.	60
Document Type	Articles (including early access) and review papers searched () and proceeding papers and retracted papers excluded from the category ()	37
Subject Area	Limited to WOS categories such economics, education educational research, development studies, political science, sociology, and social science interdisciplinary has been included.	579
Language	Only articles published in the English language are included and others are excluded	18
Total articles included for the analysis	Based on all inclusion and exclusion criteria	434

Source: Created by the author and based on Cristina Bota-Avram (2023)

Bibliometric Analysis
We have adopted two techniques for bibliometric analysis such as performance analysis and science mapping. A performance analysis helps in analyzing research productivity and impact such as trends in publication counts, citation growth over time, institutional contributions, country-level outputs, and highly published documents. Science mapping, on the other hand, explores the intellectual connections and relationships among various parameters. Typically, there are four methods used for science mapping, namely, Co-citation analysis, Co-authorship, Bibliometric coupling, and Occurrence of keywords.

RESULTS AND DISCUSSION

This section provides an extensive bibliometric analysis through incorporating performance and scientific analysis. Both the performance and scientific techniques of bibliometric analysis produce a comprehensive overview of the public and private educational expenditure.

Performance Analysis

Publications Dynamics over the Period related to Public and Private Educational Expenditure

A total 434 number of document publications from 2000 to 2025 have been accounted. It is evident from Figure 1 that over the period the publication number has increased with some sort of deviations in the number. The trend depicted in the graph demonstrates a steady increase in research productivity from 2000 to 2025. During the initial years (2000–2008) the number of publications remained relatively low indicating the early stage of scholarly engagement in the field. However, from 2009 onward, a consistent upward trajectory is observed reflecting growing academic interest and expansion of research activities. The cumulative frequency curve shows a sharp and continuous rise particularly between 2012 and 2025, signifying the progressive consolidation of research efforts and the increasing recognition of the field's importance. Overall, the pattern suggests that the domain has experienced significant and sustained growth over the years with 2025 marking the highest cumulative publication output indicating its maturity and continued research relevance.

Figure 1. Number of Publications over the period of cumulative frequency
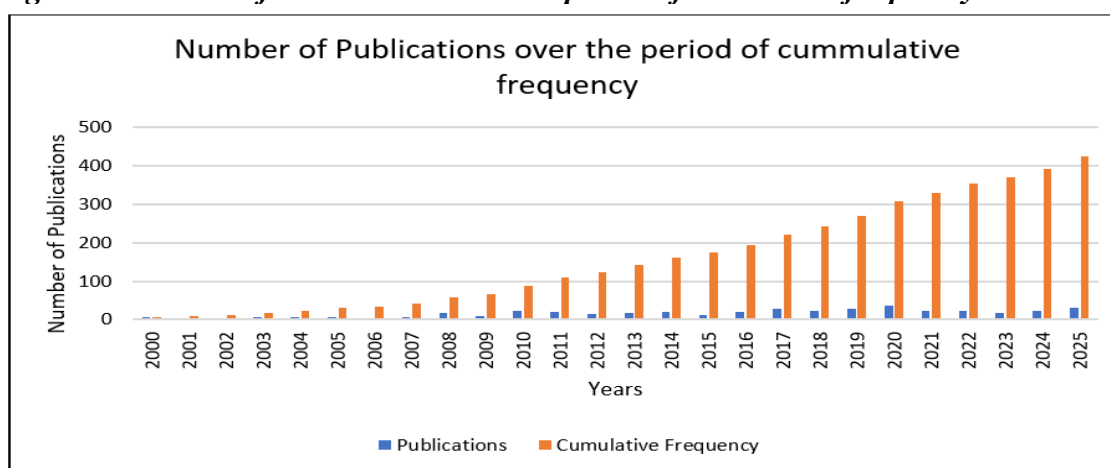
Citations Dynamics over the Period related to public and private educational expenditure

Figure 2 illustrates the annual trend of total citations and average citations from 2000 to 2025, reflecting the evolving scholarly influence and impact of research in the field. During the initial phase (2000–2008), both total and average citations remained relatively low indicating limited visibility and early-stage academic engagement. A noticeable increase appears after 2009 suggesting a growing academic interest and recognition of key studies. The period between 2014 and 2023 shows considerable fluctuations with intermittent spikes particularly around 2015, 2019, and 2022. Where citation counts and averages peaked sharply signifying the publication of highly influential works or increased referencing activity during these years. Despite the temporary decline observed after 2023, the overall trend demonstrates a substantial upward trajectory in citation performance underscoring the field's maturation and rising research impact over time.
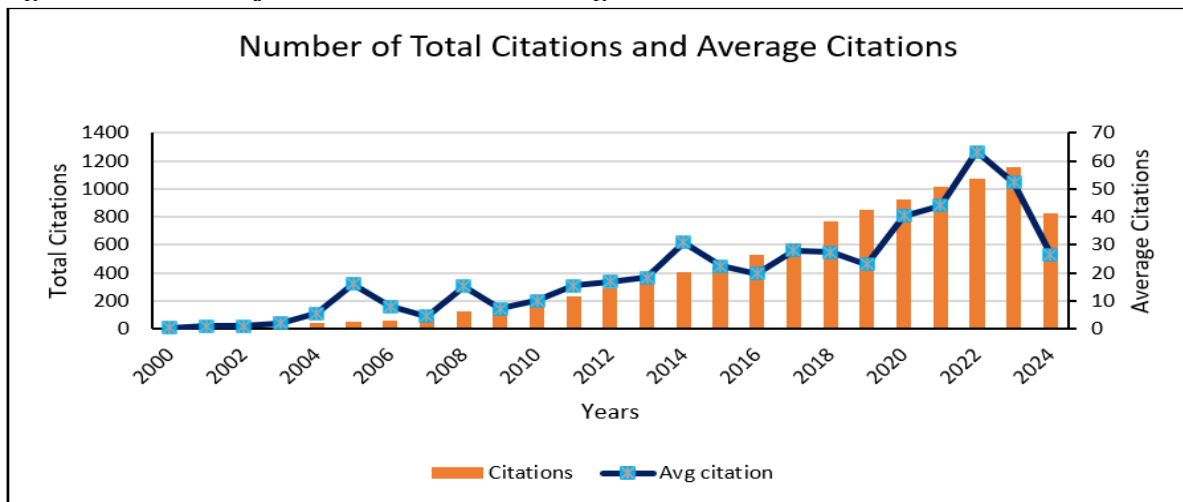
Figure 2. Number of total citations and average citations

Findings using theoretical and empirical databases
Citations by the top 10 sources or journals
Table 2 represents the most influential sources contributing to the literature on educational expenditure based on a threshold of at least five documents and ten citations. Out of 172 total documents 21 sources meet the inclusion criteria, indicating that only a limited number of journals significantly contribute to the research output in this field. Among the listed sources Applied Economics recorded the highest number of publications (18 documents), highlighting its strong productivity and active engagement with the research topic of educational expenditure. However, World Development stands out as the most influential journal with 1249 citations across 16 documents reflecting its high research visibility and impact within the domain. In terms of network connectivity, the Journal of Policy Modeling exhibits the highest total link strength (8) implying strong intellectual collaboration and co-citation relationships with other sources. In contrast, journals such as Studies in Higher Education and African Development Review though contributing relevant studies show lower link strengths, indicating relatively limited interconnection within the broader citation network.

Table 2. Citation by top 10 Sources and Journals

No.	Source	Documents	Citations	Total link strength
1	World Development	16	1249	6
2	China Economic Review	10	521	2
3	Journal of Public Economics	7	466	7
4	Journal of Policy Modeling	9	383	8
5	Applied Economics	18	268	4
6	Studies of Higher Education	5	265	0
7	Manchester School	5	225	6
8	African Development Review-Revue Africaine De Development	8	184	0
9	Economic Modelling	12	143	4
10	International Journal of Educational Development	12	130	1

Note: Minimum 5 documents and 10 citations, out of 172 documents, 21 meet the threshold.

Co-citation network diagram by cited references (10)

The minimum number of citations of cited references is 10. Of the 17962 cited references, 39 references meet the threshold. The co-citation network analysis visualized in the figure 3 reveals the intellectual structure and thematic foundations of the literature on public and private educational expenditure. Using a minimum threshold of 10 citations, the most frequently cited references were mapped resulting in several well-defined clusters that represent distinct but interrelated research streams within the field. The blue cluster, centered around influential works such as Lucas (1988), Mankiw et al. (1992), and Romer (1990), primarily reflects the macroeconomic and human capital growth theories that form the theoretical backbone of education–growth linkages. These studies emphasize the role of human capital accumulation in long-term economic development. The green cluster, dominated by Glomm & Ravikumar (1992, 2003, 2005) and Blankenau (2007), focuses on public education expenditure, intergenerational models, and fiscal dynamics, highlighting how government spending on education influences economic growth and inequality through dynamic modeling frameworks. The red cluster, which includes works such as Oates (1972), Tiebout (1956), and Arellano & Bond (1991), represents the fiscal federalism and econometric methodology stream, providing the empirical and analytical tools that underpin much of the quantitative research in this area. The yellow cluster, anchored by Barro (1990) and Levine (1992), connects elements of endogenous growth theory and policy analysis, bridging theoretical and empirical perspectives on the role of fiscal policy and institutional factors in shaping educational outcomes. The size of the nodes corresponds to the relative influence of each cited study indicating their prominence and citation impact within the field, while the density and proximity of links illustrate strong intellectual relationships and shared theoretical bases among these clusters.

Figure 3. Co-citation network diagram by cited references

Co-authorship analysis by the author

The minimum number of documents for an author is 2. A minimum number of citations for an author is 10. Of the 870 authors, 46 meet the threshold. The table presents the most influential authors contributing to the literature on educational expenditure based on bibliometric performance indicators namely, the number of documents, total citations, and total link strength. Among the listed authors, Jean-Paul Faguet emerges as the most

influential contributor with 4 publications and 504 citations, indicating his substantial impact and central role in shaping discussions related to education financing and decentralization. Simon Marginson ranks second in terms of citation impact (443 citations from two publications), reflecting the high visibility and academic influence of his limited but seminal works on higher education policy and globalization. Authors like Ioana Schiopu and Nihal Bayraktar exhibit relatively lower publication counts but possess non-negligible link strengths, suggesting that their works serve as bridging nodes connecting different thematic clusters in the citation network.

Table 3. Co-authorship analysis by the author

No.	Author	Documents	Citations	Total link strength
1	Faguet, Jean-Paul	4	504	2
2	Marginson, Simon	2	443	0
3	Afonso, Antonio	2	239	0
4	Sanchez, Fabio	2	150	2
5	Agenor, Pierre-Richard	4	108	1
6	Healy, Michael	2	100	0
7	Fan, Shenggen	2	77	0
8	Meyhew, Ken	2	70	0
9	Bayraktar, Nihal	2	58	1
10	Schiopu, Ioana	3	55	2

The bibliographic coupling network diagram of the authors

The bibliometric coupling analysis of authors in Figure 4 shows the structure of research collaborations and shared intellectual foundations. Out of 870 authors, only 12 meet the thresholds of at least three publications and 10 citations. The author's co-citation network map illustrates the intellectual structure and collaboration patterns among leading scholars in the field of educational expenditure. The visualization reveals two major clusters, representing distinct yet interrelated research orientations. The red cluster, including Jean-Paul Faguet, Pierre-Richard Agenor, Ioana Schiopu, and Rolando Escobar, forms the core intellectual group focusing on public finance, fiscal decentralization, and education policy. The strong interconnections among these authors indicate frequent co-citations, highlighting their collective influence on governance and institutional development research. In contrast, the green cluster comprising Cheng Bing and Ono Susuo represents a complementary research stream emphasizing empirical and regional analyses of educational investment and development outcomes. Although the two clusters are loosely connected, they share conceptual overlaps that link theoretical and empirical dimensions of educational economics. Overall, the map reveals two interconnected but distinct research communities one emphasizing institutional and fiscal perspectives, and the other focusing on empirical and regional analyses together contributing to a cohesive and evolving body of knowledge in educational expenditure studies.

Figure 4. Bibliographic coupling network diagram of the authors
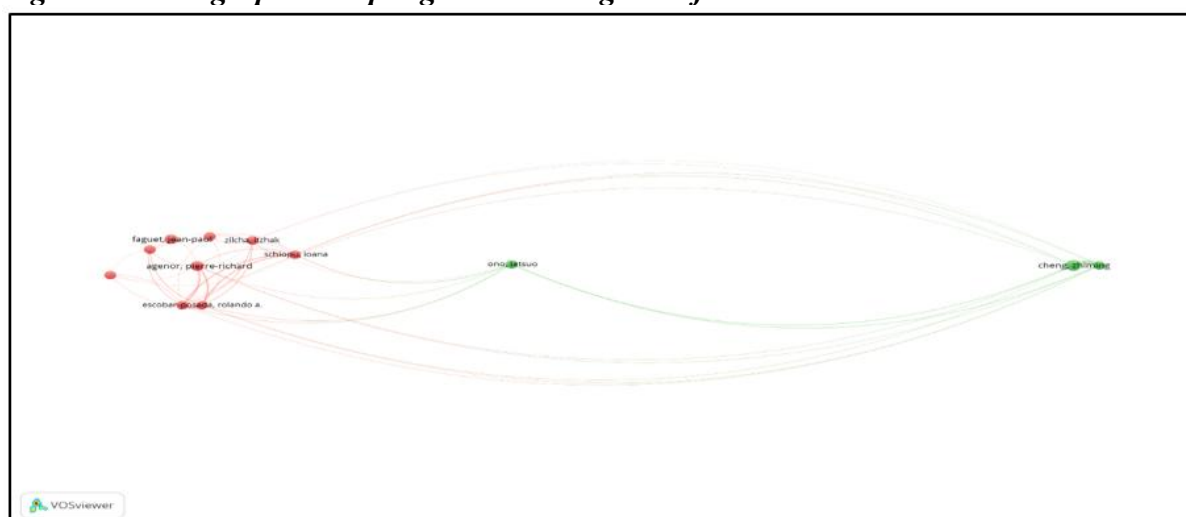
Top 10 Journals in terms of bibliometric coupling total link strength

There are 3 documents, 10 citations with a total number of sources of 172, of which 52 meet the threshold. The table presents the top 10 journals in terms of bibliometric coupling measured by total link strength. The table lists the top ten publication sources contributing to the research on educational expenditure, based on documents published, citations received, and total link strength. Applied Economics has the highest number of publications (18) with a strong citation count (268) and link strength (585), indicating its significant contribution and influence in the field. World Development stands out with the highest citation impact (1249) despite having fewer papers (16), showing its strong research quality and broader academic reach. Economic Modeling also plays a key role with 12 papers, 143 citations, and the highest total link strength (652), reflecting its central position in connecting related studies. The remaining journals, such as Post-Communist Economies, Journal of International Development, and Economic Change and Restructuring, contribute fewer papers but maintain valuable academic connections within the literature network. Overall, the analysis shows that the field is primarily dominated by economics and development journals, with Economic Modelling, Applied Economics, and World Development serving as the most influential platforms for related research.

Table 4. Top 10 Journals in terms of bibliometric coupling total link strength

No.	Source	Documents	Citations	Total link strength
1	Economic Modelling	12	143	652
2	Journal of Macroeconomics	6	109	592
3	Applied Economics	18	268	585
4	Manchester School	5	225	513
5	BE Journal of Macroeconomics	3	22	508
6	World Development	16	1249	405
7	Post Communist Economics	4	56	354
8	Journal of International Development	4	59	339
9	Bulletin of Economic Research	3	20	337
10	Economic Change and Restructuring	3	90	280

Top 10 Authors in terms of bibliometric coupling with total link strength

There are 3 documents and 10 citations with a total number of sources of 870, of which 12 meet the threshold. The bibliometric coupling analysis identifies Cheng Zhiming and Wang

Haining as the most interconnected authors, with the highest total link strengths (352 and 351), indicating strong thematic alignment and central roles in the research network. Escobar-Posada Rolando A. and Monteiro Goncalo also show high coupling values (328 each), reflecting close conceptual relationships with other core contributors. Although Pierre-Richard Agenor has the highest citation count (108), his lower link strength (115) suggests a more specialized research focus. Overall, these authors form the core intellectual structure of the field driving collaboration and shaping the thematic development of research on educational expenditure.

Table 5. Top 10 Authors in terms of bibliometric coupling total link strength

No.	Author	Documents	Citations	Total link strength
1	Cheng, Zhiming	5	52	352
2	Wang, Haining	3	43	351
3	Escobar-Posada, Rolando A.	3	12	328
4	Monteiro, Goncalo	3	12	328
5	Agenor, Pierre-Richard	4	108	115
6	Schiopu, Ioana	3	55	93
7	Zilcha, Itzhak	3	41	44
8	Ono, Tetsuo	3	11	40
9	Ziesemer, Thomas H. W.	3	49	30
10	Hidalgo-Hidalgo, Marisa	3	30	15

Top 10 Documents in terms of bibliometric coupling total link strength

There are 10 citations with a total number of sources of 434, of which 207 meet the threshold. Table 6 represents the most influential documents identified through bibliometric coupling, highlighting their central role in shaping the intellectual structure of the field. Churchill (2017) emerges as the most influential document with the highest number of citations (193), reflecting its strong academic impact and extensive connections with other studies. Haile (2018) (191 citations) and Bose (2007) (161 citations) follow closely, both contributing significantly to the development of core theoretical and empirical perspectives. Escobar-Posada (2015), Neycheva (2010), and Haini (2020) also demonstrate substantial citation strength, suggesting their relevance in extending the discussion on fiscal policy, public expenditure, and economic growth. Meanwhile, contributions by Arestis (2021), Leon-Gonzalez (2004), and Blankenau (2004) maintain important linkages with other studies, reflecting continuity between early foundational research and more contemporary analyses.

Table 6. Top 10 Documents in terms of bibliometric coupling total link strength

No.	Documents	Citations	Total link strength
1	Churchill (2017)	13	193
2	Haile (2018)	36	191
3	Escobar-Posada (2015)	12	130
4	Bose (2007)	161	121
5	Neycheva (2010)	14	117
6	Haini (2020)	20	117
7	Arestis (2021)	14	102
8	Leon-Gonzalez (2004)	12	100
9	Blankenau (2004)	120	94
10	Luintel (2020)	15	92

Co-occurrence by all Keywords (author keywords and keywords plus), density visualization

The keyword co-occurrence density visualization (Figure X) illustrates the main research themes within the field. Out of 1907 keywords, 256 met the minimum occurrence threshold of five. The yellow-coloured central zone represents the most frequently occurring and influential keywords such as "education", "growth", "inequality", "policy", "economic growth", "impact", and "government expenditure". These terms indicate that the dominant focus of the literature lies at the intersection of education, economic growth, and inequality, emphasizing the role of public policy and government spending in shaping these outcomes. Surrounding this core, moderately dense green areas include terms like "human capital", "institutions", "fiscal policy", and "democracy", reflecting the importance of governance, institutional quality, and fiscal mechanisms in influencing development outcomes. The peripheral blue regions contain less frequent but contextually significant keywords such as "migration", "remittances", "gender inequality", "sub-Saharan Africa", and "Bangladesh", suggesting region-specific and micro-level analyses. Overall, the map illustrates that the existing scholarship is centered on exploring how education, supported by fiscal and institutional frameworks, contributes to economic growth and the reduction of inequality.

Figure 5. Co-occurrence by all Keywords (author keywords and keywords plus), density visualization
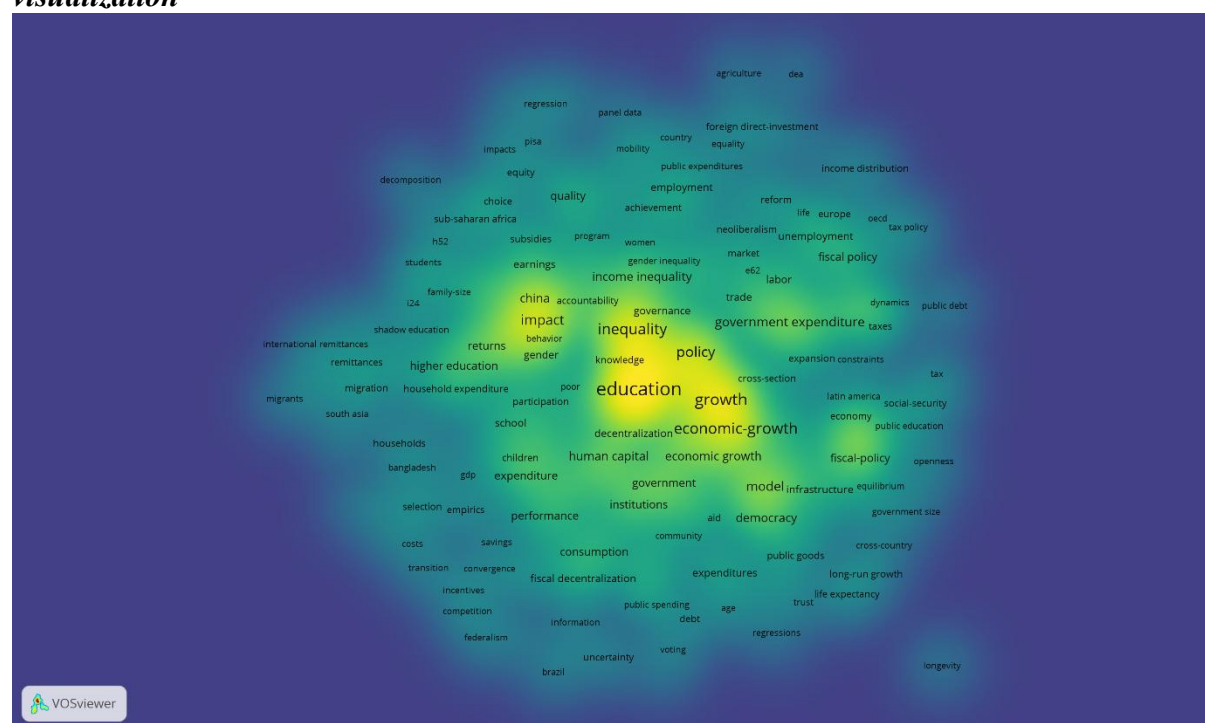
Co-occurrence by all Keywords (author keywords and keywords plus), overlay visualization

The keyword co-occurrence network visualization (Figure X) presents an interconnected structure of research themes, illustrating how various concepts are related within the literature. The size of each node represents the frequency of a keyword's occurrence, while the thickness of the connecting lines indicates the strength of their co-occurrence relationships. At the core of the network, dominant keywords such as "education", "inequality", "policy", "growth", "economic growth", "government expenditure", and "human capital" form the central cluster, revealing the primary research focus on the

interlinkages between education, economic performance, inequality, and public policy. Closely associated terms like "fiscal policy", "institutions", "democracy", and "governance" indicate the importance of institutional and fiscal frameworks in shaping development outcomes. The presence of peripheral keywords such as "migration", "remittances", "gender inequality", and "higher education" suggests the inclusion of social, regional, and microeconomic perspectives within the broader discourse. The colour gradient (from blue to yellow) represents the average publication year, showing a temporal evolution where more recent studies (in yellow) increasingly emphasize governance, fiscal decentralization, and policy reforms. Overall, this visualization demonstrates that the research field has evolved into a multidimensional domain, linking education and economic growth with inequality, policy, and institutional quality.

Figure 6. Co-occurrence by all Keywords (author keywords and keywords plus)

FUTURE RESEARCH AGENDA

The bibliometric analysis developed in this paper incorporates the emerging trends and patterns of educational investment for future research criteria. The table presents a helpful overview of important future research directions that can increase the interest of researchers in emerging topics related to educational expenditure. Despite, the awareness of educational investment for human development there are several gaps within this field that need to be addressed further for future concentration.

Table 7. Future Research Direction based on VOSviewer Keyword Co-occurrence Map

Main Streams	Sub-Streams	Future Research Themes	Representative References
Public Expenditure and Economic Growth Nexus	Fiscal policy and economic growth	Assess the differential effects of productive vs. unproductive public expenditure.	Bose et al. (2007); Chen et al. (2022); Qazi & Ammad (2021)
		Explore long-run causality	

Main Streams	Sub-Streams	Future Research Themes	Representative References
		between expenditure composition and growth using advanced econometric models (VECM, Panel Cointegration).	
		Investigate institutional efficiency and governance quality in fiscal-growth frameworks.	
Human Capital and Education Investment	The role of higher education in improving human capital and productivity	Investigate the quality and efficiency of education expenditure beyond quantity metrics.	Coronel & Diaz-Roldan (2024); Barro (2001); Becker (1994)
		Explore education's mediating role between government spending and inclusive growth.	
		Analyze cross-country variations in educational returns within developing vs. developed economies.	
Inequality and Social Policy	Dynamics of income inequality and welfare redistribution	Study the effectiveness of fiscal policy in mitigating inequality.	Kim & Samarasekara (2023); Assie-Lumumba (2000); Raza et al. (2017)
		Examine the intersection of gender equity and public expenditure on education and health.	
		Expand analysis to post-pandemic and regional inequality patterns.	
Institutional and Governance Dimensions	The interplay of governance, democracy, and corruption	Evaluate how institutional quality and governance decentralization mediate the expenditure-growth relationship.	Gupta et al. (2005); Barros et al. (2020)
		Examine fiscal decentralization's effect on regional equality and service delivery.	
Methodological and Modeling Approaches	The determinants of endogenous growth model an empirical analysis.	Apply dynamic panel models and semi-endogenous frameworks for better inference.	Hallonsten & Ziesemer (2019); Devarajan et al. (1996); Aschauer (1989)
		Integrate non-linear and	

Main Streams	Sub-Streams	Future Research Themes	Representative References
		interaction effects among fiscal, social, and institutional factors.	
		Encourage comparative bibliometric meta-analysis for trans forecasting	

CONCLUSION

The bibliometric analysis provides various insights regarding educational investment through journals, authors, and articles, enabling researchers and policymakers to understand the essential features and organization of the knowledge base concerning the significant topic of educational investment. The findings from the bibliometric analysis highlight the most prominent themes, challenges, and future directions that were discussed, indicating a research gap that attracts the interest of scholars and economists. Through bibliometric analysis we can observe how educational investment evolves over time in response to educational needs. Essentially, educational investments can be categorized into two types: public and private. This study reveals that the rise in low public investment is leading to an increase in private investment participation. Consequently, within the realm of educational investment, private investment may emerge as a compelling area for future research capable of generating benefits aligned with labour market requirements over time. Nevertheless, this study does have its limitations since it focused solely on articles published in the Web of Science, which claims to represent high-quality publications.

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