

Mapping global research on gender sensitivity in education: A bibliometric and network visualization analysis (2001 - 2024)



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Abstract This study mapped the global landscape of research on gender sensitivity in education from 2001 to 2024 to identify key trends, influential sources, and emerging themes. Using a bibliometric design, data from the Scopus database were analyzed through Biblioshiny and VOSviewer to assess publication growth, citation impact, author productivity, institutional performance, and keyword co-occurrence networks. Results revealed a consistent rise in publications, with a 16.11% annual growth rate and increasing international collaboration among scholars and institutions. The United States, United Kingdom, Canada, and Australia were the most productive countries, while Sustainability (Switzerland), PLOS ONE, and Gender and Education emerged as the most influential journals. Keyword visualizations showed a thematic transition from early discussions on gender equality and mainstreaming to contemporary concerns involving leadership, diversity, STEM participation, digital pedagogy, and ethical inclusion. Findings confirm that gender sensitivity has evolved into a dynamic, interdisciplinary field essential for advancing equity, inclusivity, and sustainability within global education systems. In addition, network visualization analyses revealed strong collaborative structures among authors and institutions, indicating the increasing internationalization of gender-sensitive educational research. Thematic clustering further demonstrated how research priorities have shifted over time, with recent studies emphasizing intersectionality, mental health, and technology-enabled learning environments. These emerging themes reflect the growing demand for evidence-based and context-responsive educational policies that address gender-related disparities across diverse learning settings. By identifying both well-established and underexplored research areas, this study provides a systematic reference for future investigations and policy-oriented scholarship. The findings offer valuable insights for educators, researchers, and policymakers seeking to strengthen gender-responsive practices and promote inclusive, sustainable development in education at local, national, and global levels.

Keywords: gender mainstreaming, inclusive education, scientometric analysis, network visualization, research trends

1. Introduction

Gender sensitivity remains a cornerstone of equitable and inclusive education. As education systems worldwide evolve to meet the demands of the twenty-first century, the recognition of gender as a determinant of learning experiences and outcomes has gained renewed importance. Gender-sensitive education ensures that teaching practices, curricular content, and institutional policies respect and respond to the diverse needs of all learners, regardless of their gender identity. According to UNESCO (2023), gender responsiveness is integral to achieving Sustainable Development Goal (SDG) 5—gender equality—underscoring that ethical and policy-driven educational reforms must integrate gender perspectives across all dimensions of schooling. Recent scholarship further emphasizes that gender sensitivity is closely linked to inclusive and transformative pedagogical practices (Lindsay et al., 2019). However, despite progress, global disparities persist in terms of access, representation, and participation, particularly in the science, technology, engineering, and mathematics (STEM) fields (Davila Dos Santos et al., 2022).

Globally, research reflects a growing emphasis on gender as both a social and institutional construct influencing education. Gender mainstreaming in academic contexts is now recognized as a governance imperative, yet institutional practices often lag behind policy commitments (Olsson & Sörensen, 2020). Systematic reviews and bibliometric studies reveal that gender sensitivity in educational research remains unevenly distributed across disciplines and regions (Lindsay et al., 2019; Bert et al., 2022). This uneven distribution mirrors broader patterns of inequality in global knowledge production (Yao et al., 2014). This imbalance signals an urgent need to examine global research patterns to identify where gender-responsive scholarship is flourishing and where gaps persist. Through bibliometric mapping, scholars can visualize how gender sensitivity has evolved as a research topic—its key contributors, networks, and emerging themes—over time (Li et al., 2021; Martín-Del-Río et al., 2021).



From a policy perspective, gender equality has been institutionalized through various frameworks. The UNESCO Priority Gender Equality Action Plan emphasizes integrating gender perspectives into educational planning and monitoring (UNESCO, 2023). In Asia, gender-sensitive educational governance is linked to commitments under the Beijing Platform for Action and the UN Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). These international frameworks have been shown to influence national education policies and research priorities (Mena & Bolte, 2019). Countries such as China have incorporated gender sensitivity into broader climate and policy reforms, recognizing that gendered perspectives are crucial for sustainable development (Zhou & Sun, 2020). Similarly, in India, Kerala's pandemic response revealed how prior investments in gender-sensitive governance can shape equitable public action during crises (Ramakumar & Eapen, 2022).

At the global level, education systems have experienced transformations driven by digitalization, internationalization, and sustainability imperatives. However, even as technological and pedagogical innovations advance, the integration of gender perspectives remains inconsistent (Abad-Segura et al., 2020; Hussein, 2023). Bibliometric evidence suggests that innovation-oriented educational research often advances faster than equity-oriented scholarship (Alsharif et al., 2022). Bibliometric analyses of related fields—such as mathematics education, STEM participation, and teacher development—indicate a concentration of studies in Western contexts, with limited representation from the Global South (Hussein, 2023; Jetsadanuruk & Chansanam, 2023). This geographic imbalance limits the understanding of how gender-sensitive educational practices operate across diverse sociocultural and economic environments.

Empirical studies further demonstrate that gender sensitivity extends beyond content inclusion to address psychological, behavioral, and institutional dynamics. For example, gender stereotypes and implicit biases continue to influence how learners and teachers perceive capabilities and roles (Bert et al., 2022). Moreover, gender differences in anxiety and social comparison sensitivity reveal how gendered emotional and cognitive factors affect educational engagement (DeWolfe et al., 2020; Hui et al., 2022; Chorot et al., 2023). Such findings reinforce the need to examine gender sensitivity as a multidimensional construct rather than a singular policy concern (Canale et al., 2022). Mena and Bolte (2019) emphasize that integrating intersectionality into research is essential for capturing the layered experiences of gender, race, and socioeconomic status in education. Without such frameworks, gender sensitivity risks being reduced to a procedural rather than transformative commitment.

The academic community has increasingly adopted bibliometric and scientometric methods to analyze patterns of knowledge production, collaboration, and thematic evolution. These tools, such as Biblioshiny and VOSviewer, facilitate the mapping of coauthorship networks, citation trajectories, and conceptual structures of fields (Li et al., 2021; Comert, 2022). Science mapping has been applied across disciplines—from health systems research (Yao et al., 2014) to organizational psychology (Martín-Del-Río et al., 2021) and technostress studies (Salazar-Concha et al., 2021)—to reveal emerging intellectual structures. Such approaches are increasingly recognized as essential for evidence-based research evaluation and policy formulation (Skrzek-Lubasińska & Malik, 2023). In education, bibliometric studies have elucidated global patterns in smart education (Jetsadanuruk & Chansanam, 2023), augmented reality learning (López-Belmonte et al., 2023), and collaborative pedagogies such as mind mapping (Fung & Liang, 2023). However, a similar comprehensive mapping focused specifically on gender sensitivity in educational research is lacking.

The absence of a consolidated global overview of gender-sensitive educational research represents a critical gap in both scholarship and policy implementation. While previous studies have explored related constructs such as inclusion, equity, and gender equality, few have systematically mapped the evolution, productivity, and influence of research dedicated to gender sensitivity itself. Salazar-Concha et al. (2021) argue that identifying thematic shifts through bibliometric analysis enables a deeper understanding of how social and scientific paradigms evolve. This is particularly important for socially grounded fields such as gender studies, where research agendas are shaped by cultural and institutional change (Hussein, 2023). This methodological advantage is particularly relevant in examining gender sensitivity, a field shaped by cultural, psychological, and institutional factors (Canale et al., 2022).

At the national level, the Philippines has made legislative commitments to gender equality and sensitivity through Republic Act No. 9710, the Magna Carta of Women, and the gender and development (GAD) framework institutionalized by the Commission on Higher Education (CHED). These mandates require integrating gender responsiveness into the curriculum, research, and community engagement. Studies indicate that implementation often varies across institutions and regions (Mena & Bolte, 2019). However, as in other contexts, research on the extent of compliance and innovation in implementing these gender-sensitive frameworks remains limited and scattered across institutions. Thus, a systematic global analysis can provide valuable insights for Philippine higher education, offering benchmarks and identifying global patterns that can inform localized action.

Parallel developments in data-driven and AI-enhanced educational research present further opportunities. Ethical frameworks such as UNESCO's (2023) Recommendation on the Ethics of Artificial Intelligence caution that emerging technologies must be evaluated for their impact on gender equality. Integrating gender sensitivity into digital learning, smart education, and research evaluation aligns with these ethical imperatives (Elshaboury et al., 2022; Abad-Segura et al., 2020). Recent science-mapping studies highlight the need to assess how technological innovation intersects with social equity

concerns (Jetsadanuruk & Chansanam, 2023). However, without comprehensive mapping of the field, policy and research communities may overlook crucial intersections between gender, technology, and pedagogy.

The current study therefore seeks to address this gap by providing a bibliometric and network visualization analysis of global research on gender sensitivity in education from 2001--2024. By examining annual production, citation impact, authorship networks, country collaborations, and thematic cooccurrences, this study aims to illuminate how the discourse on gender sensitivity has evolved over two decades. In doing so, it responds to the need for evidence-based reflection on global progress toward equitable, inclusive, and gender-responsive education. As Skrzek-Lubasińska and Malik (2023) note, mapping intellectual structures provides foresight into the competencies and values shaping future education systems. Hence, understanding the trajectory of gender-sensitive educational research is not only an academic endeavor but also a moral and strategic imperative to advance inclusive learning for all.

Guided by these considerations, the present study is anchored on the central research question: How has gender sensitivity in educational research evolved globally in terms of productivity, collaboration patterns, and thematic focus from 2001 to 2024? Rather than synthesizing effect sizes or intervention outcomes as in systematic reviews or meta-analyses, this study adopts a bibliometric approach to capture the structural, intellectual, and temporal dynamics of the field. Bibliometric analysis is particularly effective for exploratory inquiries because it enables the examination of large-scale publication patterns, citation networks, and thematic evolution across extended timeframes and diverse disciplines. By mapping research productivity, influential sources, and conceptual clusters, this approach reveals knowledge structures and emerging trends that are not readily observable through narrative synthesis alone. Thus, bibliometric and network visualization methods offer a more comprehensive and macro-level understanding of the development of gender-sensitive educational research, addressing gaps in existing literature and informing future scholarly and policy-oriented directions.

2. Materials and Methods

2.1. Study design

This study employed a bibliometric research design using a quantitative–descriptive approach to map global trends, research productivity, and thematic developments in gender sensitivity within educational research from 2001--2024. Bibliometric analysis was selected because it provides an objective, replicable, and systematic means of evaluating scholarly output and intellectual structures across time (Li et al., 2021; Martín-Del-Río et al., 2021). Such approaches are particularly useful for synthesizing large volumes of academic literature and identifying knowledge structures in emerging and interdisciplinary fields (Yao et al., 2014). The analysis focused on both performance indicators (e.g., publication growth, most productive authors, sources, and countries) and science mapping indicators (e.g., coauthorship networks, keyword cooccurrences, and thematic evolution).

To enhance analytical rigor and visualization, two specialized applications were used:

1. Biblioshiny, the web-based interface of the R package bibliometrix, for comprehensive data analysis and metric computation; and
2. VOSviewer to generate and visualize bibliometric networks, including coauthorship, co-occurrence, and country collaboration maps.

The combined use of these tools has been widely adopted in recent bibliometric studies to ensure robustness and comparability of results (Comert, 2022).

2.2. Data source

The data were obtained from the Scopus database, one of the most comprehensive repositories of peer-reviewed literature across disciplines. Scopus was chosen for its extensive coverage of international journals, detailed citation data, and export compatibility with bibliometric tools such as Biblioshiny and VOSviewer (Comert, 2022). Previous science-mapping studies have also emphasized Scopus as a reliable source for large-scale bibliometric investigations due to its standardized indexing and metadata structure (Abad-Segura et al., 2020). The search focused on articles, reviews, and conference papers published between 2001 and 2024, ensuring the inclusion of both foundational and emerging studies. Only English-language documents were included to maintain consistency in data processing and analysis.

Each retrieved record contained bibliographic information such as authors, titles, publication years, sources, abstracts, keywords, affiliations, and citation counts. Duplicate entries, retracted papers, and nonscholarly documents were excluded prior to analysis to ensure dataset validity and reliability. This filtering process is consistent with best practices in bibliometric research to enhance data quality and analytical accuracy (Li et al., 2021).

2.3. Data search and extraction

The search strategy combined keywords relevant to gender sensitivity and educational research and was refined through Boolean operators to maximize recall and precision. The final Scopus query was constructed as follows:

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"TITLE-ABS-KEY(  
("gender sensitivity" OR "gender responsiveness" OR "gender awareness" OR "gender mainstreaming" OR "gender  
inclusion" OR "gender equality")  
AND ("education" OR "educational research" OR "teacher education" OR "higher education")  
)  
AND PUBYEAR > 2000 AND PUBYEAR < 2025"
```

This query was formulated on the basis of existing keyword structures and recommendations from previous bibliometric studies (Abad-Segura et al., 2020; Jetsadanuruk & Chansanam, 2023; López-Belmonte et al., 2023). Adopting validated keyword strategies from earlier studies helps improve search transparency and replicability (Salazar-Concha et al., 2021). The full metadata of the retrieved documents were exported in BibTeX (.bib) and Comma-Separated Values (.csv) formats, ensuring compatibility with both Biblioshiny and VOSviewer.

2.4. Data cleaning

Before analysis, the dataset underwent a rigorous preprocessing stage to ensure accuracy, consistency, and analytical reliability. The exported bibliographic records from Scopus were carefully examined to remove duplicates, incomplete entries, and nonscholarly materials such as editorials and book reviews. Duplicated items across document types or journals were identified and deleted to avoid data inflation. Author and institutional names were standardized, addressing variations in spelling, abbreviation, or formatting—for example, ensuring that “Smith J.” and “Smith, J.A.” were treated as one author entity. Keywords were then harmonized to unify terms with similar meanings or conceptual overlaps. Variants such as “gender responsiveness,” “gender sensitivity,” and “gender awareness” were merged into a single descriptor to minimize fragmentation in keyword co-occurrence analyses. Keyword normalization is a critical step in science mapping to ensure meaningful network visualization and thematic clustering (Li et al., 2021; Martín-Del-Río et al., 2021). Furthermore, only peer-reviewed journal articles, reviews, and conference papers that focused directly on gender sensitivity, gender mainstream, or gender equality in education were retained. This screening process allowed the researchers to maintain a coherent dataset relevant to the study’s objectives. The refined dataset was then encoded in UTF-8 format and saved in both BibTeX (.bib) and Comma-Separated Values (.csv) formats, ready for importation into Biblioshiny and VOSviewer for analysis. Such preprocessing procedures are widely recognized as essential for ensuring the validity and reproducibility of bibliometric results (Comert, 2022).

3. Results

3.1. Descriptive analysis of the dataset

This dataset covers 14,575 documents on gender sensitivity in educational research published between 2001 and 2024, drawn from 4,890 indexed sources. The field shows a strong upward trend, with a 16.11% annual growth rate and an average of 19.52 citations per document. The high coauthorship rate (7.03 authors per paper) and international collaboration rate (24.27%) indicate substantial cross-country academic engagement. High collaboration rates are commonly associated with mature and interdisciplinary research fields (Li et al., 2021). Articles constitute the majority of publications, complemented by a smaller yet significant number of review papers.

3.2. Thematic evolution of gender-sensitive educational research

The thematic evolution shows that gender-sensitive educational research has moved from conceptual advocacy toward institutional and applied inquiry. From 2001–2010, motor themes such as gender equality, mainstreaming, and women’s empowerment reveal a foundational phase rooted in global rights frameworks and sociopolitical reform. The presence of reproductive health and social justice topics indicates attempts to connect education with broader human development concerns (Mena & Bolte, 2019). Meanwhile, the gradual decline of purely feminist and sociological discourses suggests that research began shifting away from theoretical critique toward actionable frameworks for educational practice (Zhou & Sun, 2020).

From 2011 onward, themes become increasingly institutional, strategic, and technologically embedded. Leadership, diversity, STEM participation, and workplace equity signal the operationalization of gender sensitivity within schools, universities, and professional pathways (Davila Dos Santos et al., 2022). In the most recent period (2019–2024), the emergence of digital education, artificial intelligence, mental health, and sustainability reflects a move toward interdisciplinary, data-driven, and ethically informed gender research (UNESCO, 2023; López-Belmonte et al., 2023; Skrzek-Lubasińska & Malik, 2023). This trajectory demonstrates a field transitioning from awareness toward implementation, where gender sensitivity functions not only as an equity principle but as an analytical lens guiding educational policy, innovation, and learner well-being.

3.3. Trends in research productivity and impact

Annual scientific production shows a consistent upward trajectory from 2001–2024, indicating rapid growth in scholarly attention toward gender sensitivity in education as illustrated in Figure 1. In the early 2000s, fewer than 100 articles were published each year, reflecting the field’s nascency. A gradual rise began after 2010 and accelerated sharply from 2018 onward, culminating in more than 2,500 articles by 2024. This increase corresponds with the global emphasis on gender equality initiatives such as the UN Sustainable Development Goal 5 and the integration of gender mainstreaming in education policy frameworks (UNESCO, 2023; Olsson & Sörensen, 2020). Similar publication surges have been observed in other education-related bibliometric studies following major global policy initiatives (Hussein, 2023). The 16.11 percent annual growth rate (Table 1) confirms that gender sensitivity has evolved from a specialized theme to a mainstream research agenda in the last decade.

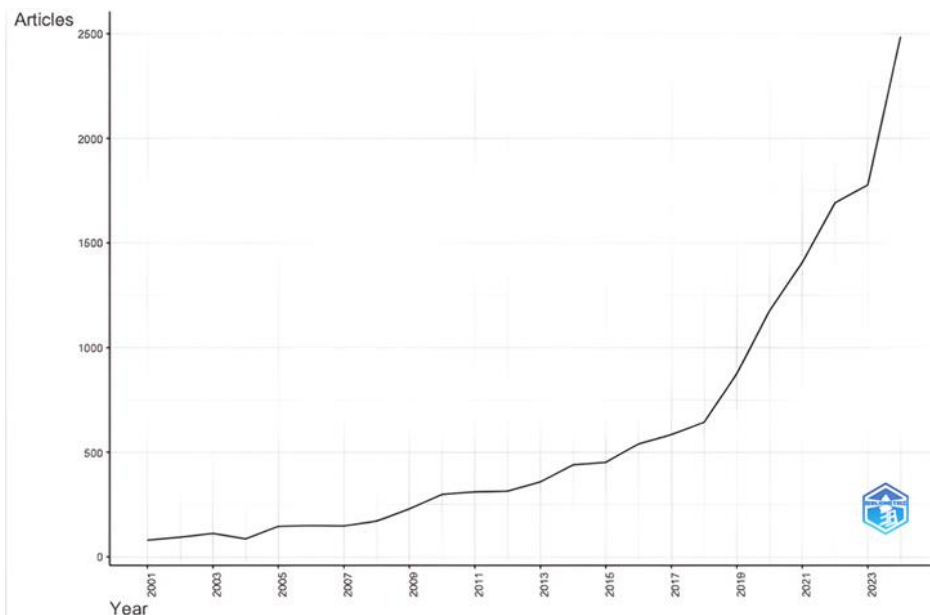


Figure 1 Annual Scientific Production of Publications on Gender Sensitivity in Educational Research (2001–2024). *Scopus*: Scopus Database.

Table 1 Main Information of the Dataset on Gender Sensitivity in Educational Research (2001–2024).

Years	Rainfall
Timespan Covered	2001–2024
Total Sources (Journals, Books, etc.)	4,890
Total Documents	14,575
Annual Growth Rate (%)	16.11
Average Document Age (Years)	6.3
Average Citations per Document	19.52
Total References Extracted	0
Keywords Plus (ID)	12,046
Authors’ Keywords (DE)	25,133
Total Authors	31,852
Authors of Single-Authored Documents	7
Single-Authored Documents	7
Average Co-Authors per Document	7.03
International Co-Authorship Rate (%)	24.27
Document Types	
– Articles	13,405
– Review Papers	1,165

Scopus: Scopus Database.

The citation trend demonstrates fluctuating scholarly influence across years, as presented in Figure 2. Early publications from 2001–2010 gained moderate citations, whereas a notable surge in citation averages occurred between 2015 and 2020, peaking at over 3.5 citations per article in 2019. This peak aligns with a wave of studies addressing gender equity in STEM, teacher education, and educational policy reforms (Davila Dos Santos et al., 2022; Hussein, 2023). Citation peaks are typical indicators of conceptual consolidation and heightened scholarly attention within a field (Yao et al., 2014). After 2020, citation



rates declined slightly, which is typical for recently published works that have not yet accumulated long-term citations. Overall, the data suggest sustained scholarly engagement with gender sensitivity topics, alongside an expanding publication base that continues to attract global academic attention.

3.4. Source analysis

As shown in Figure 3, sustainability (Switzerland) is the most prolific source, contributing 219 documents, followed by PLOS ONE, with 161 publications, and the International Journal of Environmental Research and Public Health, with 125. Specialized education and gender-focused journals also play a significant role, including Gender and Education (117), the Journal of International Women's Studies (106), and Gender, Work and Organization (102). The consistent presence of these journals indicates multidisciplinary convergence between education, gender studies, and sustainability research. Such convergence is characteristic of socially grounded research domains that span policy, education, and development (Abad-Segura et al., 2020). The prominence of sustainability (Switzerland) and PLOS ONE reflects the integration of gender perspectives into global sustainability and social development discourses. Moreover, the inclusion of psychology-oriented and health-focused journals such as *Frontiers in Psychology* (96) and *BMC Public Health* (75) suggests that gender sensitivity extends beyond pedagogy to encompass psychosocial and public health dimensions. This cross-sectoral publication pattern has been noted in other science-mapping studies addressing equity and social inclusion (Martín-Del-Río et al., 2021). This diverse range of publication outlets underscores the cross-sectoral relevance of gender sensitivity as a global educational concern.

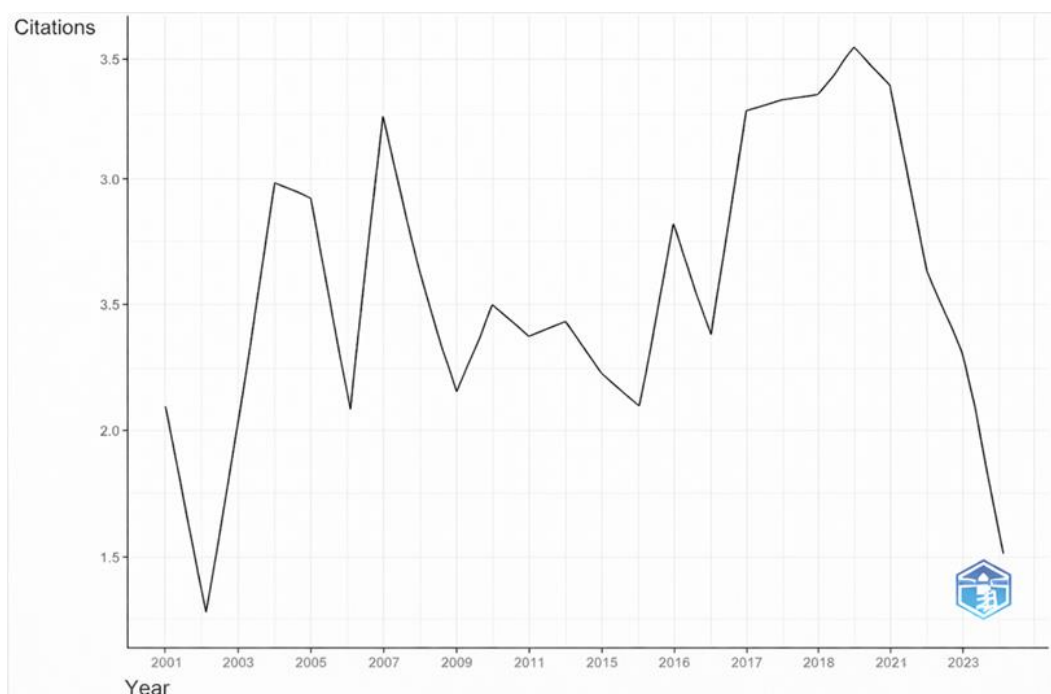


Figure 2 Average Citations per Year for Publications on Gender Sensitivity in Educational Research (2001–2024). *Scopus*: Scopus Database.

The local citation impact analysis presented in Figure 4 reveals that *World Development* has the highest H-index (36), followed closely by *Gender and Education* (33), *PLOS ONE* (32), and *Sex Roles* (32). These journals combine high productivity with substantial scholarly influence, reflecting their capacity to shape theoretical and empirical developments in gender and education research. High H-index values typically signal journals that serve as intellectual anchors within a research field (Comert, 2022). The strong performance of *World Development* and *Gender and Education* demonstrates the field's intellectual integration within both developmental and pedagogical frameworks. Moreover, despite its high publication volume, sustainability (Switzerland) records an H-index of 31, suggesting that while it publishes extensively, citation density is still maturing compared with that of more established journals. Emerging sources such as *Social Politics* and the *International Journal of Environmental Research and Public Health* (both $H = 23$) indicate growing interdisciplinary engagement. The results affirm Bradford's Law, where a small cluster of journals—chiefly *Gender and Education*, *PLOS ONE*, and *Sustainability* (Switzerland)—constitute the field's core, accounting for a substantial proportion of total research output and influence.

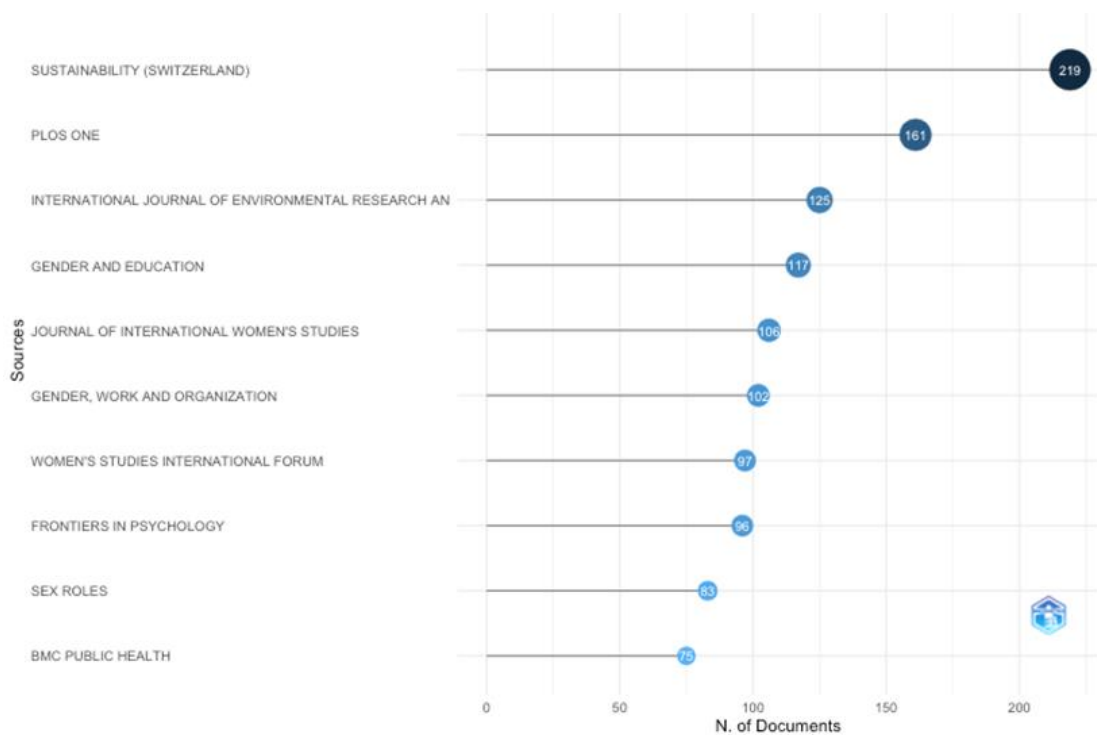


Figure 3 Most Relevant Sources Publishing Research on Gender Sensitivity in Education (2001–2024). *Scopus*: Scopus Database.

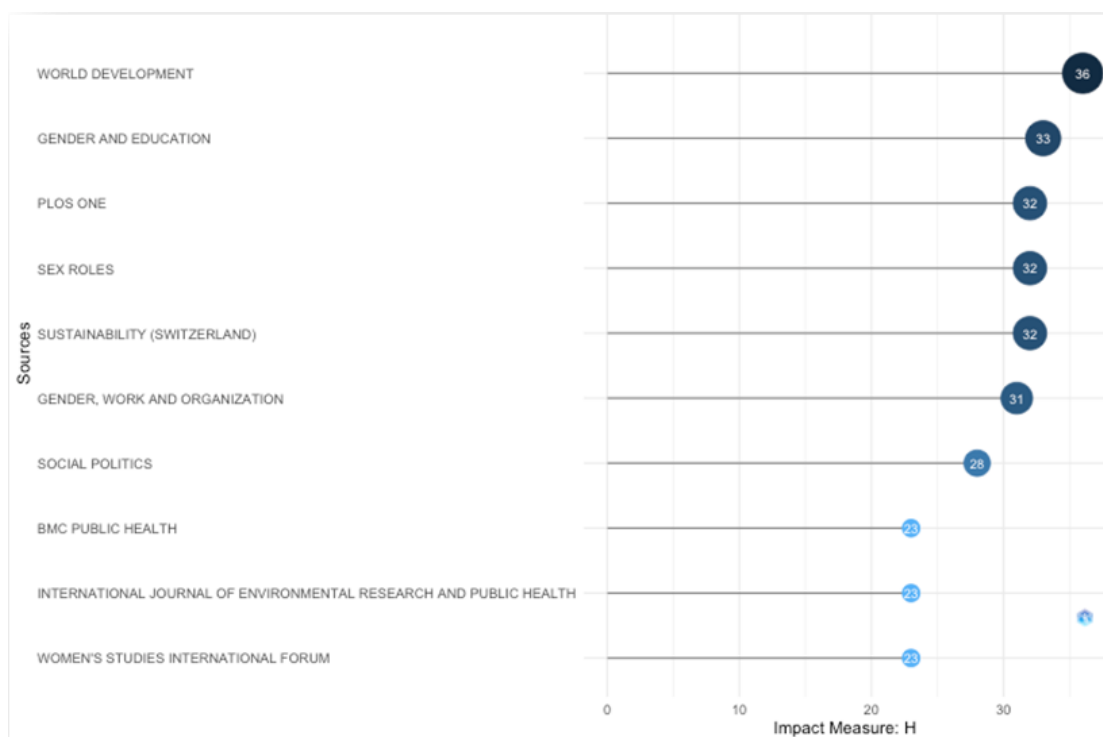


Figure 4 Sources' Local Impact by H-Index (2001–2024). *Scopus*: Scopus Database.

3.5. Author and institutional productivity

Figure 5 illustrates the most influential authors in the field of gender sensitivity in educational research on the basis of the H-index. The top-ranked scholars—represented anonymously as M (H = 113), A (H = 109), and S (H = 105)—show a significant level of scholarly influence, reflecting sustained publication productivity and citation impact over the two-decade period. High author-level H-indices are commonly associated with intellectual leadership and thematic continuity within a research domain (Li et al., 2021). These researchers have established themselves as key contributors whose work has shaped theoretical and empirical developments in gender equality and inclusive education. Mid-tier authors, represented by J (H = 102) and R (H = 95), demonstrate consistent scholarly engagement and cross-disciplinary collaboration, indicating that the domain



is supported by both leading and emerging contributors. The relatively high H-index values across the top tier suggest that the discourse on gender sensitivity has reached a mature research phase, supported by a solid base of widely cited and frequently coauthored publications.

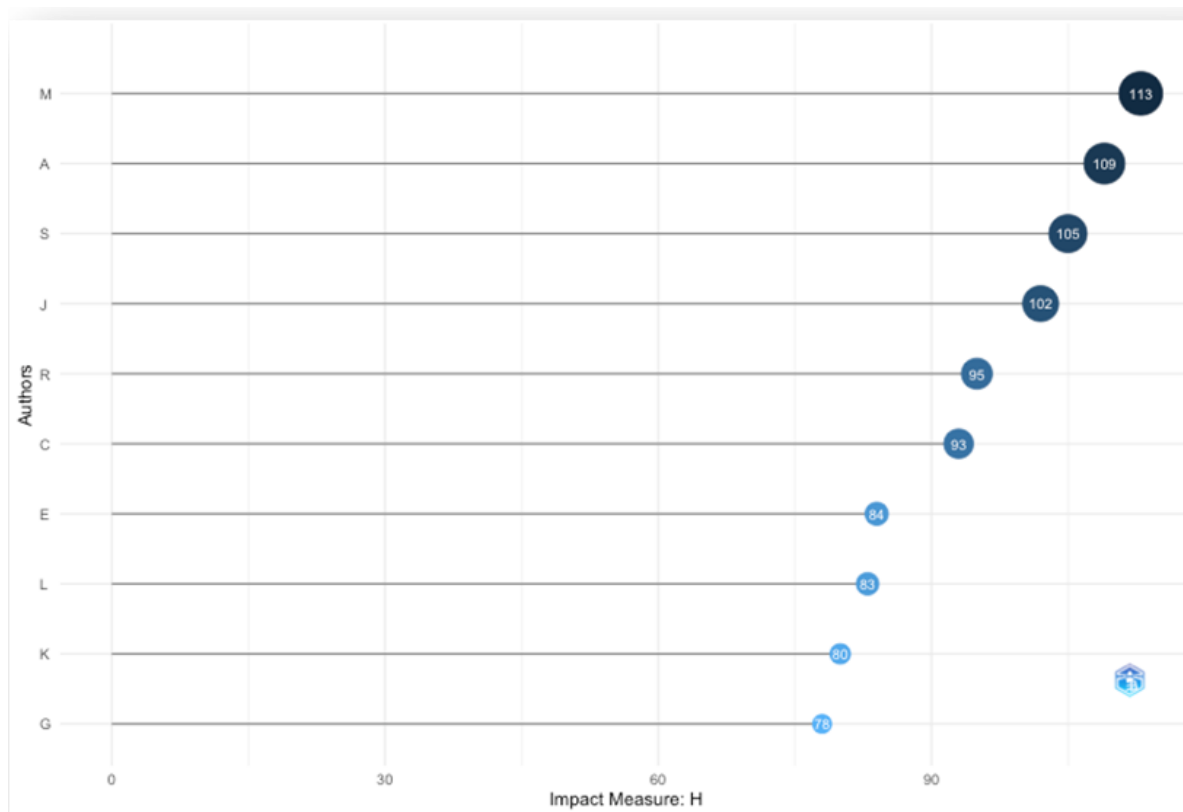


Figure 5 Authors' Local Impact by H-Index. *Scopus*: Scopus Database.

As shown in Figure 6, institutional productivity in gender-sensitive educational research has risen steadily across prominent universities over the past two decades. The University of California and the University of British Columbia lead in publication output, each producing more than 350 research articles by 2024. Other notable contributors include Umeå Universitet (Sweden), the University of Toronto (Canada), and a substantial number of studies categorized as not reported, reflecting unaffiliated or collaborative multi-institutional works. The upward trajectory across all affiliations mirrors the field's increasing internationalization and interdisciplinary appeal. Institutional growth patterns often reflect the alignment of research agendas with global policy priorities such as gender equality (Olsson & Sörensen, 2020). The consistent growth pattern observed from 2015 onward aligns with the global policy emphasis on gender equality under the United Nations' SDG 5 and the growing inclusion of gender mainstreaming in institutional research agendas (UNESCO, 2023; Olsson & Sörensen, 2020). Overall, these findings demonstrate that North American and European institutions remain dominant contributors to the literature, whereas the rising trend in global collaboration points toward the expanding geographic diversity of gender sensitivity research.

3.6. Geographical distribution of research

Figure 7 illustrates the publication trends of the top five contributing countries—the United States, the United Kingdom, Canada, Australia, and Spain—in gender sensitivity research within education from 2001--2024. The United States leads with a steep and sustained increase, surpassing 10,000 publications by 2024, signifying its dominant role in shaping the global discourse. The United Kingdom follows closely, showing consistent growth that reflects strong academic engagement through major institutions and research councils advocating gender equality in educational settings. Canada and Australia exhibit similar trajectories, indicating an active commitment to inclusive education and gender-responsive pedagogy, supported by national education frameworks and equity initiatives (UNESCO, 2023). Geographical concentration of output in Western countries is a recurring pattern in educational bibliometric studies (Jetsadanuruk & Chansanam, 2023). Meanwhile, Spain has emerged as the leading non-Anglophone contributor, showing progressive growth aligned with European Union research priorities on gender mainstreaming and equality policies.



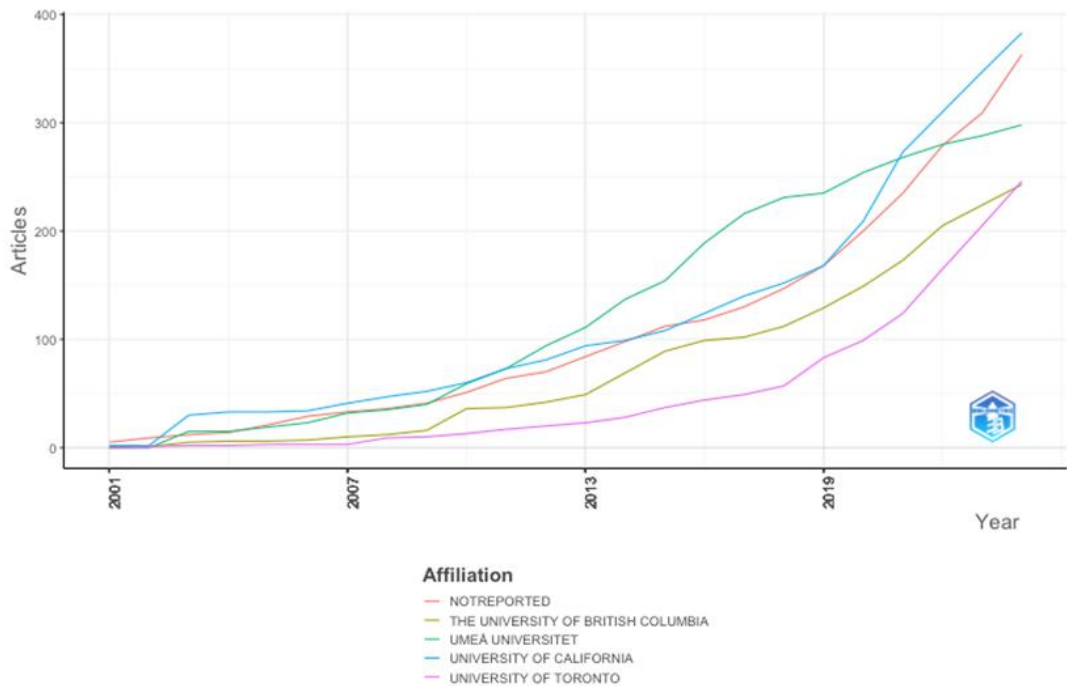


Figure 6 Affiliations' Production Overtime (2001–2024). *Scopus*: Scopus Database.

3.7. Thematic network visualization

The co-occurrence network in Figure 8 presents the conceptual structure of gender sensitivity research in education. Larger nodes represent frequently occurring keywords, whereas proximity and color clustering indicate thematic relationships among concepts. Keyword co-occurrence networks are widely used to identify the intellectual core and thematic structure of research fields (Li et al., 2021). The dominant terms—“gender,” “gender equality,” “gender differences,” “diversity,” “leadership,” and “gender bias”—occupy the central zone, reflecting their role as the intellectual core of the field. Closely related clusters include themes of gender mainstreaming, sustainable development, health, and women’s empowerment, linking educational contexts with broader social and developmental agendas.

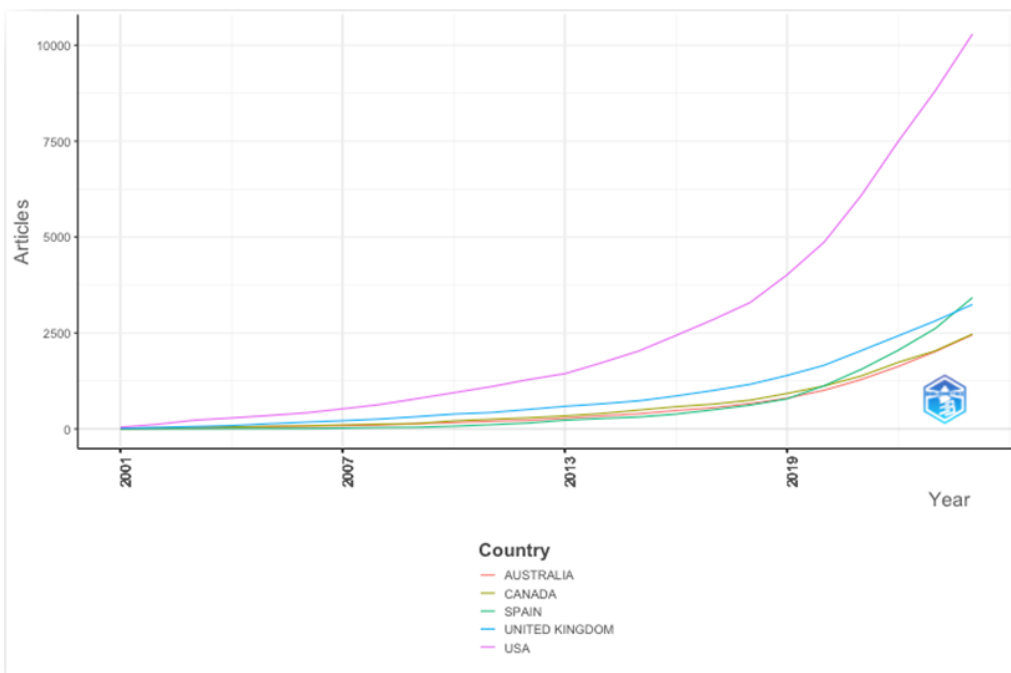


Figure 7 Country Production Trends in Gender Sensitivity in Educational Research (2001–2024). *Scopus*: Scopus Database.



areas of leadership, diversity, and gender bias in organizational and educational contexts, coinciding with the integration of gender perspectives into higher education policies.

Table 2 Thematic Evolution of Gender-Sensitive Educational Research (2001–2024).

Period	Major Themes	Category	Representative Keywords
2001–2010	Foundations of Gender Equality and Mainstreaming in Education	Motor Themes	gender, gender equality, gender mainstreaming, gender inequality, women’s empowerment, feminism, social justice
	Gender and Health Contexts	Niche Themes	reproductive health, family planning, HIV, mental health, child marriage, fertility
	Feminist and Sociological Perspectives in Education	Declining Themes	feminism, patriarchy, sociology of education, empowerment discourse
2011–2018	Institutional and Leadership Dimensions of Gender Sensitivity	Motor Themes	leadership, diversity, gender bias, gender differences, gender roles, management, workplace equity
	Gender and STEM/Science Participation	Emerging Themes	STEM education, women in science, mathematics education, gender gap, professional development
	Gender Mainstreaming and Policy Reform	Niche Themes	policy, gender mainstreaming, sustainable development, equality frameworks, empowerment programs
2019–2024	Technological and Ethical Dimensions of Gender Sensitivity	Emerging Themes	digital education, ethics, artificial intelligence, online learning, social media, higher education
	Intersectionality and Mental Health in Educational Contexts	Motor Themes	gender identity, mental health, diversity, inclusion, emotional well-being, social equity
	Globalization, Sustainability, and Cross-Sector Integration	Motor Themes	sustainable development goals, climate change, economic growth, human development, capacity building
	Traditional Feminist Discourses	Declining Themes	feminist theory, patriarchy, empowerment narratives, gender discourse

4. Discussion

The bibliometric findings provide a panoramic view of how gender sensitivity in educational research has evolved over the past two decades, revealing strong growth, widening thematic diversity, and increasing global collaboration. The steady rise in publication output from 2001–2024 (Figure 1) reflects a deepening academic commitment to gender equity within educational systems. This growth aligns with international policy frameworks, particularly the United Nations Sustainable Development Goals (SDG 5: Gender Equality) and SDG 4: Quality Education, which emphasize inclusive learning and equal opportunity (UNESCO, 2023). Comparable growth trajectories have been observed in other equity-oriented education research domains following the adoption of global development agendas (Hussein, 2023). The data suggest that gender sensitivity has become an integral dimension of educational reform discourse, transcending advocacy to influence institutional policy, teacher education, and interdisciplinary research.

Early studies focused on foundational issues such as gender mainstream, feminism, and equality—concepts that emerged in response to the Beijing Platform for Action and the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW). These early frameworks created a foundation for integrating gender perspectives into education systems (Zhou & Sun, 2020). Such foundational phases are typical in socially grounded research fields that later expand into applied and policy-oriented inquiry (Yao et al., 2014). However, as the research volume expanded—particularly after 2015—the field began incorporating broader concerns such as diversity, leadership, and organizational behavior. This shift corresponds



to the growing recognition that gender inequality is not confined to access or participation but extends to leadership representation, the institutional climate, and social norms shaping classroom dynamics (Olsson & Sörensen, 2020; Davila Dos Santos et al., 2022).

The upward trend in scholarly output was accompanied by increased international collaboration, with a 24.27% rate of cross-country authorship (Table 1). Such collaborations underscore the global nature of gender discourse and the shared educational challenges nations face in achieving gender parity. The United States, the United Kingdom, and Canada dominate publication output (Figure 7), reflecting robust research infrastructures and gender equity policies embedded in higher education. However, this concentration also highlights the imbalance in scholarly representation between the Global North and the Global South. Countries such as India, China, and South Africa, while present in the dataset, remain underrepresented, suggesting an opportunity for more inclusive international collaborations (Ramakumar & Eapen, 2022). Similar regional asymmetries have been documented in prior bibliometric studies of education and social science research (Jetsadanuruk & Chansanam, 2023). The growing involvement of non-Western contexts, visible in clusters such as Ethiopia, Turkey, and South Asia (Figure 8), indicates a gradual decentralization of gender research but underscores the continuing need to diversify voices and perspectives in educational gender studies.

Source analysis (Figures 3 and 4) identified sustainability (Switzerland), PLOS ONE, and gender and education as major publication venues. These journals bridge the boundaries between education, sociology, and sustainability studies. Gender and education remain central to theoretical and pedagogical discourse, whereas sustainability (Switzerland) represents the growing integration of gender perspectives into environmental and policy research (Bert et al., 2022; Alsharif et al., 2022). The high H-index of world development (36) also reflects the merging of gender sensitivity with development economics and social policy. High-impact interdisciplinary journals often play a gatekeeping role in shaping the direction of emerging research fields (Comert, 2022). This disciplinary convergence supports the idea that gender-responsive education is not a standalone field but rather a multifaceted research domain connecting public policy, psychology, health, and sustainability (Mena & Bolte, 2019; Yao et al., 2014).

The analysis of authorship and institutional productivity (Figures 5 and 6) further demonstrates that gender sensitivity research thrives within strong research networks. Universities such as the University of California, the University of British Columbia, and Umeå Universitet lead in terms of global output, each contributing more than 300 publications by 2024. These institutions have long histories of supporting gender studies and inclusive pedagogy programs (Hussein, 2023). The increasing coauthorship rate (7.03 authors per paper) also reflects a collaborative research culture, indicating that gender sensitivity in education is now treated as a collective, interdisciplinary effort rather than a niche or isolated pursuit. Collaborative authorship patterns are widely associated with higher research visibility and methodological innovation (Li et al., 2021). Such collaboration facilitates methodological innovation, including the integration of bibliometric mapping, AI-supported analysis, and qualitative approaches to policy assessment (Li et al., 2021).

The co-occurrence and overlay visualizations (Figures 8–9) reveal that gender equality, gender bias, leadership, and diversity remain the conceptual anchors of the field, whereas emergent topics such as digital education, artificial intelligence, and mental health point toward a more complex intersectional landscape. These newer clusters reflect a postpandemic paradigm where issues of gender sensitivity intersect with technology, online learning, and emotional well-being (Hui et al., 2022; Fung & Liang, 2023). The temporal gradient clearly evolves from advocacy-based gender studies to evidence-driven educational innovation. Temporal mapping of research themes has been shown to effectively capture paradigm shifts in education research (Salazar-Concha et al., 2021). This trajectory mirrors global developments in data ethics and sustainable governance, where gender sensitivity now encompasses digital inclusion, ethical leadership, and equitable access to technology (UNESCO, 2023).

Furthermore, the thematic evolution (Table 2) captures three major transitions in the literature:

- (1) Foundational phase (2001–2010) – establishing theoretical bases through feminism, equality, and mainstreaming;
- (2) Institutionalization phase (2011–2018) – expanding into leadership, diversity, and STEM participation;
- (3) Integration phase (2019–2024) – Merging gender discourse with digital ethics, mental health, and sustainability.

This pattern suggests that the field is moving from conceptual advocacy to applied research that supports policy design and pedagogical transformation. This evolution is consistent with studies emphasizing the need for gender-responsive teacher education and leadership development as mechanisms to close persistent equity gaps (Lindsay et al., 2019; Davila Dos Santos et al., 2022).

Despite these advancements, the bibliometric evidence also highlights ongoing research gaps. The underrepresentation of studies from developing regions points to the need for greater participation from the Global South, where gender inequities are often more pronounced but less documented. Similarly, while there is a rich body of literature on women's empowerment, fewer studies focus on intersectional identities—such as those involving LGBTQ+ learners, indigenous education, or disability-inclusive pedagogy. Recent global reviews emphasize that true gender sensitivity must move beyond binary frameworks to address complex layers of identity and systemic bias (Canale et al., 2022; Comert, 2022). Another gap lies in longitudinal and

mixed-methods research connecting gender-sensitive policies with measurable educational outcomes, which remains an emerging methodological priority (Martín-Del-Río et al., 2021; Salazar-Concha et al., 2021).

Overall, this bibliometric mapping demonstrates that the global discourse on gender sensitivity in education has transitioned from advocacy and awareness to integration and innovation. This transition is consistent with broader shifts toward evidence-based and data-driven educational reform (Abad-Segura et al., 2020). The surge of publications, interdisciplinary convergence, and diversification of research contexts collectively affirm that gender sensitivity is now a cornerstone of global educational research. However, the field's next challenge lies in ensuring that gender equity principles are not only studied but also embedded in educational systems through context-sensitive, data-informed, and culturally responsive practices. This requires continued collaboration among scholars, educators, and policymakers to sustain gender sensitivity as both a research priority and an operational framework for inclusive, transformative education.

Future research should extend the findings of this bibliometric analysis through mixed-methods and longitudinal designs that examine how gender-sensitive educational policies translate into institutional practice over time. Longitudinal studies combining bibliometric trends with empirical outcome data may provide deeper insights into the sustainability and real-world impact of gender-responsive initiatives. In addition, qualitative approaches—such as interviews, policy document analysis, and case studies—can complement large-scale quantitative mappings by capturing contextual, cultural, and organizational factors that shape gender sensitivity in educational settings. Comparative research examining discrepancies between formal institutional policies and their empirical implementation across different regions and educational systems would further enrich understanding of policy effectiveness. Integrating bibliometric evidence with qualitative and longitudinal data can support more nuanced, actionable, and context-sensitive strategies for advancing gender equity and inclusion in education.

5. Final Considerations

This bibliometric and network visualization study provides a global overview of gender sensitivity research in education over the past two decades. The analysis revealed that scholarly attention to gender equity, inclusivity, and leadership has grown rapidly and diversified across disciplines, particularly since 2015. Using Biblioshiny and VOSviewer, the study identified highly productive countries, journals, and authors while mapping the intellectual and thematic evolution of the field. The results demonstrate that gender sensitivity has shifted from a predominantly advocacy-driven discussion to a multidimensional and data-informed research domain that now intersects with technology, mental health, and sustainability. Despite notable progress, the findings also underscore the need for stronger research representation from developing regions to balance global discourse. The study contributes to advancing inclusive and equitable educational practices by providing a structured reference for future researchers and policymakers seeking to deepen gender-responsive scholarship worldwide.

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6. Declarations

6.1. Ethical considerations

The study did not involve human participants, experiments, or confidential data collection; hence, ethical approval was not applicable. All bibliometric data were obtained from publicly available sources (Scopus database), and the analysis adhered to the research integrity and data ethics guidelines of Pangasinan State University.

6.2. Use of artificial intelligence (AI)

The authors declare that the generative artificial intelligence (AI) tool ChatGPT (OpenAI) was used exclusively for language editing and grammatical improvement. The use of AI did not influence the scientific content, study design, data collection, data analysis, data interpretation, results, or conclusions of the manuscript. Full responsibility for the accuracy, originality, and integrity of the content remains with the authors.

6.3. Conflict of interest

The authors declare that they have no conflicts of interest.

6.4. Funding

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