

## WHOSE KNOWLEDGE COUNTS? A BIBLIOMETRIC MAPPING OF ICT, GENDER AND WOMEN'S QUESTION

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### Abstract

Information Communication and Technology (ICT) has been considered a 'male dominated' field for a larger time of the computer era, which is why several national and international bodies have come together in past to make the field more inclusive of women. Therefore, how much that has been in effect at the research regarding ICT and gender has evoked the scholastic curiosity. To find the answer we searched the SCOPUS databased and analysed 692 articles, published between 1999 to 2025 with the help of VOSviewer. The analysis shows a rise in publication after 2007, being highest during the period 2017 and 2024. The citation and co-citation maps reveal six thematic clusters that have dominated the research area. Keyword analysis reveals that the scholarship has shifted from early researcher' focus on digital literacy and accessibility, to current trends of algorithmic bias, platform labour and gendered surveillance. Further analysis shows a consistent pattern of absence of Global south female voices from the prominent spotlight of these researches, with most distinguished scholars either identifying as male or belonging from a global north country. By situating bibliometric evidence within a feminist critique, our study provides a meta-perspective on the ways ICT and gender research has evolved, while pointing to the need for future scholarship that is attentive to inclusion, equity, and epistemic justice.

**Keywords:** ICT, Gender, Bibliometric Analysis, SCOPUS, VOSviewer.

## 1. INTRODUCTION

In the last twenty-five years, work at the crossroads of ICT and gender has grown from a narrow set of concerns into a sprawling, contested domain. Early studies, often preoccupied with digital access and literacy, now seem almost modest when set against the sheer diversity of today's debates. Research has steadily expanded to include digital activism (Kaun & Uldam, 2018), the persistence of online harassment (Nadim & Fladmoe, 2021), questions of algorithmic bias (Kordzadeh & Ghasemaghaei, 2022), feminist readings of technological epistemologies (Schurr, Marquardt, & Militz, 2023), and the precarities of platform labour (Muñoz et al., 2024). This widening horizon is not simply a reflection of technological change; it also signals the mounting urgency of addressing structural gender asymmetries embedded in digital environments—an urgency that is both academic and political (Rojas-Osorio, et. Al., 2024). Despite this proliferation of research, relatively little has been done to synthesise how knowledge in this domain has

shifted over time (Hertweck & Lehner, 2025). This review addresses that lacuna by charting growth patterns in publications and citations related to ICT and gender from 1999 to 2025, offering a longitudinal view of the field's expansion and intellectual consolidation. Tracing these developments is not merely an exercise in trend-spotting: it is essential for recognising emergent themes, conceptual turning points, and disciplinary convergences that signal both the vitality and the vulnerabilities of this scholarly formation (Gnambs & Schwaß, 2025). To that end, we formulate four interlinked research questions, each directed at a different dimension of the field's trajectory (Zhou et. Al., 2025).

The first concerns growth patterns in publications and citations. Rather than treating bibliometric data as a descriptive tally, we use it diagnostically, as a way to capture the temporal rhythms of scholarly investment and institutional attention, particularly in relation to global technological transformations and policy shifts such as the introduction of the Sustainable Development Goals (SDGs) (Wayagi et al., 2025). The second investigates the intellectual structure of the field, identifying influential works, citational clusters, and theoretical orientations that have shaped the knowledge architecture of ICT and gender (Hertweck & Lehner, 2025). The third attends to trending topics, tracing how the field has moved from concerns over access and representation toward more nuanced debates on data justice, algorithmic governance, and feminist organising in digital spaces (Shah & Krishnan, 2024). Finally, the fourth turns to the geographies and networks of scholarly production, highlighting leading authors, journals, and regions. This lens brings into view both the dominant centres of knowledge-making and the continued marginalisation of perspectives from the Global South or from underrepresented disciplines (Hertweck & Lehner, 2025).

Together, these questions enable a comprehensive mapping of ICT and gender research. Through bibliometric and thematic analyses, our review brings to light patterns of influence, participation, and thematic evolution, offering not only a systematic overview but also a critical framework for understanding how gendered concerns are articulated, contested, and institutionalised in digital contexts. Beyond a scholarly cartography, the study positions the field as an intellectual and political battleground where questions of justice, recognition, and epistemic authority are continually negotiated.

This orientation also allows us to point toward underexplored areas and future directions, particularly in light of intensifying debates around gender justice, digital sovereignty, solidarity, and inclusion within global technological infrastructures (Hertweck & Lehner, 2025; Gnambs & Schwaß, 2025). The intersection of ICT and gender has become an increasingly visible site in global development discourse, closely tied to the United Nations' SDGs, and especially to SDG 5, which seeks to "achieve gender equality and empower all women and girls." Here, digital technologies are framed not merely as tools but as transformative infrastructures with the potential to reshape access to education, healthcare, economic life, and political participation (Wayagi et al., 2025; Balsalobre-Lorente et al., 2025). In many contexts where gendered restrictions curtail mobility or visibility, ICTs have opened unprecedented opportunities for amplifying marginalised voices, fostering digital literacy, enabling mobile banking, and sustaining platforms for

advocacy and education (Schurr, Marquardt, & Militz, 2023). The persistence of the digital gender divide—evident in disparities of access, use, design, and representation—reminds us that advances in this field have been uneven and often fragile (Hertweck & Lehner, 2025). For this reason, it becomes important to ask not only how ICT has been imagined as a tool of empowerment, but also how scholarship has grappled with its contradictions, treating the digital sphere as much a site of struggle as of opportunity (Kordzadeh & Ghasemaghaei, 2022).

Looking across the past two decades, research on ICT and gender tells a story that is more than one of simple growth. It charts the ways in which the field has been shaped, and at times redirected, by shifting policy agendas, societal concerns, and scholarly interventions (Hertweck & Lehner, 2025). Tracing publication and citation patterns makes visible how the field has moved from the periphery of academic inquiry into broader recognition, even as its trajectory has been conditioned by regimes of power, funding, and discourse (Shah & Krishnan, 2024). To follow these pathways is to situate the intellectual evolution of ICT and gender within the wider politics of knowledge production—where inclusion, exclusion, and contestation continually shape the boundaries of the field.

## 2. THEORETICAL BACKGROUND

Feminist Technology Studies (FTS) has played a crucial role in unsettling the masculinised narratives that have long framed technological innovation, challenging the assumption that digital infrastructures are neutral or inherently objective (Wajcman, 2004). At its core, FTS argues that technologies are never merely passive tools; rather, they are sociotechnical artefacts, shaped and reshaped within institutional power relations and ideological contexts that frequently sideline feminist and gendered perspectives (Shah & Krishnan, 2024). By insisting on the politics embedded in access, design, and representation, FTS draws attention to the ways ICT can simultaneously reinforce structural inequalities and open possibilities for contestation (Albirini, 2006; Nadim & Fladmoe, 2021). When brought into dialogue with bibliometric inquiry, this perspective prompts us to ask whose theories and frameworks become dominant, whose voices are legitimised, and whose contributions are systematically ignored. whose voices are centred or silenced? and which epistemic contributions shape the knowledge ecology of ICT and gender (Kordzadeh & Ghasemaghaei, 2022; Shah & Krishnan, 2024)? Furthermore, FTS provides a vantage point for tracing how concepts such as algorithmic justice, digital labour, and online safety have emerged and transformed over time (Richterich & Wyatt, 2024).

Alongside FTS, Intersectionality and Global South Feminist Perspectives bring a critical transnational and relational lens to the uneven terrain of ICT and gender research (Balsalobre-Lorente et al., 2025). Intersectionality, coined by Crenshaw (1991), foregrounds how power, gender, race, caste, class, and sexuality intersect to produce differentiated experiences of access and oppression. Postcolonial feminist theorists, by contrast, highlight the colonial residues that continue to structure global knowledge

production, where Euro-American epistemologies often dominate and voices from the Global South are systematically marginalised or instrumentalised (Mohanty, 2003; Akpan et al., 2024). These perspectives are invaluable for bibliometric inquiry, allowing us to trace not only the geography of scholarly production but also the epistemic hierarchies embedded within it (Schurr et al., 2023). They sharpen our capacity to discern whether ICT and gender research has fostered epistemic diversity or merely replicated extractive logics of silencing, particularly in contexts marked by colonial legacies, digital precarity, and techno-solutionism (Carmody, 2025).

Furthermore, FTS, intersectionality, and postcolonial feminist critique provide a critical scaffold for examining both the trajectories and the politics of ICT and gender scholarship. These frameworks allow us to move beyond descriptive mappings toward a reflexive engagement with the structural conditions under which knowledge in this field is authorised, circulated, and contested.

### 3. METHOD

#### 3.1. Data sources:

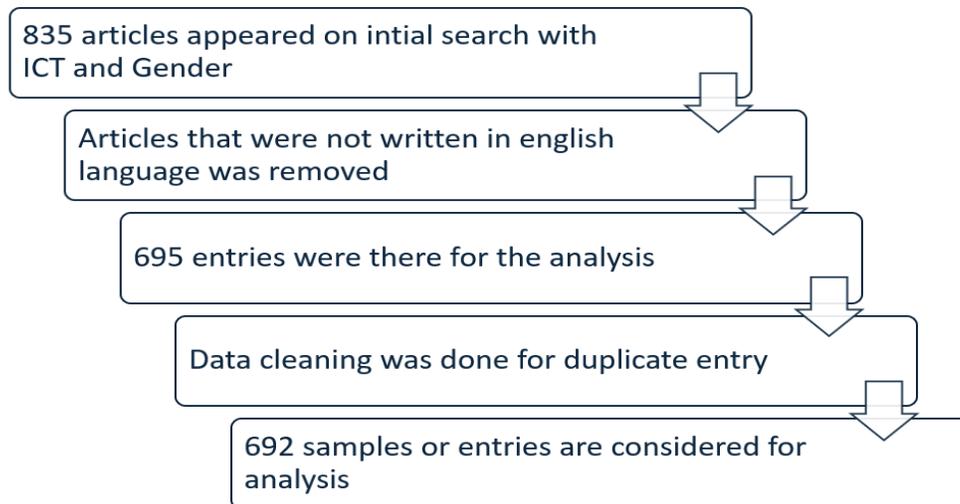
This study employs a bibliometric analysis to systematically examine the publication trends, intellectual structure, and thematic evolution of research at the intersection of information and communication technologies (ICT) and gender. The analysis was designed to identify the emerging trends in this domain and key contributors (journals, authors, countries), and core research themes.

The data were retrieved from the SCOPUS database, one of the most comprehensive bibliographic repositories for peer-reviewed literature, ensuring the reliability and scope of the dataset. The search was conducted using the keywords “ICT” OR “Information and Communication Technologies” AND “Gender”, including variants of these two words (listed in Table 1). The time frame for the analysis was set from 1999 to 2025, capturing the longitudinal development of the field. The following terms were generated by VOSviewer, when the inputs ‘ICT’ and ‘Gender’ were given. The time frame was selected on the basis of first occurrence year of the key word and the last occurrence year of the key words, to cover the complete literature body that is present on the SCOPUS database. Terms that were related to both the keywords were included. However, terms that were related to either one of the keywords were not considered. This was to assess the impact of the terms with respect to the correlation between ICT and gender.

**Table 1: Terms used for Search**

Terms for “ICT”	Information And Communication Technology; Internet; Information Technology; ICTs; ICT Skills
Terms for “Gender”	Gender; Women; Gender Disparity; Gender Differences; Women’s Status; Gender Gap; Gender Equality; Gender Issue; Gender Role; Feminism; Sex Difference; Gender Digital Divide; Gender Bias

To meet quality and relevance standards, only peer-reviewed journal articles written in English were considered. Duplicate records and non-relevant documents were excluded after screening titles and abstracts. 695 entries are saved in the data file as a comma separated values (.csv) for analysis into the software. After performing data cleaning 692 samples or entries are considered for analysis.



**Chart 1: Screening method for the final selection**

### 3.2. Analysis and Visualization of Data:

Bibliometric methodology, which involves quantitative techniques like citation analysis, and keyword analysis, plays a crucial role in systematically examining the research landscape of a given field. In the context of ICT and Gender, its importance lies in the ability to analyze large volumes of bibliometric data to uncover influential contributions, emerging trends, and thematic structures. The growing availability of vast bibliographic datasets supported by platforms like Google Scholar, Web of Science Scopus, and tools such as R, VOSviewer, and Leximancer has significantly enhanced the capacity to conduct such analyses, thereby boosting scholarly interest and engagement. Widely adopted across disciplines such as accounting, operations research, sustainability, economics, and mathematics, bibliometric analysis is now increasingly applied in interdisciplinary domains like ICT and Gender, offering valuable insights for researchers, policymakers, and practitioners alike.

For data analysis we employed Science mapping in Bibliometric analysis and for visualization, the software VOSviewer (version 1.6.20) and Excel were used to construct keyword co-occurrence, citation, and co-citation networks (Science mapping). Bibliometric indicators such as publication counts, total citations, h-index, normalized citations, SNIP, and SJR scores were also analyzed to assess journal and author impact. To address intellectual structure of knowledge base on ICT and Gender, co-citation analysis is performed. As earlier studies suggest, citations act as markers of intellectual

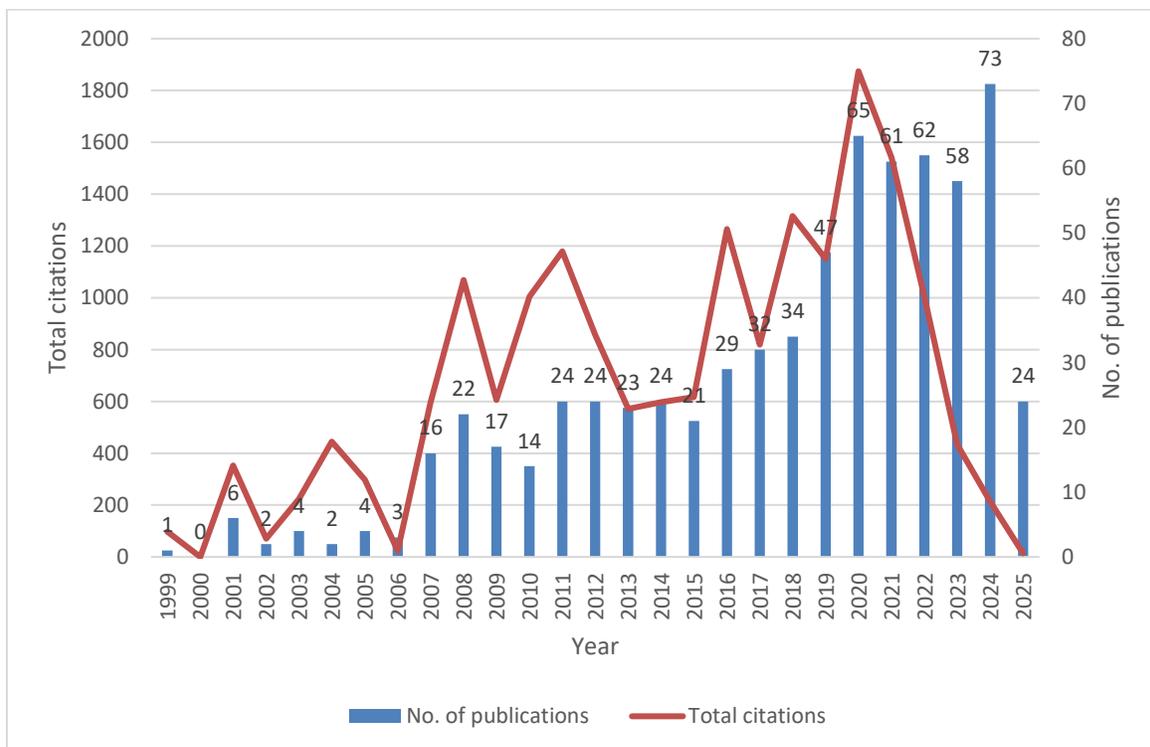
connection across texts, and their frequency often signals the weight or authority of a given contribution within the field (Appio et al., 2014). Examining these patterns therefore provides more than a ranking: it opens a window onto the networks of influence, the circulation of ideas, and the shifting architecture of knowledge production in ICT and gender studies.

## 4. RESULTS AND ANALYSIS

### 4.1 Trends in publications and citations

Examining the number of publications and citations on ICT and gender from 1999 to 2025 (Figure 1) offers important information on the field's development, level of scholarly interest, and influence throughout time. By indicating whether the subject is increasing intellectual significance or exhibiting signs of stagnation, this study aids in tracking the evolution and momentum of research effort. Growing attention from scholars is shown by an increase in publication output, and the work's significance, relevance, and visibility within the larger academic environment are reflected in citation patterns.

This analysis also highlights key milestones, shifts in research priorities, and the response of the field to global technological or policy developments. Overall, it offers valuable insights for researchers, policymakers, and funding bodies to understand the maturity and future potential of the ICT and Gender research domain.



**Figure 1: Trends in citations and publications for "ICT and Gender" from 1999 to 2025**

As depicted in the figure, there is a clear upward trajectory in publication output, particularly after 2007, when the number of documents surpassed five. The number of publications remained relatively low until 2006, with fewer than five documents published annually. However, from 2007 onward, scholarly interest in the intersection of ICT and gender intensified significantly, with the number of publications steadily increasing and peaking at 73 publications in 2024.

The figure also reveals a corresponding trend in citations. Although total citation counts were minimal during the early years, a substantial rise began around 2008. This increase reached its apex in 2020 with nearly 1800 citations, indicating a growing recognition and referencing of work related to ICT and gender. The sharp rise in citations, especially between 2017 and 2021, suggests the emergence of influential papers that significantly shaped scholarly discourse during this period.

While the number of publications slightly declined after 2021, the existing literature continued to garner attention, as seen in the relatively high citation numbers up to 2022. The drop in citation counts after 2023 is likely due to the recency of publications, which typically require time to accumulate citations. Nonetheless, the overall trends demonstrate an expanding body of research on ICT and gender and increasing scholarly engagement with this literature.

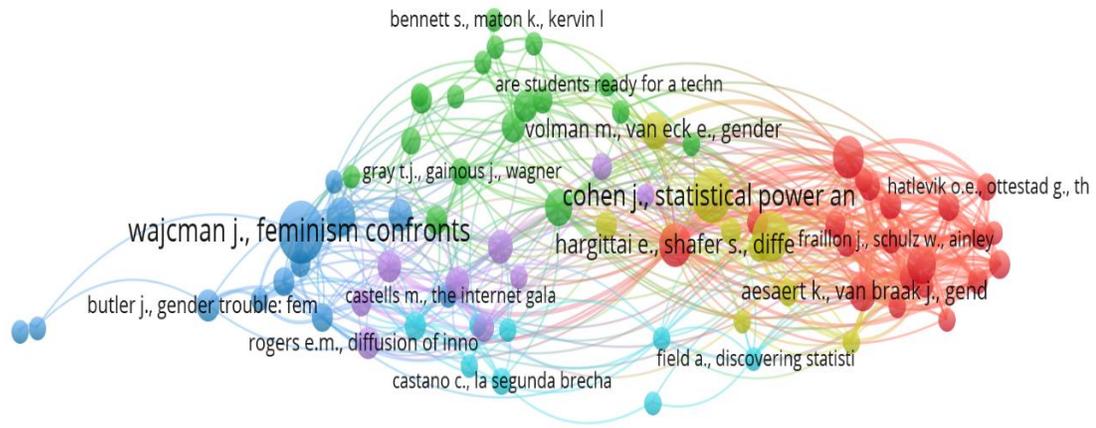
These findings suggest that the topic of ICT and gender has moved from a marginal subject to a more mainstream research domain. The alignment of rising publication and citation trends indicates that researchers not only continue to contribute actively to this area but also increasingly rely on prior studies for theoretical grounding and empirical evidence.

#### **4.2 Intellectual structure of knowledge base on ICT and Gender**

Identifying the intellectual structure is essential because it reveals the core themes, foundational theories, and influential works that have shaped the development of this research field. By uncovering how different studies, authors, and ideas are interconnected typically through techniques like co-citation analysis, we gain insight into the conceptual foundations and scholarly conversations that define the field.

This helps researchers understand the evolution of key debates, recognize the seminal contributions, and locate their own work within the broader academic landscape. Additionally, it highlights dominant schools of thought, interdisciplinary linkages, and emerging subfields, offering a strategic overview for guiding future research and promoting a more cohesive and informed advancement of knowledge in ICT and Gender.

To address this research question, we employed co-citation analysis (using VOSviewer) to create a visual map of references cited within the bibliographies of the documents in our ICT and Gender dataset. As noted by Punnakitikashem and Hallinger (2020), this analysis is instrumental in uncovering the intellectual structure and thematic foundations of a research area.



**Figure 2: Co- citation map [78 met the criterion (a threshold of 5 citations applied)]**

We applied a minimum citation threshold of 5, resulting in 78 cited references being included in the final visualization. These were selected from a much larger pool of referenced items. The resulting co-citation network, presented in Figure 2, illustrates the connections among the selected references, where nodes represent individual documents and edges indicate the frequency of co-citation between them. Higher co-citation counts are signified by larger nodes, while conceptual closeness is reflected by the proximity between nodes.

This network illustrates the intellectual structure of ICT and Gender research, organized into six thematic clusters, each reflecting a specific area of scholarly concentration.

These clusters capture a range of perspectives, from digital inclusion and feminist theory to educational technology, digital competencies, and methodological contributions. This highlights the interdisciplinary nature of this research domain and the evolving dialogue among its key contributors.

Cluster 1 (in red) indicates the “ICT Competencies & Digital Learning Outcomes theme”, includes studies that examine gender differences in digital readiness, and educational performance. The key concepts within this cluster include gendered digital competence in students and teachers, ICT self-efficacy and digital literacy performance, and the adoption of educational technology with its gendered implications. Within this thematic cluster, the most influential contributions come from Hargittai and Shafer (2006), who

explore “Differences in actual and perceived online skills: the role of gender”; Vekiri and Chronaki (2008), investigated “gender issues in technology use: perceived social support, computer self-efficacy and value beliefs, and computer use beyond school”; and Ferrari (2013), whose “DIGCOMP : a framework for developing and understanding digital competence in Europe” provides a comprehensive model for understanding digital competence in educational settings. Together, these works underscore the cluster’s emphasis on applied educational research, revealing how gender influences the development and performance of digital skills in ICT-driven learning environments.

The Gender Digital Divide and Access Inequality theme can be noticed in Cluster 2 (in green), highlighting policy- and society-oriented research that examines gendered disparities in access to ICT, particularly within developing country contexts. The key concepts include socioeconomic determinants of ICT access, policy responses aimed at bridging the gender gap, and broader themes of digital equity and inclusiveness. Within this thematic space, some of the most influential studies include Antonio and Tuffley (2014), who analyze structural factors contributing to the gender digital divide in developing nations; Venkatesh and Davis (2000), whose extension of the Technology Acceptance Model provides a theoretical foundation for understanding gendered patterns of technology adoption; and Hilbert (2011), who critically evaluates statistical claims about ICT as a tool for women’s empowerment. These works exemplify the cluster’s focus on intermediate-level research that moves beyond individual-level analysis to engage with systemic, institutional, and policy-driven factors shaping gendered ICT access and use.

Cluster 3 (in blue) represents the Feminist Theories, Techno-feminism, and the Socio-Structural Dimensions of ICT theme, capturing critical and theoretical perspectives on the intersection of gender, technology, and power structures. This cluster includes key concepts such as gendered constructions of technology, feminist critiques of technological development, and the role of identity in digital engagement. It reflects foundational and theory-driven research that explores how technology is not just a neutral tool, but a sociotechnical construct influenced by historical and gendered power dynamics.

Within this cluster, Wajcman (1991), in “Feminism confronts technology”, provides a groundbreaking analysis of how technological systems are shaped by male-dominated institutions, a theme she further develops in “Technofeminism” (2004). Butler’s (1990) “Gender trouble: feminism and the subversion of identity” introduces the idea of gender as performative, deeply influencing later feminist technology studies. Similarly, Castells (1996), through “The rise of the network society”, situates the internet and digital transformation within broader socio-economic shifts, while Faulkner (2001) in “the technology question in feminism: a view from feminist technology studies, women’s studies international forum” and Cockburn & Ormrod (1993) in “Gender and technology in the making” contribute feminist critiques that challenge the assumed neutrality of technological design and adoption. Collectively, these works anchor Cluster 3’s emphasis on structural critique, social theory, and feminist epistemology in the analysis of ICT,

offering a deep understanding of how technology intersects with gender, identity, and power.

Cluster 4 (in gold) focuses on the theme of Psychosocial Dimensions of ICT Use and Digital Skill Development, highlighting individual-level factors that influence digital engagement and performance. The key concepts in this cluster include self-efficacy in digital contexts, motivation and attitudes toward ICT, psychometric and behavioral measurements, and gendered experiences in using technology. This cluster consists of empirical and foundational research that looks at the intersections between behavioural and psychological factors and ICT use, frequently as seen through the prism of social or educational outcomes. Bandura (1997) is one of the most influential authors in this cluster; most of the research on people's confidence and ability to navigate digital settings is based on his book "Self-efficacy: the exercise of control". Bandura's earlier work (1986) on "Social foundations of thought and action: a social cognitive theory" complements this, providing a more comprehensive framework for comprehending how environmental and personal influences impact behaviour. Both Nunnally (1978) in "Psychometric theory" and Cohen (1988) in "Statistical power analysis for the behavioural sciences" provide important methodological underpinnings in behavioural and psychometric analysis, which are frequently employed in research pertaining to ICT and digital literacy. Other important contributions include Cooper (2006), who addresses gender-specific aspects of the digital divide in "The digital divide: the special case of gender, journal of computer assisted learning", and Zhong (2011) in "From access to usage: the divide of self-reported digital skills among adolescents, computers & education", who explores the gap between access and actual usage skills among adolescents. Collectively, these works establish a comprehensive view of how psychological constructs such as self-efficacy, attitudes, and cognitive perception shape ICT adoption and performance, especially in relation to gender differences and digital equity.

Cluster 5 (in purple) represents the theme of Foundational ICT Access and Communication Models, offering the historical and conceptual grounding for how issues of digital access have been understood and theorized over time. This cluster is particularly relevant to gender-based analysis, as it sets the stage for how access disparities—both structural and social—are framed in the broader discourse. Central concepts within this theme include the diffusion of innovation, the conceptual framing of the digital divide, and the identification of access barriers and policy frameworks that shape ICT use across populations.

Within this thematic context, seminal works such as Warschauer (2003) in *Technology and Social Inclusion* provide a critical reevaluation of access, shifting the focus from mere connectivity to meaningful integration of ICT in users' social and educational lives. In "Digital divide: civic engagement, information poverty, and the internet worldwide", Norris (2001) examines global trends in information inequality and civic participation and emphasises how digital divisions interact with political and economic systems around the world. In the meantime, Rogers' "Diffusion of Innovations" (1995, 2003) provides a theoretical framework for comprehending how new technologies proliferate in societies

and the reasons why some groups, such as women and marginalised communities, frequently lag behind in terms of adoption. When taken as a whole, these studies offer a conceptual framework for comprehending gendered digital disparities, emphasising the significance of inclusive strategies and laws that go beyond simple access to guarantee significant engagement in the digital sphere.

Cluster 6 (in light blue) reflects the theme of Critical Reflections on Gender, Methodology, and the Second-Level Digital Divide, focusing on how gendered patterns of ICT use and access are measured, interpreted, and situated within broader educational and societal contexts. This theme emphasizes key concepts such as the second-level digital divide (differences in ICT skills and meaningful use rather than basic access), critical measurement and methodological approaches, and the sociocultural framing of gender and technology.

Bimber (2000), whose work “Measuring the Gender Gap on the Internet” offers an empirical basis for comprehending the enduring gender disparity in digital contexts, is at the centre of this cluster. Kennedy, Wellman, and Klement (2003) explore the social and cultural aspects of “Gendering the digital divide”, emphasising the ways in which inequality is perpetuated in virtual environments. Castano (2008) presents the idea of the “second digital divide,” which goes beyond access to look at the qualitative elements of ICT use including engagement and competence. Simultaneously, Selwyn (2004) challenges the simplistic political narratives around the digital divide and advocates for a more complex, context-driven understanding in “reconsidering political and popular understandings of the digital divide”. Methodologically, publications like Field (2009) in “Discovering statistics using SPSS” offer recommendations for statistical and instructional research methodologies that facilitate thorough ICT studies with a gender focus. The research in this cluster provide a thoughtful, fact-based strategy for investigating gender differences in ICT, emphasising the value of both methodological soundness and sociocultural awareness in directing initiatives for digital inclusion.

Together, the six clusters create a cohesive, multidisciplinary framework that expands on our knowledge of gender and ICT. Individual and educational aspects are the emphasis of Clusters 1, 4, and 6. Cluster 1 deals with gendered digital competencies, Cluster 4 investigates psychological aspects such as motivation and self-efficacy, and Cluster 6 stresses methodological rigour in assessing gendered ICT use. Clusters 2 and 5, which provide macro-level viewpoints, support these: Cluster 5 offers fundamental theories including early digital divide models and diffusion of innovations, whereas Cluster 2 concentrates on access disparity and policy solutions, particularly in poor nations. Cluster 3 acts as a critical-theoretical anchor, offering feminist critiques of technology and challenging gender-neutral assumptions in the frameworks and methodologies of the other clusters. Together, these clusters evolve from conceptual foundations (Clusters 3 and 5) to systemic interventions (Clusters 2 and 6) and practical, individual-level implications (Clusters 1 and 4), forming a comprehensive structure that links theory, policy, empirical evidence, and critique to holistically address gender disparities in ICT.

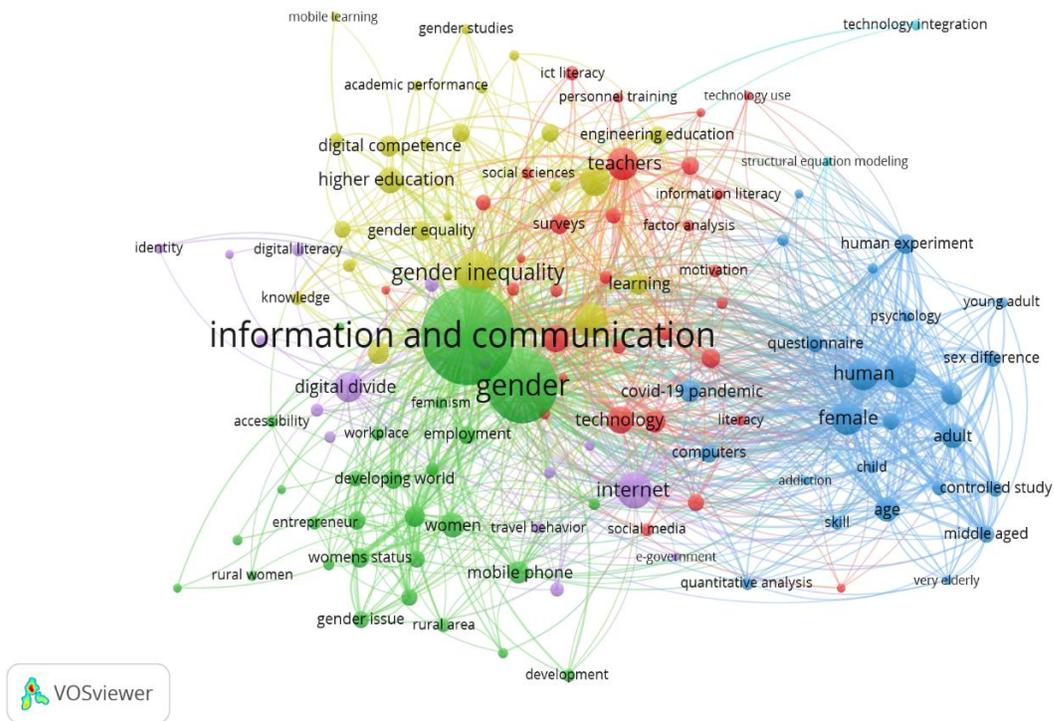
### 4.3 Trending topics

Keyword co-occurrence analysis is a powerful bibliometric technique used to uncover and visualize the relationships between research topics by analyzing how often specific keywords appear together across a set of publications. This method enables researchers to highlight emerging areas of interest and identify central themes within literature. To address the final research question, we conducted a keyword co-occurrence analysis using VOS viewer, employing an overlay visualization. A thesaurus file was utilized during the analysis to standardize terms with different spellings under a single keyword. Furthermore, certain terms were excluded to produce a more conceptually meaningful keyword map. A threshold of 5 co-occurrences is applied and 124 keywords met that criterion and 6 clusters or themes have emerged is shown in Table 1.

**Table 1: List of all keywords (cluster wise):**

Clusters	Items
1 (Red)	Attitude, communication, communication technologies, digital inequality, e-learning, economic and social effects, educational technology, factor analysis, ICT literacy, ICT self-efficacy, ICT skills, information literacy, information technology, information use, literacy, motivation, personnel training, population statistics, regression analysis, research, self-efficacy, social media, social networking (online), social sciences, social support, surveys, teacher education, teachers, technology, technology use, university students.
2 (Green)	Accessibility, decision making, developing world, development, digital inclusion, employment, empowerment, entrepreneur, entrepreneurship, feminism, gender, gender issue, gender relations, gender role, information and communication technologies, labor market, mobile communication, mobile phone, rural area, rural development, rural women, technological development, technology adoption, women, women empowerment, women's employment, women's status, workplace.
3 (Blue)	Addiction, adolescence, adult, age, behavioral research, child, computers, controlled study, COVID-19 pandemic, female, human, human experiment, major clinical study, male, middle aged, psychology, quantitative analysis, questionnaire, school, self-concept, sex difference, sex factors, skill, very elderly, young adult.
4 (Gold)	Academic performance, artificial intelligence, digital competence, education, engineering education, gender equality, gender inequality, gender studies, higher education, inclusion, knowledge, learning, mobile learning, perception, primary education, professional aspects, secondary education, STEM, students, sustainable development, teacher training, training, university.
5 (Purple)	Comparative study, digital divide, digital literacy, digital skills, digitization, e-government, gender digital divide, identity, inequality, innovation, internet, social networks, socioeconomic status, travel behavior, young people.
6 (Sky blue)	structural equation modeling, Technology integration

Network visualization is generated by VOSviewer software (Figure-3) by employing keyword co-occurrence analysis. From the figure it is decoded that the most repeatedly occurred keywords are Information and communication technology (473), gender (271) from cluster 2; gender inequality (90), education (57) from cluster 4; internet (66), digital divide (46) from cluster 5; female (56) from cluster 3; teachers (52), technology (40) from cluster 1.



**Figure 3: Co-occurrence analysis (all keywords)**

The keyword co-occurrence analysis reveals that trending topics in the ICT and gender research domain span across six thematic clusters. Key areas include ICT literacy, digital skills, educational technology, and teacher training, reflecting strong interest in ICT integration in education. Another major focus lies in gender inequality, women’s empowerment, employment, and rural development, highlighting the role of ICT in promoting inclusion and equity.

**4.4: Influential (top 15) journals, authors, and countries:**

Understanding which sources and contributors shape the field is central to grasping the dynamics of research on ICT and gender. By mapping the top fifteen authors, journals, and countries, one can begin to see the intellectual and institutional engines that drive knowledge production and dissemination in this area.

Such an analysis not only highlights centres of academic excellence and collaboration but also reveals preferred publishing outlets and the distinctive regional patterns that underpin global scholarship.

These insights are more than descriptive: they provide a roadmap for how the field has taken shape, where it is heading, and how future work might foster stronger international linkages. In doing so, they help to chart ICT and gender studies as both a growing academic domain and a collaborative endeavour that thrives on cross-border exchange.

#### 4.4.1 Top 15 journals

To ensure a nuanced evaluation of journal prominence, additional bibliometric indicators were considered, including the h-index, SNIP, SJR, and Scopus quartile rankings (Tables 2 and 3). The h-index offers a measure of consistent influence by weighing both productivity and citation uptake, while SNIP (Source Normalised Impact per Paper) accounts for disciplinary differences, thereby allowing comparisons across diverse fields. The SJR (SCImago Journal Rank) builds further depth by incorporating the prestige of citing journals, foregrounding not just frequency of citation but the scholarly weight of those references. Finally, Scopus quartiles (Q1–Q4) classify journals according to their standing within subject categories, with Q1 journals signalling the highest impact. When read together, these measures provide a layered picture of quality, reach, and relevance. Such an integrative approach makes it possible to discern the most significant journals for ICT and gender scholarship, guiding both bibliometric mapping and subsequent thematic analyses. Sustainability (Switzerland) leads the list with an impressive 207 citations and 26 publications. Its SCOPUS Q1 ranking and respectable SNIP (1.113) show its relevance in sustainability and technology-driven social research, making it a key outlet for ICT and gender intersection studies. Computers and Education, with 19 articles and the highest citation count (2088), reflects its deep engagement in the field. It's very high SJR (3.343) and h-index (253) make it a cornerstone journal for studies exploring digital learning and ICT impacts on education across gender lines. High-impact journals like Computers and Education, Sustainability and Telecommunications Policy not only publish the most but also attract the highest citations, underscoring their influence in shaping the discourse. The minimum threshold is 5 documents and 19 met the criterion. Out of which top 15 are listed in the following Table 2:

**Table 2: Top 15 journals (based on number of published articles)**

Based on published articles (minimum 5 and above)					
Sl. No.	Journal Name	Published articles	h-index	SNIP	SJR and SCOPUS-Quartile
1.	Sustainability (Switzerland)	26	207	1.113	0.688, Q1
2.	Computers and Education	19	<b>253</b>	4.176	3.343, Q1
3.	Education and Information Technologies	18	<b>97</b>	2.689	1.654, Q1
4.	Gender, Technology and Development	15	<b>35</b>	0.939	0.483, Q2
5.	Telecommunications Policy	12	93	2.201	1.728, Q1
6.	Computers In Human Behavior	11	275	3.354	2.923, Q1
7.	PLoS One	9	461	1.065	0.803, Q1
8.	Education Sciences	8	68	1.411	0.73, Q1
9.	Library Philosophy and Practice	8	29	0.244	0, Q3
10.	New Media and Society	7	160	3.317	2.4, Q1
11.	Frontiers in Psychology	6	212	1.213	0.872, Q2
12.	Gender, Work and Organization	6	101	2.347	2.539, Q1
13.	Information Technology for Development	6	59	2.096	1.439, Q1
14.	Cogent Education	5	42	1.234	0.602, Q2
15.	Development in Practice	5	57	0.561	0.366, Q2

Source: Author's calculations by VOSviewer

**Table 3: Top 15 journals (based on number of citations)**

Based on citations					
Sl.No	Journal name	Total citations	h-index	SNIP	SJR and SCOPUS-Quartile
1.	Computers and education	2088	253	4.176	3.343, Q1
2.	Sustainability (switzerland)	793	207	1.113	0.688, Q1
3.	Telecommunications Policy	604	93	2.201	1.728, Q1
4.	Computers in human behavior	583	275	3.354	2.923, Q1
5.	New media and society	503	160	3.317	2.4, Q1
6.	Education and information technologies	400	97	2.689	1.654, Q1
7.	Technological forecasting and social change	269	209	3.255	3.472, Q1
8.	Development in practice	208	57	0.561	0.366, Q2
9.	Gender, technology and development	207	35	0.939	0.483, Q2
10.	Gender, work and organization	194	101	2.347	2.539, Q1
11.	Education sciences	172	68	1.411	0.73, Q1
12.	Information communication and society	166	125	2.718	2.026, Q1
13.	Eurasia journal of mathematics, science and technology education	102	63	1.187	0.554, Q2
14.	Information technology for development	82	59	2.096	1.439, Q1
15.	PLoS One	62	461	1.065	0.803, Q1

Source: Author's calculations by VOSviewer

#### 4.4.2 Top 15 globally cited authors

Including both total citation count and normalized citations in the analysis of globally cited authors ensures a more accurate and equitable assessment of an author's impact across different publication years and disciplines. Total citations measure the overall influence of an author's work by counting how often their publications have been cited. However, this metric can be biased by factors such as the age of publications (older works naturally accumulate more citations over time) and varying citation behaviors across research fields. Normalized citations correct for these differences by accounting for the average number of citations received by publications in the same field and year, offering a field- and time-adjusted indicator of influence. This enables fairer comparisons across authors who publish in diverse areas or periods.

**Table 4: Contributing authors (3 or above)**

Sl.No	Authors	Mentioned gender	Affiliated country	Geographical site of work	Total citations	Normalized citations
1.	Tondeur, Jo	Male	Belgium	Global North	796	13.36
2.	Scherer, Ronny	Male	Norway	Global North	559	29.51
3.	Sáinz, Milagros	Female	Spain	Global North	306	7.09
4.	Guillén-Gámez, Francisco D.	Male	Spain	Global North	303	14.93

5.	Asongu, Simplicie A.	Male	South Africa	Global South	302	8.47
6.	Volman, Monique	Male	Netherlands	Global North	272	5.15
7.	Hatlevik, Ove E.	Male	Norway	Global North	214	6.30
8.	Odhiambo, Nicholas M.	Male	South Africa	Global South	182	7.59
9.	Lau, Wilfred W.F.	Male	Hong Kong (China)	Global North	132	4.74
10.	Yuen, Allan H.K.	Male	Hong Kong (China)	Global North	132	4.74
11.	Meneses, Eloy López	Male	Spain	Global North	128	4.73
12.	Chib, Arul	Male	Netherlands	Global South (Indonesia)	98	2.57
13.	Richardson, Helen	Female	United Kingdom	Global North	89	2.03
14.	Fernández-Batanero, José María	Male	Spain	Global North	86	3.95
15.	Raman, Arumugam	Male	Malasia	Global South	64	2.58

Source: Author's calculations by VOSviewer

Data source: Gender of the researcher is sourced from LinkedIn and author's Homepages. The fact that there are only two female scholars from the Global North and four male scholars from the Global South among the top 15 writers says a lot about the profound structural imbalances that control the creation of knowledge in gender studies and ICT. Women continue to be remarkably under-represented in forming the scholarly canon of the area, despite being the key subjects and stakeholders of "ICT and gender" research. This is a reflection of the gendered exclusions within academia itself. Their lack of presence indicates that the "voice of woman" is not only marginal but also routinely excluded from the status of authoritative knowledge. The fact that a greater proportion of authorship positions are held by men, particularly in the Global South, highlights how the epistemic terrain perpetuates androcentric hierarchies even in a field that is purportedly dedicated to gender equity.

This power dynamic is further complicated at a higher level by the location of authorship. Whereas male authorship predominates in the Global South, female writing is most noticeable in the Global North. This implies that when women are successful in gaining epistemic power, it is frequently in Northern institutions that may have more financial, linguistic, and infrastructure resources, which may allow their voices to be heard around the world. Gender and geopolitics, on the other hand, present a double bind for women in the Global South, as institutional obstacles limit their capacity to participate in international discourse. In the meantime, male academics from the South might have frequently taken use of patriarchal privileges in their local contexts to break into the field,

despite the fact that they were also marginalised within the larger global epistemic system.

Critically, this distribution suggests that the “voice of woman” in ICT and gender remains conditional and precarious: it is legitimized only within the power-laden structures of the North, while being silenced or rendered invisible in the South. This perpetuates what Spivak (1988) calls epistemic violence—where marginalized women (particularly in the Global South) are not merely unheard but actively excluded from producing the very knowledge that governs their lives and technological futures. In other words, the discourse of ICT and gender risks becoming a disciplinary regime that speaks about women but rarely allows women, especially from the South, to speak for themselves.

#### 4.4.3 Top 15 most cited countries

The table presents the top 15 most cited countries based on publications that met the minimum threshold of 15 documents. It provides insights into both the total research impact (total citations) and average impact per article (average citations), helping to identify not just prolific countries, but also those producing high-quality and influential work in the field.

**Table 5: Contributing countries (15 and above)**

Sl.No	Country name	Total citations	Average citations
1.	United states	3259	39.27
2.	Spain	2992	25.57
3.	United Kingdom	1972	37.92
4.	Belgium	1514	94.63
5.	Netherlands	1353	64.43
6.	Norway	1230	61.50
7.	South Africa	711	18.71
8.	China	660	34.74
9.	Germany	651	20.34
10.	Canada	607	26.39
11.	Australia	575	27.38
12.	Nigeria	555	25.23
13.	India	477	14.91
14.	Turkey	449	18.71
15.	Sweden	401	20.05

Source: Author’s calculations by VOSviewer

United States leads in total citations (3,259) and maintains a strong average citation rate (39.27), confirming its dominant position in global ICT and gender-related research. Spain follows closely with 2,992 total citations, showing high productivity, although its average citation rate (25.57) is relatively moderate. Belgium stands out with the highest average citations per document (94.63) despite having fewer total citations than the U.S. or Spain, indicating extremely high-impact research contributions. Netherlands (64.43), Norway (61.50), and United Kingdom (37.92) also demonstrate strong average citation values, suggesting these countries produce consistently well-cited, high-quality research.

Emerging contributors like China (34.74) and India (14.91) reflect growing interest and engagement in the ICT and gender domain, although their average citations are lower compared to Western counterparts. Countries like South Africa, Nigeria, and Turkey, despite fewer total citations, meet the inclusion threshold and show promising regional representation in the field.

This analysis highlights both geographic diversity and citation strength in the field. While countries like the U.S. and Spain dominate in volume, others like Belgium and the Netherlands are leading in per-document influence. This suggests that research impact is not only driven by volume of output, but also by the relevance and depth of the research. The presence of developing countries indicates a broadening global discourse on ICT and gender issues.

## 5. DISCUSSION AND CONCLUSION

The trend of publications and citations shows the rise of ICT and gender research over time, which not only shows growing academic engagement but also the unequal power dynamics influencing knowledge generation. Global policy pushes on digital inclusion and education coincided with the spike after 2007, indicating that scholarship frequently responds to developmentalist goals rather than naturally emerging from local epistemic requirements (Shah & Krishnan, 2024). Few influential works solidify discursive authority, generating a regime of truth that determines which narratives obtain legitimacy, as evidenced by the citation peaks between 2017 and 2021. However, the proportionate drop in new publications after 2021 suggests that some thematic clusters may have reached saturation as well as possible epistemic fatigue, where technocratic solutions predominate and structural critiques are marginalised (Niumai, 2025).

Further analysis reveals a fragmented yet hierarchically ordered knowledge structure, shaped simultaneously by thematic clustering, journal hierarchies, and uneven authorship geographies. The dominance of education-related clusters, digital literacy, teacher training, and STEM competence, indicates that ICT and gender research is still tethered to developmentalist frameworks, where women are positioned as beneficiaries of digital inclusion rather than epistemic producers of technological futures (Bello et. Al., 2024). High-impact journals not only channel the discourse but enhances the dominant voices by privileging certain vocabularies of empowerment, competence, and equity while marginalizing critiques of structural patriarchy and postcolonial exclusions (Santos, & Areepattamannil, 2023).

The concentration of citations in Global North institutions and journals illustrates how academic legitimacy flows through circuits of epistemic capital, consolidating authority in select sites while relegating Southern contributions to peripheral recognition (Eacersall et. Al., 2024). The sharp gendered imbalance among influential authors, where women remain scarce and predominantly Northern, underscores a persistent epistemic violence that conditions women's voices within ICT and gender to institutional privilege rather than lived proximity to the problem (Bayar, et. Al., 2024).

Thus, our bibliometric finding demonstrates that ICT and gender studies are not a neutral academic field but a contested site of power where global academic hierarchies, gendered exclusions, and postcolonial inequalities converge (Rajasekhar, 2024). The scarcity of female authors reflects not only an absence of representation but a deeper silencing, where women's experiences, particularly from the South, remain mediated, translated, or overwritten by male-dominated narratives (Agaya, 2025). What our analysis reveals is more than just a cartographic detailing of who produces research—it's a map of power. The digital divide reflects an academic divide, where discussions about ICT and gender are still dominated by those (the masculine gender) least affected by its deepest inequalities (Shah & Krishnan, 2024). The task, then, is not only to note this absence but to recognize it as a symptom of broader structural inequities in knowledge production that demand deliberate corrective interventions—through decolonial citation practices, feminist epistemologies, and structural support for women in the Global South.

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