International Journal of Ethnoscience and Technology in Education (IJETE)
https://e-journal.undikma.ac.id/index.php/ijete/index

March 2026 Vol. 3, No. 1
pp. 67-88

Who Produces Knowledge on Inclusive Education and Technology in Africa? A Bibliometric Mapping of Research Trends, Themes, and Collaboration

Aniku Ahmed Mohammed Moyini[1]*, Salih Mohamed Harun[2], Ali K Anami[3], Miiro Farooq[4], Stella Migide Madete[5]

[1] Departmentof Internal Audit, Islamic University in Uganda, Mbale, UGANDA
[2] College of Community Studies and Rural Development, University of Juba, Juba City, SOUTH SUDAN
[3] Faculty of Arts and Humanities, Muslim University of Morogoro, Morogoro, TANZANIA
[4] Centre for Wisdom Pedagogy, Makerere University, Kampala, UGANDA
[5] Umma University, Kajiado, KENYA

*Corresponding author e-mail: anikuahmed@iuiu.ac.ug

Article Info

Article History
Received: February 2026
Revised: February 2026
Published: March 2026

Keywords
Inclusive education;
Educational technology;
Africa;
Knowledge production;
Bibliometric analysis

10.33394/ijete.v3i1.19652

Abstract

This study examines who produces knowledge on inclusive education and technology in Africa and how that knowledge is organised in indexed scholarship. Records were exported from Scopus on 7 February 2026 and filtered to publications from 2021 to 2025, yielding a final corpus of 157 documents. A bibliometric design was applied to conduct performance analysis (publication trends, source productivity, and citation patterns) and science mapping (country collaboration networks, temporal overlays, and keyword-based conceptual structures). Results show rising publication output, but the wide dispersion of journals and loosely connected keyword clusters indicate parallel development rather than a consolidated conceptual core. Knowledge production is unevenly distributed, with South Africa leading affiliation occurrences, signalling selective visibility within indexed literature. Citation patterns are highly skewed, with a small set of anchor papers shaping debates on accessibility, digital inequality, and online learning. International collaboration is more established than intra-African collaboration, which appears thinner and less dense, and major collaborative ties remain largely stable between 2021–2023 and 2024–2025. Thematic evolution suggests movement from pandemic-era exclusion concerns toward post-crisis digital governance and emerging topics such as artificial intelligence and generative tools.

How to Cite: Moyini, A. A. M., Harun, S. M., Anami, A. K., Farooq, M., & Madete, S. M. (2026). Who Produces Knowledge on Inclusive Education and Technology in Africa? A Bibliometric Mapping of Research Trends, Themes, and Collaboration. *International Journal of Ethnoscience and Technology in Education*, *3*(1), 67–88. https://doi.org/10.33394/ijete.v3i1.19652

INTRODUCTION

Inclusive education is a core principle in the global education agenda, grounded in the right of every individual to access quality education without discrimination. In practice,

inclusive education extends beyond the physical placement of learners with disabilities in mainstream classrooms. It also concerns how education systems respond to learner diversity through policy, curriculum, pedagogy, and appropriate technological support. In Africa, inclusive education is pursued within complex social, economic, and structural conditions, including limited resources, uneven infrastructure, and substantial variation in national education policies (Simelane-Mnisi & Mthimunye, 2025; Ugwuoke et al., 2025).

Over recent decades, technology has increasingly been positioned as a potential enabler of inclusive education. Educational technology, including information and communication technologies, digital learning environments, and assistive technologies, is often expected to broaden access, support differentiated instruction, and strengthen participation for learners with diverse needs. Several studies emphasise its potential to narrow educational access gaps, particularly in African contexts (Machaka & Singh-Pillay, 2025; Ugwuoke et al., 2025). However, optimism about technology does not always align with implementation realities. Without context-sensitive planning and sustained support, technology can reproduce or widen digital divides and reinforce social exclusion, especially when participation depends on unequal connectivity, devices, and digital resources (Kafile et al., 2025; Woldegiorgis, 2022).

The expanding literature indicates that technology-enabled inclusive education in Africa is commonly discussed through structural conditions such as digital literacy, teacher readiness, and education policy. Research on educator competence, for example, suggests that inclusive technology integration depends not only on access to devices but also on educators' pedagogical knowledge and professional commitments to inclusion and social justice (Simelane-Mnisi & Mthimunye, 2025). In parallel, studies in vocational and higher education highlight how technology may support underrepresented groups, including women and students with special needs, within systems that have historically been exclusionary (Machaka & Singh-Pillay, 2025). Evidence from higher education also shows that inclusion is sustained through support ecosystems and institutional services, not simply through platform availability (Mireku et al., 2024).

Despite these contributions, the literature on inclusive education and technology in Africa remains fragmented. Some studies frame technology primarily as a technical response to access barriers, whereas others locate it within more critical perspectives that emphasise social justice, structural inequality, and power relations in education systems (Ugwuoke et al., 2025). This fragmentation may reflect differences in disciplinary backgrounds, institutional settings, and theoretical orientations. It is also reinforced by the fact that work on digital inequality and participation often develops in parallel with disability-focused accessibility scholarship, even when both address exclusion (Woldegiorgis, 2022; Zongozzi, 2022).

Questions of knowledge production are especially salient in African education research. Scholars have noted that research in Africa can be influenced by agendas, conceptual frameworks, and funding priorities that do not necessarily originate from local educational realities (Ugwuoke et al., 2025). In technology-enabled inclusive education, this concern is

heightened because technologies are often promoted as universal solutions, while their effectiveness and sustainability depend strongly on local social, cultural, and economic conditions (Simelane-Mnisi & Mthimunye, 2025). The persistence of the digital divide in higher education participation illustrates how structural conditions can shape who benefits from innovation and who remains excluded (Kafile et al., 2025; Woldegiorgis, 2022).

Within the existing corpus, several studies explicitly connect inclusive education to broader development agendas, including sustainable development, educational innovation, and digital transformation. This orientation is evident in work linking technology integration to the Sustainable Development Goals and to improved education quality in Sub-Saharan Africa (Ugwuoke et al., 2025). Other contributions situate inclusive education within national policy frameworks and higher education reform, emphasising institutional capacity and governance arrangements (Machaka & Singh-Pillay, 2025). Related research on curriculum delivery and emerging technologies in rural university contexts further suggests that institutional readiness and innovation diffusion dynamics influence how technology-mediated reforms unfold in practice (Ajani et al., 2025).

At the thematic level, technology-enabled inclusive education is frequently discussed in relation to specific domains such as higher education, STEM, digital literacy, and access inequalities. The strong focus on higher education reflects universities' roles as sites of knowledge production and educational innovation in Africa (Machaka & Singh-Pillay, 2025). However, this emphasis may also limit visibility into inclusion challenges at primary and secondary levels, which are foundational for building sustainable inclusive systems. For instance, evidence from basic education during COVID-19 shows that the adoption of education technologies can be uneven and context-dependent, shaping participation patterns early in the education pipeline (Ochieng' & Ngware, 2023).

To date, much of the research on inclusive education and technology in Africa has taken the form of case studies, small-scale empirical work, or conceptual discussions. These approaches are valuable for understanding specific contexts, but they offer limited insight into how the field is developing as a broader knowledge ecosystem. This is where bibliometric analysis becomes relevant. The purpose is not to assess the effectiveness of inclusive education interventions, but to map the landscape of knowledge production by identifying key actors, collaboration patterns, publication outlets, and the structure and evolution of research themes, particularly in a post-pandemic landscape where exclusion dynamics became more visible (Ngubane-Mokiwa & Zongozzi, 2021; Woldegiorgis, 2022).

Beyond documenting publication growth and thematic dispersion, it is important to interrogate how far the indexed scholarship reflects the diverse structural realities of African education systems. Research on digital inequality and participation in higher education demonstrates that infrastructural capacity, socioeconomic conditions, and institutional readiness significantly shape who benefits from technology-mediated learning (Woldegiorgis, 2022; Kafile et al., 2025). Similarly, studies focusing on accessibility in open and distance learning institutions show that inclusive digital environments depend not only on

technological availability but also on institutional systems and disability support frameworks (Ngubane-Mokiwa & Zongozzi, 2021; Zongozzi, 2022). These findings suggest that technology-enabled inclusion in Africa is deeply mediated by contextual constraints rather than operating as a neutral or universally transferable model. Bibliometric mapping therefore becomes relevant not merely as a descriptive tool, but as a means of examining whether the most visible and cited scholarship adequately represents the diversity of African educational conditions or primarily reflects contexts with stronger research infrastructure.

Against this background, the present study asks a central question: Who produces knowledge on inclusive education and technology in Africa? This question approaches knowledge production as a social and academic process involving authors, institutions, collaboration networks, and research agendas. Using Scopus as the data source and bibliometric approaches as the analytical strategy, the study aims to map research trends, thematic structures, and collaboration patterns shaping the discourse on technology-enabled inclusive education in Africa as represented in internationally indexed scholarship. This framing is also timely because new conversations about artificial intelligence and generative tools are entering higher education debates and may reconfigure what becomes visible as "innovation" and for whom (du Plessis & Bayeck, 2025; Tarisayi, 2024).

By focusing on knowledge production, this study does not seek to replace empirical studies of inclusive education practice. Instead, it complements them by offering a macro-level and reflective perspective. Bibliometric mapping is expected to provide an analytical basis for more critical discussion about future research directions, including strengthening intra-African collaboration, developing more integrated conceptual frameworks, and ensuring that research on technology and inclusion remains responsive to educational contexts and needs across Africa (Simelane-Mnisi & Mthimunye, 2025; Ugwuoke et al., 2025). This is especially important in areas where accessibility and disability inclusion require sustained attention to design and institutional systems, rather than being treated as secondary to technology adoption (Magedi et al., 2023; Zongozzi, 2022).

METHODS

Study Design

This study adopts a bibliometric research design to systematically map the production and structure of scholarly knowledge on inclusive education and the use of technology in the African context. Bibliometric analysis was selected because it enables quantitative and relational examination of large bodies of academic literature through publication metadata, allowing researchers to identify patterns of productivity, collaboration, influence, and thematic development within a research field. Rather than evaluating the effectiveness of inclusive education practices, this study focuses on how knowledge in this domain is produced, disseminated, and structured within indexed academic communication.

The bibliometric approach employed in this study is descriptive and mapping-oriented. It is designed to reveal trends in publication output, dominant sources and contributors, citation-based influence, collaboration networks, and conceptual structures derived from

keywords. Consequently, the findings are interpreted as representations of scholarly communication patterns rather than as indicators of policy success or educational outcomes. The analysis concentrates on publications from 2021 to 2025, a period selected to capture recent developments and evolving research interests in technology-mediated inclusive education, particularly in response to rapid digital transformation in education.

Data Source and Search Strategy

The bibliographic data were retrieved from Scopus, chosen for its extensive coverage of peer-reviewed journals across education, social sciences, technology, and interdisciplinary research areas, as well as for the completeness of its metadata fields relevant to bibliometric analysis. Data extraction was conducted on 7 February 2026 using the Scopus export function, and records were downloaded in CSV format to facilitate data processing and reproducibility.

The search strategy was developed to reflect three conceptual pillars central to this study: inclusive education, technology, and Africa. Searches were conducted within the TITLE-ABS-KEY fields to ensure conceptual relevance while avoiding excessive restriction. Boolean operators were used to combine the following components:

- Inclusion-related terms, such as *"inclusive education"*, *inclusion*, and *inclusive*, capturing literature on educational inclusion and disability-related education;
- Technology-related terms, including *technology*, *ICT*, *educational technology*, *assistive technology*, *digital learning*, *e-learning*, and *mobile learning*, representing various forms of technology integration in education;
- Contextual identifiers, specifically *Africa* or *African*, to delimit the geographical scope.

This strategy intentionally prioritised inclusivity as the core thematic anchor to prevent the dataset from being dominated by general educational technology studies lacking an inclusion focus. At the same time, the authors acknowledge that some country-specific African studies may not explicitly reference "Africa" in searchable metadata, a limitation addressed in the final section of the article.

Eligibility Criteria

Clear inclusion and exclusion criteria were applied to define the analytical corpus consistently and transparently.

Publications were included if they:

- were indexed in Scopus and retrieved through the defined search strategy;
- addressed inclusive education or inclusion-related issues within educational contexts;
- explicitly incorporated technology as a medium, tool, or contextual factor in education;
- referred to Africa explicitly in the title, abstract, or keywords;
- were published between 2021 and 2025.

Publications were excluded if they:

- discussed technology in Africa without a clear educational or inclusion-related dimension;
- focused on inclusive education without reference to technology;

- fell outside the defined publication period;
- constituted duplicate records within the exported dataset.

Eligibility screening was conducted at the metadata level (title, abstract, and keywords) rather than through full-text review, consistent with the objectives of bibliometric mapping and ensuring reproducibility.

Data Preparation

Prior to analysis, the dataset underwent several preprocessing steps to enhance consistency and analytical reliability. First, metadata fields were examined for completeness and format consistency. Publication years and citation counts were standardised as numerical variables, while missing values were retained where they did not impede analysis. Second, author keywords were normalised to reduce superficial variation. Keywords were separated using the standard delimiter, trimmed for excess spacing, and converted to lowercase. This procedure minimised duplication caused by inconsistent capitalisation while preserving the original conceptual framing chosen by authors. Synonym merging was intentionally limited to avoid introducing subjective interpretation into the preprocessing stage. Third, country information was extracted from the *Affiliations* field to support collaboration analysis. Affiliations were parsed by separating individual entries and identifying country names from the final segment of each affiliation string. Duplicate country entries within a single publication were removed to prevent inflation of collaboration counts. While this approach is widely used in bibliometric studies, the authors recognise potential inaccuracies arising from inconsistent affiliation formatting, which are acknowledged as a methodological limitation. Finally, for visualisation purposes, excessively long titles were truncated when necessary to improve readability in figures without altering the analytical calculations.

Analytical Procedures

The analysis was structured into two complementary components: performance analysis and science mapping. Performance analysis examined publication productivity and influence. Annual publication output was analysed to identify temporal patterns in research activity. Source productivity was assessed by counting publications per journal to understand the dispersion of research outlets. Citation analysis utilised the *Cited by* field to examine academic influence, including identification of highly cited documents, citation distribution patterns, and average citations per publication year. Particular attention was given to the age effect, recognising that recently published articles naturally accrue fewer citations. Science mapping focused on relational and conceptual structures within the literature. Country collaboration networks were constructed based on co-occurrence of countries within author affiliations, with edge weights representing collaboration frequency. To highlight regional dynamics, an Africa-only collaboration network was derived by filtering African countries. Temporal overlay analysis compared collaboration patterns between two periods (2021–2023 and 2024–2025) to identify continuity or change over time.

Conceptual mapping was conducted through keyword co-occurrence analysis, identifying thematic clusters based on keywords appearing together within publications.

Thematic evolution analysis compared keyword frequencies across the two temporal periods to detect emerging or declining themes. Finally, thematic mapping was performed using a centrality–density framework, classifying themes into motor, basic, niche, and emerging or declining categories. Centrality was operationalised as the strength of a keyword's connections within the network, while density reflected its internal development through frequency of use.

Ethical Considerations

This study is based exclusively on bibliographic metadata retrieved from Scopus and does not involve human participants or sensitive personal data. As such, ethical approval for human-subject research was not required. Interpretation of findings was carefully constrained to the scope of bibliometric indicators: citation counts were treated as measures of academic visibility rather than quality, and collaboration patterns were interpreted as structural features of knowledge production rather than normative assessments of national or institutional performance.

RESULTS AND DISCUSSION

The results are based on a filtered corpus of 157 documents indexed in Scopus and published between 2021 and 2025. All documents included in this corpus meet the relevance criteria linking inclusive education with the use of technology in African contexts, as established during the search and screening stages. Accordingly, the findings should be understood as a portrait of scholarly communication patterns within an indexed database rather than as direct evidence of policy effectiveness or the success of inclusive educational practices on the ground.

The central focus of this discussion is to address who produces knowledge and how that knowledge is structured, disseminated, and gains academic influence. To ensure transparency, interpretations are consistently linked to visual evidence in the form of figures, which are treated as analytical tools rather than illustrative supplements. The narrative unfolds progressively, beginning with publication dynamics, followed by geographic distribution, publication sources, citation-based influence, patterns of international and intra-African collaboration, and finally the thematic structure and evolution of the field. Through this structure, the discussion highlights the relationships between authorship, publication venues, visibility, and thematic anchors shaping the research landscape of inclusive education and technology in Africa.

The volume of publications shows a clear increase across the analysed period, as illustrated in Figure 1, which presents both annual output and cumulative growth. This upward trend suggests that inclusive education and technology in Africa has gained prominence as a research agenda, aligned with broader discussions on educational access, equity, and digital transformation. However, it is important not to equate publication growth with conceptual maturity.

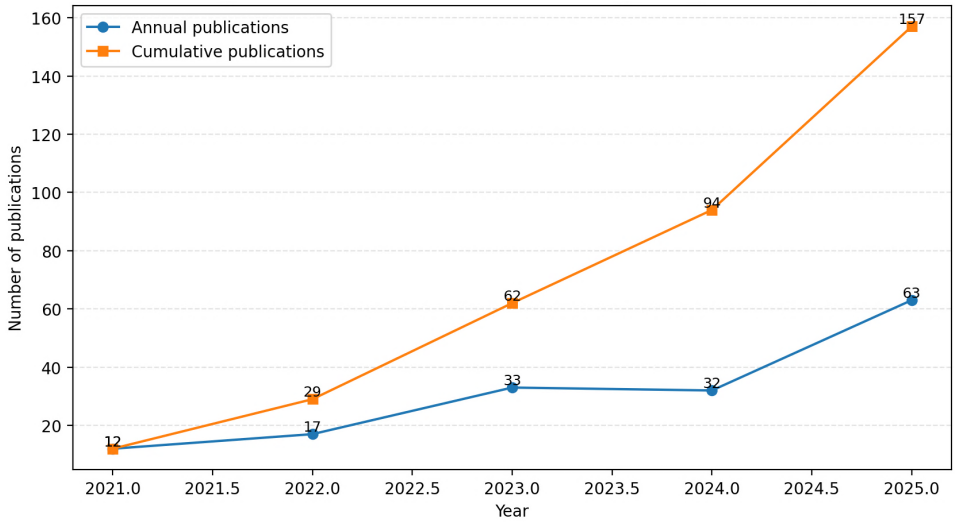

Figure 1. Publication trend and cumulative growth (2021–2025)

In interdisciplinary fields, increases in output often occur because multiple academic communities enter the same research space with different priorities. Some studies emphasise accessibility and the right to quality higher education for students with disabilities, as demonstrated by Zongozzi (2022). Others frame digital inequality as a structural challenge within African higher education systems, particularly in South Africa, as highlighted by Woldegiorgis (2022). Additional strands focus on digital competence among prospective teachers as a prerequisite for equitable technology-supported learning, as examined by Tomczyk (2024).

More recent contributions reflect momentum around emerging technologies, including artificial intelligence as a potential driver of adaptive and inclusive learning environments (Opesemowo & Adekomaya, 2024) and debates around the use of ChatGPT in universities, which raise new questions about access, ethics, and learning practices (Tarisayi, 2024). Taken together, these examples illustrate why Figure 1 should be read as an indicator of momentum rather than evidence of a consolidated theoretical core. This interpretation is reinforced by subsequent findings on source dispersion and thematic mapping, which point to parallel rather than unified development trajectories.

The geographic distribution of author affiliations clarifies who participates most visibly in knowledge production. Figure 2 shows that contributions within the corpus are unevenly distributed, with South Africa emerging as the most prominent contributor based on affiliation occurrences, followed by a smaller group of other countries, including both African and non-African contexts. This pattern is significant because Africa is often treated as a single analytical category, despite substantial variation in inclusion policies, institutional capacity, technological infrastructure, and research ecosystems across countries.

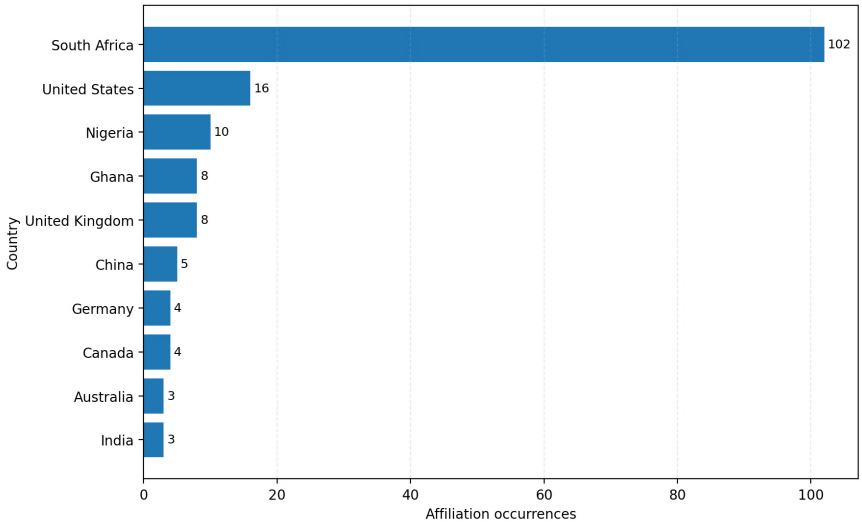

Figure 2. Top 10 countries by author affiliation (occurrences)

When indexed literature is dominated by a limited number of contexts, there is a risk that the portrayal of inclusive education and technology in Africa reflects the experiences of countries with stronger research and publication capacity rather than the diversity of conditions across the continent. Several influential studies in the corpus illustrate this concentration, including analyses of digital divide mitigation (Woldegiorgis, 2022), learning exclusion during the pandemic (Ngubane-Mokiwa & Zongozzi, 2021), and critical examinations of higher education systems (Hlatshwayo, 2022). At the same time, the corpus includes work addressing broader African issues, such as gender and mobile technology for inclusion (Simplice et al., 2021), indicating that the field is not entirely country-bound even if visibility remains uneven. Bibliometric analysis cannot determine the underlying causes of this concentration, whether related to funding, international networks, national research policies, or access to journals. It can, however, demonstrate that visibility within Scopus is selective, underscoring the need to interpret the evidence base with an awareness of representational bias.

The concentration of affiliation occurrences in a limited number of countries, particularly South Africa, should also be interpreted in light of the structural conditions documented in the literature. Several highly visible studies within the corpus focus on South African higher education institutions, examining issues such as digital divide mitigation (Woldegiorgis, 2022), accessibility and quality for students with disabilities (Zongozzi, 2022), and exclusion during pandemic-driven online transitions (Ngubane-Mokiwa & Zongozzi, 2021). These works provide important conceptual and empirical foundations for the field. However, their prominence within citation networks may also contribute to a situation in which particular national contexts become disproportionately influential in defining the contours of "inclusive education and technology in Africa." When research from relatively well-resourced higher education systems dominates indexed visibility, it risks shaping regional narratives in ways that may not fully reflect the infrastructural, policy, and

institutional diversity documented across African systems more broadly (Kafile et al., 2025; Simelane-Mnisi & Mthimunye, 2025).

The analysis of publication outlets further illustrates the character of the field. Figure 3 shows that research on inclusive education and technology in Africa is disseminated across a wide range of journals, with no single outlet exercising overwhelming dominance. This dispersion can be interpreted as evidence of interdisciplinarity.

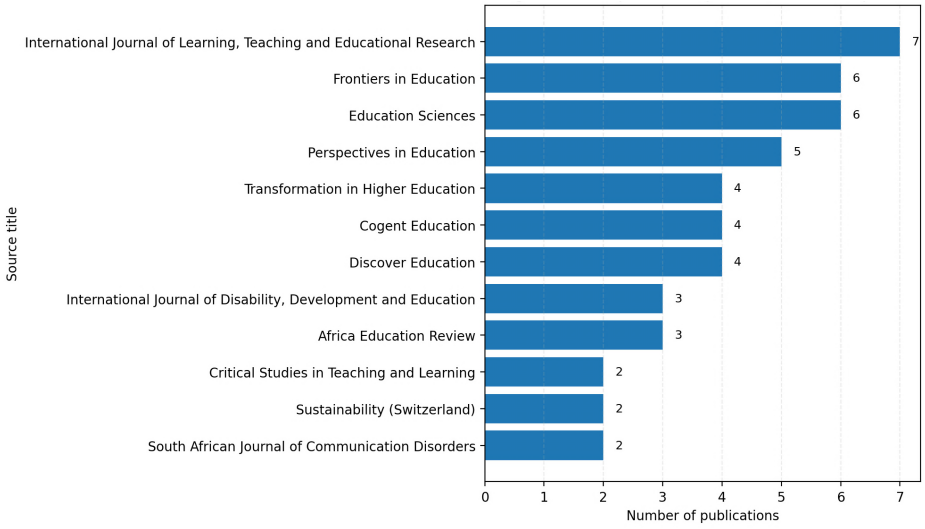

Figure 3. Most productive journals/sources (top 12)

Studies appear in journals focused on education, higher education, disability studies, and other intersecting domains that bring together issues of access, technology, and social justice. For example, some contributions emphasise pedagogical practices and student learning experiences in higher education, including analyses of online learning during the pandemic and the use of community of inquiry frameworks (Ngubane-Mokiwa & Khoza, 2021). Other studies focus more explicitly on accessibility and quality in higher education for students with disabilities, highlighting systemic barriers and the need for inclusive design (Zongozzi, 2022). Additional work engages with digital transformation and teacher digital competence, implicitly questioning the readiness of education systems to deploy technology inclusively (Tomczyk, 2024). While this diversity of outlets allows ideas to circulate across communities and avoids confinement within a single academic tradition, it also suggests the absence of a stable core venue where debates accumulate and develop cumulatively. In more mature fields, core journals often function as focal points for sustained conceptual dialogue. In contrast, the pattern in Figure 3 suggests parallel development across outlets, where similar themes may be discussed without strong cross-referencing, contributing to slower conceptual consolidation.

Citation-based indicators provide insight into which publications achieve greater academic visibility and influence. Figure 4 highlights the ten most cited documents in the corpus, which can be understood as anchoring works frequently used to frame problems, justify methodological choices, or position subsequent studies.

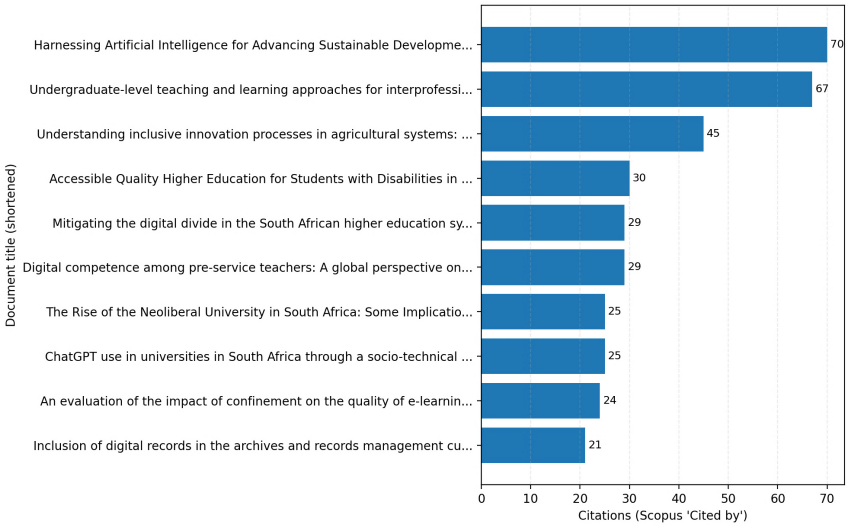

Figure 4. Top 10 most cited documents in the dataset

In many fields, highly cited publications help establish shared language and conceptual reference points. For instance, discussions on artificial intelligence as a means to advance learning have become increasingly visible and may shape emerging debates on inclusivity and adaptability (Opesemowo & Adekomaya, 2024). Similarly, influential work on teaching and learning practices at the undergraduate level can shape how researchers conceptualise curriculum design and pedagogy (Aldriwesh et al., 2022). In the area of accessibility, analyses of quality higher education for students with disabilities have also gained prominence as key reference points (Zongozzi, 2022). Nevertheless, citation counts should not be treated as indicators of substantive quality or practical effectiveness. Rather, they reflect academic visibility and uptake within scholarly communities.

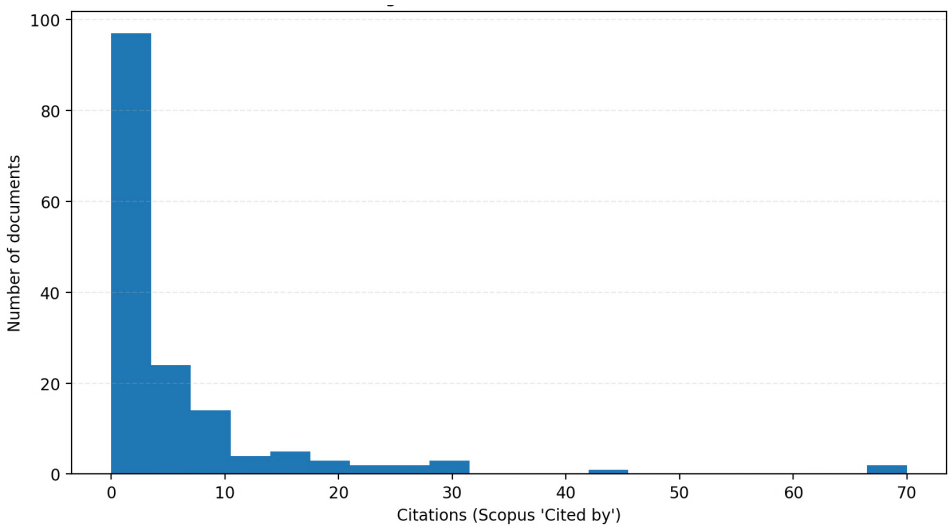

Figure 5. Citation distribution

Figure 5 adds important context by showing a highly skewed citation distribution, where many documents receive few citations while a small number accumulate disproportionately high counts. This pattern indicates a concentration of scholarly attention

that can accelerate consolidation if anchor works are conceptually robust, but can also narrow the range of perspectives if highly visible studies primarily represent specific contexts or approaches. Studies on learning exclusion during the pandemic, for example, have become widely cited reference points for discussions of online learning risks (Ngubane-Mokiwa & Zongozzi, 2021), while experiences from other African contexts may remain less visible if they do not enter the same citation circuits.

International collaboration patterns add a relational dimension to understanding who produces knowledge. Figure 6 presents the international country collaboration network, emphasising ties that occur repeatedly and therefore represent more stable partnerships.

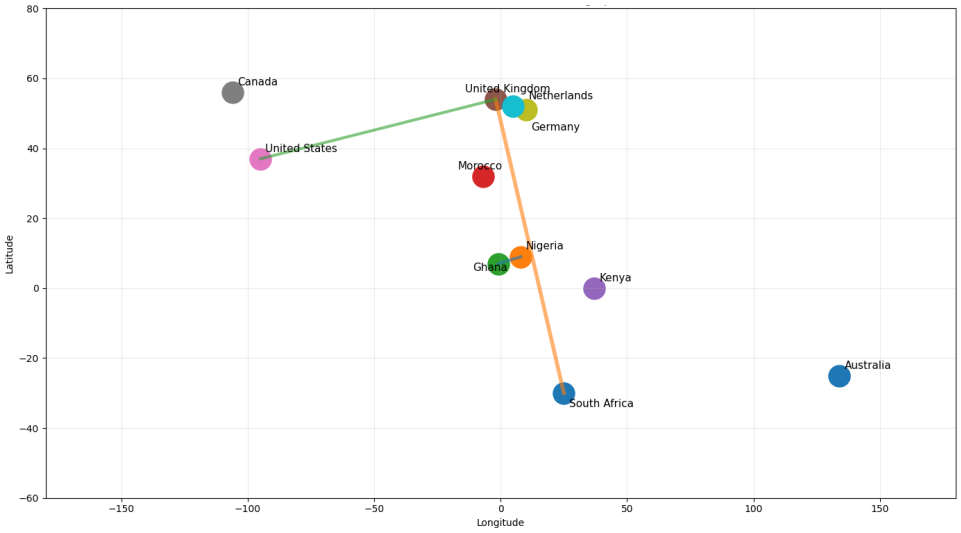

Figure 6. International country collaboration network

Cross-national collaboration can offer clear benefits, including methodological exchange, access to resources, and opportunities for comparative analysis. At the same time, collaboration networks can shape research agendas by reinforcing particular centres of activity. When collaboration repeatedly revolves around the same nodes, there is a risk that dominant perspectives and priorities are reproduced, while contexts outside these networks remain less visible in indexed literature. Within the corpus, prominent themes such as digital divide mitigation and online learning exclusion are often examined in higher education systems with relatively strong research infrastructures (Woldegiorgis, 2022; Ngubane-Mokiwa & Zongozzi, 2021). Emerging topics, including generative technologies such as ChatGPT, also tend to arise within academic ecosystems that are closely connected to global debates on innovation and ethics (Tarisayi, 2024). Bibliometric analysis cannot assess power relations within collaborations, but the structure shown in Figure 6 indicates that collaboration is clustered rather than evenly distributed, aligning with the geographic concentration observed earlier.

A more focused examination of intra-African collaboration reveals a different picture. Figure 7 presents a schematic map of collaborations among African countries represented in the corpus.

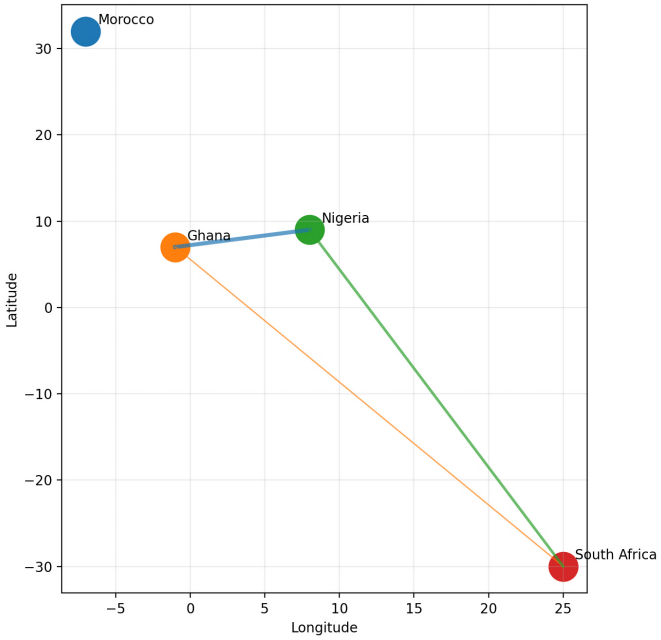

Figure 7. Africa-only collaboration map (schematic)

Compared with the international network, intra-African collaboration appears thinner and less dense. This does not imply the absence of collaboration among African scholars, but rather indicates that within Scopus-indexed literature, such collaboration has not yet formed strong regional clusters. A cautious interpretation is that knowledge production in this corpus is more strongly supported by cross-regional networks than by extensive intra-African partnerships. From the perspective of strengthening African research agendas, this pattern has implications for the sustainability of knowledge ecosystems. Limited intra-African collaboration can constrain the exchange of experiences across diverse African contexts, which is particularly important for inclusive education and technology given its sensitivity to social, linguistic, cultural, and policy conditions. The diversity of issues addressed in the corpus, ranging from higher education accessibility to digital inequality and pandemic-related learning challenges (Rughoobur-Seetah & Hosanoo, 2021; Woldegiorgis, 2022; Zongozzi, 2022), would benefit from stronger regional dialogue that supports comparative learning within the continent. It is also important to acknowledge that Scopus itself filters visibility, and intra-African collaboration may be more prominent in non-indexed outlets, policy reports, or local journals. Nevertheless, as a representation of internationally indexed scholarship, Figure 7 highlights the limited role of intra-African collaboration in sustaining the field.

The relative thinness of intra-African collaboration is particularly significant when considered alongside the thematic concerns documented in the corpus. Many of the highly visible studies addressing digital inequality, accessibility, and institutional readiness are situated within specific national systems, especially South African higher education (Woldegiorgis, 2022; Zongozzi, 2022; Ngubane-Mokiwa & Zongozzi, 2021). While these contributions are analytically robust, limited cross-regional collaboration may restrict

opportunities for systematic comparison across African contexts that differ in governance arrangements, infrastructural capacity, and policy implementation. For example, research on digital competence and institutional readiness (Tomczyk, 2024; Simelane-Mnisi & Mthimunye, 2025) highlights how technological integration depends on professional development and system-level support structures. Without stronger Africa–Africa collaboration, such findings risk remaining embedded within specific institutional ecosystems rather than being examined comparatively across diverse African higher education systems.

Furthermore, the growing attention to emerging technologies such as artificial intelligence and generative tools in higher education (Opesemowo & Adekomaya, 2024; Tarisayi, 2024) may intensify this pattern if research capacity and publication visibility are concentrated in a limited number of networks. In this sense, collaboration structures do not merely reflect existing research productivity; they actively shape which technological developments, institutional models, and inclusion strategies gain regional and international visibility. Strengthening intra-African collaboration would therefore support more contextually grounded theorisation of inclusive digital education, enabling comparative inquiry that connects accessibility (Zongozzi, 2022), digital divide mitigation (Woldegiorgis, 2022), and institutional support ecosystems (Mireku et al., 2024) across varied African systems.

The temporal dimension of collaboration sheds light on whether growth in publication output is accompanied by structural change in networks. Figure 8 overlays collaboration patterns from 2021 to 2023 and from 2024 to 2025, allowing comparison of continuity and change.

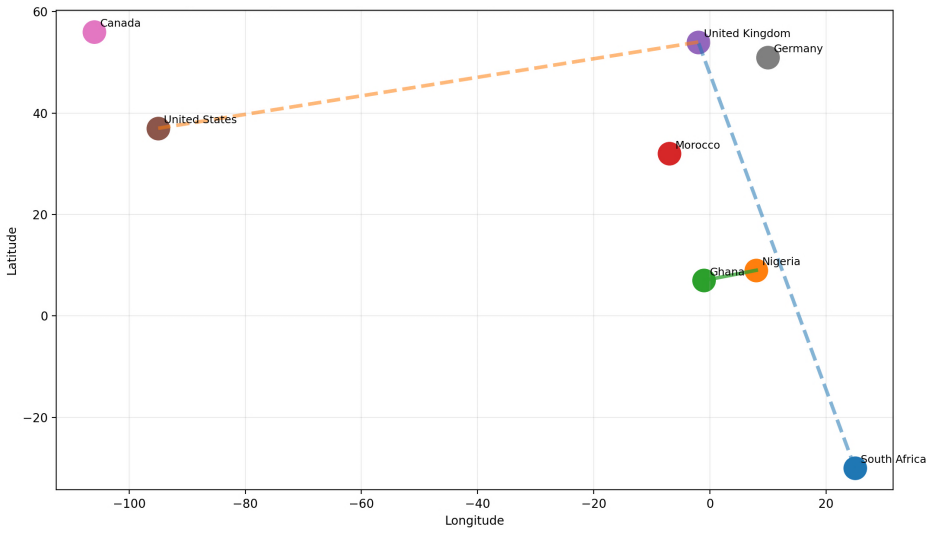

Figure 8. Temporal overlay of collaboration (dashed: 2021–2023; solid: 2024–2025)

The visual pattern suggests strong continuity, with many collaborative ties persisting across both periods. This indicates network stability rather than rapid diversification. Conceptually, such stability can be advantageous, enabling research teams to build sustained programmes, refine methodologies, and develop longitudinal agendas. This is consistent with

repeated engagement with themes such as digital capacity building and accessibility, which often require iterative inquiry (Tomczyk, 2024; Zongozzi, 2022). At the same time, if stable networks do not become more inclusive over time, growth in output may occur without a corresponding expansion of perspectives. In relation to the guiding research question, Figure 8 supports the interpretation that expansion of the field may not be accompanied by major changes in who is connected and who occupies central positions. This is particularly relevant as new topics such as artificial intelligence and ChatGPT gain prominence, potentially reinforcing existing centres of knowledge production (Opesemowo & Adekomaya, 2024; Tarisayi, 2024).

The conceptual structure of the field becomes visible through keyword co-occurrence analysis. Figure 9 presents the network of prominent author keywords and their co-occurrence relationships. Rather than converging into a single dense cluster, the network is composed of several loosely connected groups, which suggests a field that is thematically active but not tightly integrated. The pattern implies that research on inclusive education and technology in Africa spans multiple sub-issues that are conceptually related yet not always developed within a unified framework. These sub-issues include access and participation, digital literacy, disability-related support, online learning modalities, institutional constraints, and broader social justice concerns.

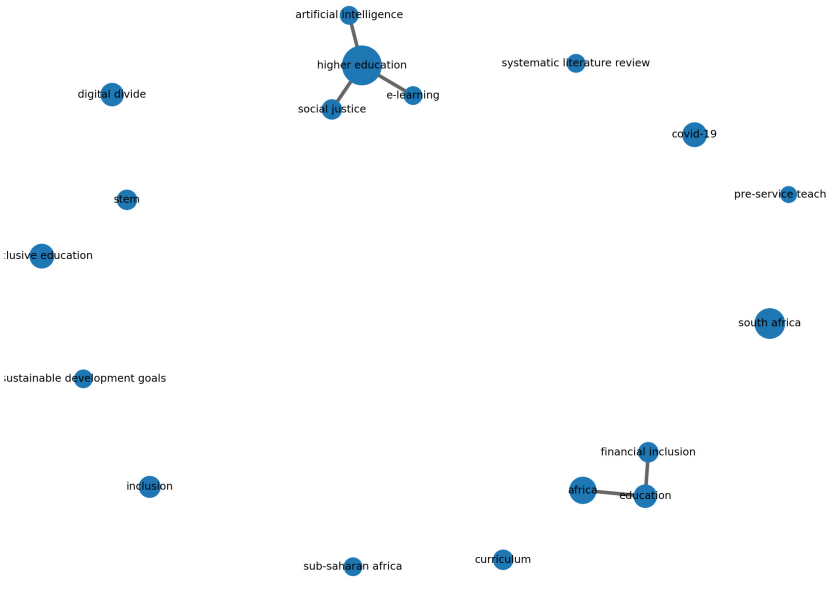

Figure 9. Keyword co-occurrence network

The heterogeneity of emphasis is consistent with the variety of influential contributions in the corpus, including work on accessibility and quality in higher education for students with disabilities, research on structural digital inequality, and analyses of exclusion risks during crisis-driven online learning transitions (Ngubane-Mokiwa and Zongozzi, 2021; Woldegiorgis, 2022; Zongozzi, 2022). At the same time, the relatively loose connectivity across clusters also signals that technology and inclusion are sometimes treated as adjacent topics

rather than as mutually constitutive constructs. In practical terms, some studies may foreground digital systems or platforms while implicitly assuming inclusion, whereas others emphasise inclusion as a normative imperative while treating technology as a contextual tool, leaving fewer studies that articulate an integrated explanatory model connecting accessibility, pedagogy, and technological design.

Figure 10 adds a temporal lens by comparing keyword prominence across earlier and later periods, which helps clarify whether the vocabulary of the field is changing and how that change might relate to shifting research priorities.

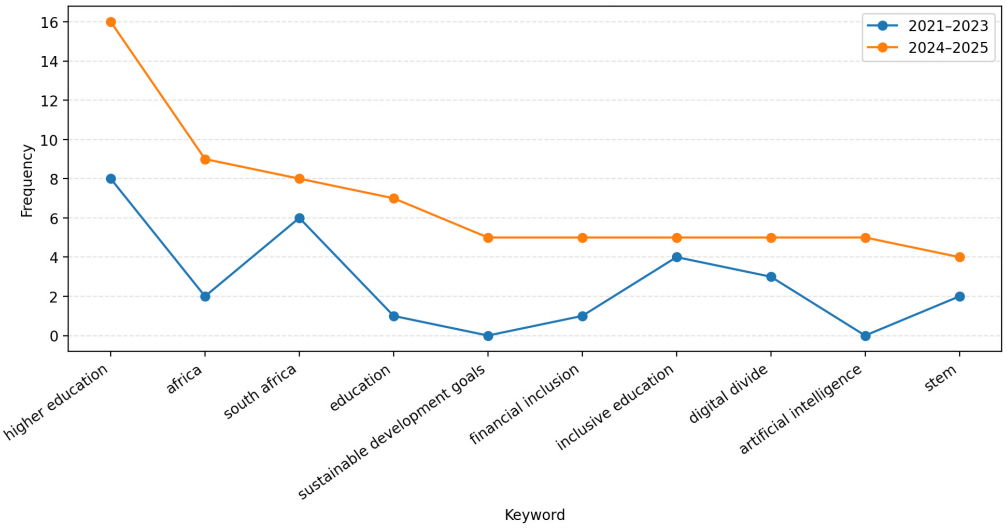

Figure 10. Thematic evolution of prominent keywords (early vs late period)

Differences in keyword frequency do not prove a paradigm shift, but they provide plausible signals about what scholars increasingly foreground when describing their work. The corpus suggests movement from crisis-shaped framing associated with pandemic restrictions toward a broader engagement with post-crisis governance of digital learning and the implications of newer technological developments, including generative technologies and institutional responses to them. This transition is consistent with studies that were strongly shaped by the constraints and exclusions of emergency online learning during the pandemic period, alongside more recent discussions of digital learning practices and the ethics and accessibility implications of tools such as ChatGPT in higher education settings (Rughoobur-Seetah and Hosanoo, 2021; Tarisayi, 2024). Importantly, this temporal comparison also highlights a potential tension in the literature: while the field is expanding and adopting new technological vocabularies, the persistence of loosely connected keyword clusters suggests that newer topics may be added as parallel strands rather than absorbed into a more coherent conceptual architecture. As a result, the field may grow in breadth faster than it deepens its integrative theoretical explanations.

The conceptual mapping is further consolidated in Figure 11, which plots themes using a centrality and density logic to distinguish themes that are central and developed, central but less developed, developed but peripheral, and emerging or declining. This thematic map

reinforces the interpretation that the field is expanding and diversifying, yet conceptual consolidation remains uneven.

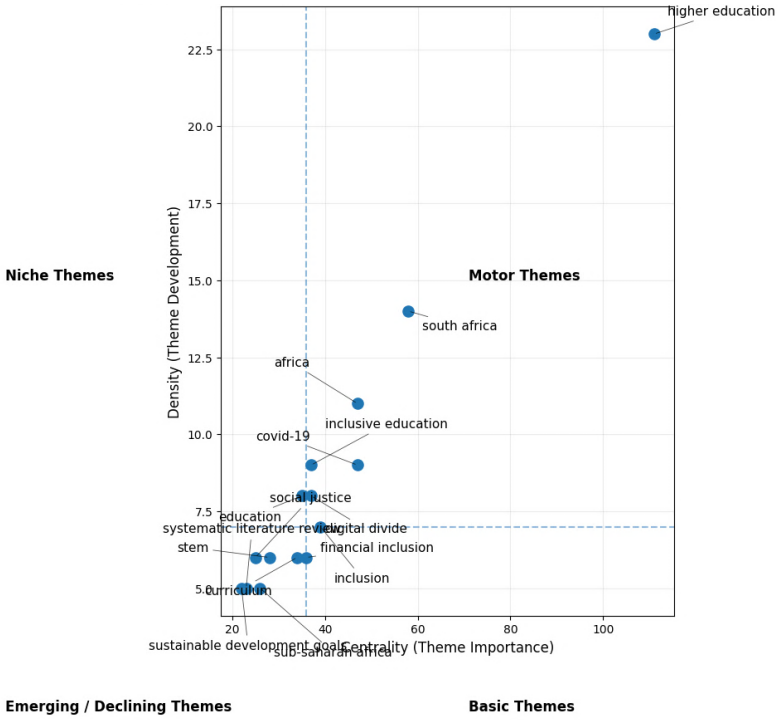

Figure 11. Thematic map

Themes that are structurally central may function as broad framing devices that connect many studies, while their internal density remains relatively limited, suggesting that these themes are frequently invoked but not always developed into coherent, cumulative research programmes. This matters for inclusive education and technology in Africa because the most actionable insights typically emerge when inclusion is linked explicitly to the design features of technologies, the institutional conditions of implementation, and the accessibility requirements of diverse learners, rather than being treated as an assumed goal or a general moral horizon. The thematic map therefore supports a cautious but defensible implication: the literature would benefit from stronger integration across currently separated strands, especially by connecting accessibility and disability inclusion to concrete technological design, pedagogical practice, and institutional governance in African contexts. Such integration would help reduce fragmentation and enable the field to move from parallel discussions of inclusion and technology toward more explicit explanatory models and transferable frameworks grounded in African educational realities (Zongozzi, 2022; Woldegiorgis, 2022).

CONCLUSION

This bibliometric mapping of 157 Scopus-indexed documents (2021–2025) demonstrates steady growth in research on inclusive education and technology in Africa, signalling increasing scholarly engagement with equity and digital transformation across educational systems. However, publication expansion should not be equated with conceptual consolidation. The dispersion of journals, the presence of loosely connected keyword clusters,

and the uneven distribution of citation influence indicate that the field remains thematically active but structurally fragmented.

In addressing the central question of who produces knowledge, the analysis reveals concentrated visibility within a limited number of national contexts, particularly South Africa. While this reflects strong research infrastructure and scholarly productivity, it also means that certain institutional experiences and policy environments become more influential in shaping the indexed narrative of "Africa." As a result, the diversity of infrastructural conditions, governance arrangements, and accessibility practices across the continent may be only partially represented in internationally visible scholarship.

Collaboration structures reinforce this pattern. International partnerships appear more established than intra-African collaboration networks, and temporal overlay analysis suggests continuity rather than substantial diversification of collaborative ties. Without stronger cross-regional engagement within Africa, comparative understanding of how inclusive digital education unfolds across varied systems may remain limited. Collaboration patterns therefore influence not only research productivity but also the epistemic architecture of the field.

Conceptually, the literature shows movement from pandemic-driven concerns about exclusion toward broader debates on digital governance and emerging technologies such as artificial intelligence and generative tools. Yet accessibility, disability inclusion, and structural digital inequality remain foundational concerns. For the field to mature, future research must move beyond parallel discussions of technology adoption and inclusion, and instead develop integrative frameworks that explicitly connect technological design, institutional capacity, pedagogical practice, and accessibility within diverse African higher education contexts.

Ultimately, bibliometric mapping provides a macro-level reflection on visibility, influence, and collaboration. By examining not only what is studied but also whose scholarship shapes the discourse, this study contributes to ongoing efforts to strengthen inclusive, context-sensitive, and regionally grounded knowledge production in African education research.

LIMITATION

This study is constrained by database coverage and metadata-dependent decisions that shape what becomes visible as "knowledge production." The reliance on Scopus excludes many regional journals, policy reports, and locally circulated scholarship, which may underrepresent intra-African collaboration and contributions from less internationally indexed research systems. In addition, the search strategy required explicit "Africa/African" references in TITLE-ABS-KEY, which can omit country-specific studies that do not use those terms in metadata, while eligibility screening at the metadata level risks misclassifying studies where inclusion or technology is discussed implicitly. Finally, collaboration mapping depends on affiliation parsing, which can introduce inaccuracies when affiliation formats are inconsistent, and citation-based influence is affected by publication age, limiting the interpretability of "high impact" for recent work.

In addition, it is important to acknowledge that interpretation of bibliometric patterns is shaped by the positionalities of the authors. As scholars working within African higher education systems, our reading of collaboration structures, geographic concentration, and thematic fragmentation is informed by lived engagement with institutional resource constraints, digital transformation efforts, and accessibility challenges. While the dataset itself is derived strictly from Scopus metadata, our analytical emphasis on representation, infrastructural diversity, and inclusion reflects an awareness that knowledge production is embedded within material and institutional realities. Making this standpoint explicit strengthens transparency and clarifies that bibliometric interpretation is not value-neutral, but situated within ongoing debates about equity and visibility in African education research.

RECOMMENDATION

Future research should strengthen the evidence base by triangulating Scopus results with complementary sources and more context-sensitive retrieval strategies, including country-name queries and regional databases, to reduce representational bias and better capture African-led scholarship. Analytically, bibliometric work would benefit from adding institution- and author-level mapping, normalised citation indicators, and sensitivity checks for keyword harmonisation to confirm whether fragmentation is substantive or methodological. Substantively, research agendas should prioritise integrative frameworks that connect disability inclusion and accessibility to specific technology design features, pedagogical practices, and institutional governance, while supporting stronger intra-African collaboration that enables comparative learning across diverse linguistic, cultural, and policy settings.

Building on the empirical patterns identified in this mapping, future research should also prioritise comparative African perspectives that examine how inclusive digital practices are operationalised under different infrastructural and governance conditions. Studies on digital divide mitigation and participation barriers among extended curriculum programme students demonstrate that technology integration interacts with socioeconomic inequality and institutional capacity. Comparative research across African higher education systems could clarify how these structural factors shape the accessibility and sustainability of digital inclusion initiatives.

In addition, the literature on accessibility and disability inclusion in open and distance learning contexts suggests the need for more explicit operationalisation of accessibility standards within institutional digital strategies. Future research should therefore examine how assistive technologies, platform design, lecturer digital competence, and student support services are institutionally coordinated rather than treated as isolated interventions. Such integrative approaches would help move the field from parallel discussions of technology adoption and inclusion toward system-level models grounded in African higher education realities.

Finally, as emerging technologies such as artificial intelligence and generative tools become more prominent in higher education debates, future scholarship should critically

assess their accessibility implications, equity risks, and governance requirements. Without sustained attention to disability inclusion and digital inequality, the rapid adoption of advanced technologies may reproduce existing structural disparities documented in the corpus. Bibliometric research can continue to monitor whether these emerging themes become more conceptually integrated with accessibility and inclusion, or whether they develop as parallel strands within the literature.

Author Contributions

The authors have sufficiently contributed to the study, and have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Acknowledgment

We express appreciation to the Scopus database for providing access to bibliographic metadata that enabled this bibliometric mapping. We also thank colleagues who provided informal feedback during the conceptualisation and reporting stages of the study.

Conflict of Interests

The authors declare no conflict of interest.

REFERENCES

Ajani, O. A., Govender, S., & Gamede, B. T. (2025). Investigating emerging technologies for curriculum delivery in a rural South African university through the lens of diffusion of innovation. *Journal of Curriculum Studies Research, 7*(2), 394–411. https://doi.org/10.46303/jcsr.2025.27

Aldriwesh, M. G., Alyousif, S. M., & Alharbi, N. S. (2022). Undergraduate-level teaching and learning approaches for interprofessional education in the health professions: A systematic review. *BMC Medical Education, 22*(1), 13. https://doi.org/10.1186/s12909-021-03073-0

du Plessis, E., & Bayeck, R. Y. (2025). South African lecturers' views of ChatGPT: An AI technology used for designing online assessments. *Journal of Teaching and Learning, 19*(4), 97–113. https://doi.org/10.22329/jtl.v19i4.9853

Hlatshwayo, M. N. (2022). The rise of the neoliberal university in South Africa: Some implications for curriculum imagination(s). *Education as Change, 26*, Article 11421. https://doi.org/10.25159/1947-9417/11421

Kafile, M., Ninana, A., & Makhetha-Kosi, P. (2025). The digital divide and e-learning participation: A mixed-methods study of extended curriculum programme students in South Africa. *International Journal of Learning, Teaching and Educational Research, 24*(9), 769–784. https://doi.org/10.26803/ijlter.24.9.37

Machaka, M. E., & Singh-Pillay, A. (2025). Technical and vocational education and training college female students' experiences in engineering disciplines. *Journal of Technical Education and Training, 17*(4), 17–31. https://doi.org/10.30880/jtet.2025.17.04.002

Magedi, M. J., Rakgogo, T. J., Mnguni, O. S., Segoe, B. A., & Kgoebane, M. (2023). COVID-19 and its impact on students with disabilities: A case of a South African university. *Transformation in Higher Education, 8*, 1–9. https://doi.org/10.4102/the.v8i0.212

Mireku, D. O., Bervell, B., Dzamesi, P. D., Nimo, S. K., & Teng, B. (2024). A systematic review of students' support services for inclusive education in higher education in Africa. *Cogent Education, 11*(1), 1–27. https://doi.org/10.1080/2331186X.2024.2397826

Ngubane-Mokiwa, S. A., & Khoza, S. B. (2021). Using Community of Inquiry (CoI) to facilitate the design of a holistic e-learning experience for students with visual impairments. *Education Sciences, 11*(4), 152. https://doi.org/10.3390/educsci11040152

Ngubane-Mokiwa, S. A., & Zongozzi, J. N. (2021). Exclusion reloaded: The chronicles of COVID-19 on students with disabilities in a South African open distance learning context. *Journal of Intellectual Disability – Diagnosis and Treatment, 9*(1), 137–147. https://doi.org/10.6000/2292-2598.2021.09.01.17

Ochieng', V. O., & Ngware, M. W. (2023). Adoption of education technologies for learning during COVID-19: A case of primary schools in Kenya. *International Journal of Educational Reform, 32*(4), 513–531. https://doi.org/10.1177/10567879221076081

Opesemowo, O. A. G., & Adekomaya, V. (2024). Harnessing artificial intelligence for advancing sustainable development goals in South Africa's higher education system: A qualitative study. *International Journal of Learning, Teaching and Educational Research, 23*(3), 67–86. https://doi.org/10.26803/ijlter.23.3.4

Rughoobur-Seetah, S., & Hosanoo, Z. A. (2021). An evaluation of the impact of confinement on the quality of e-learning in higher education institutions. *Quality Assurance in Education, 29*(4), 422–444. https://doi.org/10.1108/QAE-03-2021-0043

Simelane-Mnisi, S., & Mthimunye, J. M. (2025). Gender differences in lecturers' competency and use of learning management systems at a university of technology in South Africa. *Education Sciences, 15*(12). https://doi.org/10.3390/educsci15121595

Simplice, S. A., Adegboye, A., Ejemeyovwi, J., & Umukoro, O. (2021). The mobile phone technology, gender inclusive education and public accountability in Sub-Saharan Africa. *Telecommunications Policy, 45*(4), Article 102108. https://doi.org/10.1016/j.telpol.2021.102108

Tarisayi, K. S. (2024). ChatGPT use in universities in South Africa through a socio-technical lens. *Cogent Education, 11*(1), Article 2295654. https://doi.org/10.1080/2331186X.2023.2295654

Tomczyk, Ł. (2024). Digital competence among pre-service teachers: A global perspective on curriculum change as viewed by experts from 33 countries. *Evaluation and Program Planning, 105*, Article 102449. https://doi.org/10.1016/j.evalprogplan.2024.102449

Ugwuoke, U., Tetteh, A., Okebukola, P., & Ogonenwe, J. (2025). Enhancing ICT retention through indigenous pedagogy. *Discover Education, 4*(1). https://doi.org/10.1007/s44217-025-00962-0

Woldegiorgis, E. T. (2022). Mitigating the digital divide in the South African higher education system in the face of the COVID-19 pandemic. *Perspectives in Education, 40*(3), 197–211. https://doi.org/10.18820/2519593X/pie.v40.i3.13

Zongozzi, J. N. (2022). Accessible quality higher education for students with disabilities in a South African open distance and e-learning institution: Challenges. *International Journal of Disability, Development and Education, 69*(5), 1645–1657. https://doi.org/10.1080/1034912X.2020.1822518