Journal of International Students
Volume 16, Issue 9 (2026), pp. 143-160
ISSN: 2162-3104 (Print), 2166-3750 (Online)
jistudents.org
https://doi.org/10.32674/sj02n785

Mapping Indigenous Knowledge and Curriculum Internationalization for Sustainability: A Scientometric Analysis

Vinodh Kumar
Lovely Professional University

Khusbu Thakur
Lovely Professional University

ABSTRACT: The integration of indigenous knowledge (IK) into internationalized higher education curricula has emerged as an epistemically significant yet empirically underexplored domain. This study employs scientometric methods — using Scopus-indexed data, Bibliometrix/Biblioshiny, and VOSviewer — to map publication trends, collaborative networks, and thematic evolution across a decade of scholarly output (2016–2025). The results indicate limited research activity until 2018, followed by steady growth and a notable increase after 2022. The United States, Australia, Canada, and South Africa have emerged as major contributors, alongside increasing participation from Global South countries. Keyword and thematic analyses reveal major clusters around sustainability education, curriculum internationalization, climate change, and decolonization. The findings suggest that indigenous knowledge is being increasingly integrated into internationalized higher-education curricula and contributes to sustainability-oriented education and epistemic diversity. This study provides insights into the evolving global knowledge landscape shaping inclusive, sustainability-focused learning environments in higher education.

Keywords: bibliometric analysis, decolonization, global citizenship, higher education, indigenous knowledge, internationalization, scientometric analysis, sustainability education

Received: 19-12-2025 | **Revised**: 25-02-2026 | **Accepted:** 16-03-2026 |

Associate Editor: Dr. Metrice Harris-Weedman | **Volume Editor**: Dr. Jing Luan

Corresponding Author: Vinodh Kumar (vinodhkb1@gmail.com)

INTRODUCTION

Tengö et al. (2017) describe indigenous knowledge (IK) as place-based, intergenerational, and practice-oriented, with long-term informed stewardship of land, water, and biodiversity. In global policy forums, IK is now recognized as a complementary knowledge system for sustainability and climate action, including within frameworks that connect nature and people and weave multiple knowledge systems for decision-making. Díaz et al. (2015) note that frameworks such as the IPBES emphasize the integration of human and ecological systems through diverse knowledge traditions. Concurrently, internationalization in higher education has moved beyond mobility-focused models toward curricula, pedagogies, and partnerships that value cultural and epistemic diversity (Altbach & Knight, 2007; de Wit & Altbach, 2021; Leask, 2015). This development intersects with efforts to decolonize curricula and foster sustainability competencies in teacher education and university programs (Padayachee, 2018).

Recent studies in the Journal of International Students have increasingly emphasized the importance of integrating indigenous perspectives and socially responsible curricula within international higher education. For example, research on indigenous and international student experiences highlights the role of culturally responsive learning environments in shaping student engagement and inclusion (Yuan, 2025). Similarly, studies on indigenous alliances and justice-oriented education underscore the growing importance of incorporating Global South knowledge systems and decolonial approaches into curriculum internationalization (Acharya, 2025).

Despite this convergence, systematic quantitative evidence remains limited regarding the global evolution of research at the intersection of IK, sustainability, and higher-education internationalization over the past decade. Previous studies are predominantly conceptual, region specific, or centered on environmental management rather than educational systems and curricula (Carrin, 2024; Akalibey, 2024). To address this gap, this study presents a 10-year global scientometric review (2016–2025) to (1) trace growth dynamics; (2) identify leading countries, institutions, and collaboration patterns; and (3) map thematic structure and evolution, including decolonizing curricula, teacher education, climate and biodiversity, and sustainable development goals (SDGs). This study aligns with the Journal of International Students' commitment to re-envisioning international education through inclusive, globally connected, and socially responsible curricula. While international students are not the direct unit of analysis, this study provides important insights into the global curricular and epistemic environments that shape international student learning experiences. The integration of indigenous

knowledge (IK) within internationalized higher education curricula has implications for inclusive pedagogy, intercultural learning, and sustainability-oriented education. By mapping the evolution of IK research within curriculum internationalization, this study contributes to understanding how international students are increasingly exposed to diverse knowledge systems, epistemic plurality, and globally relevant sustainability competencies.

LITERATURE REVIEW

Leask's (2015) model of the **internationalization of the curriculum (IoC)** emphasizes the intentional integration of international, intercultural, and global dimensions into curriculum content, learning outcomes, assessment, and pedagogy. The keyword clusters and thematic evolution identified in this study—particularly those that emphasize curriculum, teacher education, sustainability, and decolonization—demonstrate that IK appears to be becoming a core knowledge domain through which IoC is being enacted.

The transition from early ecological and biodiversity-oriented research (2016–2019) to more recent emphasis on curriculum reform, teacher education, and global citizenship (2023–2025) highlights that IK is increasingly embedded within formal learning structures rather than remaining confined to environmental or community-based contexts. This evolution aligns with Leask's assertion that the internationalization of the curriculum must extend beyond content inclusion to include the transformation of pedagogical approaches and epistemic assumptions. The emergence of themes such as Ubuntu, place-based education, and decoloniality indicates that IK is actively reshaping the concept of global knowledge in higher education, thereby reconfiguring the internationalized curriculum toward epistemic plurality instead of Western universalism.

Knight's (2004, 2015) internationalization framework conceptualizes internationalization as a cyclical process that involves **policy, programs, organizational strategies, and outcomes**. The global collaboration patterns identified in this study—particularly the strong research networks that connect institutions in the United States, Australia, Canada, South Africa, Brazil, India, and Indonesia—demonstrate that IK has become embedded within this internationalization cycle.

At the policy level, the greater alignment of IK research with sustainability and decolonization reflects institutional responses to global frameworks such as UNESCO's Education for Sustainable Development roadmap. At the program level, studies focusing on teacher education, environmental education, and the curriculum emerge as dominant thematic clusters, which indicates that IK is being increasingly operationalized through degree programs, teacher preparation, and curriculum policies. At the organizational level, cross-regional research partnerships between institutions in the Global North and Global South reflect a shift from unidirectional knowledge transfer to more reciprocal knowledge production. At the outcome level, the heightened prominence of global citizenship, intercultural education, and climate resilience as emerging themes indicates that IK integration is reforming the learning outcomes expected of international graduates.

Thus, IK is increasingly embedded across all phases of Knight's internationalization cycle and does not operate at the periphery of internationalization.

De Wit's critical approach to internationalization serves as a challenge to market-driven, mobility-centric models and advocates a shift toward values-based, socially responsible, and inclusive internationalization. The current findings provide strong empirical support for this transition. The prominence of decoloniality, community participation, and indigenous epistemologies within the thematic structure implies that IK is being used as a counterframework against the dominant neoliberal and Western-centric paradigms of international education.

Instead of reinforcing competitive global rankings or entirely economic rationales for internationalization, IK-driven research emphasizes relational ethics, ecological responsibility, and community-centered learning. This view aligns with de Wit's call for internationalization by prioritizing social responsibility, sustainability, and intercultural justice. The emergence of Ubuntu as a niche but theoretically dense theme further reinforces this value-based reorientation, highlighting collective identity, reciprocity, and relational knowledge as central to global education.

However, IK is increasingly recognized as an essential pillar for sustainable development, ecological resilience, and social justice. Researchers highlight that the IPBES framework integrates scientific and indigenous perspectives to promote collaborative and inclusive approaches to sustainability. Such frameworks stress inclusivity and reciprocity to enable collaboration among scientists, policymakers, and indigenous communities in constructing sustainable, people-centered knowledge structures.

Internationalization in higher education has evolved from merely acknowledging indigenous practices to redesigning curricula that appreciate diverse areas (Altbach & Knight, 2007; Leask, 2015). De Wit and Altbach (2021) argue that this transformation requires higher-education institutions to engage diverse worldviews and knowledge systems, thereby placing IK at the center of decolonizing and internationalizing education. This perspective aligns with Mbah (2022) and Padayachee (2018), who maintain that decolonial frameworks and epistemic diversity are central concerns, particularly within ESD. These approaches prioritize context-based learning, ethical human–nature relations, and the inclusion of local voices in global sustainability discourse.

Recent literature reflects growing interest in mapping the global dissemination of IK studies. Marsandi (2025) conducted a global bibliometric analysis of the integration of ethnobotany and IK into higher-education curricula, revealing rising collaboration and interdisciplinary engagement. Similarly, Akalibey (2024) examined the incorporation of IK in sustainable forest management and identified the need to link indigenous practices with global environmental policies. Carrin (2024) offered conceptual insights into how IK provides a cultural and philosophical foundation for sustainability with relevance across regions.

Scientometric and bibliometric studies have become essential for identifying knowledge growth and collaboration trends. Donthu (2021) outlined best practices for bibliometric analyses, whereas Van Eck and Waltman (2010) and Aria and Cuccurullo (2017) developed the widely adopted visualization tools VOSviewer and Bibliometrix. By employing these tools, Gondo (2025) performed a bibliometric review of the literature

on IK systems and climate change adaptation. Anand (2025) and Basumatary (2024) applied similar methods in the Indian context, confirming a rising research trajectory that connects IK to sustainability, traditional practices, and policy implications.

UNESCO and the World Bank recognize IK as vital to global sustainability goals. The UNESCO LINKS Program (2019) promotes the inclusion of IK in sustainability and climate education, while the World Bank (2024) highlights gender, governance, and land rights as critical factors in indigenous resilience. Zari et al. (2025) suggest how IK supports the achievement of the SDGs, particularly SDG 4 (education), SDG 13 (climate action), and SDG 15 (life on land).

Mohanty (2024) further highlights that incorporating IK into sustainable policy frameworks may strengthen ecological values and community participation, thereby advancing the systematic integration of traditional wisdom into development agendas. These perspectives reflect a growing consensus that IK is not supplementary but foundational to sustainability and educational transformation.

Despite these developments, significant gaps persist. Most studies remain regional or thematic in scope, and no global scientometric synthesis has yet examined the intersection of IK, higher education, and sustainability. Few investigations have traced the evolution of key research clusters, including curriculum internationalization, teacher education, and decolonization, within this discourse. The present study addresses these gaps by mapping global productivity, collaboration patterns, and thematic evolution over the decade 2016–2025. It elucidates how IK contributes to reconfiguring international curricula toward a more inclusive and sustainable global education system, drawing on bibliometric analysis, sustainability frameworks, and relevant education policies.

METHODOLOGY

Research Design and Rationale

This study adopts a quantitative scientometric design for mapping and analyzing global research on IK in higher education and focuses on curriculum internationalization, sustainability, and decolonization between 2016 and 2025. Scientometric approaches are appropriate for this purpose because they enable a systematic assessment of publication trends, geographic and institutional distributions, and conceptual structures in a given field over time (Aria & Cuccurullo, 2017; Donthu et al., 2021). By combining performance indicators with science mapping techniques, the study situates IK within extensive debates on the internationalization of the curriculum, sustainability education, and global citizenship in higher education.

Data Source and Search Strategy

Scopus was selected as the primary data source because it offers broad international coverage across education, social sciences, environmental studies, and interdisciplinary journals and provides robust citation metadata that are widely used in scientometric analyses. Compared with other databases, Scopus features extensive indexing of journals in international and comparative education, curriculum studies, and sustainability-related

fields, which is critical for capturing research at the intersection of IK, higher education, and internationalization.

The following search query was used to retrieve documents from Scopus:

TITLE-ABS-KEY("indigenous knowledge" OR "indigenous knowledge systems" OR "traditional ecological knowledge" OR "local knowledge") AND TITLE-ABS-KEY("sustainability" OR "sustainable development" OR "environmental education" OR "sustainable practices") AND TITLE-ABS-KEY("higher education" OR "university" OR "college" OR "curriculum" OR "teacher education" OR "education policy" OR "internationalization" OR "international education" OR "global learning" OR "decolonizing the curriculum" OR "international students" OR "student mobility") AND PUBYEAR > 2015 AND PUBYEAR < 2026 AND (DOCTYPE(ar) OR DOCTYPE(re)) AND (LANGUAGE(english)). A Scopus search was executed, and the bibliographic data were downloaded in November 2025.

The **IK block** (e.g., "indigenous knowledge," "traditional ecological knowledge," "local knowledge") was designed to capture core work on indigenous- and place-based knowledge systems. The **sustainability block** (e.g., "sustainability," "sustainable development," "environmental education") reflects the study's focus on ecological and social sustainability. The **higher education and internationalization block** intentionally includes terms such as "curriculum," "teacher education," "education policy," "internationalization," "international education," "global learning," "international students," and "student mobility" to align with frameworks on the internationalization of the curriculum (Leask, 2015), internationalization of higher education (Altbach & Knight, 2007; de Wit & Altbach, 2021), and global citizenship education. The use of these terms ensures that the retrieved literature extends beyond environmental management and local practice to explicitly include the contexts of higher education, the curriculum, and international education.

The 2016–2025 time window was selected for two reasons. First, it corresponds to the period following the adoption of the **SDGs**, particularly 4.7 and 13, which foreground education for sustainable development, global citizenship, and climate action. Second, this period captures the most recent decade of scholarship during which IK has been increasingly discussed in relation to decolonization, curriculum reform, and internationalization in higher education. Restricting document types to **articles and reviews** ensures a focus on peer-reviewed scholarly contributions and excludes editorials, notes, and conference abstracts, which generally lack extensive methodological and conceptual details. Limiting the search to **English-language publications** facilitates consistent analysis and interpretation while acknowledging that this aspect may underrepresent non-English scholarship on IK.

The search yielded **173 documents** representing the global research output on IK, sustainability, and higher education during the selected period.

Data Cleaning and Inclusion Criteria

The raw Scopus exports included bibliographic records containing author information, institutional affiliations, titles, abstracts, keywords, and citation details. These records were imported into Bibliomagika for data cleaning and standardization. The cleaning procedures included the following:

- Omit duplicate records because of the overlapping indexing of coauthored papers;
- Standardizing author names and institutional affiliations to merge name variants (e.g., "Univ. of Wollongong" and "University of Wollongong";
- Harmonizing country names and spellings for accurate geographic analysis; and
- Normalizing keywords by merging obvious variants (e.g., "indigenous knowledge systems" and "indigenous knowledge system") while preserving relevant conceptual distinctions.

Documents were retained for analysis if they met the following criteria:

(a) the full record clearly pertained to indigenous or local knowledge in relation to sustainability, the environment, or development;
(b) the study focused on or explicitly referenced higher education, universities, teacher education, curriculum, or educational policy; and
(c) the content engaged, directly or indirectly, with the themes of internationalization, global learning, decolonization, or intercultural perspectives in higher education. Records that only passively mentioned IK without substantive connections to education or sustainability or exclusively focused on primary or secondary education without a clear link to higher education were excluded during the manual screening of titles and abstracts.

Analytical tools and procedures

Following cleaning, the final dataset was imported into Biblioshiny, the web interface of the R-based Bibliometrix package (Aria & Cuccurullo, 2017), for descriptive and performance analysis. The following analyses were conducted:

- Annual scientific production: To identify temporal growth patterns in IK–sustainability–higher education research;
- Country-level and institutional productivity: To map leading countries and institutions on the basis of total publications and fractionalized counts; and
- Authorship and collaboration indicators: To assess patterns of international coauthorship and cross-regional collaboration.

To explore the conceptual structure, keyword co-occurrence networks were generated using Biblioshiny and VOSviewer (Van Eck & Waltman, 2009). Author keywords and index keywords were used to construct co-occurrence matrices. Minimum occurrence thresholds were then applied to filter out extremely rare terms and highlight core conceptual clusters, balancing network density with interpretability. VOSviewer's association strength normalization was used to visualize clusters and link strengths among keywords, revealing major thematic communities in the field.

In addition, thematic mapping was conducted in Biblioshiny, which positions themes across four quadrants—motor, basic, niche, and emerging/declining—based on centrality (relevance to the overall field) and density (internal development). This procedure fostered the identification of mature and emerging themes at the intersection of IK, sustainability, and internationalized higher education.

Cluster Interpretation and Validation

An iterative, theory-informed process was used to interpret the clusters and themes. First, each cluster in the keyword co-occurrence network was examined on the basis of its most frequent and central terms. The representative documents within each cluster were then reviewed to determine the use of specific terms in context. Thematic labels (e.g., sustainability and curriculum; decoloniality and community participation; global citizenship; and climate resilience) were inductively assigned, informed by established frameworks in the internationalization of the curriculum (Leask, 2015), internationalization of higher education (Altbach & Knight, 2007; de Wit & Altbach, 2021), and education for sustainable development.

Second, the thematic map was used to cross-validate the positioning of the clusters. Themes that appeared as motor or basic were checked against the broad literature on IK, sustainability education, and global citizenship to ensure that their classification reflected empirical centrality and theoretical importance. Emerging or niche themes were also inspected to determine whether they represent genuinely new areas of inquiry (e.g., digital or climate resilience, Ubuntu, and indigenous internationalization) or specialized subfields.

Finally, to enhance transparency and replicability, key analytical decisions—including database selection, time window, keyword construction, inclusion/exclusion criteria, and threshold settings for co-occurrence and thematic analyses—are explicitly reported. These procedures provide a robust methodological foundation for interpreting the evolution of IK, sustainability, and curriculum internationalization as interconnected research domains in higher education.

RESULTS AND ANALYSIS

Annual Scientific Production

From 2016 to 2025, the research output on IK in sustainability education increased steadily, with a marked acceleration after 2018. A clear upward trend is observed in the annual scientific production in IK and sustainability education. The output remained

below 10 publications per year from 2016 to 2018. A gradual increase began in 2019, followed by a sharp increase after 2022, reaching approximately 50 publications in 2025. The trajectory indicates expanding scholarly interest in the intersection of IK, sustainability, climate education, and curriculum design. The post-2018 surge coincided with heightened global attention to SDG 4.7 and SDG 13, which promoted inclusive, culturally responsive sustainability education (UNESCO, 2020). This trend also signals strengthened collaboration between institutions in developed and developing countries to incorporate indigenous ways of knowing into higher education.

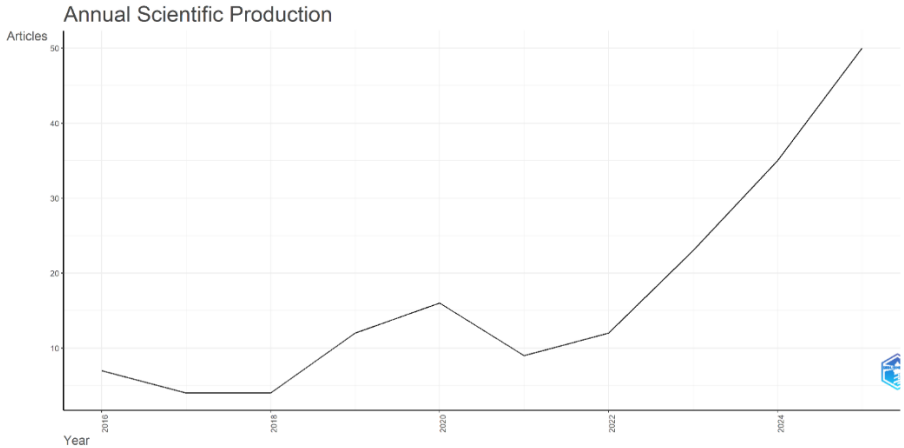

Figure 1: Annual Scientific Production on Indigenous Knowledge (IK) and Sustainability Education (2016–2025)

Note. Generated using Biblioshiny (Bibliometrix R package) on the basis of Scopus data retrieved in November 2025.

Country Scientific Production

The geographic distribution of publications reveals considerable variation. The United States leads with 155 documents, followed by Australia (55), Canada (53), South Africa (46), and Brazil (33). Additional contributors include Indonesia (31), the United Kingdom (24), Italy (17), Germany (16), and China (15) (Table 1). These figures represent total contributions, including internationally coauthored works. The map indicates higher output (darker shading) in the United States, Australia, and Canada, while the notable participation of South Africa, Brazil, and Indonesia underscores growing engagement from the Global South in context-specific sustainability research. This distribution highlights extensive international collaboration and the integration of local IK into global sustainability, education, and environmental strategies. Country productivity reflects total contributions, including internationally coauthored publications.

High concentrations in the United States and Australia reflect robust academic infrastructure and funding availability. Rising contributions from emerging economies indicate a shift toward inclusive, context-based research.

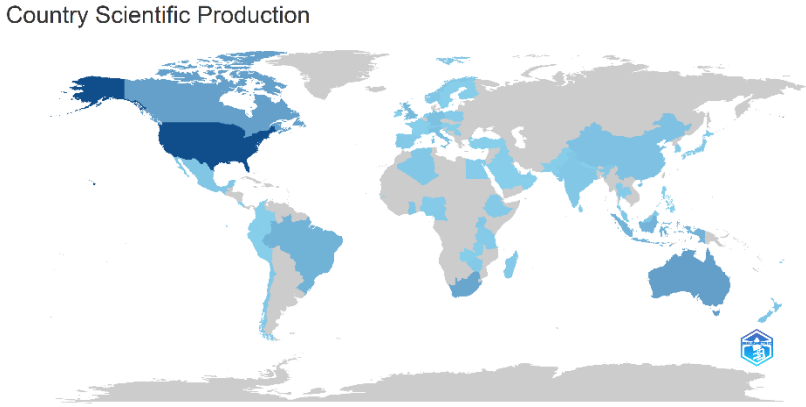

Figure 2: Scientific Production in IK and Sustainability Education Per Country (2016–2025)

Table 1: Scientific Production in IK and Sustainability Education Per Country (2016–2025)

Country	Frequency
United States	155
Australia	55
Canada	53
South Africa	46
Brazil	33
Indonesia	31
United Kingdom	24
Italy	17
Germany	16
China	15

Note. Data extracted from Scopus (n = 173) and visualized using Biblioshiny.

Keyword Cooccurrence Analysis

Keyword co-occurrence analysis using VOSviewer reveals five primary clusters centered on "IK," "sustainability," "education," "traditional ecological knowledge," and "sustainable development." Strong connections exist among terms such as climate change, curriculum, higher education, environmental education, and teacher education,

confirming the field's interdisciplinary character. The strongest associations link IK with sustainability, reflecting increasing attention to how local wisdom informs biodiversity conservation and education. Additional clusters involving *decolonization, place-based education, and Ubuntu* highlight the growing prominence of decolonial and culturally responsive approaches in research and policy.

The keyword network shown in Figure 3 reveals the key conceptual clusters:

Cluster 1 (Red): Sustainability, curriculum, teacher education.
Cluster 2 (blue): IK, higher education, environmental education.
Cluster 3 (Green): Biodiversity, participation, learning, and human knowledge.
Cluster 4 (Yellow): Ubuntu, Africa, and place-based education.

Core nodes, including "IK," "Sustainability," and "Education", underscore the field's interdisciplinary and international scope.

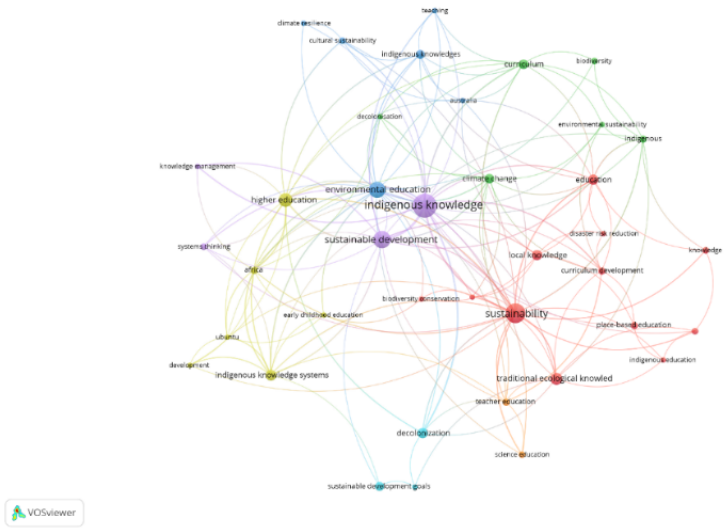

Figure 3: Keyword Co-Occurrence Network of Research on IK, Sustainability, and Higher Education

Note. Generated using VOSviewer (Van Eck & Waltman, 2009) using author keywords with minimum occurrence thresholds.

Thematic Map

The thematic map positions the themes according to centrality and density, indicating their relevance and maturity.

Motor Themes (high centrality and density): These include sustainability, IK, and environmental protection. These factors drive research that connects education, policy, and sustainability.
Basic Themes (high centrality, moderate density): Local knowledge, sustainable development goals, and IK systems serve as foundational yet evolving areas, showing continued theoretical and empirical refinement.
Emerging or declining themes (low centrality and density): Topics such as global citizenship, climate resilience, and intercultural education appear in the lower-left quadrant, showing emerging or waning research interest.
Niche Themes (low centrality, high density): Community participation and decoloniality occupy the upper-left quadrant, highlighting specialized yet influential subfields focused on local learning and participatory sustainability.

The thematic evolution categorizes areas into the following:

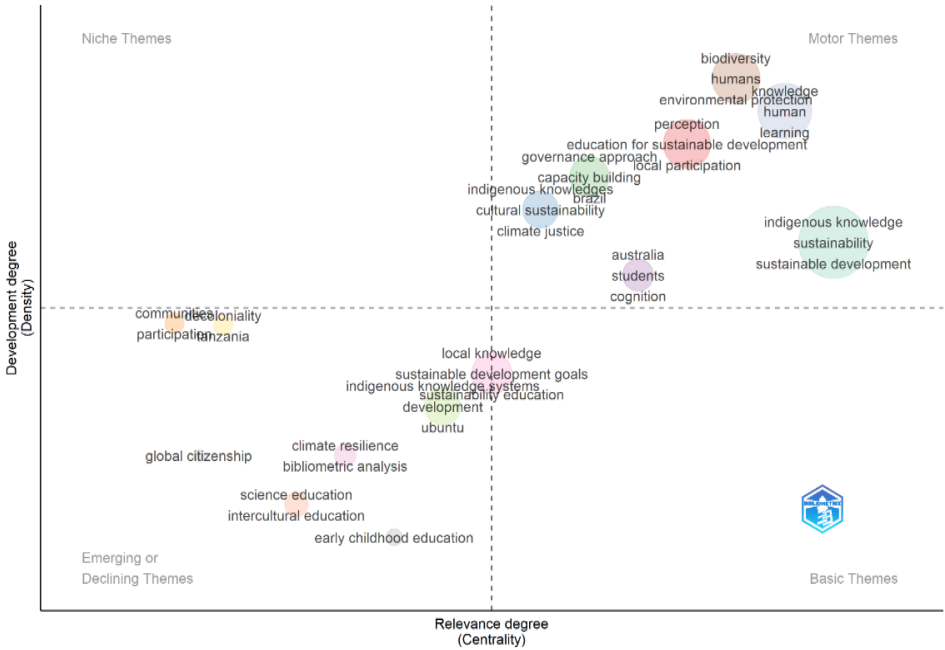

Figure 4*:* Thematic Evolution of Research on IK and Sustainability in Higher Education (2016–2025)

Motor Themes: IK, Sustainability, Biodiversity.
Niche Themes: Community Participation, Decoloniality.
Emerging Themes: Global Citizenship, Climate Resilience, Early Childhood Education.
Basic Themes: Local Knowledge, SDGs, Ubuntu.

This reflects a shift from local ecological research (2016–2019) to sustainability and curriculum internationalization (2023–2025).

DISCUSSION

This study presents a global scientometric analysis suggesting that IK has transitioned from the margins of sustainability discourse to a structurally significant position within higher education research, particularly in relation to curriculum transformation, decolonization, and global citizenship. The sharp increase in publications after 2018 reflects increased scholarly attention and a broader policy shift following the adoption of the SDGs, especially 4.7 (education for sustainable development and global citizenship) and 13 (climate action). These trends indicate that IK is increasingly positioned beyond localized ecological contexts and is gaining relevance within international education discourse.

Implications for International Students' Learning Experiences

For international students, integrating IK into curricula has significant pedagogical and epistemological implications. Engagement with indigenous perspectives disrupts the dominance of Western knowledge systems and exposes students to alternative worldviews grounded in relationality, spirituality, land-based ethics, and community accountability. This exposure may contribute to the development of intercultural competence, ethical reasoning, sustainability literacy, and global citizenship—attributes widely recognized as essential for graduates in international education.

The growing emphasis on curriculum internationalization and teacher education within the IK research landscape indicates that international students are increasingly encountering indigenous epistemologies not only in elective sustainability courses but also within core disciplinary curricula. Participation in community-based learning projects, indigenous research partnerships, and place-based sustainability initiatives further enables international students to experience internationalization "at home," which is consistent with Leask's non-mobility-centered IoC framework. Consequently, the integration of IK has the potential to strengthen international students' learning environments by fostering epistemic humility, cross-cultural empathy, and socially responsible global engagement.

Shifts in Global Knowledge Power and North–South Dynamics

The geographic distribution of research output reflects the continuity and change in global knowledge power structures. While the United States, Australia, and Canada

remain dominant contributors—reflecting robust funding ecosystems and institutionalized indigenous research frameworks—the substantial increase in contributions from South Africa, Brazil, India, and Indonesia signals the expanding presence of the Global South. This shift indicates a gradual rebalancing of epistemic authority in which IK is no longer filtered exclusively through northern academic institutions; instead, it is increasingly articulated through indigenous and postcolonial research contexts.

However, asymmetry in publication volume reveals persistent inequalities in research infrastructure, access to funding, and international visibility. These structural disparities underscore the need for equitable North–South collaboration models, capacity building, and strategies for open-access dissemination to prevent the appropriation or recentralization of IK among elite global institutions.

From Descriptive Mapping to Institutional and Policy Transformations

In addition to documenting growth patterns, this study reveals important contradictions and gaps in the global landscape of IK research. Although curriculum decolonization and global citizenship are seemingly emerging themes, their centrality remains relatively low compared with that of sustainability and environmental protection. This notion suggests that while policy discourses increasingly reference decolonization and epistemic justice, institutional implementation remains inconsistent. Many universities continue to integrate IK symbolically instead of structurally within programs, assessment frameworks, and faculty development systems.

For higher education institutions, this finding implies that the meaningful integration of IK requires more than curricular add-ons. It demands systemic transformations in terms of curriculum governance, teacher education, research ethics, and international partnership design. For policymakers, the results highlight the need for regulatory frameworks to protect indigenous intellectual sovereignty, promote community coauthorship, and ensure that internationalization does not reproduce extractive knowledge practices. These findings align with the Journal of International Students' focus on inclusive, globally responsive, and sustainability-oriented higher education by highlighting the evolving curricular contexts within which international students learn.

CONCLUSION

This global scientometric review suggests that IK has become a structurally significant force in the reconfiguration of higher education toward sustainability, decolonization, and internationalization. The sustained growth in research output between 2016 and 2025, with a notably sharp acceleration after 2018, indicates that IK is no longer limited to localized environmental or cultural studies. It is now embedded in international debates on curriculum reform, teacher education, and global citizenship. This trajectory signals a broad shift in international education—from mobility-centered models to knowledge-centered, value-driven, and socially responsible internationalization.

From the perspective of the *Journal of International Students*, the findings reveal that IK is increasingly influencing the learning environments of international students. Through the internationalization of the curriculum, place-based education, and decolonial pedagogy, international students are being exposed to diverse epistemologies that challenge the dominance of Western knowledge and foster ethical engagement through sustainability, culture, and community. This aspect supports a more inclusive model of international education in which intercultural learning is grounded not only in cross-border movements but also in epistemic diversity and curriculum justice.

The dominance of contributions from the United States, Australia, Canada, South Africa, and emerging regions in the Global South, such as India, Brazil, and Indonesia, reflects the institutional strength and evolving knowledge dynamics between the Global North and the Global South. While it signals greater global participation, it also reveals persistent structural inequalities in research visibility and resources. These asymmetries underscore the need for internationalization frameworks that prioritize equitable partnerships, indigenous intellectual sovereignty, and reciprocal knowledge production rather than extractive or symbolic inclusion.

Thematic evolution indicates a paradigm shift from early environmental and biodiversity-centered studies to the recent emphasis on curriculum decolonization, teacher education, sustainability pedagogy, and global citizenship. This shift aligns with Leask's internationalization of the curriculum, Knight's internationalization cycle, and de Wit's critical internationalization framework. These perspectives affirm that IK is becoming a core driver of transformative international education rather than a peripheral supplement.

The implications for higher education institutions are clear: the meaningful integration of IK requires systemic transformation across curriculum governance, faculty development, assessment practices, research ethics, and international partnership design. For international students, exposure to indigenous epistemologies enhances intercultural competence, sustainability literacy, ethical reasoning, and global responsibility—capabilities essential for navigating complex global challenges.

In summary, this study establishes IK as a central pillar in the evolving architecture of sustainable and internationalized higher education. It advances a vision of international education grounded in epistemic plurality, ecological responsibility, cultural reciprocity, and social justice, thus offering a robust empirical foundation for educators, policymakers, and international program designers geared toward inclusive global learning.

FUTURE RESEARCH DIRECTIONS

While this study provides a comprehensive global scientometric overview of IK, sustainability, and internationalized higher education from 2016 to 2025, several critical directions for future research emerge. First, cross-database validation using Web of Science, Dimensions, and Lens.org is needed and may strengthen the robustness of the global trend analysis while identifying regional journals that may be underrepresented in Scopus. This triangulation would enhance the visibility of indigenous scholarship from nonwestern publication ecosystems.

Second, future studies should extend beyond descriptive mapping toward longitudinal and predictive modeling, including topic modeling, bibliometric forecasting, and dynamic network analysis. These approaches could identify emerging frontiers such as indigenous data sovereignty, AI and indigenous ethics, climate-induced student mobility, and digital sustainability education.

Third, a notable need emerges for empirical research on the lived learning experiences of international students in IK-integrated curricula. While bibliometric evidence reveals rapid growth, studies that use qualitative and mixed methods are needed to examine the cognitive, cultural, and ethical engagement of international students with indigenous epistemologies in classrooms, fieldwork, and community partnerships.

Fourth, future research should analyze the implementation of institutional policy, shifting from rhetoric to practice. Comparative case studies across regions could be conducted to examine universities' operationalization of decolonized and indigenous-informed curricula within accreditation systems, international partnership agreements, and transnational education programs.

Fifth, the relationship between IK and the mobility patterns of international students remains understudied. Future investigations could examine whether IK-centered sustainability programs influence destination choice, intercultural adjustment, and global employability outcomes among international students.

Finally, greater scholarly attention must be given to ethical governance, intellectual property, and knowledge co-ownership in international IK collaborations. As IK becomes increasingly internationalized, safeguarding indigenous rights, community support, and benefit-sharing mechanisms must become the core pillars of global research and education policy.

Collectively, these future directions position IK not only as a subject of sustainability education but also as a transformative force in the formation of the ethics, governance, and pedagogy of international higher education in the decades ahead. Although this study does not directly examine international students, it provides a robust empirical foundation for understanding the evolving curricular environments that shape international student learning in globally interconnected higher education systems.

NOTE: In the preparation of this manuscript, the authors utilized Artificial Intelligence (AI) tools, including ChatGPT (OpenAI), for language refinement, structuring, and editing support. All content has been critically reviewed, validated, and substantially developed by the authors to ensure originality, accuracy, and adherence to academic integrity standards.

REFERENCES

Acharya, C. N. (2025). Justice-oriented tourism education: Advocacy for reforming Global North curricula with Global South knowledge for sustainability. *Journal of International Students, 15(10), 41–60.* https://doi.org/10.32674/hhs39r16

Ahmi, A. (2024) biblioMagika, available from https://bibliomagika.com

Akalibey, S., Hlaváčková, P., Schneider, J., Fialová, J., Darkwah, S., & Ahenkan, A. (2024). Integrating Indigenous knowledge and culture in sustainable forest management via global environmental policies. *Journal of Forest Science, 70*(6), 265–280. https://doi.org/10.17221/20/2024-jfs

Anand, S., Sonar, R. M., & Jain, K. (2025). Traditional knowledge research in India: A bibliometric-based review and thematic analysis. *Indian Journal of Traditional Knowledge, 24*(3), 275–287. https://or.niscpr.res.in/index.php/IJTK/article/view/9491

Altbach, P. G., & Knight, J. (2007). The internationalization of higher education: Motivations and realities. *Journal of Studies in International Education, 11*(3–4), 290–305. https://doi.org/10.1177/1028315307303542

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

Basumatary, B., Robin, K., Arvind, N., & Verma, M. K. (2024). Mapping of Indigenous knowledge research in India: A review of growth, emerging topics and future research directions based on scientometric tools. *Journal of Ethnic and Cultural Studies, 11*(4), 148–168. https://doi.org/10.29333/ejecs/1731

Carrin, M. (2024). Indigenous knowledge and sustainability. *The Oriental Anthropologist, 24*(1), 13–31. https://doi.org/10.1177/0972558x241227859

Díaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M., Ash, N., Larigauderie, A., Adhikari, J. R., Arico, S., Báldi, A., Bartuska, A., Baste, I. A., Bilgin, A., Brondizio, E., Chan, K., Figueroa, V. E., Duraiappah, A., Fischer, M., Hill, R., … Zlatanova, D. (2015). The IPBES conceptual framework—Connecting nature and people. *Current Opinion in Environmental Sustainability, 14*, 1–16. https://doi.org/10.1016/j.cosust.2014.11.002

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

World Bank. (2024). *Indigenous peoples' resilience: Enhancing access to benefits while lowering emissions* (Report). World Bank.

Gondo, R. (2025). Bibliometric analysis of Indigenous knowledge systems and climate change adaptation literature, 1993–2023. *IFLA Journal*. Advance online publication. https://doi.org/10.1177/03400352251317716

Haigh, M. (2008). Internationalization, planetary citizenship and higher education inc. *Compare: A Journal of Comparative and International Education, 38*(4), 427–440. https://doi.org/10.1080/03057920701582731

Sumida Huaman, E. A., Chiu, B., & Billy, C. (2019). Indigenous internationalization: Indigenous worldviews, higher education, and tribal colleges and universities. *Education Policy Analysis Archives, 27*, 101. https://doi.org/10.14507/epaa.27.4366

Leask, B. (2015). *Internationalizing the curriculum*. Routledge.

Ilieva, R., Beck, K., & Waterstone, B. (2014). Toward sustainable internationalization of higher education. *Higher Education, 68*(6), 875–889. https://doi.org/10.1007/s10734-014-9749-6

Marsandi, F., Sutadji, E., Kuntadi, I., Rizal, F., Nur Rahma, A. B., & Fajri, H. (2025). Integrating ethnobotany and Indigenous knowledge into higher education curricula: Insights from a global bibliometric analysis. *Ethnobotany Research and Applications, 30*, 1–12. https://doi.org/10.32859/era.30.17.1-12

Mbah, M. F., Ajaps, S., Johnson, A. T., & Yaffa, S. (2022). Envisioning the indigenized university for sustainable development. *International Journal of Sustainability in Higher Education, 23*(7), 1667–1684. https://doi.org/10.1108/ijshe-09-2021-0413

Mbah, M., & Johnson, A. (2021). Special issue introduction: Exploring the role of indigenous knowledge in postsecondary policies and practices toward sustainable development. *Journal of Comparative & International Higher Education, 13*(3), 7–19. https://doi.org/10.32674/jcihe.v13isummer.3931

Mohanty, A., Ghosh, A., & Roy, S. (2024). Calling for better ecological values: Integrating Indigenous knowledge system with sustainable policies. *Purushartha: A Journal of Management, Ethics and Spirituality, 17*(1), 39–50. https://doi.org/10.21844/16202117103

Padayachee, K., Matimolane, M., & Ganas, R. (2018). Addressing curriculum decolonization and education for sustainable development through epistemically diverse curricula. *South African Journal of Higher Education, 32*(6), 288–304. https://doi.org/10.20853/32-6-2986

Tengö, M., Hill, R., Malmer, P., Raymond, C. M., Spierenburg, M., Danielsen, F., Elmqvist, T., & Folke, C. (2017). Weaving knowledge systems in IPBES, CBD and beyond—Lessons learned for sustainability. *Current Opinion in Environmental Sustainability, 26–27*, 17–25. https://doi.org/10.1016/j.cosust.2016.12.005

Van Eck, N. J., & Waltman, L. (2009). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Wu, Y. J., & Shen, J. (2016). Higher education for sustainable development: A systematic review. *International Journal of Sustainability in Higher Education, 17*(5), 633–651. https://doi.org/10.1108/ijshe-01-2015-0004

Yuan, X. (2025). Exploring the needs for Indigenous allyship among postsecondary international students in Canada. *Journal of International Students, 15*(2), 183–203. https://doi.org/10.32674/56b7kr09

Zari, M. P., Abbott, M., Chenery, I., Smith, H., Kiddle, R., Tone, L., & Ershadi, S. (2025). Indigenous knowledge driven nature-based solutions: Findings from an international design competition. *Nature-Based Solutions, 8*, 100252. https://doi.org/10.1016/j.nbsj.2025.100252

bios

VINODH KUMAR is a PhD Research Scholar in Library and Information Science at Lovely Professional University, India. His research interests include bibliometric and scientometric analysis, indigenous knowledge systems, sustainability in higher education, and curriculum internationalization. Email: vinodhkb1@gmail.com

KHUSBU THAKUR, PhD, is an Assistant Professor at Lovely Professional University, India. Her academic interests focus on information management, research methodologies in library science, scholarly communication, and emerging trends in knowledge organization. Email: khusbu.31576@lpu.co.in