

Review

Mapping the Trajectory of Planetary Health Education—A Critical and Constructive Perspective from the Global South

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Abstract

The planetary health approach has gained traction in academic and international governance spheres; however, its limited integration into education systems has hindered its emergence as a universal framework for addressing the triple planetary crisis (climate change, biodiversity loss, and pollution) and its impacts on individual well-being and global health systems. We mapped the evolution of the educational approach to planetary health between 2015 and 2025 from a critical and constructive perspective, using a bibliometric and thematic analysis. Through the bibliometric analysis, we found that publications from the Global North predominate, focusing on health programmes and topics such as climate change, One Health, Global Health and Public Health. The thematic analysis, based on inductive categorisation, allowed us to identify criticisms of the educational approach, such as its curricular marginalisation and limited scalability. From an epistemological perspective, these criticisms refer to technoscientific reductionism, the invisibility of non-Western epistemologies and the decoupling of cognition and environment. Given these limitations, we propose a reconstruction of the planetary health approach along three critical dimensions: Motivation, Legitimacy and Epistemology. This reconstruction is projected into short-, medium- and long-term scenarios at the university level, particularly as part of curriculum reform efforts, to broaden the pedagogical impact and promote a more inclusive and transformative vision.

Keywords: planetary health; education; university curriculum; critical theory; Global South

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1. Introduction

The planetary health approach is more than a vision of the current state of human–environment interaction. It is understood as the interdependent vitality of natural and human-made ecosystems, encompassing biological ecosystems that sustain biodiversity, as well as the social, political, economic and entrepreneurial systems that promote health equity, high-level well-being, and sustainable trade at both local and global scales [1]. Justice, for its part, is not peripheral to the planetary health approach—it is foundational [2], holistically integrated into the interdisciplinary knowledge drawn from public health, environmental science, and sustainable development, in order to devise long-term strategies that advance both sustainability and equity [3].

The planetary health approach is embedded within a longstanding intellectual genealogy, shaped by the gradual convergence of knowledge systems originating from diverse cultural and disciplinary traditions. Since the 1970s, holistic, ecological, and integrative currents have progressively linked human well-being to ecosystem stability, articulating a broadened vision that encompasses the personal, communal, and planetary domains. In the 1980s, environmental activists notably called for an expansion of the World Health Organisation's definition of health to include ecological and planetary dimensions. This perspective was further enriched by Indigenous knowledge and environmental movements. It was consolidated in 2015 through the Rockefeller–Lancet report, and in 2018 via the Canmore Declaration, which outlined ethical and operational principles for interdisciplinary implementation [4,5].

Nevertheless, the decline of planetary health is progressing at a pace that exceeds current efforts to reform the global development paradigm and the prevailing lifestyles responsible for the so-called triple planetary crisis (climate change, biodiversity loss, and pollution). It is estimated that climate change will cause 250,000 additional deaths annually between 2030 and 2050, while pollution will cause 9 million premature deaths worldwide [6]. Under a fossil fuel-based development scenario, ecoregions worldwide could lose 20.8% of their plant species by 2050 [7]. According to various studies, current projections estimate a global species loss of ~12–40% [8]. Industrialised countries contribute significantly to biodiversity loss beyond their borders through their demand for agricultural and forestry products cultivated in other countries [9]. The scale of human-induced environmental impacts is undermining nutrition and mental health, heightening exposure to both infectious and non-communicable diseases, and contributing to population displacement and social conflict [10].

As a foundational institution, education plays a pivotal role in the planetary health approach, fostering among educators, researchers, students, and university graduates the development of the knowledge–action nexus [11]. Educating citizens who are aware of and take responsibility for the relationship between ecosystem health, their health, and global health requires more than just slogans; it necessitates the integration of these principles into formal education and lifelong learning processes.

Recent studies show that planetary health has gained prominence, particularly in university education and health-related professions [12]. They propose a comprehensive understanding of the interrelated Earth–human systems, foster transdisciplinary and interdisciplinary approaches, and encourage the analysis of diverse cultural contexts [5,6]. However, efforts to operationalise the planetary health approach in education (PHAE) have mainly been documented in the Global North [13]. Research in this area shows inconsistent growth [3]. There is a lack of studies analysing instructional strategies within this approach. Although PHAE is increasingly being adopted, it has not yet been fully implemented or integrated into various settings. Humanity is far from making the cultural shift necessary to realise the promise of planetary health as a movement that places the health of people and the planet at the centre of all policies and actions [14]. This underlines the limited impact of education as the primary means of socialisation to achieve such change.

In this paper, we trace the path of PHAE through a bibliometric analysis. We identify and critically analyse how the scientific community has taken up this topic. We identify the most pressing gaps and challenges and then formulate a proposal from the Global South aimed at integrating the planetary health approach as a cross-cutting theme in the university curriculum, striking a balance between urgency, operationality, transdisciplinarity and feasibility that contributes to the training of global citizens responsible for the care of the planet.

2. Theoretical Architecture

2.1. Critical Theory: A Reflexive Lens

Critical theory (CT) is primarily conceived as a form of social, cultural or political critique whose central aim is emancipation, understood as the overcoming of oppression and injustice [15]. While historically rooted in the tradition of radical social [16], CT aspires to function as a theory of society, as explicitly pursued by its first generation through a culturally modified Marxism [17].

Under its broad designation, CT encompasses diverse currents, including the classical Frankfurt School, ideology critique, radical feminism, critical race theory and postcolonial studies [15]. Despite their distinct trajectories, these strands share a normative commitment to social transformation [17], guided by the analysis of conditions that give rise to systematic suffering—affecting both human lives and non-human entities, such as the degradation inflicted upon natural systems [17].

CT is grounded in the lived experience of individuals within their immediate socio-historical contexts, enabling the identification and promotion of social potentials with normative implications [15,17]. Its methodological orientation, shaped by Marxism, Weberian sociology and functionalist theory, reflects a Young Hegelian logic of integrated critique and emancipatory praxis [17].

Four defining features characterise CT: it is emancipatory; embedded, in that it focuses on overcoming forms of unfreedom affecting people “here and now”; diagnostic, through its critique of oppressive practices; and self-reflexive regarding the role of theory in enabling or obstructing emancipation [15]. This reflexivity allows CT to challenge normative assumptions and stimulate imaginative reconstructions of hazardous conditions, including ecological realities [18].

CT seeks not only to interpret society but to transform it through a democratic lens, wherein core moral-political concepts—legitimacy, critique, equality, freedom, dignity, authenticity and secularism—acquire moral and legal validity within social arrangements [17]. Its concern for social justice and the good life translates into a practical commitment to emancipation and the unlocking of obstructed normative [16,17].

Critical theory conceptualises justice as the minimisation of potential harms arising from actions aimed at reducing inequalities [19]. Justice serves a socially orienting function [20]; for instance, in environmental contexts, a critical approach to justice can illuminate and address the disproportionate exposure to pollutants affecting specific social groups and ecosystems [21].

This study adopts the notion of CT as a form of social critique situated within socio-historical contexts. It embraces diagnostic and reflexive analysis to interrogate prevailing normative frameworks, affirming its commitment to societal transformation and the pursuit of justice in the construction, dissemination, utilisation, and application of knowledge concerning Planetary Health Education (PHAE) in the Global South.

2.2. The Global South: An Epistemic Frontier

The Global South is a construct that attempts to depict the complex network of interactions between different groups of countries from a broad perspective. Although the concept has moved beyond geographical references since the publication of the Brandt Line in the 1980s—a framework developed by Willy Brandt to classify countries according to income levels and economic development [22] (Figure 1)—it typically refers to countries and regions shaped by colonisation, excluded from the global economic system, and facing persistent development and equity challenges, including poverty and dependency linked to primary product exports [23,24]. From a CT perspective, the Global South has been characterised as a space of resistance to global capitalism [25].

The term has been used mainly to presuppose a unit of analysis that reinforces the narrative of precarity and subalternity [25], summarising in a structuralist vision what is, in reality, an archipelago of experiences, levels, and conditions of development. Indeed, recent trends indicate that several nations in the Global South are currently outperforming their regional peers and even some in the Global North, such as China. In contrast, countries like India and Indonesia are projected to enter the world's top four economies by 2030 [24], according to specific academic analyses. Meanwhile, specialised platforms such as World Economics [26] reported that, as of September 2025, four Global South countries—China, India, Indonesia, and Brazil—ranked first, third, sixth, and eighth, respectively, in terms of economic size, measured by Gross Domestic Product adjusted for Purchasing Power Parity.



Figure 1. 1980 Original Brandt Line according to Bahri [10]. Map generated via MapChart licensed under a Creative Commons Attribution-ShareAlike 4.0 International License [27].

However, based on the prevailing binary concepts since the advent of the Brandt Line and the conceptual positions of CT, the Global South is revealed as an object of diffuse analysis in which technological, commercial and economic powers such as China or Malaysia, advanced countries in human, democratic and sustainable development such as Uruguay and Costa Rica, with other countries that are recipients of international aid such as Ghana, Uganda and Vietnam, among others [28]. This complexity has led some scholars to coin the term “Global Souths” [29].

As a heuristic geopolitical division, the Global South comprises all countries in Latin America, Africa, the Middle East and Asia (except Japan, South Korea, Singapore, Taiwan and Israel). The Global North includes the exceptions mentioned above, countries such as the United States, Canada, Australia, and New Zealand, as well as entire continents like Europe (despite the differences in development levels between Western and Eastern Europe) [22,23,30–32].

As an epistemological entity, however, the South is not unique but rather an intellectual, political, and ethical position that challenges the Western hegemonies of knowledge. The epistemological South refers to a set of critical perspectives that emerge from or are in

solidarity with the historical experiences of inequality that characterise the Global South. It is not limited to a geographical location, but represents an epistemic position that questions the dominant ways of producing, validating, and applying knowledge [33,34].

In this study, we identify authors and perspectives which, irrespective of their geographical origin (whether from the Global North or South), challenge the dominance of Western methods, methodologies, and theories in research and knowledge production. Rather than contributing to their universalisation, these positions foster a critical interrogation of the assumptions, motivations, and values underpinning research practices [35]. Within the context of PHAE, this is expressed through the formulation of alternative epistemologies or the facilitation of non-hegemonic conceptual frameworks.

For purely analytical purposes, we will use both the geopolitical (Figure 1) and epistemological perspectives to delineate and understand the dichotomy between the North and the Global South.

3. Materials and Methods

We conducted a bibliometric analysis to quantitatively analyse the scientific literature and provide a detailed description of the links and patterns within the research field. We also conducted a qualitative thematic analysis to gain insights into discrepancies, contradictions, and knowledge gaps, creating a space for theorising [36]. Finally, we utilised a critical, theory-based approach [18,37] to challenge the current perspective on PHAE and offer a transformative proposal.

Stage 1: Bibliometric analysis. We conducted an academic literature search using the open-access academic platform <https://www.lens.org/> (accessed on 28 September 2025). This free database aggregates content from bibliographic resources, including Microsoft Academic (203 million records), CrossRef (172 million), OpenAlex (74 million), and PubMed (39 million). It comprises over 290 million scientific records, of which more than 68 million are open-access. These records originate from over 100,000 editorial sources worldwide (<https://www.lens.org/>) [38]. The integration of data from Microsoft Academic and CrossRef renders it comparable to traditional bibliometric platforms such as Scopus and Web of Science [39].

Given the various search options offered by <https://www.lens.org/> [40], we chose the Scholarly Works option, which allowed us to exclude patents from the outset. We used a simple search term: Planetary and Health and Education, and the following filters: Year Published = (2015–2025), Publication Type = (journal article), External ID Type = (DOI, OpenAlex, PubMed, PubMed Central, Microsoft Academic), Open Access Colour = (gold).

The search resulted in 253 articles. When creating the collection of selected articles, the platform prevents the inclusion of duplicates. We detected and eliminated one peer review report. We applied the following exclusion criteria (EC): EC1, articles unrelated to education (27 exclusions), and EC2, educational articles on environmental topics that did not include PHAE as a substantial part of the text (30 exclusions). One article appears to be unavailable or inaccessible through the sources reviewed, yielding a final sample of 194 articles. The PRISMA flow diagram illustrates the search and selection process undertaken (Figure 2).

We used <https://www.lens.org/> [40] to analyse the following indicators: Scholarship Works Over Time, Most Active Countries/Regions, and Top Institutions. The mapping of <https://www.lens.org/> to the data used for the bibliometric analysis is supported by the following iframe code: `<iframe src="https://lens.org/lens/embed/attribution" scrolling="no" height="30px" width="100%"></iframe>`. Scimago Graphica Beta 1.0.51 was employed to visualise the three aforementioned indicators.

We downloaded the collection created with <https://www.lens.org/> [40] into a CSV (Comma-Separated Values) file, which was then uploaded into the VOSviewer software version 1.6.20 to process the following indicators: Co-occurrence analysis, citation analysis and bibliographic linkage. We chose this software because it is free, easy to use, and supported by documentation and various tutorials on effective use [41].

Stage 2: Thematic analysis. This phase was developed from a simplification of the holistic approach proposed by Marzi et al. [36] and adapted to a bifocal framework based on Naeem et al.'s [41] conceptualisation of inductive and deductive categorisation:

- (a) We classified a sample of studies according to predefined analytical categories (deductive) based on the North–Global–South geopolitical heuristic classification. We selected only articles documenting concrete initiatives applying the planetary health approach in the context of university education or socio-formative community practices, using dialogue-based or participatory methods for adults. A total of 29 articles were selected.
- (b) We grouped the findings around new, inductively constructed analytical categories. First, we categorised the 29 initiatives according to their degree of institutionalisation. We distinguished between initiatives that promote greater institutionalisation of PHAE and those that promote emancipatory visions or focus on the participation and creativity of their interlocutors.

Secondly, we identified documents that highlight structural obstacles hindering the implementation of PHAE, focusing on pedagogical, curricular, and institutional dimensions that constrain its practical application. We also examined contributions from authors who describe epistemological barriers surrounding PHAE. Thirdly, we conducted a diagnostic mapping across the Global South, selecting articles that explore the situated realities of PHAE implementation, primarily within university settings.

Stage 3: In the discussion of the results, we formulated a proposal based on the thematic analysis findings. We based this on Stahl's [37] dimensions of criticality:

- (a) Motivation dimension: This is about the desire to promote change. In this study, we aim to reconcile the emphasis on describing phenomena with the need to intervene in order to achieve improvements.
- (b) Legitimacy dimension: This refers to the researcher's acceptance of the legitimacy of the status quo, i.e., the socio-economic structures that influence the phenomenon under study. In this case, we adopt an intermediate position between fully accepting and rejecting the status quo in the planetary health approach.
- (c) Epistemological dimension: This refers to the researcher's understanding of the nature of research and truth. In this case, we assume that we can ascribe plausibility to different positions on the planetary health approach, regardless of whether they assume the status quo or alternative epistemologies.

We have prioritised the literature published between 2023 and 2025, which is in the collection created with <https://www.lens.org/> [40], to inform stages 1 and 2. Due to the limited availability of documents on PHAE from the Global South, references from 2021 and 2022 were included to support a critical assessment of the approach in this region.

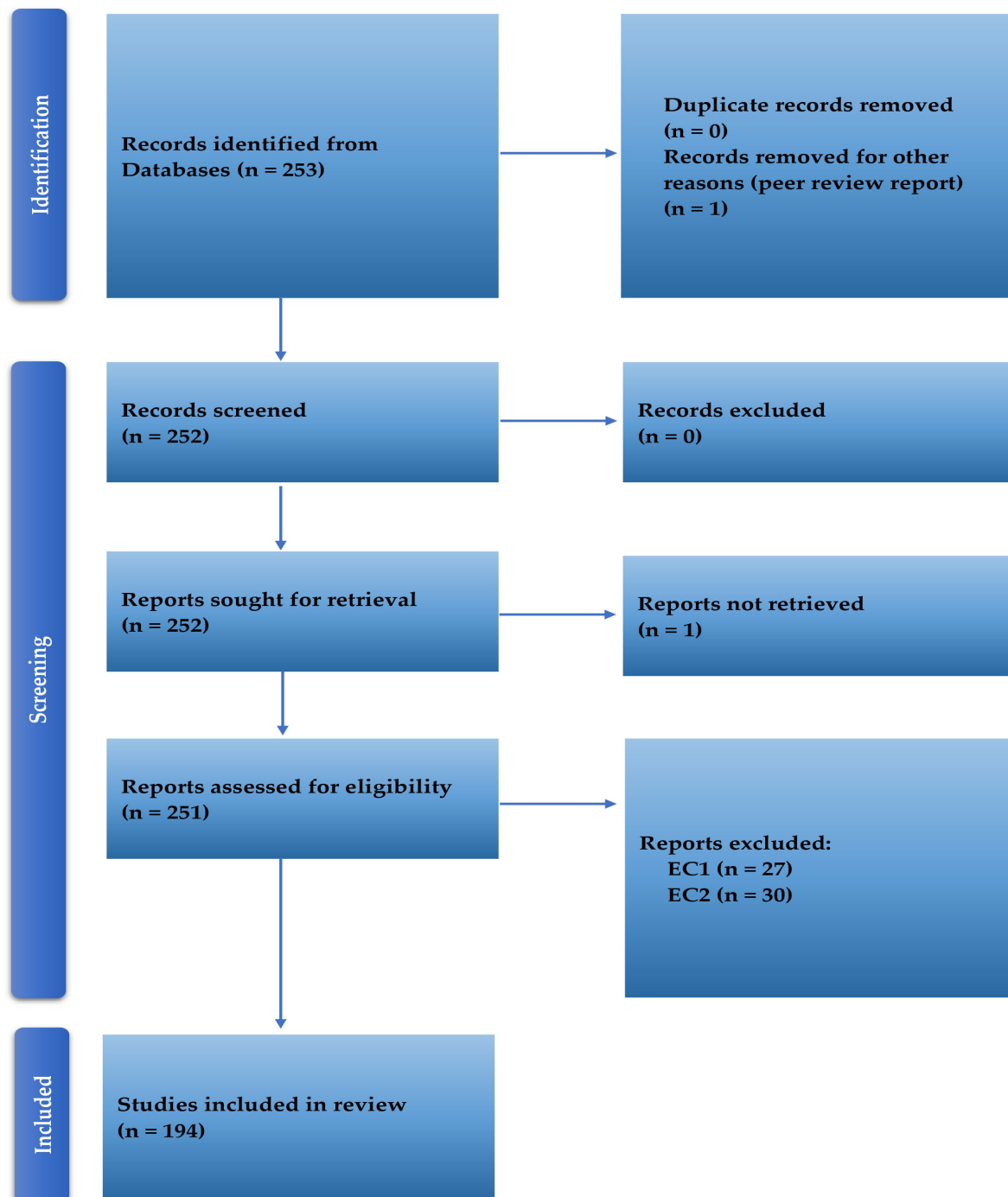


Figure 2. PRISMA flow diagram according to Page et al. [42].

4. Results

4.1. Bibliometric Analysis

4.1.1. Scholarly Works over Time

Figure 3 presents the year-by-year record of publications concerning PHAE, drawn from our curated dataset hosted on <https://www.lens.org/> [40], covering the years 2015 to 2025. The years with the highest number of scientific papers were 2023 (52 articles), 2024 (43 documents), and 2022 (37). It is worth noting that when the search in The Lens was completed in 2025, 20 open-access articles were identified, surpassing the number found in any of the years prior to 2022.

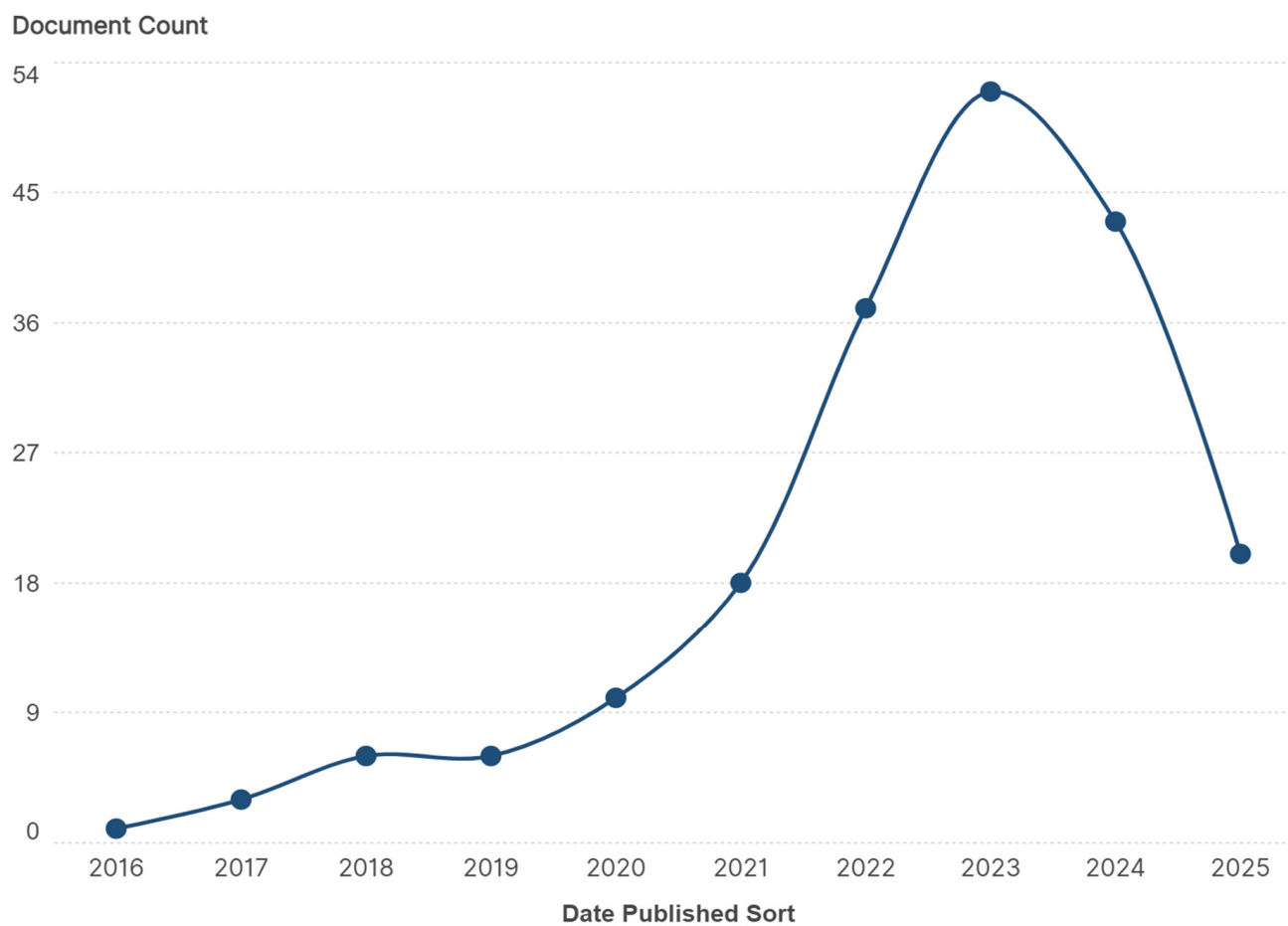


Figure 3. Scholarly Works Over Time. Source: <https://www.lens.org/> [40].

4.1.2. Type of Articles

Table 1 shows a range of article types, including empirical studies, integrative reviews, theoretical contributions, editorials, and conference reports. This distribution illustrates the variety of formats in the field of planetary health. It reflects the multidisciplinary nature and the coexistence of research, synthesis, and discursive engagement in academic publications.

Table 1. Type of articles.

Type of Article	No.
Original research articles	60
Review articles	36
Theory articles, essays and perspectives	21
Comments	20
Viewpoints	19
Case reports	13
Opinion articles	7
Conference reports	6
Abstracts	4
Editorials	4
Meeting Abstracts	3
Short Communications	1
Total	194

Source: <https://www.lens.org/> [40]. Count: The researchers conducted the enumeration by hand.

4.1.3. Most Active Countries/Regions

Figure 4 illustrates the dominance of the Global North in scientific production on the topic of PHAE, with publications from the United States (52), the United Kingdom (37), Australia (31), Canada (25), and Germany (18) accounting for 84% of the selected research publications. Among the countries of the Global South, Brazil (15), South Africa (9), Chile (4), India (4), China (3), and Colombia (3) are particularly noteworthy.

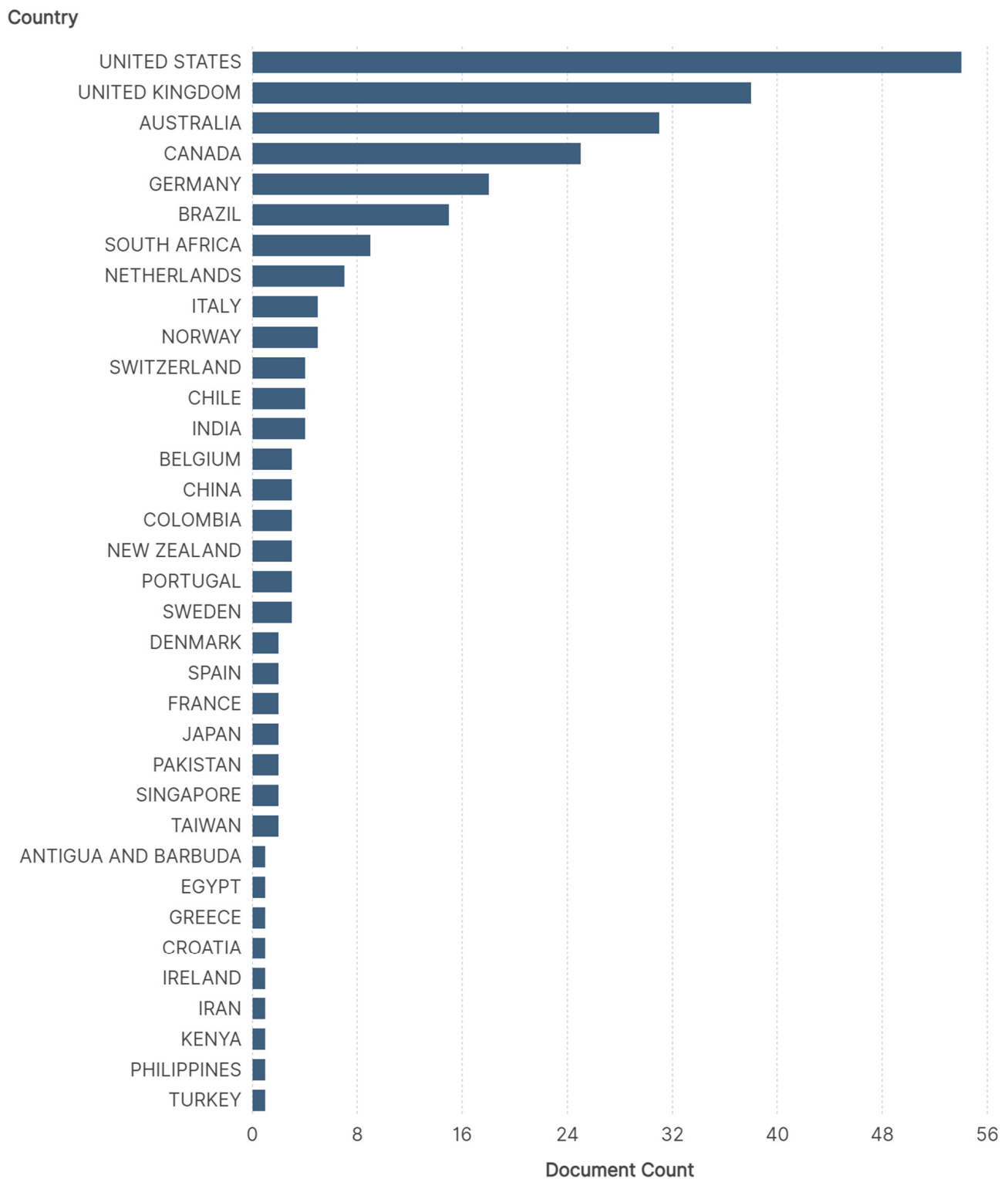


Figure 4. Most active Countries/Regions. Source: <https://www.lens.org/> [40].

4.1.4. Top Institutions

The institutions with the most significant number of publications are Harvard University (9), Monash University (9) and Heidelberg University (7). Note that the Universidade Federal do Rio Grande do Sul (4) and University of São Paulo (4) in Brazil are also represented in the list (Figure 5).

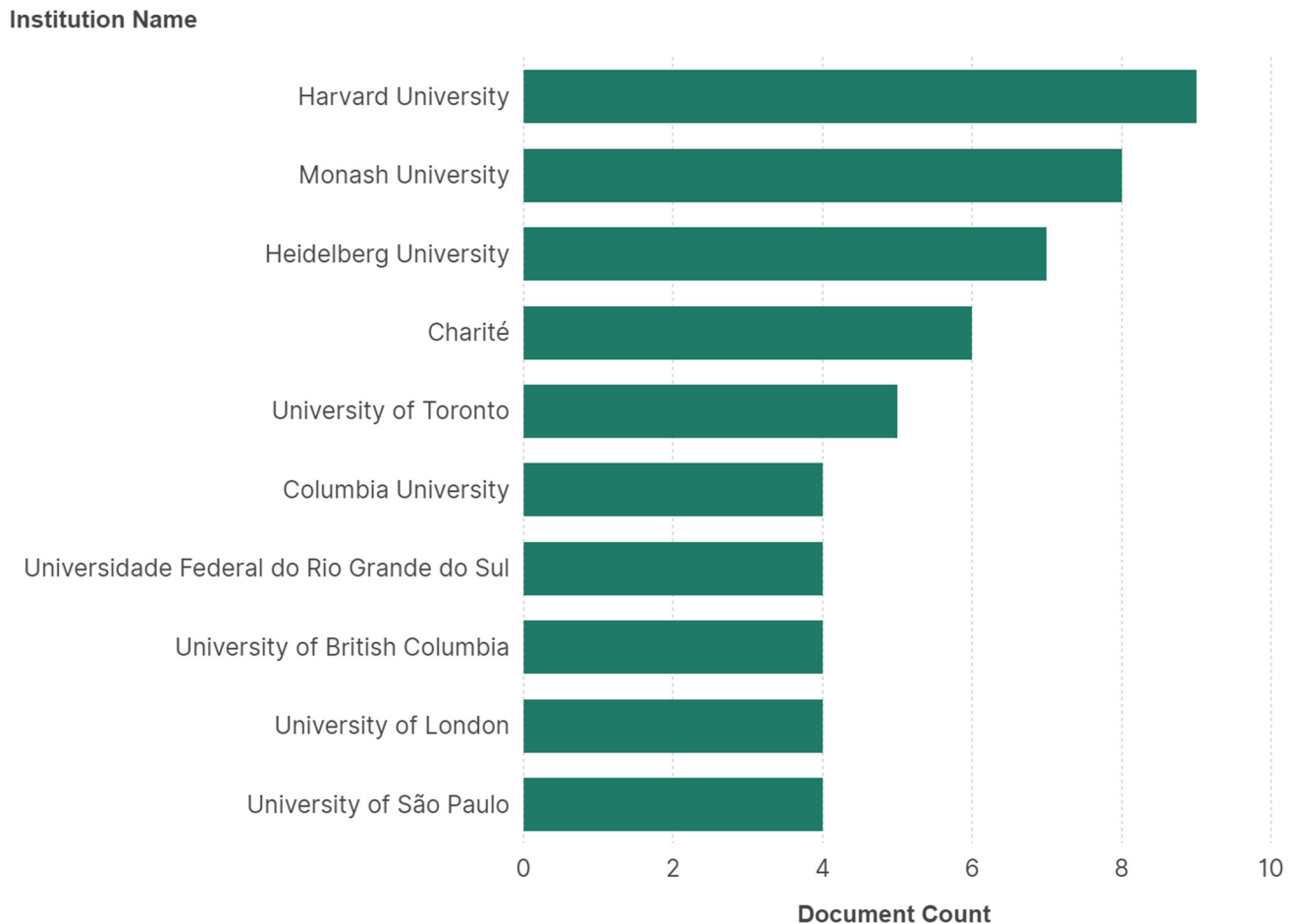


Figure 5. Top institutions. Source: <https://www.lens.org/> [40].

4.1.5. Co-Occurrence Analysis

To analyse co-occurrence (Figure 6), we used “author keywords” as the unit of analysis and complete counting as the counting method. We set 5 as the minimum number of keyword occurrences. Out of 394 keywords, 15 exceeded the set threshold (we report the total number of occurrences and the total link strength, separated by semicolons and in parentheses): planetary health (61;101), climate change (34;67), one health (15;24), medical education (12;34), planetary health education (11;26), education (11;24), public health (10;21), global health (10;20), sustainability (10;15), curriculum development (7;24), environment (7;16), sustainable healthcare (6;15), health professions education (5;12), curriculum (5;10), and sustainable development goals (5;7).

Three clusters were identified: Cluster 1 (red) revolves around the keyword “planetary health” and includes education, environment, global health, one health, and public health. Cluster 2 (green) focuses on the keyword climate change and integrates the terms curriculum development, medical education and planetary health education. Cluster 3 (blue) encompasses curriculum, sustainability, and sustainable development goals. Cluster 4 (yellow) includes health professions education and sustainable healthcare.

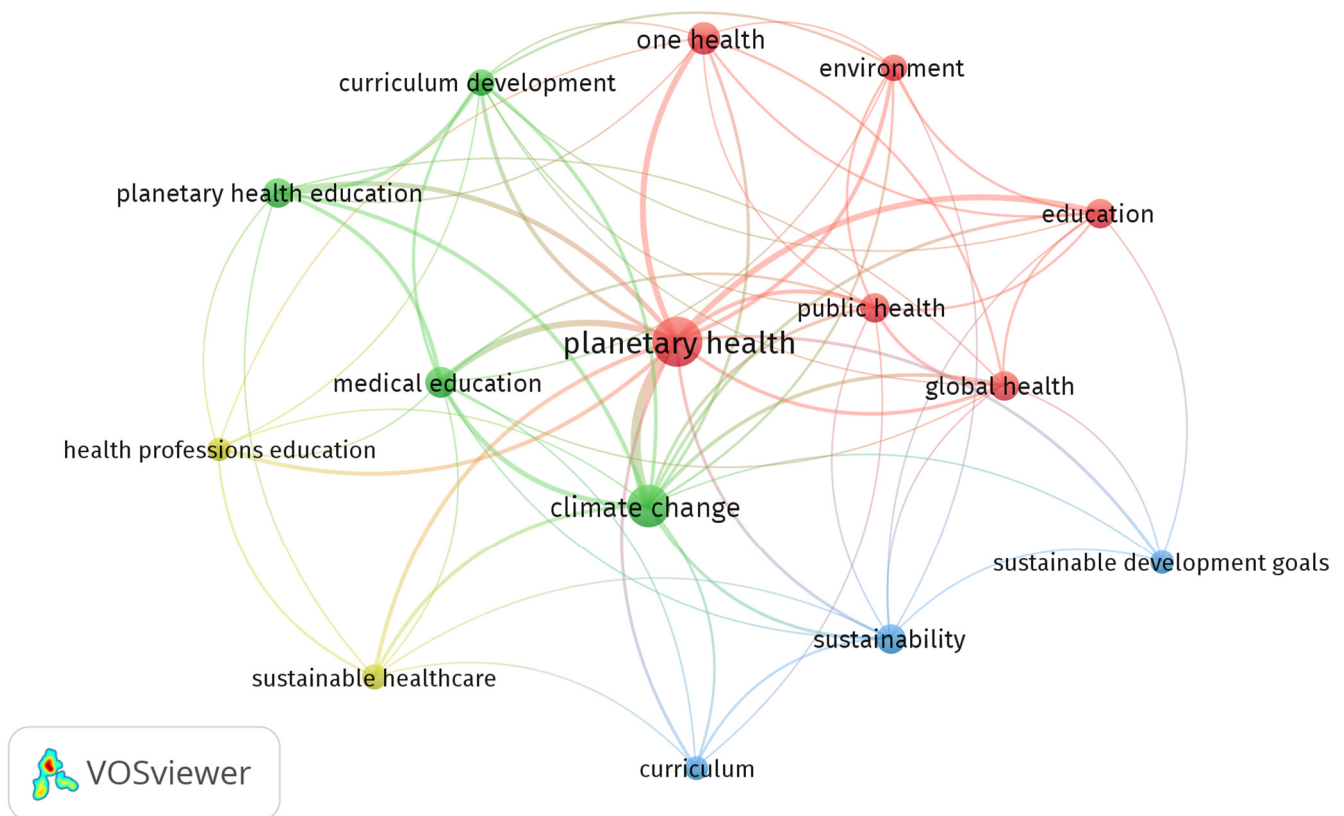


Figure 6. Visualisation of co-occurrence analysis by authors' keywords, using VOSviewer. software version 1.6.20. Note: Each colour represents a cluster.

This visualisation clearly shows the relevance of climate change and sustainability within the planetary health approach; it also highlights their influence on curriculum development, especially in the medical field, as well as in other health professions. It also illustrates the link between the One Health, Public Health, Global Health, and Environment approaches and the education sector (Figure 6).

4.1.6. Citation Analysis

To analyse the citations, we counted the sources, setting a minimum of five documents per source and a minimum of five citations for each document. Out of 76 sources, eight met this threshold. The source with the highest number of citations is The Lancet Planetary Health, with 709, followed by Frontiers in Public Health, with 251. The remaining sources have fewer than 100 citations (Table 2).

Table 2. Citation analysis.

Rank	Source	Documents	Citations
1	The Lancet. Planetary Health	29	709
2	Frontiers in public health	16	251
3	Challenges	15	67
4	Sustainability	5	65
5	The Journal of Climate Change and Health	5	64
6	Sustainable Earth Reviews	5	56
7	BMC Medical Education	8	33
8	Frontiers in Medicine	6	9

Source: <https://www.lens.org/> [40]. Count: VOSviewer.

4.1.7. Bibliographic Coupling

Bibliographic coupling was made in two ways. Firstly, the term “authors” was used as the unit of analysis, specifically those with at least four documents and five citations. Out of 1091 authors, 6 met the threshold. Author Eva-Maria Schwienhorst-Stich has the most significant number of publications (10) with 100 citations. Authors Nicole Redvers (7 publications, 263 citations) and Enrique Falceto de Barros (4 publications, 246 citations) are the most influential, according to the review, based on the number of citations. Cluster 1 (red) links the authors Enrique Falceto de Barros, Nicole Redvers and Tatiana Souza de Camargo. Cluster 2 (green) links the authors Eva-Maria Schwienhorst-Stich with Anne Simmenroth and Katharina Wabnitz (Figure 7a).

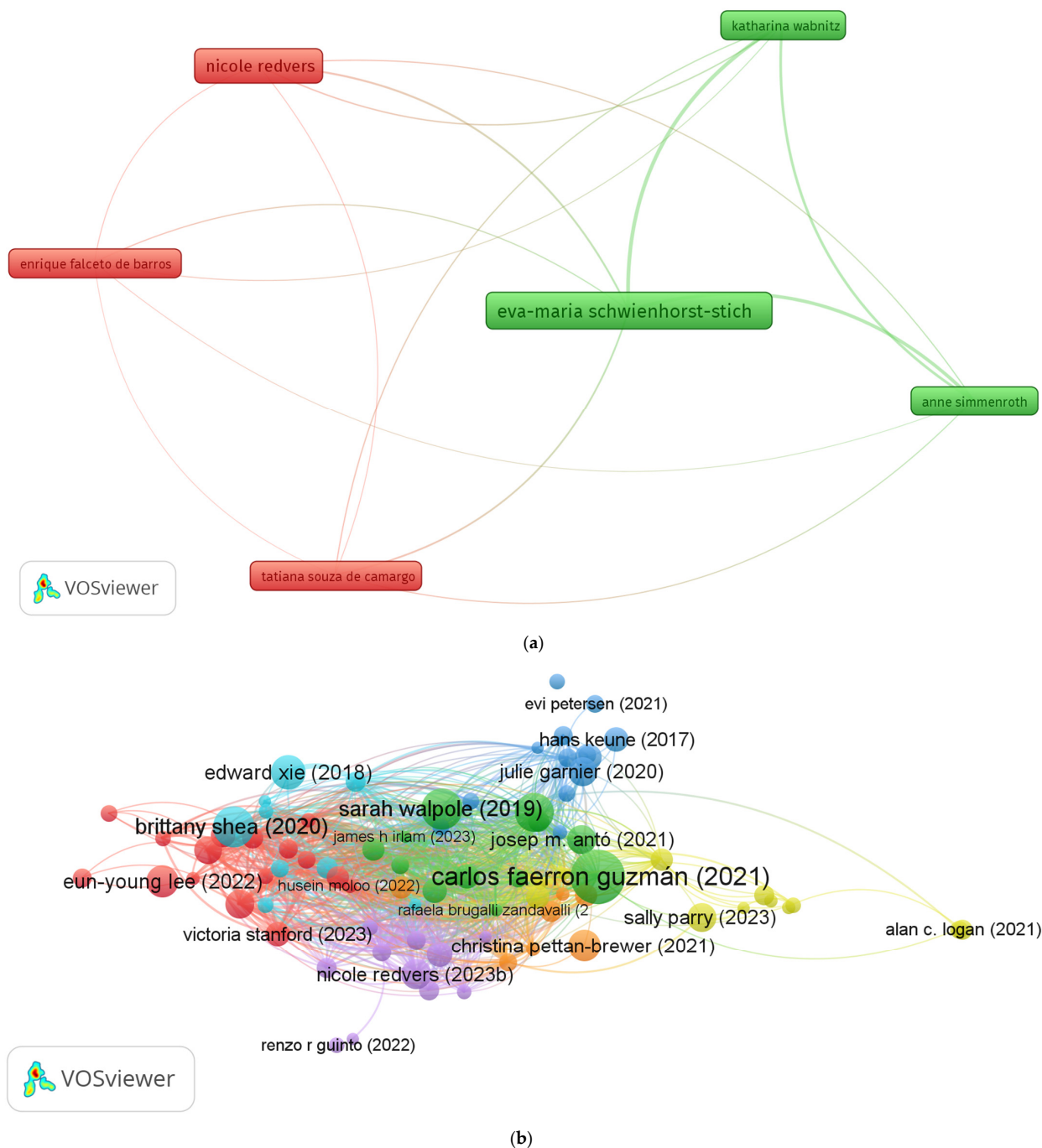


Figure 7. Bibliographic coupling using VOSviewer software version 1.6.20. (a) Unit of Analysis: Author. (b) Unit of Analysis: Documents. Note: Each colour represents a cluster.

Secondly, by selecting “documents” as the unit of analysis and setting five as the minimum number of citations, 88 of the 194 documents exceeded this threshold. The article with the most citations was “A Framework to Guide Planetary Health Education” [43] with 174 citations, which is in the green cluster. The second most cited article was “Assessment of Climate-Health Curricula at International Health Professions Schools” [44] with 90 citations, which is in the light blue cluster. The third most cited article was “Sustainable Healthcare Education: Integrating Planetary Health into Clinical Education” [45], with 88 citations, in the green cluster (Figure 7b).

4.2. Thematic Analysis

Table 3 summarises the PHAE initiatives that are being carried out in various countries in the Global North and South. These include courses, workshops, digital tools, and community programmes that address the links between health and the environment. Each description emphasises the focus, scope, and specific contribution of the proposal to the education sector.

Table 3. PHAE Initiatives.

Analytical Category (Deductive)	Initiative	Country	Source	Description	Analytical Category (Inductive)
Global North	The Earthrise Community	International	[46]	A contemplative community fostering cultural and spiritual transformation for planetary health through storytelling, emotional intelligence, ancestral wisdom, and creative practices. It convenes monthly forums, creative workshops, and intercultural dialogues to cultivate ecological belonging and regenerative educational practices.	Rhizomatic perspective
Global North	Sustainable Simulation-Based Education Toolkit	United Kingdom	[47]	A toolkit helping educators embed planetary health into simulation-based learning, reduce environmental impact, and model sustainable clinical behaviours through scenario design, resource audits, faculty training, waste reduction, and low-carbon simulation practices.	Institutional perspective
Global North	Sustainable Healthcare Curriculum–Joint Medical Program	Australia	[48]	A four-week course integrating planetary health into medical education, addressing climate-related risks, eco-anxiety, and sustainable practice. Grounded in Self-Determination Theory, it includes modules on ecosystems, clinical adaptation, and health policy leadership.	Institutional perspective
Global North	Nutrition and Planetary Health–Elective Course	Germany	[49]	A two-week course linking nutrition to planetary health, exploring food systems, sustainable diets, and culinary medicine. It employs interactive, interdisciplinary methods, including case-based learning, simulation, and self-experimentation, to address the clinical, ecological, and sociopolitical dimensions of nutrition.	Institutional perspective
Global North	Planetary Health Workshop–Monash University	Australia	[50]	A co-designed workshop for nutrition students to build advocacy skills and integrate Indigenous perspectives into public health nutrition through reflection tasks, scenario-based dialogue, and interactive activities fostering values-driven, practice-oriented learning.	Rhizomatic perspective
Global North	Planetary Health Rounds–Residency Curriculum	Canada	[51]	Case-based sessions where residents estimate Greenhouse Gas emissions from clinical care using lifecycle analysis tools and real-world converters, fostering sustainable decision-making and critical reflection on avoidable interventions.	Institutional perspective

Table 3. Cont.

Analytical Category (Deductive)	Initiative	Country	Source	Description	Analytical Category (Inductive)
Global North	Planetary Health Education–Würzburg University	Germany	[52]	A university programme combining lectures and optional courses that improved students’ emotional resilience and climate motivation through action-oriented content, values-based reflection, and interactive formats fostering agency and planetary health engagement.	Institutional perspective
Global North	Medicine for a Changing Planet–Online Series	United States	[53]	A free online curriculum using clinical cases to teach planetary health, zoonoses, and pandemic preparedness. It features 11 case studies designed around Bloom’s taxonomy, integrating social–environmental history, host–environment dynamics, and actionable steps for achieving sustainable and equitable healthcare.	Institutional perspective
Both	Planetary Health Bricks–ScholarRx/Medical Student Alliance for Global Education (MeSAGE)	International	[54]	14 short online modules co-developed by students from 11 countries, covering air pollution, climate migration, and sustainable systems. Hosted on ScholarRx, these open-access bricks utilise multimedia, case-based learning, and peer-driven content to teach foundational concepts in planetary health, promote equity, and support flexible curricular integration across global health education programmes.	Rhizomatic perspective
Global North	Drawing a Line from Carbon Dioxide (CO ₂) to Health–Serious Game	Netherlands	[55]	A game embedded in medical training to teach climate–health links through experiential learning and peer discussion. Using visual cards and collaborative rounds, students explore causal pathways between environmental change and health outcomes, reflect on emotional responses, and examine their professional responsibilities in climate adaptation, mitigation, and advocacy.	Institutional perspective
Global South	Participatory Climate and Health Education	India	[56]	A community-based initiative in rural villages using visual tools to empower local climate–health action. Through participatory dialogues, pictorial storytelling, causal loop diagrams, and timeline mapping, communities explored lived vulnerabilities, prioritised local concerns, and co-developed micro-scale adaptation strategies such as early warning systems and protective measures for agricultural workers.	Rhizomatic perspective
Global North	Planetary Health Diet Curriculum	Germany	[57]	A pilot course combining seminars and cooking sessions to teach sustainable eating based on the EAT–Lancet diet. Delivered over seven weeks, the programme utilised a flipped-classroom model and a teaching kitchen to enhance planetary health literacy, reformulate student recipes for lower carbon footprints, and foster self-efficacy through hands-on practice and communal reflection.	Institutional perspective
Global North	Planetary Health Objective Structured Clinical Examination (OSCE) Elective Course	Germany	[58]	An OSCE-based course trains students to counsel on climate-related health risks and sustainable prescribing. Combining online modules, peer-led workshops, and simulated clinical stations, the programme builds planetary health competencies and communication skills through experiential learning, actor-based roleplay, and structured feedback. Scenarios include dietary advice, prescribing alternatives, and public health dialogue on vector-borne disease.	Institutional perspective

Table 3. Cont.

Analytical Category (Deductive)	Initiative	Country	Source	Description	Analytical Category (Inductive)
Global South	Education for Sustainable Healthcare Delphi Panel Study	South Africa	[59]	Aligns planetary health learning with African Medical Education Standards (AfriMEDS), serving as a strategic tool for curricular reform and eco-ethical leadership. Through a Delphi-based consensus process, South African educators identified context-relevant learning objectives, activities, and assessments to embed planetary health and sustainable care into health professions education, fostering systemic thinking and interprofessional engagement.	Institutional perspective
Global North	Sitka Tribe of Alaska Summer Internship Programme	United States	[60]	Sitka Tribe of Alaska's paid summer planetary health internship fuses Tlingit mentorship, environmental toxin monitoring, laboratory research, and community engagement. Rooted in Indigenous knowledge and scientific practice, the programme empowers youth to address shellfish toxin risks, develop culturally grounded research projects, and pursue careers in planetary health through intergenerational learning and place-based stewardship.	Rhizomatic perspective
Global North	Canadian Community of Practice in Ecosystem Approaches to Health (CoPEH-Canada) Ecosystem Health Training	Canada	[61]	A transdisciplinary programme using land-based and hybrid formats to teach systems thinking and Indigenous knowledge. Developed over 15 years by CoPEH-Canada, it blends place-based case studies, talking circle methods, and experiential learning to foster ecohealth competencies. Its iterative pedagogy—centred on Head, Hands, and Heart—invites learners as co-creators, continuously refining content through reflection, dialogue, and real-world engagement.	Rhizomatic perspective
Both	World Organization of Family Doctors (WONCA) Air Health Train-the-Trainer	International	[62]	A pilot programme training professionals in low- and middle-income countries on air pollution and climate, enabling 370+ educational activities including workshops, clinical rounds, school programmes, media outreach, citizen science, and advocacy.	Institutional perspective
Global South	Web3 Technologies in Medical Education	Turkey	[63]	A conceptual proposal advocating for decentralised, energy-efficient technology in medical education, aligned with planetary health. Drawing on sustainability concerns, it recommends Holochain over energy-intensive blockchain models, promoting agent-centric architectures that enhance data integrity, privacy, and scalability. The proposal urges educators and policymakers to adopt Web3 technologies that minimise environmental impact while supporting secure, transparent, and equitable learning ecosystems.	Institutional perspective
Global North	Longitudinal Mosaic Curriculum	Germany	[64]	A curriculum integrating planetary health across all semesters and disciplines at Würzburg's Faculty of Medicine. The mosaic model embeds content through curricular mapping, interdisciplinary consultations, and strategic injection points across 26 specialities. It follows a spiral structure, fostering a holistic understanding of environmental change and health, with visual markers to enhance thematic coherence.	Institutional perspective

Table 3. Cont.

Analytical Category (Deductive)	Initiative	Country	Source	Description	Analytical Category (Inductive)
Global North	Planetary Health in Medical Education (ME Elective)	Germany	[65]	An online elective empowering students to design seminars and promote interdisciplinary learning. Implemented across 13 medical faculties in Germany, the course trains students in planetary health content, digital pedagogy, and peer-led teaching. Using flipped-classroom methods and supervised lesson planning, it fosters curricular innovation, interfaculty networking, and the development of student-led planetary health education through a structured, four-phase model.	Institutional perspective
Global North	BIOL 1455–Planetary Health: Global Environmental Change and Emerging Infectious Disease Course	United States	[66]	An asynchronous online undergraduate course exploring links between environmental change and infectious disease, designed to foster planetary health literacy across disciplines. Delivered at Brown University, it employs an inclusive, project-based pedagogy—utilising micro-lectures, literature analysis, and student-designed public communication—to foster systems thinking and solution-oriented engagement. Evaluations show increased competence and a shift from pessimism to cautious optimism.	Institutional perspective
Global North	Human and Artificial Intelligence (AI) for Climate Action Epistemic Web	International	[67]	A framework proposing human-in-the-loop AI for equitable climate mitigation and planetary health knowledge. It calls for aligning machine intelligence with global epistemic networks to reduce bias, embed data justice, and support socially grounded decision-making. By integrating diverse human perspectives and recognising social tipping points, the approach enables low-carbon, trustworthy AI systems that foster inclusive, context-sensitive climate action.	Institutional perspective
Global North	Extension for Community Healthcare Outcomes (ECHO)–Climate Change Telementoring Series	United States	[68]	A virtual programme educating health professionals on climate-health impacts and healthcare decarbonisation. Delivered through an eight-week telementoring series, the programme utilised case-based learning and live simulation to develop knowledge, communication skills, and interprofessional collaboration. Participants explored evidence-based strategies for sustainable clinical practice, workplace advocacy, and systemic change, forming a community of practice to advance low-carbon healthcare.	Institutional perspective
Global North	Climate Change and Health–2-week Course	Norway	[69]	A multidisciplinary course combining lectures, workshops, and student projects to inspire climate action. Delivered online over two weeks at the University of Oslo, it explored climate-health links through interdisciplinary teaching, stakeholder dialogue, and student-led communication projects. Designed to empower future clinicians as planetary health advocates, the course emphasised effective messaging, systems thinking, and real-world engagement with diverse voices and lived experiences.	Institutional perspective

Table 3. Cont.

Analytical Category (Deductive)	Initiative	Country	Source	Description	Analytical Category (Inductive)
Global North	GREENER Collective	Netherlands	[70]	A grassroots movement advocating for planetary health in Dutch healthcare curricula through policy and education. GREENER, a decentralised and multidisciplinary collective, advances this mission through curriculum audits, national conferences, stakeholder roadmaps, and strategic advocacy. By mobilising students, clinicians, and educators, it fosters systemic transformation towards sustainable, resilient healthcare education rooted in civic responsibility and scientific evidence.	Rhizomatic perspective
Global South	Planetary Health for Primary Care—Massive Open Online Course (MOOC)	Brazil	[71]	A free MOOC using creative arts and case studies to train primary care professionals in planetary health. Developed for a global audience in the Global South, the course combines clinical and community interventions with rhizomatic, spiral learning to foster critical reflection and transdisciplinary action. Through modules on climate-sensitive diseases, mental health, and sustainable food systems, it equips frontline practitioners with inclusive, context-aware strategies for planetary health advocacy and care.	Rhizomatic perspective
Global North	Planetary Health Academy—Online Lecture Series	Germany	[72]	A free lecture series promoting ecological awareness and advocacy through interactive sessions. The Planetary Health Academy offers open-access virtual conferences and workshops designed to foster transformative learning, ecological responsibility, and engagement in the health sector. Through interdisciplinary content, reflective dialogue, and community-led action strategies, it empowers participants to reduce ecological footprints and expand their handprints—mobilising knowledge, imagination, and implementation for systemic change.	Rhizomatic perspective
Global North	Planetary Health Module—University of Amsterdam	Netherlands	[73]	A module embedded in clinical training using blended learning to foster climate literacy and resilience. Developed at the University of Amsterdam, it combines flipped classroom strategies, Bloom’s taxonomy, and practical hospital-based assignments to integrate planetary health into everyday clinical practice. Through interdisciplinary teaching, ecological footprint analysis, and student-led infographics, the module equips future health professionals with the tools, mindset, and agency to lead sustainable transformation in healthcare systems.	Institutional perspective
Global North	Planetary Health Film Lab	Canada	[74]	A week-long Canadian programme empowering young adults to produce documentaries that illuminate planetary health challenges and advocate climate justice. Rooted in transdisciplinary and youth-centred pedagogy, the Planetary Health Film Lab combines critical reflection, community storytelling, and Freirean conscientisation to foster ecological awareness and political agency. Participants engage in intensive workshops and produce short films that are disseminated through the Youth Climate Report, a United Nations-affiliated platform designed to influence global climate policy.	Rhizomatic perspective

We found a significant imbalance in the availability and documentation of educational initiatives on planetary health between the Global North and the Global South. Most systematised experiences come from institutions in the North that have access to academic resources, international networks, and established publication platforms. This preponderance does not necessarily reflect greater innovation or engagement, but rather a potential asymmetry in the conditions of visibility, funding, and dissemination of knowledge.

We found no differences in the orientation of the initiatives from the North–South dichotomy. In both cases, we observed at least two perspectives:

- (a) Institutional perspective: these initiatives are characterised by a high degree of curricular institutionalisation, with a predominance of formal university formats such as clinical modules, electives, simulations, serious games, and digital platforms. These experiences integrate planetary health as interdisciplinary content in medical degree programmes, with a focus on climate literacy, hospital sustainability, and clinical competencies. Emphasis is placed on developing emotional resilience, systems thinking, and sustainable decision-making in clinical settings. Most projects are carried out at established universities, which provide access to technological resources and employ active research methods.
- (b) Rhizomatic perspective: The initiatives included here favour participatory, community-based, and interprofessional approaches. They are oriented towards social change and ecological–ethical leadership, combining local knowledge, environmental justice, and professional action. They emphasise curriculum co-design, national audits, teacher training, and the use of visual aids in rural areas. Although some of them are linked to universities, their implementation is more emergent and contextualised. They propose transformative models with strong territorial and ethical anchors.

The implementation of the PHAE may be constrained by a series of structural and contextual obstacles, identified by the consulted authors across diverse national and international settings. Among the most salient are limited curricular integration, the absence of specific accreditation standards, and the restricted scalability of existing initiatives. These are compounded by persistent institutional inertia, characterised by insufficient leadership support and inadequate teaching capacities. Disciplinary fragmentation, a weak sense of urgency, and the lack of concrete sustainability plans hinder the transition from rhetoric to action. Collectively, these factors undermine the consolidation of a transformative and cross-cutting planetary health education (Table 4).

Table 4. Obstacles to the implementation of the PHAE.

Analytical Category	Descriptors	Country	Source
Limited curricular integration	Most planetary health instruction is delivered through non-compulsory modules.	Germany	[75]
	In some institutions, the time allocated for teaching planetary health is limited or altogether absent.	International	[76]
	Lack of specific accreditation standards	International	[77]
Lack of scalability	Planetary health courses reach only a minority of students	Germany	[75]
	Knowledge of the subject is often tied to a specific individual or to personal experience.	International	[76]

Table 4. Cont.

Analytical Category	Descriptors	Country	Source
Institutional inertia	Lack of explicit support from senior leadership is a crucial factor in legitimising curricular change. Perceived lack of relevance of planetary health	Ireland	[78]
	Faculty members often lack the knowledge to teach this emerging subject	International	[76]
Lack of interdisciplinarity and transdisciplinarity	Artificial disciplinary boundaries have inhibited students' learning and participation.	International	[79]
Lack of urgency	The overall sense of urgency is weak and fragmented.	Netherlands	[70]
Lack of Advanced Cognitive Skills.	Deficits in transformative competencies such as climate communication, scientific communication, transdisciplinary collaboration, project management, and sustainable healthcare.	Germany	[75]
Need for a Shift from Rhetoric to Action	Lack of concrete sustainability plans. Need to empower meaningful, measurable, and achievable actions.	International	[47]
	Inconsistency between knowledge and sustainable application. Teaching about problems without addressing possible solutions is ineffective.	Canada	[61]

Table 5 synthesises the main epistemological barriers hindering the implementation of PHAE, as identified by the selected authors. Key issues include technoscientific reductionism, which limits understanding of the interdependence between human and ecological systems. The marginalisation of non-dominant epistemologies is also noted, including the silencing of Indigenous knowledge and the reproduction of unsustainable values such as materialism and individualism. The authors further highlight the anthropocentric legacy of educational systems, which perpetuates fragmented visions of development and disconnects health systems from Nature. Added to this is the exclusion of emotional and spiritual dimensions, as well as the dominance of crisis-centred narratives that foster despair. Finally, the limited incorporation of ecofeminist perspectives is evident, restricting the visibility of women who lead transformative processes in this field.

Table 5. Epistemological Barriers to PHAE.

Analytical Category	Descriptors	Source
Technoscientific reductionism	Traditional technocratic and reductionist approaches fail to account for the profound interconnections between human well-being and ecological systems.	[46]
	Scientific knowledge is essential for understanding the complexity of the Anthropocene, but it is insufficient on its own to inspire the profound and systemic changes required.	
Marginalisation of non-dominant epistemologies	The knowledge imparted in PHAE has primarily been limited to specific forms of understanding rooted in Western epistemology.	[80]
	Epistemicide is an ongoing process that discredits knowledge beyond the Euro-Western sphere, while reinforcing the legitimacy and elevating the status of Eurocentric epistemic traditions.	[81]
	Dominant epistemological perspectives reproduce unsustainable values—materialism, individualism, and the exploitation of nature for economic gain—which have fuelled both environmental degradation and social inequalities.	[46]
	Need to decolonise learning through the integration of Indigenous knowledge systems and voices.	[80]

Table 5. *Cont.*

Analytical Category	Descriptors	Source
Overemphasis on human-centred domains	Colonial educational legacies, rooted in anthropocentric paradigms, overlook the interconnection between human and non-human systems, promoting skewed visions of development that undermine systemic interdependence.	[82]
	Forced disconnection between health systems and Nature.	[81]
Suppression of emotional and spiritual dimensions	Emotional disconnection and a lack of care, alongside selfishness and greed, constitute profound dimensions of the environmental crisis that cannot be addressed solely through logic and science.	[46]
Crisis-centred environmental messaging	Much of the climate and environmental discourse is framed in terms of crisis and catastrophe, often eliciting anxiety, despair, and a sense of helplessness.	[46]
Lack of ecofeminist perspectives	Planetary health scholarship has underexplored the narratives and contributions of women leading transformative change within the field.	[83]

Although based on a limited selection of authors, this diagnostic overview reveals emerging patterns in the integration of PHAE across the Global South. It highlights shared challenges—such as curricular gaps, institutional inertia, and pedagogical disempowerment—across diverse regions, including Africa, Latin America, India, Brazil, and South Africa. These convergences suggest structural constraints that transcend national contexts, underscoring the need for coordinated educational reform and context-sensitive strategies to advance the planetary health approach as a transformative educational domain. In the African context, additional barriers include the persistence of colonial educational legacies, the erosion of Indigenous knowledge systems, and a profound cognitive disconnection from ecological realities. These factors further complicate efforts to embed the planetary health approach within formal curricula (Table 6).

Table 6. Diagnosis of the PHAE across the Global South.

Analytical Category	Description	Country/Region	Source
Curricular Peripheralization	Documented planetary health approach curricula in Global South universities are scarce and primarily result from collaborations with institutions in the Global North.	Global South	[84]
Curricular Underdevelopment	Latin American universities lack planetary health courses, and environmental education is insufficient, with a minimal focus on climate change and environmental health.	Latin America	[85]
Systemic Disempowerment	The planetary health approach lacks educational leadership, public awareness, and curricular integration, leaving professionals ill-equipped to drive transformative environmental health action.	Africa	[86]
Epistemological constraints	Colonial educational legacies, erosion of Indigenous knowledge, cognitive disconnection from ecological systems, disciplinary fragmentation, and limited curricular links between human and ecosystem health persist across PHAE.	Africa	[82]
Institutional Apathy and Pedagogical Weakness	Faculty training is weak, thematic coverage is limited, and institutional interest is low; active engagement in PHAE remains minimal.	India	[87]

Table 6. *Cont.*

Analytical Category	Description	Country/Region	Source
Curricular Stagnation and Governance Barriers	The integration of the planetary health approach in undergraduate and postgraduate education is slow, lacking curricular guidelines and hindered by governance barriers and contextual disparities that deepen health education inequalities.	Brazil	[88]
Symbolic Marginalisation and Pedagogical Disengagement	Planetary health approach lacks trained educators, staff interest, and leadership; academic structuring is weak, and hidden curricula often undermine its urgency and educational legitimacy.	South Africa	[59]

5. Discussion: Towards a Planetary Health Curriculum

The quantitative bibliometric and qualitative thematic analyses reveal a greater diffusion of knowledge on PHAE originating from the Global North. As a result, the discourse in this field is predominantly shaped by scholars from that region, who influence the definition of truth (ontology), its theoretical foundations, and the epistemological frameworks adopted [89]. This pattern may reflect a context in which voices from the Global South face significant barriers to open-access publishing and reliable internet connectivity—conditions that contrast sharply with those in the Global North [90]. Asaduzzaman et al. [91] note that this imbalance contributes to resource disparities in the Global South, particularly in the availability of universal training in planetary health modules. In addition, a persistent knowledge gap between North and South is compounded by linguistic and cultural barriers, notably the dominance of English in planetary health-related courses.

As part of the thematic analysis, we observed a variety of initiatives that are both institutional—aiming to normalise, standardise and formalise PHAE—and rhizomatic, with more participatory and creative formats, particularly influenced by Deleuzoguattarian philosophy. The latter are characterised by their emphasis on reclaiming the autonomy of interlocutors, fostering discursive and dialogical diversity, and embracing continuous transformation [92].

The thematic analysis revealed that only 11.30% of the literature selected for this section (2023–2025) presents structural and epistemological barriers to PHAE. Additionally, seven studies (2021–2025) were identified that highlight obstacles in the implementation of PHAE within the Global South. Although the emphasis of this section is qualitative, the low proportion of barrier-focused perspectives among the selected authors suggests a broadly positive view of the approach as one viable pathway for addressing current socio-environmental challenges.

However, the thematic analysis reveals a convergence between the structural obstacles and epistemological barriers to implementing the PHAE, as identified by the selected authors in international contexts and those observed in the Global South diagnosis. Curricular limitations, limited scalability, and institutional inertia [75,76,78] are reflected in the curricular marginalisation and stagnation documented in Latin America, India, and Brazil [85,87,88]. Likewise, epistemological barriers—such as technoscientific reductionism, the marginalisation of non-dominant knowledge systems, and the anthropocentric legacy [46,80,82]—are reflected in the African context, where cognitive disconnection from ecological systems and weak integration between human and environmental health are evident [82].

The above-mentioned concepts raise the challenge of developing new ways to understand and implement the approach, while maintaining the original emphasis on the

interdependence between the health of human civilisation and the state of natural systems [93].

Guided by critical reflexivity, which points towards the reconstruction of reality as proposed by CT [18], and taking into account Stahl's [37] three dimensions of criticality, we propose a phased approach spanning the short, medium, and long term, in line with Nagy et al. [94], under a holistic and macro perspective [1,46,95]. While it focuses on higher education, we share the premise that the planetary health approach should be integrated across all educational levels [96,97].

- **Motivation Dimension**

The adoption of a holistic planetary health approach is urgent in the face of converging socio-ecological crises that jeopardise human survival and well-being. This emergency is manifested in the so-called “triple planetary crisis”, in which climate change is identified as the principal threat to global health [6]. From a critical perspective, these crises extend beyond the merely ecological and disclose profound psychological, cultural and narrative dysfunctions [98].

The health consequences of environmental degradation are interdependent and markedly inequitable [6,54]. Historically marginalised populations, particularly in the Global South, bear the most significant burden of planetary boundary transgressions, driven mainly by high-income countries [54,76]. Nonetheless, the North–South dichotomy does not exhaust the forms of exclusion; in the Global South, persistent structures of marginalisation and inequality, rooted in deep sociocultural patterns, endure, as evidenced by Frankema et al. [99] in Africa and Vajpeyi [100] in Asia.

The global health sector requires a critical self-examination, given its substantial contribution to greenhouse gas emissions [6,101]. Health professionals must assume an active role as communicators and promoters of preventive lifestyles that support the planetary health approach [102]. Accordingly, the planetary health approach demands cultural and systemic transformation that places human and planetary health at the centre of policy and practice, advancing social and ecological justice for present and future generations [14,103].

For this reason, the planetary health approach should be embedded as a mandatory, transversal component of higher education beyond health disciplines, since environmental challenges are systemic and require collective, cross-sectoral responses [69]. Its relevance spans all domains of knowledge, as the planetary crisis also constitutes a crisis of values, knowledge, and cognition [80,82]. Students of every discipline are future leaders and change agents who require literacy to make sustainable, evidence-based decisions in political and economic spheres [57,101]. The transdisciplinary nature of the planetary health approach promotes the integration of knowledge from multiple domains [77,104].

- **Legitimacy Dimension**

The cultural and systemic transformation demanded by the planetary health approach requires the integration of Western scientific knowledge with alternative, Indigenous and ancestral epistemologies. Indigenous epistemologies offer a holistic, relational worldview that contrasts with Western reductionism: they do not separate planetary health from community or individual health, are anchored in Land and Territory, eschew anthropocentric hierarchies and embody reverence for all living beings [76,81,95,105,106]. Their methods are contextual, symbolic, nonlinear, and relational, with a focus on reciprocity with Nature as the foundation for ecological justice and sustainability [46,77]. These communities sustain millennia-old knowledges and norms—the Natural Laws or First Laws—that underpin legal and governance practices centred on the Earth [105].

Conventional scientific knowledge remains indispensable for generating evidence, monitoring impacts, and designing effective interventions; nevertheless, it is insufficient on its own to meet planetary challenges. Epistemic complementarity, exemplified by methodologies such as “Two-Eyed Seeing” (Etuaptmumk), enables the mobilisation of the strengths of Indigenous knowledges alongside Western science for collective benefit [95,105,106]. Such articulation enhances resilience, equity, and the transformative capacity of the planetary health approach, ensuring culturally safe approaches and sustainable solutions for the well-being of the Earth and its communities [14,77,104].

- Epistemological Dimension

The epistemological proposal draws on Prescott et al.’s [1,46] holistic vision, which identifies selfishness, greed, and apathy as root causes of environmental problems and advocates for a spiritual and cultural transformation grounded in inner awareness, emotional intelligence, and moral wisdom. Complementarily, Redvers et al. [95] articulate an Indigenous framework of universal interconnection and propose the decolonisation of being—a reconnection with our original self—as a unifying principle linking molecular health to planetary health, alongside the restitution of territorial rights to Indigenous peoples who steward the majority of the world’s remaining biodiversity.

Stone et al.’s [107] pedagogical principles guide PHAE towards equity, sustainability, intergenerational justice, ecosocial resilience and transformative education. Rees and Wilhelm’s [108] Planetary Health Knowledge taxonomy delineates the essential knowledge concerning the state of the world, human health, and political-economic systems. It promotes the acquisition of conceptual, integrative, quantitative, and geographic knowledge necessary to characterise problems in terms of definition, causation, magnitude, and global distribution. This epistemological structure reduces conceptual confusion and provides a robust basis for informed action.

By integrating these frameworks, PHAE adopts an epistemic pluralism that recognises relational knowledges and locates colonial structures and injustice [19,21] as fundamental drivers of the crisis, thereby charting a path towards well-being grounded in mutual respect.

Based on the above, we propose a comprehensive redesign of university curricula that applies across all degree programmes, not solely to the health sciences. This proposal is not exclusive to the Global South; instead, it addresses structural, pedagogical and epistemological challenges present in educational systems worldwide. Its implementation is relevant in both contexts with high institutional capacity and those marked by historical inequalities, recognising that the planetary crisis demands transversal and globally contextualised responses. This proposal is divided into three progressive stages:

In the short term, we propose introducing courses on planetary health for students in the final years of university education, following the courses proposed by Pais Rodrigues et al. [54], which consider the urgency factor [70]. These courses should cover fundamental content such as planetary boundaries, the interdependence between ecological and human systems, socio-ecological inequalities, and plural epistemologies that explain the ecological crisis from alternative perspectives. We recommend the inclusion of case studies, participatory methodologies, and exercises that combine knowledge with action, promoting both ethical and emotional reflection [11,52,98]. Pedagogical strategies should be dialogic, transdisciplinary, and focused on situated learning, utilising audiovisual resources, simulations, collaborative digital platforms, and materials that represent epistemic and cultural diversity [47,96,103]. Lecturers should include specialists in planetary health, critical pedagogy, and ancestral knowledge who are trained in intercultural and decolonial approaches [76,77,80,103].

In the medium term, we propose including the planetary health approach as a compulsory subject in all university curricula [84] and adapting it to the various professional

profiles [109]. This subject should integrate content on environmental justice, sociocultural justice, and gender justice [19–21,83], as well as ecological ethics, public policy, and planetary governance [107], along with tools for critically analysing models of development, consumption, and production. It should also include the study of community practices of care, resilience, and ecological regeneration [41]. Pedagogical strategies should promote complex thinking, co-creation of knowledge and interdisciplinary work by linking theory and practice [6,7] through community engagement projects [56,79], social innovation labs [104], and critical mapping exercises [59,61]. Institutional investment is necessary to train teachers, create context-specific teaching materials, and develop virtual learning environments that facilitate equal access and active participation [70].

In the long term, we propose to make the planetary health approach a transversal [103], experiential [104], and transdisciplinary [77] focus of the university curriculum. This mainstreaming must be based on ontological principles that recognise the interdependence between humans and nature as the basis of being [93], on epistemological principles that value the plurality of knowledge [14], including experiential, spiritual, and community knowledge [46,60,105], and on axiological principles that promote ecological justice [106], the dignity of all living beings, and care as a central ethical principle. Implementation should include a review of graduate profiles, professional competencies, and educational objectives in all degree programmes to ensure the planetary health approach is integrated into existing subjects, placements, research, and extra-curricular activities [54,77,82]. Participatory curriculum management is required, with cross-faculty committees, continuous assessment mechanisms, and institutional policies that support educational transformation [77].

To enable this change, an institutional process of education, awareness-raising, and sensitisation is needed, targeting decision-makers, university authorities, and teaching staff [59,77,96]. This process must include spaces for critical dialogue on plural epistemologies, cognitive justice [104,110], and transformative pedagogies, as well as strategies for curriculum redesign and teaching innovation [80,111]. The urgency of the planetary crisis must be communicated, without resorting to paralysing, fear-based narratives [46,58], but rather appealing to truth as a driver of awareness, agency, and collective action [79]. Education must provide ethical and ecological certainties that mobilise student and academic engagement and overcome disciplinary fragmentation [79] and anthropocentrism [82].

6. Limitations

While this study aims to provide a comprehensive mapping of the trajectory of PHAE from the perspective of the Global South, several methodological limitations were encountered. The analysis relied exclusively on The Lens platform, selected for its open-access nature. Although the use of commercial databases might have broadened the scope for identifying additional findings, The Lens offers a wide range of academic records, enabling access to global perspectives on the planetary health approach.

The study focused on publications in English, which may have constrained the representation of key regions within the Global South, such as Latin America. To address this limitation, articles published from the Global South were traced within The Lens database, forming the basis for a critical diagnostic as part of the thematic analysis.

The theoretical framework was grounded in CT, which privileges the deconstruction and reconstruction of dominant perspectives. This orientation may have led the study to emphasise gaps, tensions, and limitations in the development of PHAE, rather than its strengths. Nevertheless, this limitation also constitutes an opportunity to revisit the foundational principles of the approach and enhance its viability and universal applicability.

The notion of the Global South may appear ambiguous when defined strictly in geopolitical terms, particularly if based on the Brandt Line (see Figure 1). Had this criterion

not been applied to the identification of sources, the number of studies from the developed world would have increased, including contributions from scholars based in countries such as China. This methodological decision reinforces our hypothesis: the documentation—though not necessarily the initiatives, practices, or lived experiences—of PHAE research originates predominantly from the most advanced countries.

Finally, the concept of the epistemological South may initially seem a priori, especially since not all scholars who adopt critical positions on PHAE explicitly identify with this tradition. The classification of such positions as belonging to the Epistemological Barriers to PHAE is our own, serving purely analytical purposes and intended to organise the information deemed most relevant to the study's objectives.

7. Conclusions

The bibliometric analysis demonstrates the predominance of the Global North in scholarship on PHAE, with emphasis on institutional approaches, climate change and curricula for health professions. The thematic analysis identifies convergent barriers: structural (limited curricular integration, institutional inertia), pedagogical (deficits in transformative competencies, lack of transdisciplinarity) and epistemological (technoscientific reductionism, marginalisation of Indigenous knowledges). These constraints are exacerbated in the Global South by reduced visibility and limited institutional capacity. We propose a three-phase pathway: short term—introduce final-year modules covering core content through participatory and situated methodologies; medium term—institutionalise the planetary health approach as a compulsory subject and train faculty; long term—mainstream the aforementioned approach as an experiential, transdisciplinary curricular strand. These measures must be accompanied by institutional investment, continuous evaluation and participatory governance that integrates scientific and ancestral knowledges via frameworks of epistemic complementarity.

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Abbreviations

The following abbreviations are used in this manuscript:

PHAE	Planetary Health Approach in Education
CT	Critical theory
EC	Exclusion Criteria
MeSAGE	Medical Student Alliance for Global Education
CO ₂	Carbon Dioxide
OSCE	Objective Structured Clinical Examination
CoPEH-Canada	Canadian Community of Practice in Ecosystem Approaches to Health
WONCA	World Organization of Family Doctors
AI	Artificial Intelligence
ECHO	Extension for Community Healthcare Outcomes
MOOC	Massive Open Online Course

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