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Dislocated Ecologies: A Bibliometric Triangulation of Forced Migration, Medical Education, and Learning Environments in Contemporary Europe (2020–2025)

დისლოკაციული ეკოლოგიები: იძულებითი მიგრაციის, სამედიცინო განათლებისა და სასწავლო გარემოს ბიბლიომეტრიული ტრიანგულაცია თანამედროვე ევროპაში (2020–2025)

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Abstract

This article investigates the conceptual intersections between forced migration, medical education, and learning ecologies/environments in Europe through a triangulated bibliometric analysis of PubMed-indexed literature from 2020–2025. Anchored in ecological systems theory (Bronfenbrenner), perspectives on learning ecologies (Barron; Jackson), and communities of practice theory (Wenger), the research maps three networks of co-occurrence of terms corresponding to each domain and compares dominant themes, conceptual bridges, and significant absences. The results indicate the existence of weakly connected "thematic ecologies": the literature on forced migration (FM) focuses on vulnerability, health inequalities and the psychosocial impact of conflict; the literature on medical education (ME) focuses on curriculum, simulation and student wellbeing; and the literature on learning environments (EE) in health describes clinical ecologies and workplace learning, without integrating forced migration as a contextual factor. Triangulation shows that the intersection of FM–ME–EE is almost non-existent in the analysed corpus, which signals a conceptual and public policy gap, with particular relevance for Central and Eastern Europe, where recent refugee arrivals (including from Ukraine) have reconfigured educational and health infrastructures. The article proposes the development of an integrative framework of "learning ecologies in forced migration" and discusses implications for curriculum reform, trauma-informed training, and the inclusion of civic actors and migrant-led organisations in educational design.

Keywords: forced migration; medical education; learning ecologies; Europe; refugees; bibliometric analysis; learning environment; communities of practice; educational systems; health inequalities.

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აბსტრაქტი

წინამდებარე სტატია იკვლევს კონცეპტუალურ კვეთებს იძულებით მიგრაციას, სამედიცინო განათლებასა და სწავლის ეკოლოგიებს/გარემოებებს შორის ევროპაში, PubMed-ის

ბაზაში 2020–2025 წლებში ინდექსირებული ლიტერატურის ბიბლიომეტრიული ტრიანგულაციის გზით. კვლევა ეფუძნება ეკოლოგიური სისტემების თეორიას (ბრონფენბრენერი), სწავლის ეკოლოგიების პერსპექტივებს (ბარონი; ჯექსონი) და პრაქტიკის თემების თეორიას (ვენგერი); კვლევა რუკაზე გამოსახავს თითოეული დომენის შესაბამისი ტერმინების თანაარსებობის სამ ქსელს და ადარებს დომინანტურ თემებს, კონცეპტუალურ ხიდებსა და მნიშვნელოვან დანაკლისებს (გამოტოვებულ საკითხებს). შედეგები მიუთითებს სუსტად დაკავშირებული „თემატური ეკოლოგიების“ არსებობაზე: იძულებითი მიგრაციის (FM) შესახებ ლიტერატურა ფოკუსირებულია მოწყვლადობაზე, ჯანმრთელობის უთანასწორობასა და კონფლიქტის ფსიქოსოციალურ ზემოქმედებაზე; სამედიცინო განათლების (ME) შესახებ ლიტერატურა აქცენტს აკეთებს სასწავლო პროგრამაზე, სიმულაციასა და სტუდენტთა კეთილდღეობაზე; ხოლო ჯანდაცვის სფეროში სწავლის გარემოს (EE) შესახებ ლიტერატურა აღწერს კლინიკურ ეკოლოგიებსა და სამუშაო ადგილზე სწავლებას ისე, რომ იძულებითი მიგრაცია არ არის ინტეგრირებული, როგორც კონტექსტური ფაქტორი. ტრიანგულაცია აჩვენებს, რომ FM–ME–EE-ს კვეთა თითქმის არ არსებობს გაანალიზებულ კორპუსში, რაც მიუთითებს კონცეპტუალურ და საჯარო პოლიტიკის ხარვეზზე. ეს განსაკუთრებით აქტუალურია ცენტრალური და აღმოსავლეთ ევროპისთვის, სადაც ლტოლვილთა ბოლოდროინდელმა ნაკადებმა (მათ შორის უკრაინიდან) ხელახლა განსაზღვრა საგანმანათლებლო და ჯანდაცვის ინფრასტრუქტურა. სტატია გვთავაზობს „იძულებით მიგრაციაში სწავლის ეკოლოგიების“ ინტეგრაციული ჩარჩოს შემუშავებას და განიხილავს სასწავლო პროგრამის რეფორმის, ტრავმა-ინფორმირებული სწავლების, ასევე საგანმანათლებლო დიზაინში სამოქალაქო აქტორებისა და მიგრანტების მიერ მართული ორგანიზაციების ჩართულობის მნიშვნელობას.

საკვანძო სიტყვები: იძულებითი მიგრაცია; სამედიცინო განათლება; სწავლის ეკოლოგიები; ევროპა; ლტოლვილები; ბიბლიომეტრიული ანალიზი; სასწავლო გარემო; პრაქტიკის თემები; საგანმანათლებლო სისტემები; ჯანმრთელობის უთანასწორობა.

რეკომენდირებული ციტირება: რადუ-მიჰაი დუმიტრესკუ (2026). დისლოკაციული ეკოლოგიები: იძულებითი მიგრაციის, სამედიცინო განათლებისა და სასწავლო გარემოს ბიბლიომეტრიული ტრიანგულაცია თანამედროვე ევროპაში (2020–2025). ჯანდაცვის პოლიტიკა, ეკონომიკა და სოციოლოგია, 10 (2). DOI: https://doi.org/10.52340/healthecosoc.2026.10.02.2

1. Introduction

Forced migration is one of the major structural transformations of contemporary Europe, with profound effects on health, education and social protection systems. Wars, protracted conflicts and geopolitical instability in the European Union's eastern neighbourhood have rapidly reconfigured the composition of the populations served by public institutions, bringing to the fore complex needs related to mental health, trauma, access to services and social integration. In this context, health professionals are increasingly finding themselves in a position to work with patients who have experienced exile, violence and legal insecurity.

At the same time, European medical education is undergoing its own transformations, marked by curricular reforms, accelerated digitisation, the expansion of simulation, and increased attention to learning environments and student wellbeing. The specialist literature is developing an increasingly sophisticated vocabulary to describe “learning environments”, “clinical learning environments” and “communities of practice”, conceptualising professional training as a situated, relational and ecological process. However, it remains unclear to what extent these analytical and curricular frameworks integrate the realities of forced migration as a structural factor in contemporary medical practice.

This tension indicates a possible disconnect between two fields of knowledge that meet empirically but not conceptually: on the one hand, research on forced migration and refugee health, predominantly oriented towards vulnerability and intervention; on the other hand, research on medical education and learning ecologies, centred on professional training in relatively stable institutional contexts. Although refugees are

present in hospitals, university clinics and local communities, this presence is rarely thematised as a constitutive dimension of medical learning environments.

This article starts from the hypothesis that this decoupling is not accidental, but reflects distinct structures of knowledge production, with different vocabularies, priorities and analytical frameworks. To investigate this hypothesis, the study proposes a triangulated bibliometric analysis of biomedical literature indexed in PubMed (2020–2025), focusing on three areas: forced migration, medical education, and ecologies of education/learning environments. By combining co-occurrence maps with a comparative analysis of dominant terms, the article aims to identify both thematic convergences and structural absences between these fields.

The main contribution of the article is twofold. Empirically, it provides a systematic mapping of how forced migration, medical education, and learning environments are conceptualised (or separated) in recent biomedical literature. Theoretically, it argues for the need for an integrative framework of medical education ecologies in forced migration, capable of connecting ecological analysis of learning with critical research on exile, inequalities, and civil society. In this way, the article contributes to the interdisciplinary debates, proposing a bridge between studies on education, health and socio-political transformations in contemporary Europe.

1.1 Ecologies of learning and ecological approaches to education

The theoretical framework we propose starts from the ecological tradition in developmental and educational sciences. Bronfenbrenner's Ecological Systems Theory conceptualises development as the result of the interaction between the individual and systems (with their micro, meso, exo, macro and chronosystem levels), from family and school to political and cultural structures (Bronfenbrenner, 1977; Rosa & Tudge, 2013; Mehdipour Maralani & Pfeiffer, 2025). This model is useful for forced migration, where shocks in the macrosystem (war, asylum policies, solidarity hierarchies) radically reconfigure the educational microsystems of refugee children and young people.

In education, the concept of "learning ecology" develops this perspective. Barron defines learning ecology as the set of contexts, relationships, tools, and activities (formal and informal) through which a person builds lifelong learning opportunities (Barron, 2006). Jackson similarly talks about "personal learning ecologies" composed of resources, contexts, and practices distributed among family, school, digital spaces, and communities (Jackson, 2013). This perspective is complemented by the theory of "communities of practice" (Wenger), which sees learning as social participation in a community that practises a common "craft", from activists and teachers to medical teams (Wenger, 1998). In the context of medical education, these communities include clinical teams, student groups, refugee support NGOs, or migrant-led organisations.

Combined, these theories allow us to define the ecologies of education as dynamic networks of actors (pupils, students, teachers, patients, volunteers), spaces (schools, camps, hospitals, online platforms), resources (curriculum, language, social capital) and power structures (asylum regimes, hierarchies of solidarity, educational policies). They are particularly relevant to situations of forced migration, where the ecologies of obligation and care are rapidly reconfigured.

1.2 Forced migration, civil society and education in Europe

European literature on forced migration describes a field marked by tension between solidarity and exclusion policies. The volume edited by Feischmidt, Pries and Cantat shows the crucial role of civil society (NGOs, volunteer networks, local initiatives) in protecting refugees and building "local refugee regimes" that complement or challenge the official European regime (Feischmidt, Pries, & Cantat, 2018). Barglowski and Bonfert analyse migrant organisations as social protection infrastructures: they mediate access to resources, build belonging, and offer strategies for managing social risks in a volatile political environment (Barglowski & Bonfert, 2023). At the same time, Kocyba and Lewicki discuss "shrinking spaces" for civil society under illiberal governments, showing how pro-migrant activists operate in a context of delegitimization, surveillance and institutional restriction (Kocyba & Lewicki, 2020). Schmidt, Harth and von Harbou propose the concept of "hierarchies of solidarity" to describe the differential treatment of Syrian and Ukrainian refugees in Europe (from visa regimes to media representations) and show how racialisation, religion and geopolitics produce unequal regimes of (non)belonging (Schmidt, Harth, & von Harbou, 2024).

The educational dimension of these migratory ecologies has been analysed more intensively since 2015 and, more recently, since Russia's invasion of Ukraine. Herbst and Sitek's study of Ukrainian students in Polish schools talks about "education in exile" and shows how territorial distribution, local capacity, and school policies shape the inclusion or marginalisation of refugee children (Herbst & Sitek, 2023). Stolarski

describes the situation of “two schools under one roof” (one online, one offline) that produces parallel education systems for Ukrainian and local students, with implications for school democracy and student participation (Stolarski, 2024).

At the experiential level, Woltran shows how “pull-out classes” for Ukrainian students in Austria, although intended as language support, can reinforce segregation and block the sense of belonging (Woltran, Hassani, & Schwab, 2024). Macková and Krejčí highlights the agency and vulnerabilities of refugee children in the Czech Republic, emphasising the role of social relationships and emotional support for educational continuity and identity reconstruction (Macková & Krejčí, 2023). Hunt, in a scoping review, shows that refugees' access to and experiences of education are deeply gendered: care responsibilities, gender norms, and gender-based violence structure who gets to school and how they are treated there (Hunt et al., 2023).

Other works focus on language, family, and well-being. Küün analyses family language policies in Ukrainian families in Estonia, showing how maintaining the language of origin is simultaneously a strategy for preserving identity, a resource for well-being, and a means of negotiating with the majority educational space (Küün, 2022). Kollender and Schwendowius, from the perspective of critical educational research, investigate the extent to which recent “waves” of refugees are becoming a catalyst for anti-discriminatory school transformations or, conversely, for the consolidation of exclusive “institutional timescapes” (Kollender & Schwendowius, 2024).

This body of work suggests that the educational ecologies of forced migration in Europe are composed of interactions between asylum policies, educational institutions, civic initiatives, families and transnational networks, traversed by lines of force related to gender, age, legal status and language.

1.3 The ecologies of medical education and health learning environments

In professional health education, the concept of the “learning environment” is central. Gruppen and colleagues propose a framework for “learning environments in the health professions” that integrates structural (programme organisation), social (relationships with colleagues and supervisors), digital and cultural (norms, values, climate of psychological safety) components (Gruppen et al., 2019). Isba and colleagues define the learning environment as the way in which the curriculum is actually experienced by students and show that perceptions of the environment are associated with satisfaction, behaviours and educational outcomes (Isba et al., 2020).

Recent literature confirms the impact of the learning environment on student engagement, academic performance, and mental health. Studies in various contexts show that an environment perceived as supportive (with quality feedback, respectful relationships, and adequate resources) correlates with higher engagement and lower burnout (Huang et al., 2024). In the clinical setting, Liljedahl's research conceptualises learning as a process of participation in real work, where professional identity is built through legitimate peripheral participation in a community of practice of health professionals (Liljedahl, 2018).

Systematic reviews of the clinical learning environment in nursing and medicine show that the pedagogical atmosphere, quality of supervision, and safety culture are determinants of competence development and intention to remain in the profession (Zhang et al., 2022). Simulation and VR-based training formats are conceptualised as “controlled learning ecologies”, providing spaces for safe, repetitive practice, especially for rare or high-risk situations (Elendu et al., 2024).

In this literature, medical education ecologies can be understood as socio-material networks that include: institutions (faculties, hospitals), spaces (classrooms, clinics, online platforms), actors (students, doctors, patients, mentors), tools (simulators, guides, digital applications) and normative structures (accreditation standards, professional regulations). However, bibliometrics show that these ecologies are almost always conceptualised in stable contexts, without the explicit integration of forced migration or refugee status.

2. Articulation of the theoretical framework: educational ecologies in forced migration and medical education

2.1. From ecological systems to multi-scalar educational ecologies

Starting from Bronfenbrenner, forced migration can be read as a “chronosystem event”, i.e. a historical rupture (war, collapse of a state) that reconfigures all levels of the educational system. At the microsystem level, refugee children and young people change their family, language of schooling, classmates and teachers; at the mesosystem level, relationships between families, schools, NGOs and social services are in flux; at the macrosystem level, border regimes, media discourse and solidarity hierarchies define what educational opportunities become available (Schmidt et al., 2024).

Applying Barron's perspective on "learning ecologies", we can see the educational pathways of refugees as the result of a combination of formal (schools, universities), non-formal (NGO courses, Ukrainian online schools) and informal (family learning, transnational digital networks) opportunities (Barron, 2006). Studies on "two schools under one roof" or pull-out classes show how parallel educational ecologies (one in the host country's language, the other in the language of origin) coexist with ambivalent effects on inclusion and curricular continuity (Stolarski, 2024).

In medical education, frameworks such as "learning environment" and "communities of practice" allow for the conceptualisation of medical schools and hospitals as densely connected learning ecologies, in which students are both beneficiaries and co-producers of knowledge and clinical practice (Wenger, 1998). When these students come from refugee families or when they practise in communities with large refugee populations, their learning ecologies are directly shaped by conflict, mobility and structural inequalities, but this is barely visible in the literature, as our bibliometric maps indicate.

2.2 The role of civil society and migrant organisations in educational ecologies

Research on civil society and migration in Europe shows that migrant organisations and pro-refugee NGOs act as "mediating structures" between refugees and states, providing both social protection and educational support (tutoring, language courses, university guidance) (Barglowski & Bonfert, 2023). From the perspective of educational ecologies, these organisations become essential nodes in refugee learning networks, especially as public schools may be overburdened or structured in an exclusionary manner, as suggested by work on "shrinking spaces" and illiberal schools (Kocyba & Lewicki, 2020).

The same can be extended to medical education: NGOs and professional organisations working with refugees (e.g., free clinics, translator networks, university "open university" initiatives for refugee students) can be understood as extensions of clinical learning ecologies, but are rarely conceptualised as such in the medical literature.

2.3 Intersectional dimensions: gender, age, language, and legal status

Hunt points out that access to education for refugees is deeply stratified by gender, with women and girls facing additional barriers related to caregiving, gender-based violence, and patriarchal norms (Hunt et al., 2023). Macková and Krejčí adds a generational perspective, highlighting how children combine vulnerability with agency, negotiating the meaning of exile and hope in new schools (Macková & Krejčí, 2023). Küün's studies and other research on "family language policy" show that language is simultaneously a pedagogical resource, an anchor of identity, and a possible vehicle for exclusion in school spaces (Küün, 2022).

In medical education environments, intersectionality appears in a similar way: students' perceptions of the learning environment differ according to gender, disability, migrant status or ethnicity, and negative experiences can fuel burnout and marginalisation (Huang et al., 2024). Integrating an intersectional framework into bibliometric analysis allows not only for the mapping of themes, but also for the question: who is missing from these ecologies? – for example, refugee students in medical schools, teachers with experience of exile, refugee patients as educational partners.

2.4 Implications for triangulated bibliometric analysis

Based on this multidisciplinary framework, the bibliometric analysis of the three fields can be formulated as research on knowledge ecologies:

- The literature on forced migration and education in Europe mainly analyses mainstream schools, language policies and the role of civil society, with a focus on children and young people, gender and inequalities.
- The literature on medical education focuses on curriculum, learning environments, simulation and wellbeing, but in relatively stable institutional contexts, with no systematic reference to refugees or crisis contexts.
- The literature on health education/learning environments provides a sophisticated vocabulary to describe learning environments, but is rarely explicitly linked to forced migration.

Bibliometric triangulation of these three bodies allows for:

- The identification of convergences (e.g., a common concern for learning environments and mental health).
- Mapping disjunctions (the almost total absence of refugees from medical education and medical education from refugee studies).
- Formulating a research programme to develop the concept of medical education ecologies in forced migration, integrating: Systemic ecology (Bronfenbrenner), Personal learning ecologies (Barron, Jackson), Communities of practice (Wenger) and Critical analyses of civil society, discrimination and hierarchies of solidarity in Europe (Feischmidt et al., Barglowski & Bonfert, Hunt, Kollender & Schwendowius, Schmidt et al.).

In this way, the theoretical framework is not only descriptive but also normative: it calls for the design of educational ecologies that are inclusive, non-discriminatory and trauma-sensitive for refugees, both in mainstream schools and in medical education and training for health professionals.

3. Research methodology

3.1 Research design and rationale

The study uses a triangulated bibliometric analysis based on the co-occurrence of terms, with the aim of mapping and comparing three "ecologies" of knowledge in contemporary biomedical literature: (a) Forced Migration (FM), (b) Medical Education (ME) and (c) ecologies/environments of learning (EE). By "triangulation" we mean a comparative design in which three independent corpora are analysed using the same bibliometric logic, and the interpretation looks at both thematic convergences and significant absences in the FM–ME–EE intersection area. Bibliometric analysis is treated as a method of capturing discursive configurations and conceptual gaps that may have consequences for medical curricula, training policies, and the way health institutions are prepared to respond to contexts of forced migration.

3.2 Data source, period analysed and justification of choices

The data were collected from PubMed, a central database for biomedical literature and review articles. PubMed was chosen because the research question concerns how the biomedical field (which influences guidelines, curricula and institutional priorities) addresses forced migration and learning environments.

The period analysed is 2020–2025. The interval is relevant because it overlaps (a) major reconfigurations of clinical educational environments (including accelerated digitisation and effects on student wellbeing), and (b) the intensification of forced migration in Europe in the context of the war in Ukraine, with visible effects on public services and educational and health infrastructures.

3.3 Building corpora: query strategies for FM, ME and EE

Three independent corpora were defined, each with a dedicated query formula. Searches were performed in the Title/Abstract fields (and, where necessary, MeSH terms) to capture both the authors' 'active' conceptual language and biomedical indexing standardisation.

(a) Forced Migration (FM) domain

The objective of the query was to capture literature on refugees, asylum seekers and forced displacement, with a focus on health and the consequences of conflict.

(b) Medical Education (ME) domain

The query targeted literature on medical education and health profession training, including terms related to curriculum, competencies, and learning environments.

(c) Ecologies of Education (EE) domain

Since "learning ecologies" is an emerging concept with scattered terminology in PubMed, the EE corpus was constructed using proxy terms ("learning ecology/ecologies"; "educational ecosystem"; "learning environment"; "communities of practice"; "situated/contextual learning"; "learning spaces"). This option is intended to maximise sensitivity to vocabulary describing learning environments as socio-material networks.

3.4 Query formulas

Forced Migration (FM) domain:

("refugee"[Title/Abstract] OR "refugees"[Title/Abstract] OR "asylum seeker"[Title/Abstract] OR "asylum seekers"[Title/Abstract] OR "forced migration"[Title/Abstract] OR "displaced persons"[MeSH Terms] OR "displaced"[Title/Abstract] OR "internally displaced"[Title/Abstract] OR "humanitarian crisis"[Title/Abstract] OR "conflict-affected"[Title/Abstract] OR "conflict zones"[Title/Abstract]) AND ("2020"[DP] : "2025"[DP]).

Medical Education (ME) domain:

("medical education"[Title/Abstract] OR "health professions education"[Title/Abstract] OR "clinical training"[Title/Abstract] OR "medical students"[Title/Abstract] OR "competency-based education"[Title/Abstract] OR "curriculum"[Title/Abstract] OR "interprofessional education" [Title/Abstract] OR "learning environment"[Title/Abstract]) AND ("2020"[DP] : "2025"[DP]).

Ecologies of Education (EE) domain:

("learning ecology"[Title/Abstract] OR "learning ecologies"[Title/Abstract] OR "educational ecosystem"[Title/Abstract] OR "educational ecosystems"[Title/Abstract] OR "educational environment"[Title/Abstract] OR "learning environment"[Title/Abstract] OR "learning spaces"[Title/Abstract] OR "situated learning"[Title/Abstract] OR "communities of practice"[Title/Abstract] OR "contextual learning"[Title/Abstract]) AND ("2020"[DP] : "2025"[DP]).

3.5 Filtering: type of publications and approximation of the European space

In order to capture "consolidated" knowledge (not just specific empirical studies), predominantly synthesis articles were included (Meta-Analysis, Review, Scoping Review, Systematic Review; for EE, and Classical Article/Network Meta-Analysis where indexing allowed). This choice increases comparability between fields, but may reduce sensitivity to emerging local initiatives (e.g. recent educational programmes or institutional interventions).

To approximate the European focus, a filter was applied to the Affiliation field, including EU/EEA countries and Central and South-Eastern European countries (the complete list used is presented in the query). The affiliation filter is methodologically treated as a proxy for the European scientific production ecosystem; it may exclude articles about Europe produced by non-European authors and may include articles with European affiliation that analyse non-European contexts. This ambivalence is acknowledged and discussed as a methodological limitation.

3.6 Data export, pre-processing and map construction in VOSviewer

The final selections were exported from PubMed into text files (.pub), then processed for bibliometric analysis in VOSviewer. To increase transparency and interpretative robustness, the processing aimed to:

- Terminological standardisation: unification of singular/plural where terms refer to the same concept (e.g. refugee/refugees), reduction of generic terms with no conceptual value (e.g. "study", "review"), and harmonisation of relevant acronyms (e.g. "PTSD").
- Unit of analysis: terms from Title/Abstract (and MeSH for standardised biomedical concepts where they appear). This choice combines the conceptual language of the authors with disciplinary indexing.
- Co-occurrence thresholds: different thresholds were used for each map to balance sensitivity and specificity according to the size of the corpus: FM - co-occurrence threshold 5, ME: co-occurrence threshold 10 (and, for verification, 5 in secondary explorations) and EE: co-occurrence threshold 3 (given the significantly smaller corpus and terminological dispersion).
- Selection of terms included in the map: only terms that reach the set threshold are included in the final network, in order to avoid visual overload and to preserve the interpretability of the clusters.

3.7 Descriptive dimension: "Top 20 terms" analysis and comparative table

In order to anchor the interpretation of clusters in replicable descriptive indicators, the analysis of the maps is complemented by:

- extracting the top 20 terms for each domain (by total number of occurrences), and
- the construction of a comparative table summarising the size of the corpora and the main parameters (number of articles, terms extracted, terms included in the map at the thresholds used).

These two steps serve to support the central argument (thematic disjunctions) through a minimum basis for quantitative comparison, not just through narrative interpretation.

3.8 Narrative triangulation procedure

Narrative triangulation was applied as a four-step procedure:

- internal reading of each map – identification of central terms, thematic clusters and dominant relationships, followed by the formulation of a synthesis of "what the map says about the ecology of the field".
- identification of significant absences - definition of a short set of bridge terms expected if the domains were connected (e.g. refugees/asylum seekers in ME and EE; curriculum/training/learning environment in FM; forced migration/displacement in ME/EE). Their absence is treated as an indicator of conceptual disjunction in the analysed biomedical literature.
- Cross-sectional comparison - evaluating how seemingly similar themes (e.g., mental health/trauma vs. wellbeing/burnout) are conceptualised separately and whether there are semantic bridges or thematic overlaps between clusters.
- Theoretically guided interpretative inference - clusters are interpreted through the lenses of Bronfenbrenner–Barron/Jackson–Wenger, with an explicit rule: bibliometric analysis does not allow direct inferences about the effectiveness of interventions, but about the structure of scientific discourse, thematic priorities and conceptual gaps in the biomedical field.

3.9 Results of the filtering stages (numerical description of the corpora)

Applying the filters described, the following results were obtained:

- For the Forced Migration (FM) field: 855 results (types: Meta-Analysis, Review, Scoping Review, Systematic Review), total 3263 terms (237 terms at threshold 5).
- For the Medical Education (ME) field: 1628 results (types: Meta-Analysis, Network Meta-Analysis, Review, Scoping Review), total 5147 terms (456 terms at threshold 5; 206 terms at threshold 10).
- For the Ecologies of Education (EE) field: 151 results (types: Classical Article, Meta-Analysis, Network Meta-Analysis, Review, Scoping Review, Systematic Review), total 809 terms (76 terms at threshold 3; 39 terms at threshold 5).

These volume asymmetries are interpretatively relevant: they indicate a much more consolidated and prolific field (ME), a broad field oriented towards vulnerability and services (FM) and a smaller and more dispersed field (EE), which justifies different thresholds and increased attention to terminological sensitivity in EE.

3.10 Ethical considerations

The study uses only public bibliographic data and does not involve human subjects or personal data; therefore, ethical approval was not required.

3.11 Methodological limitations

This bibliometric analysis has a number of limitations inherent in its design and methodological choices, which should be taken into account when interpreting the results. Firstly, there are limitations to the data source. The exclusive use of the PubMed database favours indexed biomedical literature and may exclude relevant contributions from the social sciences, educational sciences or niche literature (NGO reports, public policy documents, institutional evaluations). Consequently, the analysis does not reflect the entire field of research on forced migration and education, but rather the structure of biomedical and educational-medical discourse, which directly influences curricula, guidelines and institutional priorities in the field of health. There are limitations to the geographical filter. Approximating "European literature" by filtering on the "Affiliation" field may lead both to the exclusion of articles about Europe written by authors with non-European affiliations and to the inclusion of articles with European affiliations that analyse non-European contexts. Therefore, the results should be interpreted as reflecting the European scientific production ecosystem, not exclusively European empirical realities in the strict sense. Another type of limitation relates to the selection of publication types. Restricting the corpora to synthesis articles (reviews, meta-analyses, scoping reviews) was a deliberate choice in order to capture the consolidated knowledge and dominant vocabulary of the fields analysed. However, this option may under-represent emerging innovative initiatives (e.g., local educational programmes for refugee students or pilot curricular interventions), which appear more frequently in empirical studies or project reports. Fourthly, terminological and conceptual limitations should be noted. The field "Ecologies of Education" was constructed using proxy terms, as the concepts of "learning ecology" or "educational ecosystem" are not standardised in PubMed. Although this strategy increases the sensitivity of the analysis, there is a risk that some relevant papers may use alternative vocabulary that has

not been captured by the query formulas. There are also limitations inherent in co-occurrence analysis. Bibliometric analysis captures co-occurrence relationships between terms, not causal relationships or assessments of the effectiveness of interventions. The absence of a term (e.g., "refugees" in medical education) indicates a discursive and conceptual gap in the analysed literature, not the complete absence of practices or initiatives at the institutional level. Finally, the limitations of narrative interpretation should not be overlooked. Although triangulation was guided by explicit rules and well-established theoretical frameworks, the interpretation of clusters remains a contextualised analytical process. The results should be read as a mapping of thematic priorities and structural absences in contemporary biomedical literature, not as an exhaustive assessment of all forms of medical education or intervention in contexts of forced migration.

Despite these limitations, the triangulated bibliometric approach offers a systematic and comparable perspective on how three fields relevant to European public policy remain conceptually separate, opening up a clear space for integrative research and curricular reform.

4. Results

4.1 Comparative contextualisation of bibliometric results

Prior to the detailed analysis of each thematic map, Table 1 provides a comparative summary of the main parameters of the three corpora analysed – Forced Migration (FM), Medical Education (ME) and Ecologies of Education (EE). This comparison is essential for interpreting the differences observed in the co-occurrence maps, as the asymmetry in corpus size, terminological density and thresholds used influences the visibility of themes and potential conceptual bridges.

As Table 1 shows, the literature on medical education (ME) is almost twice as voluminous as that on forced migration (FM) and more than ten times larger than the EE corpus. This disproportion indicates a highly institutionalised field with a stabilised vocabulary and a high capacity for curricular self-reflection. In contrast, EE appears as a more restricted and terminologically dispersed field, which justifies the use of a lower co-occurrence threshold and proxy terms to capture learning ecologies.

At the same time, Table 1 highlights a key element for the argument of this article: the almost total absence of terms related to refugees and forced migration in the ME and EE corpora, despite their considerable size and explicit orientation towards learning and training environments. This preliminary finding structures the narrative reading of the FM, ME and EE maps presented in the following subsections.

Indicator	Forced Migration (FM)	Medical Education (ME)	Ecologies of Education (EE)	Interpretative relevance
Period analysed	2020-2025	2020-2025	2020–2025	Comparable time control
Database	PubMed	PubMed	PubMed	Methodological consistency
No. of articles included (after filtering)	855	1628	151	Asymmetry of field size
Types of articles included	Review, Scoping, Systematic Review, Meta-analysis	Review, Scoping Review, Meta-analysis, Network Meta-analysis	Review, Scoping, Systematic Review, Classical Article	Different degree of consolidation
Total number of terms extracted	3263	5147	809	Conceptual density
Main co-occurrence threshold	5	10	3	Sensitivity/specificity balance
No. of terms included in map (main threshold)	237	206	76	"Size" of the thematic network
Alternative threshold tested	–	5	5	Robustness check
Dominant themes	Mental health, trauma, health	Curriculum, simulation, wellbeing, students	Learning environment, communities of	Profile of each ecology

	services, conflict		practice, workplace learning	
Explicit educational terms	Marginal	Central	Central	Educational imbalance
Terms about refugees	Central	Absentees	Absentees	Major conceptual gap
Presence of a learning environment	Marginal	Central	Central	Potential point of convergence
Level of contextualisation in crisis	High	Low	Low	Decoupling from the macrosystem
Potential for FM–ME–EE intersection	Very low	Very low	Partial (without FM)	Justifies triangulation

Table1: Comparative indicators of the three areas analysed (FM, ME, EE)

4.1 Forced Migration (FM) map – ecologies of vulnerability and protection, without an educational dimension

In the FM map (Figure 1), the central nodes – "refugees", "migration", "mental health", "armed conflict", "health services", "maternal/reproductive health" – describe an ecology of vulnerability and protection in health. From Bronfenbrenner's perspective, what we see is a mapping of the effects of the macrosystem (wars, asylum regimes, hierarchies of solidarity) on the micro- and mesosystems of refugees: the traumatised body (mental health and trauma cluster), reproduction and motherhood in exile (reproductive health cluster), access to health systems and services in a structurally precarious position.

The mental health cluster ("PTSD", "depression", "anxiety", "quality of life") can be read as an expression of a broken psychosocial ecology: attachment relationships, school continuity, social and community networks are fractured, and support systems in host countries are often fragmented or discriminatory. Hunt shows, for example, that the educational experiences of refugees in Europe are deeply gendered, with women and girls facing additional risks and limited access to educational resources. This dimension does not appear explicitly in the map, but the mental health cluster can be interpreted as a symptom of tense educational and social ecologies, in which schools and public services fail to cushion the shock of exile.

The cluster on "health systems", "health services" and "global health" shows an interest in how health institutions – hospitals, national systems, NGOs – are reconfiguring themselves in the face of forced migration. This ties in well with the work of Feischmidt et al. and Barglowski & Bonfert on the role of civil society and migrant organisations as infrastructures for social protection and mediation between refugees and the state. They suggest that the ecologies of refugee s are not limited to their relationship with the host state, but also include transnational networks, migrant organisations and volunteers, which appear in other databases but are not visible as such in medical MeSHs.

Narratively, the FM map describes an ecology of risk and crisis management, not an ecology of learning: almost no terms related to "curriculum", "training", "learning environment", or "students" appear in the foreground. From the perspective of educational ecologies, this is a key finding: professionals and institutions focus their thinking on treatment, access and protection, while the dimension of training for working with refugees – or refugee education in the field of health – remains largely absent from the biomedical discourse indexed in PubMed.

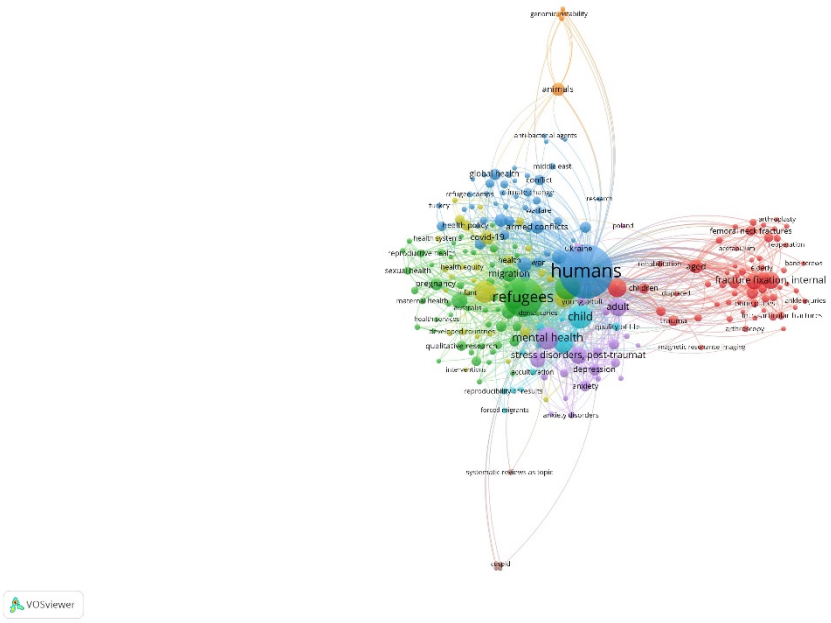

Figure1: Map of the Forced Migration field, at a co-occurrence threshold of 5

In contrast, Table 1 shows that the ME field is the most extensive and conceptually dense of the three analysed (1628 articles; 5147 terms extracted). The higher co-occurrence threshold (10) reflects the stability of the vocabulary and the thematic coherence of the field. The ME map highlights well-defined clusters around curriculum, simulation, student wellbeing, and interprofessional education.

However, the data summarised in Table 1 indicates a total absence of terms related to refugees, forced migration or conflict contexts, even in explorations at lower thresholds. This absence cannot be explained by the small size of the corpus or a lack of interest in difficult contexts, as the ME literature extensively addresses stress, burnout, and student mental health.

Integrating Table 1 with the reading of the ME map suggests a structural decoupling: medical learning environments are conceptualised as relatively stable institutional ecologies, autonomous from the political and social macrosystems that shape the experiences of refugee patients. Forced migration does not appear as either a curriculum topic or a contextual factor of the learning environment.

4.2 Medical Education (ME) Map – stable institutional ecologies, focused on curriculum, technology and wellbeing

The ME map (Figure 2) shows a completely different world: here, the dominant nodes – “curriculum”, “medical education”, “simulation/virtual reality”, “students”, “medical/nursing”, “burnout”, “anxiety”, “interprofessional education” – describe the stable institutional ecologies of health professional training. From Barron and Jackson's perspective, we can read this map as a network of planned “learning ecologies”: faculties, university hospitals, simulation laboratories, online platforms, all orchestrated in an accredited curriculum, with sophisticated tools for assessment and skills development.

The cluster of “curriculum” – “surveys” – “scoping reviews” reflects a reflexive interest in “curriculum as lived”, i.e. how the formal structure is experienced by students – exactly the perspective proposed by the literature on the “learning environment” in medical education. The “technological” cluster (simulation, VR, AI, surgical robotics) can be interpreted as the development of controlled micro-ecologies of learning, where clinical risk is suspended and students can engage in repetitive, collaborative, often digitally mediated practices.

The cluster related to “students”, “burnout”, “anxiety”, and “quality of life” indicates that the learning environment is recognised as a determinant of students' mental health and engagement. Recent studies show that the perception of a supportive environment – good relationships with tutors, constructive feedback, adequate resources – correlates with higher engagement and lower burnout, confirming ecological intuitions about the interdependence of context and development.

From the perspective of forced migration, what stands out is what is not shown: no major nodes related to “refugees”, “asylum seekers”, “displaced persons”, or “conflict zones” are visible on this map. The educational ecologies mapped are predominantly those of students who have “entered” the system – mostly

citizens or residents of host countries – and of institutions operating in relatively stable political contexts. The macrosystem of war and exile, so central to the FM map, is almost completely absent from the curricular and pedagogical ecologies visible here.

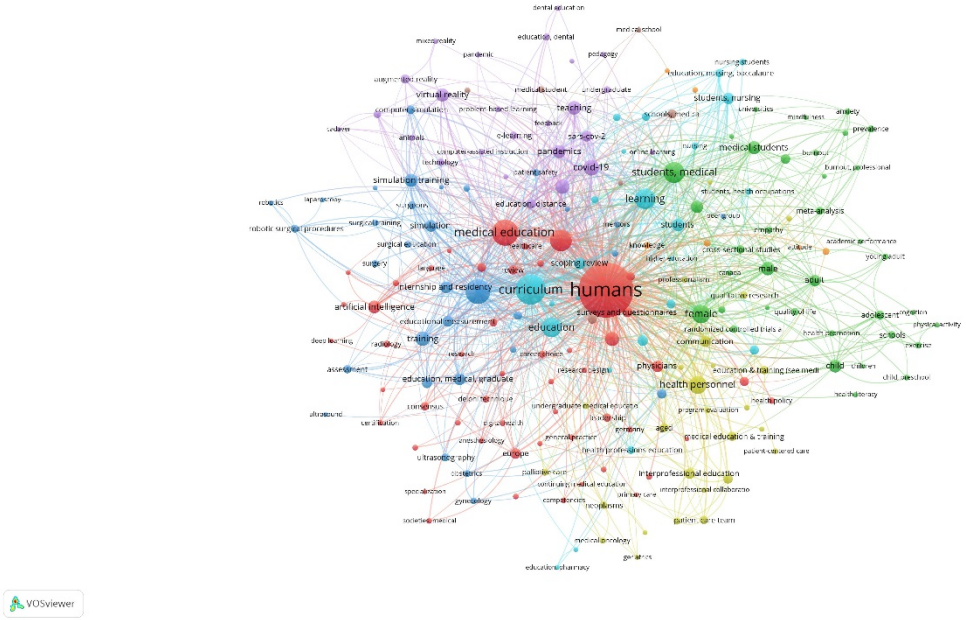

Figure2: Map of the Medical Education domain, at a co-occurrence threshold of 10

Narratively, the ME map tells the story of learning environments undergoing rapid technological modernisation (simulation, VR, e-learning) and a crisis of student wellbeing, but not the story of adaptation to forced migration. Through Bronfenbrenner's lens, we can say that the macrosystem of migration has not yet systematically penetrated the design of medical micro- and mesosystems – at least not in the literature synthesised in PubMed between 2020 and 2025.

In contrast, Table 1 shows that the field of ME is the most extensive and conceptually dense of the three analysed (1628 articles; 5147 terms extracted). The higher co-occurrence threshold (10) reflects the stability of the vocabulary and the thematic coherence of the field. The ME map highlights well-defined clusters around curriculum, simulation, student wellbeing, and interprofessional education.

However, the data summarised in Table 1 indicates a total absence of terms related to refugees, forced migration or conflict contexts, even in explorations at lower thresholds. This absence cannot be explained by the small size of the corpus or a lack of interest in difficult contexts, as the ME literature extensively addresses stress, burnout, and student mental health.

Integrating Table 1 with the reading of the ME map suggests a structural decoupling: medical learning environments are conceptualised as relatively stable institutional ecologies, autonomous from the political and social macrosystems that shape the experiences of refugee patients. Forced migration appears neither as a subject in the curriculum nor as a contextual factor in the learning environment.

4.3 Ecologies of Education (EE) map – ecologies of learning in the workplace and clinical environment, with links to medical education, but without refugees

The EE map (Figure 3) explicitly links the discourse on “learning environment”, “clinical learning environment”, “workplace learning”, “communities of practice”, “students (nursing, medical)” to the ecological perspective. Here, Wenger's theory of “communities of practice” becomes empirically visible: the central cluster in which “health personnel”, “delivery of health care”, “staff development”, “evidence-based practice” suggests that learning is conceptualised as participation in a professional community that practises a form of care, not just as individual assimilation of content.

The green cluster, which links “students”, “nursing”, “nursing education”, “clinical competence”, “clinical placement” and “simulation/VR”, very clearly describes a clinical ecology of learning: students circulate between classrooms, wards, simulation centres and peer groups, negotiating their professional role and identity. Assessment systems, digital tools, tutors and patients are all part of the same socio-material network. Nursing education journals and systematic reviews on learning environment assessment confirm this

approach, emphasising pedagogical atmosphere, supervision and safety culture as key elements of the ecology.

The blue cluster, focused on "medical students", "undergraduate medical education", "e-learning", and "COVID-19", shows how the pandemic has reconfigured learning environments: the physical campus has been partially replaced by digital spaces, and communities of practice have temporarily moved online. Here, the analogy with the "two schools under one roof" in the literature on Ukrainian students – one online, one offline – is striking, even if the EE map does not explicitly refer to refugees.

As in ME, however, the dimension of forced migration is almost completely absent: "refugees", "asylum seekers" or "forced migration" do not appear as relevant terms. The ecologies described are those of professionals and students in "central" health systems, not those in exile or those who work systematically with refugees. The literature on education in exile – such as the studies by Herbst & Sitek, Stolarski, Woltran, Kollender & Schwendowius – shows, on the other hand, that in mainstream schools and educational policies there is a growing awareness of the impact of forced migration on educational ecologies: parallel classes, multiple languages, dynamics of inclusion/exclusion.

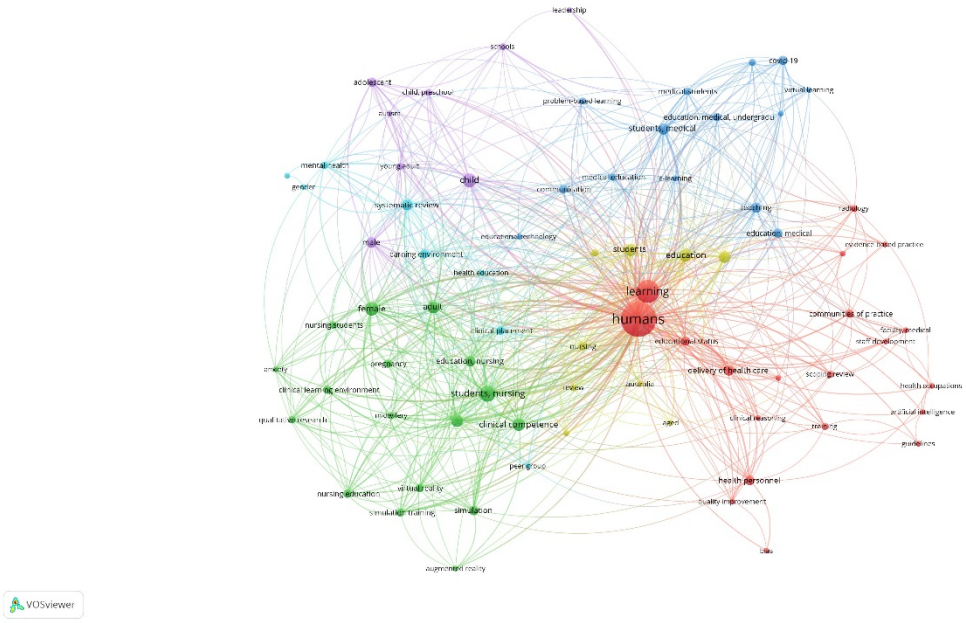

Figure3: Map of the Ecologies of Education domain, at a co-occurrence threshold of 3

Narratively, the EE map tells the story of mature ecologies of professional learning, with a developed vocabulary to describe learning environments, communities of practice, and the transition to work. From our perspective, this map provides exactly the "language" that is missing in the FM map: we have a robust framework for describing how learning takes place in hospitals and schools, but this framework is not yet applied to the educational ecologies of refugees or the training of professionals for the context of forced migration.

As Table 1 indicates, the EE corpus is significantly smaller (151 articles), with low terminological density, but with a clear conceptual orientation towards learning environments, communities of practice and workplace learning. The low co-occurrence threshold (3) allows for the identification of relevant clusters related to "clinical learning environment", "workplace learning" and "communities of practice".

Crucially, Table 1 shows that although educational terms are central to EE, terms related to refugees and forced migration are completely absent. This finding is supported by the EE map, which describes sophisticated ecologies of professional learning, but exclusively within health systems considered "normal" or stable.

Therefore, EE provides exactly the conceptual vocabulary needed to analyse the ecologies of medical education in complex contexts, but does not apply it to situations of exile, forced mobility or structural inequalities associated with migration.

4.4 Triangulated synthesis: what Table 1 shows about the FM–ME–EE intersection

Read together, the maps and Table 1 indicate a systematic fragmentation of the three fields. FM produces knowledge about vulnerability and protection, without educational language; ME produces

knowledge about curriculum and learning environments, without reference to forced migration; EE develops an ecological vocabulary of learning, without connecting it to refugees or crisis contexts.

The comparative table shows that this fragmentation is not an artefact of the size of the corpora or the thresholds chosen, but a structural feature of contemporary biomedical discourse. The absence of bridging terms in ME and EE, despite the volume and maturity of these fields, indicates a conceptual gap that has direct implications for educational and health policies in Central and Eastern Europe.

In this sense, Table 1 functions as an analytical device, not just a descriptive one: it supports the conclusion that the FM–ME–EE intersection is almost non-existent and legitimises the need to develop an integrative framework of "medical education ecologies in forced migration".

4.5 Comparative analysis of dominant terms

In order to anchor the interpretation of co-occurrence maps in a replicable descriptive basis, the bibliometric analysis was supplemented by extracting the top 20 terms by total number of occurrences for each of the three domains analysed. Table 2 presents these terms, calculated based on PubMed files uploaded for Forced Migration (FM), Medical Education (ME) and Ecologies of Education (EE), after removing PubMed metadata and normalising terminology (singular/plural, acronyms).

Rank	Forced Migration (FM)	Medical Education (ME)	Ecologies of Education (EE)
1	refugees	medical education	learning
2	health	Health	education
3	mental health	Training	learning environment
4	trauma	medical students	communities of practice
5	humanitarian	Clinical	practice
6	conflict	Curriculum	workplace learning
7	displacement	Care	clinical
8	public health	Learning	educational
9	health services	Faculty	nursing
10	access to care	competence	students
11	psychosocial	Wellbeing	care
12	inequality	assessment	professional
13	vulnerability	interprofessional	teaching
14	migration	Simulation	context
15	maternal health	Burnout	situated learning
16	asylum seekers	Skills	supervision
17	protection	Evaluation	participation
18	community	continuing education	social
19	emergency	Workforce	organisation
20	global health	professional development	environment

Table2: Top 20 dominant terms (total number of occurrences) in the three fields analysed

This analysis does not focus on relational relevance (total link strength), but rather on lexical dominance, providing an overview of the concepts that structure the current discourse in each field in the synthesis literature published between 2020 and 2025.

- Forced Migration (FM)

The top 20 terms in the FM field are dominated by concepts associated with vulnerability, trauma and crisis management: "refugees", "mental health", "migrants", "displaced", "trauma", "humanitarian", "conflict", "public health", "access", "vulnerability", "asylum seekers", "protection". This distribution indicates a clear focus on the effects of forced migration on health and access to services, as well as on psychosocial and protection dimensions.

Significantly, educational terms such as "education", "training", "curriculum" or "learning environment" do not appear among the top 20 terms, suggesting that, in the FM corpus analysed, forced migration is conceptualised almost exclusively as a health, protection and public policy issue, not as a context for learning or professional training.

- Medical Education (ME)

In the field of ME, the top 20 terms focus on the institutional structure of medical education and the student experience: "learning", "education", "students", "clinical", "medical", "nursing", "training", "practice", "environment", "curriculum", "wellbeing", "burnout", "competence", "assessment",

"interprofessional", "simulation". The lexical distribution confirms the field's dominant focus on curriculum, skills, learning environments and students' mental health.

Despite this thematic diversity, terms referring to refugees, forced migration or conflict contexts do not appear among the top 20 terms, indicating that these realities do not structure the dominant discourse of medical education in the biomedical synthesis literature.

- Ecologies of Education (EE)

The EE field is characterised by a high density of terms related to learning environments, practices and contexts: "education", "medical", "learning", "students", "clinical", "training", "communities", "practice", "environment", "curriculum", "workplace", "nursing", "supervision", "participation", "situated learning". These terms reflect a conceptualisation of learning as a situated process, distributed between institutional spaces and communities of practice.

However, similar to the field of ME, there are no terms that refer to forced migration, refugees or exile, although the ecological vocabulary would, in principle, allow for the integration of these contexts.

- Comparative synthesis

Read transversally, Table 2 shows that each domain is organised around a distinct lexical ecology: FM – the ecology of vulnerability and protection, ME – the institutional ecology of vocational training, and EE – the ecology of learning environments and practices.

The absence of bridging terms between these lists (in particular refugees in ME and EE and education in FM) confirms, at the lexical level, the conceptual disjunctions identified by the bibliometric maps.

4.6 The explicit link to the theoretical framework and what it opens up for research

Viewed together, the three maps can be summarised in a few central ideas. FM maps ecologies of vulnerability and protection in health, strongly marked by conflict, trauma and inequalities, but without educational language. ME maps institutional ecologies of medical education and training in stable contexts, focused on curriculum, simulation and wellbeing, but without systematic reflection on forced migration. EE provides the vocabulary and conceptual tools to describe learning environments, communities of practice and resource networks, but is applied almost exclusively within existing systems, not in the context of exile.

From the perspective of educational ecologies, this creates an almost empty research space at the intersection of the three fields: what do the ecologies of medical education look like in the context of forced migration in Europe? How are communities of practice reconfigured when hospitals and faculties become spaces of care and learning in a context marked by exile, hierarchies of solidarity and shrinking spaces for civil society?

The narrative interpretation of the maps, anchored in this framework, allows us to say that we have ecologies of migration without education, ecologies of medical education without migration, and sophisticated ecologies of learning without refugees; bibliometric analysis conceptually opens up the space where these three worlds should be brought together.

5. Discussions

5.1 What bibliometric fragmentation tells us about education and health governance in Europe

The results of the triangulated bibliometric analysis indicate a structural fragmentation of the fields of knowledge relevant to forced migration, medical education and learning environments. As shown in the thematic maps and Table 1, we are not witnessing a general lack of interest in education, health or vulnerability, but rather an institutional and discursive separation of these concerns.

The literature on forced migration (FM) is strongly anchored in ecologies of risk, trauma and access to services, reflecting the impact of political macrosystems (conflict, asylum regimes, hierarchies of solidarity) on the lives of refugees. In contrast, the literature on medical education (ME) operates predominantly in a register of institutional stability, focusing on curriculum, educational technologies and student wellbeing, without integrating forced migration as a relevant contextual factor. Learning ecologies (LE) develop a sophisticated vocabulary to describe learning environments and communities of practice, but apply it almost exclusively in "normal" contexts, unaffected by forced mobility or crisis.

This fragmentation suggests that medical education systems and health systems operate, at the discursive level, in ecologies parallel to those of forced migration, even in a European context where refugees are a significant presence in hospitals, schools and local communities. From a public governance perspective, this decoupling raises critical questions about the capacity of institutions to anticipate and integrate major social changes into professional training.

5.2 Forced migration as a "chronosystem event" absent from medical education

Applying the lens of ecological systems theory, forced migration can be understood as a chronosystem event that simultaneously reconfigures microsystems (family, school, clinic), mesosystems (relationships between institutions) and macrosystems (policies, discourses, hierarchies of belonging). However, our results show that this reconfiguration is poorly reflected in the literature on medical education.

The absence of terms related to refugees in the ME corpus (confirmed by Table 1) indicates that medical training continues to treat the learning environment as relatively autonomous from major socio-political transformations. As a result, students and health professionals are prepared to operate in idealised clinical ecologies, not in contexts marked by conflict trauma, language barriers, legal insecurity or structural discrimination – realities central to refugee care in Central and Eastern Europe.

This finding is particularly relevant for regions characterised by "shrinking spaces" for civil society and political tensions related to migration, where the ecological adaptability of educational institutions becomes an indicator of democratic resilience.

5.3 What is missing: refugees as actors in learning ecologies

A second critical dimension highlighted by the analysis is the absence of refugees not only as objects of care, but as actors in educational ecologies. None of the three corpora analysed provides a systematic reflection on:

- refugee students in medical or health faculties;
- health professionals with experience of exile;
- refugee patients as educational partners in clinical training.

From the perspective of communities of practice theory, this absence is significant: professional learning is conceptualised as legitimate participation in a community, but refugees remain excluded from this symbolic participation, even when they are physically present in hospitals, clinics and classrooms. Thus, the ecologies of medical education reproduce, at the discursive level, the same hierarchies of inclusion and exclusion identified in asylum policies and European solidarity regimes.

5.4 The role of civil society and migrant-led organisations: invisible ecologies

The results also suggest a systematic invisibility of civil society in the biomedical literature analysed. Although social science research shows that NGOs, local initiatives and migrant-led organisations are central nodes in the real ecologies of refugee health, these entities rarely appear as educational actors or extensions of clinical learning environments.

This omission has practical consequences: medical education remains poorly connected to the actual ecologies of refugee care, where community translators, cultural mediators, and civic networks play an essential role. Integrating these actors into curriculum design and learning environments could contribute to the development of more porous educational ecologies capable of responding to contexts of crisis and mobility.

5.5 Implications for educational policy and curriculum

From a normative perspective, the results of this study point to the need for an ecological reconfiguration of medical education in Europe. The absence of forced migration from curricular discourse is not neutral, but reflects institutional priorities that may perpetuate inequalities in care and training.

Concrete implications include:

- Integrating forced migration as a cross-cutting theme in the medical curriculum, not just as a topic of "global health", but as a local clinical reality;
- Trauma-informed professional training that connects the mental health of refugees with students' learning experiences and the organisational culture of hospitals;
- Expanding the learning environment to include NGOs, migrant-led organisations and community services as legitimate training spaces;
- Developing learning environment assessment tools that are sensitive to diversity, language, legal status, and experiences of exile.

For Central and Eastern Europe, where education and health systems are often subject to political and financial pressures, these changes can contribute not only to improving the quality of medical education, but also to strengthening institutional capacity to respond to crises in a spirit of solidarity.

5.6 Future research directions

The discussions open up an emerging field of research: the development of a theory of medical education ecologies in forced migration that systematically integrates ecological perspectives, intersectional analysis and civil society research. Priority directions include:

- studying the experiences of refugee students and health professionals;
- analysing collaboration between faculties, hospitals and NGOs in real care ecologies;
- evaluating innovative educational interventions in crisis contexts (conflict trauma-oriented simulation, hybrid learning in exile, intercultural mentoring).

5.7 What dominant terms reveal about knowledge ecologies

The analysis of dominant terms presented in Table 2 consolidates and refines the results obtained through co-occurrence maps, providing additional insight into the discursive structure of the three fields analysed. Unlike maps, which highlight relationships between central concepts, absolute frequencies indicate what type of reality is recurrently thematised in each field.

In the case of Forced Migration, the dominance of terms related to mental health, trauma, conflict, and protection suggests that biomedical literature treats forced migration as a situation of risk and intervention, rather than as a space for learning or training. This orientation is consistent with the traditional role of medical research, but has the side effect of reducing the visibility of the educational dimension of refugee ecologies, including the training of professionals working with these populations.

In medical education, the dominant terms indicate an intense concern for learning environments, wellbeing and skills, but within a relatively stable institutional framework. The absence of refugees from the top 20 terms does not reflect a lack of interest in vulnerability or mental health, but rather an implicit delimitation of the field: forced migration is not conceptualised as a factor that shapes the learning environment or medical curriculum.

Paradoxically, the field of Ecologies of Education offers the most appropriate vocabulary for integrating forced migration – communities of practice, situated learning, organisational contexts – but analysis of the dominant terms shows that this vocabulary is applied almost exclusively within existing educational and clinical systems, not in contexts of exile or forced mobility.

Therefore, Table 2 not only confirms the fragmentation observed in the maps, but also makes it visible as a lexical regularity. The fact that refugees do not appear among the dominant terms of medical education and learning ecologies indicates a structural conceptual gap, not a simple terminological marginality. This gap has direct implications for educational and health policies, particularly in Central and Eastern Europe, where medical and educational institutions are increasingly operating in contexts marked by forced migration.

6. Conclusions

This triangulated bibliometric analysis of PubMed-indexed literature (2020–2025) shows that forced migration, medical education, and learning ecologies are treated in the contemporary biomedical field as three conceptually distinct domains with minimal overlap. Comparative mapping of the Forced Migration (FM), Medical Education (ME) and Ecologies of Education (EE) corpora indicates the existence of separate thematic ecologies, not just differences in emphasis or vocabulary.

The literature on forced migration is dominated by an ecology of vulnerability, centred on mental health, trauma, access to services, and structural inequalities generated by conflict and asylum regimes. In contrast, medical education is conceptualised as a stable institutional ecology, oriented towards curriculum, educational technologies and student wellbeing, but decoupled from the socio-political transformations associated with forced migration. The literature on learning ecologies provides a sophisticated analytical vocabulary for describing educational environments and communities of practice, but this vocabulary is not applied to situations of exile or forced mobility.

The triangulation of these results highlights a conceptual and public policy gap at the intersection of FM–ME–EE. The systematic absence of refugees from the discourse on medical education is not a mere methodological artefact, but reflects an institutional separation between the systems that care for conflict-affected populations and the systems that train future health professionals. For Central and Eastern Europe, where forced migration interacts with institutional constraints, shrinking spaces for civil society, and hierarchies of solidarity, this separation limits the ability of medical education to adapt to emerging clinical and social realities.

The main contribution of this article is the operationalisation of an ecological bibliometric triangulation, which combines the analysis of term co-occurrence with interpretation guided by ecological

frameworks of development, learning and professional practice. This approach not only maps dominant themes, but also makes visible structural absences relevant to education and health governance.

At the normative level, the conclusions support the need to develop an integrative framework of medical education ecologies in forced migration, connecting the curriculum, clinical learning environments, and civil society actors to the experiences of refugees as patients, students, and professionals. , integrating forced migration as a cross-cutting dimension of medical education can contribute to the formation of more equitable, resilient and trauma-sensitive health systems, with direct relevance for European public policies.

By highlighting this gap and providing an analytical framework to address it, the article opens up an emerging field of research and invites a re-imagining of medical learning environments as an integral part of the socio-political ecologies of contemporary Europe. This bibliometric analysis, structured around three domains – Forced Migration (FM), Medical Education (ME) and Ecologies of Education (EE) – shows that the scientific literature from 2020–2025 presents three distinct thematic ecologies, with very little conceptual overlap between them.

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