

An analysis of the landscape of research in the field of nursing education

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ABSTRACT

This study provides a comprehensive mapping and critical analysis of the global nursing education research landscape published between 2016 and 2023. Sourced from the Scopus database, a sample of 20,724 English-language research documents was examined through bibliometric performance indicators and thematic network analysis using Excel, VOSviewer, and SciMAT. Performance indicators revealed that global output is heavily concentrated in high-income Western countries, led by the United States (n=8,790, 18%), United Kingdom (n=1,622, 3%), and Australia (n=1,394, 3%). Co-authorship network analysis identified six distinct geographic clusters governed primarily by cultural and regional affinities, highlighting limited cross-regional collaboration with low- and middle-income countries. Longitudinally, thematic evolution mapping across pre-pandemic (2016-2019) and pandemic (2020-2023) periods revealed a high degree of conceptual stability (Stability Index = 0.87; 1,270 shared keywords), while demonstrating a structural shift toward simulation-based learning, digital technology integration, and student adaptational perceptions. By identifying these systemic geographic disparities and evolving thematic trajectories, this study provides actionable evidence for nursing educators, institutional leaders, and policymakers seeking to balance global trends with localized national research agendas

RESUMO

Este estudo oferece insights valiosos sobre pesquisas atuais e futuras na área de educação em enfermagem. Utilizando a base de dados Scopus, foram analisados 20.724 documentos de pesquisa publicados em inglês entre 2016 e 2023. Realizou-se uma análise bibliométrica e de redes temáticas com o auxílio das ferramentas Excel, VOSViewer e SciMAT. O estudo examinou a produção científica, as tendências temporais, a distribuição geográfica, o impacto e a colaboração, analisando também a densidade, a centralidade e a evolução temática por meio de diagramas estratégicos, mapas de evolução e mapas de estabilidade. Os resultados indicam que os Estados Unidos lideram as pesquisas em educação em enfermagem, com epistemologias ocidentais moldando a estrutura do conhecimento. Afinidades culturais influenciam significativamente a colaboração internacional. Destaca-se a persistência da consistência temática entre os períodos pré-pandemia (2016-2019) e de pandemia (2020-2023), com aumento de estudos focados em simulação, o que sinaliza uma mudança nas prioridades de pesquisa. Este estudo contribui para o debate acadêmico ao orientar futuras pesquisas e a formulação de políticas na educação em enfermagem. As conclusões sugerem a necessidade de uma abordagem equilibrada que integre tendências globais a prioridades locais, visando o alinhamento com a Agenda de Pesquisa das Filipinas.

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Introduction

Nursing education research forms the scientific foundation of the discipline, continually redefining pedagogical practices, clinical competencies, and healthcare delivery systems. As contemporary healthcare environments become increasingly complex, nursing curricula must evolve beyond technical skill acquisition to cultivate critical thinking, clinical judgment, and ethical decision-making (Oermann, 2020; Thompson, 2017). Over the past decade, scholarly inquiry within nursing education has expanded across diverse subfields, including clinical placement optimization, high-fidelity simulation, and student perception assessments (González-García et al., 2020; Kim et al., 2016; Shrestha et al., 2019).

Despite the growing volume of scholarly literature, the reporting and integration of educational evidence remain fragmented (Oermann, 2020). While clinical practice environments adapt rapidly to emerging technological and patient-care demands, academic institutions often experience structural lag due to rigid accreditation standards and resource limitations (Fawaz et al., 2018). For example, securing traditional clinical placements has become an acute global challenge, accelerating the adoption of high-fidelity simulation as a primary educational substitute (Doolen et al., 2016; Sowerby, 2015). However, the integration of simulation and digital platforms faces persistent hurdles, including funding constraints, faculty training deficits, and uneven research capacity across global regions (Doolen et al., 2016; Ramdial, 2020).

While several bibliometric reviews have evaluated specific aspects of nursing scholarship, existing studies primarily focus on descriptive performance metrics (such as top authors, journals, and citation counts) or examine isolated subfields like clinical simulation. A significant research gap exists regarding the longitudinal, conceptual transformation of the broader nursing education field—specifically how core research themes shifted, adapted, or persisted during major global disruptions such as the COVID-19 pandemic. Furthermore, little research critically evaluates the geographic and epistemological concentration of knowledge production in nursing education and its structural implications for health education policy in developing nations.

To bridge this gap, this study integrates traditional bibliometric performance metrics with advanced thematic network analysis using SciMAT. By evaluating 20,724 documents published between 2016 and 2023, this paper charts both the performance landscape and the structural dynamics of global nursing education scholarship across pre-pandemic (2016-2019) and pandemic (2020-2023) eras. Specifically, this study answers the following research questions: Questions Relating to Bibliometric Performance: What is the annual production rate and citation impact of global nursing education research? Which countries and publication outlets dominate knowledge production in nursing education? What geographic co-authorship structures characterize global research collaboration?

Questions Relating to Thematic Networks: What core conceptual themes constitute the structure of nursing education research? How have research themes evolved conceptually across the pre-pandemic (2016-2019) and pandemic (2020-2023) periods? What is the degree of thematic stability and keyword mobility within the discipline over time?

Materials and Methods

Search Strategy and Data Retrieval

To map the literature comprehensively, bibliographic records were extracted from the Scopus database on October 8, 2023. Scopus was selected due to its extensive coverage of peer-reviewed biomedical, health, and social science journals, indexing over 44,000 active and inactive titles (AlRyalat et al., 2019; Visser et al., 2021).

The formal Scopus search query applied to the system was:

Plaintext

TITLE-ABS-KEY ("nursing education") AND PUBYEAR > 2015 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE, "English"))

Inclusion/Exclusion Criteria and PRISMA Flow

The literature identification and screening process followed a structured multi-stage workflow: Initial Identification: The broad term "nursing education" within title, abstract, or keywords returned 105,145 candidate records across all years and languages; Temporal & Language Filters: Applying the temporal boundaries (2016-2023) and limiting the records to English-language publications reduced the dataset to 20,764 records.

Data Cleaning & Screening: Metadata records were downloaded in .csv and .txt formats. Preprocessing was conducted to standardize country names, merge synonymous journal names, and clean author affiliation errors. Keyword normalization was performed by converting singular/plural forms to single standardized terms and removing generic search stop-words (e.g., "study", "author", "article"). Deduplication and screening for complete records resulted in a final sample of 20,724 unique records for analysis.

Plaintext

[Initial Search Query Output: N = 105,145]



[Filtered by Year (2016–2023) & Language (English): N = 20,764]



[Data Cleaning, Lemmatization, Deduplication: N = 20,724 Final Included Sample]

Methodological Delimitations & Database Bias

Restricting the dataset to Scopus-indexed, English-language publications provides dataset consistency and facilitates precise natural language lemmatization within SciMAT. However, this delimitation introduces inherent structural biases. Non-English publications and regional journals indexed exclusively in localized databases (e.g., LILACS, SciELO, or regional Asian indices) are underrepresented. Consequently, findings primarily reflect peer-reviewed literature circulating within international indexing frameworks, which should be considered when interpreting global participation rates.

Analytical software tools and parameter settings

Data analysis was conducted using three specialized software packages: Microsoft Excel: Used to compute descriptive frequencies, percentage growth trends, and document distributions across subject categories; VOSviewer (v1.6.19): Applied to conduct co-authorship network visualization at the country level. The association strength normalization method was selected, with a minimum threshold of 5 publications per country to assess international collaboration clusters; SciMAT (v1.1.04): Utilized to build thematic strategic diagrams, thematic network maps, and longitudinal evolution networks (Cobo et al., 2012).

The specific SciMAT configuration settings included: Time Slices: Slice 1 (Pre-pandemic: 2016-2019); Slice 2 (Pandemic: 2020-2023); Unit of Analysis: Author and Index Keywords; Network Construction: Word co-occurrence analysis using the Equivalence Index as the similarity measure; Clustering Algorithm: Simple Centers Algorithm (Max cluster size: 10, Min cluster size: 3); Evolution Analysis: Measure of quality based on Inclusion Index to calculate keyword overlap and transition stability across temporal periods.

In SciMAT strategic diagrams, themes are plotted across four quadrants based on Centrality (x-axis: measuring the strength of external ties to other themes) and Density (y-axis: measuring the internal cohesion of the theme's keyword network) (Callon et al., 1991): Q1 (Upper Right) - Motor Themes: High centrality, high density. Core themes driving the research field; Q2 (Upper Left) - Specialized Themes: Low centrality, high density. Highly developed internally but isolated; Q3 (Lower Left) - Emerging or Declining Themes: Low centrality, low density. Weakly developed or fading topics; Q4 (Lower Right) - Basic/Transversal Themes: High centrality, low density. Foundational topics spanning across the discipline

Results and Discussion

The results are presented and discussed in two distinct sections, aligning with the two overarching categories of research questions addressed in this study. The initial section tackles the research inquiries related to bibliometric performance, while the subsequent section delves into the research questions concerning the thematic network.

Bibliometric performance analysis

The analysis of bibliometric performance encompasses the evaluation of production and citation rates per Country, publication venue, and collaborative patterns in the field of Nursing Education research. To investigate aspects such as production, time, space, and impact within the Nursing Education Research, the data from the Scopus® were extracted and visualized using Excel. Scientific production quantifies the number of documents published within the Nursing Education domain. The temporal dimension considers the period under scrutiny, while the spatial aspect examines production distribution across countries and scientific journals. Impact measurement entails assessing both the number and rate of citations and the calculation of the H-Index across different units of analysis.

Meanwhile, Andrews (2009; Timmins, 2020) highlights the importance of nursing educators conducting thorough assessments of their advancements in Nursing Education research. Therefore, it is crucial to assess the extent to which countries actively participate in Nursing Education scholarship, as reflected in their research production rates and the impact of the knowledge they generate. Table 1 presents the top 10 countries' corresponding production rates and impact metrics.

Publication output dynamics and disciplinary boundaries

Global annual document production in nursing education research demonstrated consistent baseline growth between 2016 (n=2,677) and 2021 (n=2,886). This steady trajectory aligns with the initial surge of educational adaptations and empirical evaluations prompted by the onset of the COVID-19 pandemic. Publication volume underwent a slight contraction in 2022 (n=2,690) and indexed 2,154 records in late 2023 as indexing cycles finalized. Categorical classification by Scopus subject areas revealed that the vast majority of indexed research fell within Nursing (n=15,815), supplemented by broader interdisciplinary contributions from Social Sciences (n=2,410), Medicine (n=1,980), and Health Professions (n=1,110).

Country productivity, regional concentration, and citation impact

Table 1 summarizes publication volume, overall citation counts, average document impact, proportion of cited publications, and h-index metrics across the ten most active nations.

Table 1 shows that the countries are ranked based on various criteria, such as the number of documents produced, citations received, and h-index. A total of 33% entails the global production of research on Nursing Education. The United States has the highest number of documents, with a total of 8,790, representing 18% of the total documents in this analysis. The United States also has the highest number of citations, composed of 60,701, and a relatively high h-index of 65, indicating significant research impact. Other countries like the United Kingdom, Australia, Canada, and Brazil contribute to nursing education research, although to a lesser extent than the United States.

Table 1.
Research output, citation frequency, and Impact Metrics by Country

No	Country	f	%	C	CPD	CD	%CD	h-index	%GSC
1	United States	8790	18%	60701	7	6724	76%	65	18%
2	United Kingdom	1622	3%	14152	9	1237	76%	45	3%
3	Australia	1394	3%	16250	12	1163	83%	49	3%
4	Canada	1059	2%	9507	9	859	81%	41	2%
5	Brazil	643	1%	3173	5	492	77%	19	1%
6	China	622	1%	5286	8	469	75%	33	1%
7	South Korea	595	1%	4536	8	451	76%	28	1%
8	Turkey	537	1%	3817	7	404	75%	27	1%
9	Spain	514	1%	4979	10	422	82%	31	1%
10	Iran	430	1%	3398	8	329	77%	27	1%

Note: (f) number of documents; (%) percentage relative to total number of documents; (C) number of citations; (CPD) number of citations per document; (CD) number of cited documents; (%CD) number of cited documents relative to total number of documents; (h-index) latest h-index recorded in Scopus; (%GSC) percentage relative to the total global number of citation

The percentage of cited documents (%CD) for most countries is relatively high, specifically in Australia, with a value of 83%, indicating that a significant portion of their research output receives citations. It is recognizable that Iran ranks relatively low in nursing education research as a Middle Eastern country compared to some other countries listed. Iran's and Turkey's h-index, which reflects research impact and productivity, is relatively lower at 27 compared to countries like the United States, United Kingdom, and Australia. With this result, the data suggests that while Iran produces a relatively large number of documents on nursing education research, with 430 documents ranking 10th, the academic impact, as indicated by citation metrics, is relatively low.

The results suggest that while the United States leads in both the quantity and impact of nursing education research, other countries like Australia also demonstrate significant citation rates, indicating the influence of their research outputs. At the same time, Iran, although producing a considerable number of documents, has a lower academic impact, pointing towards potential areas for improvement in research quality and dissemination strategies.

The bibliometric analysis reveals that the United States leads in research production, contributing 8,790 documents, followed by the United Kingdom and Australia. This dominance aligns with previous findings that Western institutions heavily influence global nursing education research (Oermann, 2020). Moreover, citation impact analysis shows that research from these countries is frequently referenced, reinforcing their influence in shaping nursing education discourse.

The distribution of scholarly output shows a sharp geographic concentration. The United States holds a commanding lead, accounting for nearly one-fifth of global output (n=8,790; 18% global share) and accumulating 60,701 total citations with an h-index of 65. The United Kingdom (n=1,622) and Australia (n=1,394) follow as secondary production

powerhouses. However, normalized impact metrics reveal important qualitative nuances: Australia achieved the highest citation impact per document (CPD=12.0) and the highest proportion of cited papers (%CD=83%), outperforming higher-volume producers in relative reach. Conversely, middle-income and developing nations—such as Brazil (n=643, CPD=5.0), Turkey (n=537, h"-index"=27), and Iran (n=430, h"-index"=27)—contribute substantial document volumes within their respective regions, yet exhibit lower relative citation impact metrics.

Preferred Journal Outlets and Institutional Publishing Trajectories

Table 2 details the leading publication outlets preferred by scholars within the top contributing jurisdictions, along with journal impact rankings.

Table 2.

Major Publication Outlets and Quality Metrics by Country

<i>Country</i>	<i>Major Source</i>	<i>Publisher</i>	<i>Cite Score</i>	<i>Scimago JR</i>
<i>United States</i>	<i>Journal of Nursing Education</i>	<i>Slack Incorporated</i>	<i>2.8</i>	<i>Q1</i>
<i>United Kingdom</i>	<i>British Journal of Nursing</i>	<i>Mark Allen Publishing Ltd.</i>	<i>1.6</i>	<i>Q3</i>
<i>Australia</i>	<i>Nurse Education Today</i>	<i>Elsevier</i>	<i>5.5</i>	<i>Q1</i>
<i>Canada</i>	<i>Nurse Education Today</i>	<i>Elsevier</i>	<i>5.5</i>	<i>Q1</i>
<i>Brazil</i>	<i>Revista Brasileira De Enfermagem</i>	<i>Associacao Brasileira De Enfermagem</i>	<i>1.5</i>	<i>Q3</i>
<i>China</i>	<i>Nurse Education Today</i>	<i>Elsevier</i>	<i>5.5</i>	<i>Q1</i>
<i>South Korea</i>	<i>Nurse Education Today</i>	<i>Elsevier</i>	<i>5.5</i>	<i>Q1</i>
<i>Turkey</i>	<i>Nurse Education Today</i>	<i>Elsevier</i>	<i>5.5</i>	<i>Q1</i>
<i>Spain</i>	<i>Nurse Education Today</i>	<i>Elsevier</i>	<i>5.5</i>	<i>Q1</i>
<i>Iran</i>	<i>BMC Nursing</i>	<i>Springer Nature</i>	<i>3.3</i>	<i>Q1</i>

This table shows the data and presents information about the significant publication venues for studies on Nursing Education in several productive countries. The United States primarily publishes studies on Nursing Education in the "Journal of Nursing Education," which is published by Slack Incorporated. This publication has a moderate Cite Score of 2.8 and is ranked in the first quartile (Q1) according to Scimago JR, indicating its high academic impact. The "British Journal of Nursing," published by Mark Allen Publishing Ltd., is a significant source for Nursing Education studies in the United Kingdom.

However, it has a lower Cite Score of 1.6 and is ranked in the third quartile (Q3) by Scimago JR, indicating a somewhat lower academic impact than the United States publication. Countries like Australia, Canada, China, South Korea, Turkey, and Spain rely on the same primary publication source, "Nurse Education Today," published by Elsevier. This publication has a high Cite Score of 5.5 and is ranked in the first quartile (Q1) by Scimago JR, indicating a robust academic impact.

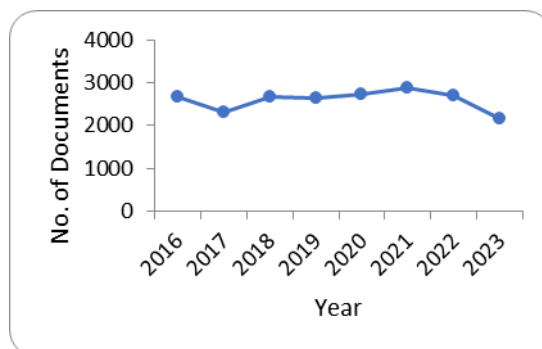
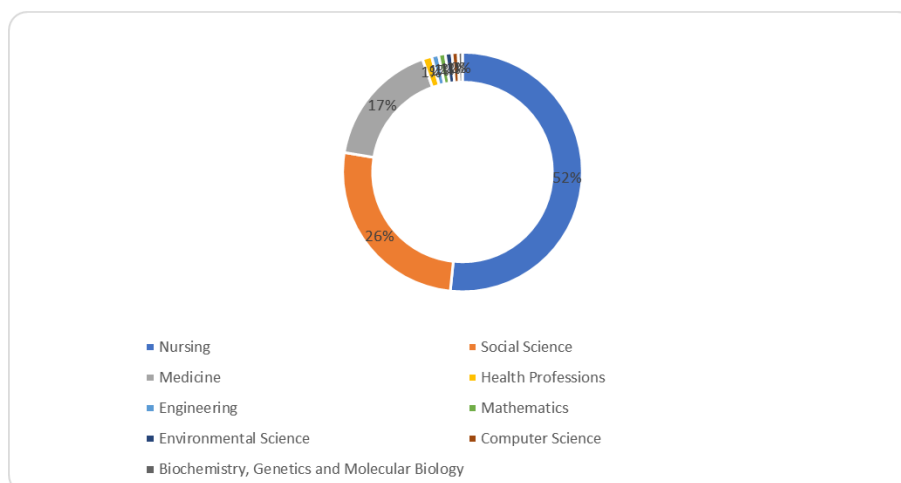
Brazil's primary source for Nursing Education studies is the "Revista Brasileira De Enfermagem," published by Associacao Brasileira De Enfermagem. This publication has a lower Cite Score of 1.5 and is ranked in the third quartile (Q3) by Scimago JR, suggesting a relatively lower academic impact than other countries. Iran relies on "BMC Nursing," published by Springer Nature, as the primary source for Nursing Education studies. This publication has a moderate Cite Score of 3.3 and is ranked in the first quartile (Q1) by Scimago JR, indicating a respectable academic impact. The choice of significant publication venues for nursing education studies varies across countries, with some countries using familiar sources like "Nurse Education Today" by Elsevier.

In contrast, others have their specific journals. The academic impact, as measured by Cite Score and Scimago JR rankings, also varies among these sources. The data underscores the variability in major publication venues for Nursing Education studies across countries, with publications like "The Journal of Nursing Education" in the United States and "British Journal of Nursing" in the United Kingdom demonstrating varying academic impacts, suggesting potential differences in research dissemination strategies and scholarly influence among nations in the field of Nursing Education.

The variability in major publication venues and their respective academic impacts across countries underscores potential disparities in research dissemination strategies and scholarly influence within Nursing Education. It highlights the importance of understanding and addressing these differences to foster global collaboration and advance the discipline.

Global collaboration patterns indicate that country-level partnerships are significantly shaped by cultural affinities, as evidenced by strong co-authorship networks within European, North American, and Asian regions. Previous studies have highlighted how cultural similarities facilitate international collaboration, strengthening research quality and impact (Thompson, 2017). However, limited cross-regional collaborations with low- and middle-income countries suggest disparities in research accessibility and funding, highlighting a need for more inclusive research partnerships (Ramdial, 2020).

The journal landscape is anchored by Nurse Education Today (Elsevier, CiteScore 5.5, Q1), which serves as the primary scientific dissemination channel across Europe, Oceania, Asia, and the Middle East. American researchers rely heavily on domestic journals such as the Journal of Nursing Education (Slack Incorporated, Q1). Scholars in Brazil rely predominantly on national open-access journals like Revista Brasileira de Enfermagem (ABEn, Q3), reflecting regional dissemination preferences that favor open accessibility within national health networks.

Figure 1.*Document distribution in terms of publication year and subject area***Graph 1.***Yearly production of nursing education research*

A graphical representation was created using Excel to analyze the pattern of scientific output from 2016 to 2023 (see Figure 1a). The graph shows a general trend of fluctuation in research output over the years, with some years showing increases and others showing decreases. The number of documents published in 2016 was 2,677, which decreased in 2017 to 2,297. However, in 2018, there was an increase to 2,685, followed by a slight decrease in 2019 to 2,649.

A significant increase in research output was seen in 2020, with 2,726 documents. The upward trend continued in 2021, with 2,886 documents, marking another year of substantial growth in research production. In 2022, there was relative stability in research output with 2,690 documents, suggesting a consistent level of research activity compared to the previous year. However, in 2023, there was a noticeable decrease in research output to 2,154 documents.

The data reveals fluctuations in research output over the eight years, with some years showing growth, others stability, and a few experiencing decreases. The fluctuating pattern of scientific output over the analyzed period underscores the dynamic nature of research activity in the field, with varying trends of increase, stability, and decrease in research production across different years, suggesting potential influences of external factors such as funding, academic priorities, and global events on research output in Nursing Education.

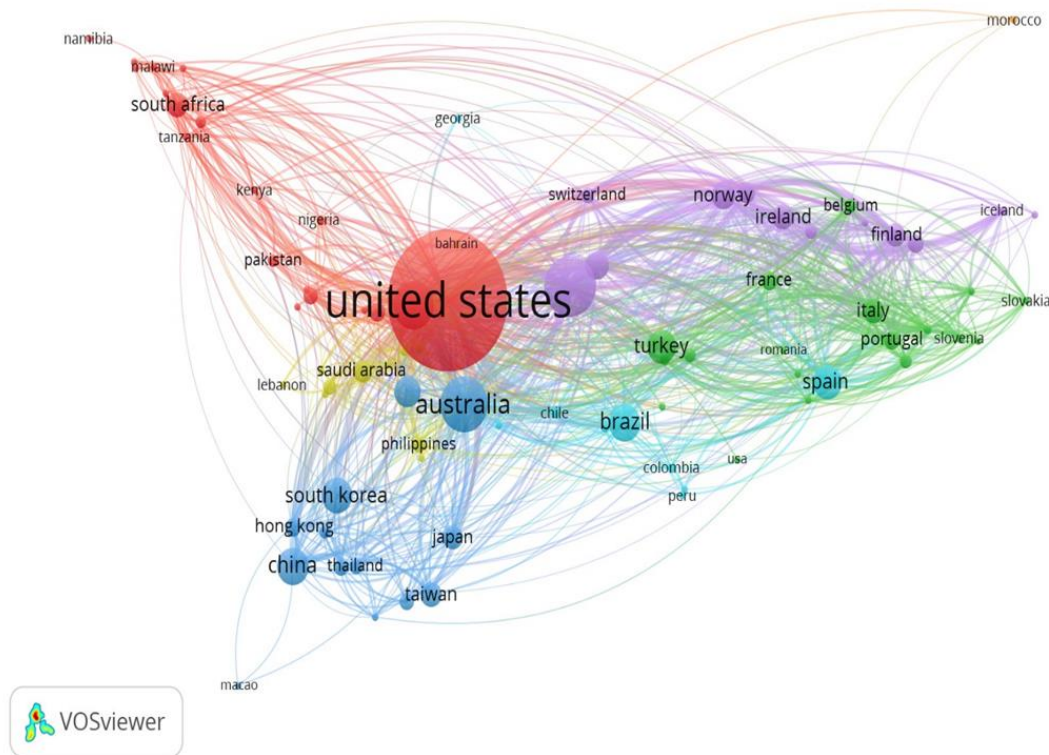
Nursing is the frontrunner for allocating pertinent research papers across various subject areas (see Figure 1b). This outcome is unsurprising given that this research focuses on nursing education, with Nursing accounting for the highest number of documents at 15,815. This dominance is expected, as the research specifically revolves around nursing education. Other subject areas, such as Social Science, Medicine, and Health Professions, also contribute to the distribution, albeit with significantly fewer research papers. In essence, this distribution underscores the primary focus on Nursing within the research context, reaffirming its central role in the study of nursing education.

The level of collaboration between nations in Nursing Education research using VOSViewer (Figure 2). Within this visual representation, discern a landscape of scientific production in Nursing Education, which can be categorized into six distinct geographical clusters. These clusters are defined by varying research productivity levels and associations' strength determined through co-authorship parameters. They are visually distinguished by color coding.

The foremost cluster prominently features contributions from the United States, while the second cluster is primarily characterized by research from Australia. The third cluster forms a collective of European nations, with notable representation from Switzerland, Norway, Ireland, Finland, and Iceland. The fourth cluster reflects a significant Hispanic influence, specifically Brazil, Chile, Colombia, and Peru. The fifth is centered around Asian countries, and the sixth cluster prominently highlights Middle Eastern nations, specifically Saudi Arabia and Lebanon, alongside the Philippines.

A noteworthy observation is the preference for collaboration between African countries and the United States. Moreover, countries tend to seek partnerships with researchers who share a common cultural background, as exemplified by the clustering of European nations with Norway, Ireland, Switzerland, Finland, and Iceland. Additionally, it is worth emphasizing that Asian countries are grouped within the same cluster as Australia, indicating a shared research space and inclination for collaborative efforts in Nursing Education research.

In summary, Figure 2 illuminates the global Nursing Education research collaboration landscape. It identifies regional clusters and highlights the intricate dynamics of collaboration among countries within this domain.

Figure 2.*Global Collaboration in Nursing Education Research using VOSviewer****International Co-Authorship and Geographic Partnerships***

Co-authorship network visualization generated via VOSviewer revealed six primary geographic collaboration clusters:

- Cluster 1 (North American Anchor): Led by the United States, exhibiting strong bilateral collaborative ties with sub-Saharan African nations (e.g., South Africa, Kenya, Malawi).
- Cluster 2 (Oceanian Anchor): Centered around Australia, serving as the primary collaboration bridge for South Asian institutions.
- Cluster 3 (European Union Cluster): Characterized by dense, highly integrated cross-border partnerships among Nordic and Central European nations (Norway, Finland, Ireland, Switzerland).
- Cluster 4 (Latin America Cluster): A regional Hispanic and Lusophone collaboration network anchored by Brazil, Chile, Colombia, and Peru.
- Cluster 5 (East Asia Cluster): Connecting academic partnerships across South Korea, China, Japan, Taiwan, and Thailand.
- Cluster 6 (Middle East & Southeast Asia Bridge): Linking collaborative research efforts between Saudi Arabia, Lebanon, and the Philippines.

Longitudinal Thematic Network Analysis (SciMAT)

The thematic network analysis covers the prevalent themes in Nursing Education research, the significance of themes within the research field, the interconnectedness of themes within the research network, and the evolution of themes across two periods. SciMat was primarily used to carry out these analyses, mainly using word co-occurrence and simple centers algorithm (Coulter et al., 1998). A simple centers algorithm in science mapping identifies central themes within a scientific domain by calculating the average distance between each document and all others and selecting the document with the shortest distance as the center (Leydesdorff & Vaughan, 2006). This algorithm aids in pinpointing the core concepts or themes that drive the research activity within a research field. The succeeding sections present these core concepts or themes as capitalized terms.

The publication period was sliced into the pre-pandemic period (2016-2019) and the pandemic period (2020-2023) to gain a longitudinal perspective of the Nursing Education Research literature. Figure 3a shows the thematic evolution across these periods. Figure 3b shows the strategic diagram of the pre-pandemic period, and Figure 3c shows the strategic diagram of the pandemic period. Figure 3d shows the inclusion index across these periods.

Structural Stability and Keyword Mobility

Comparative longitudinal mapping across Period 1 (2016-2019) and Period 2 (2020-2023) indicates strong core structural stability within the discipline. The SciMAT keyword evolution map demonstrated a Stability Index of 0.87 (87% keyword persistence), with 1,270 shared core keywords maintained across both eras. A total of 218 keywords faded from the pre-pandemic baseline, while 189 newly introduced keywords entered the discipline's vocabulary during the pandemic era.

General Impressions of the Thematic Network and Evolution

This sub-section offers a comprehensive overview of the thematic network and its evolutionary trajectory. It offers a broad perspective on the predominant themes within Nursing Education Research literature, highlighting their importance and interconnectedness. The subsequent dedicated subsections delve deeper into the intricate structures and dynamics, as illustrated in Figure 3.

Figure 3a.*Common Themes and Interconnections in Nursing Education Research: Evolution Map*

In Figure 3, the evolution map showcases the predominant research themes in Nursing Education during the pre-pandemic period (left column) and the pandemic period (right column). A solid line connecting two themes signifies a conceptual connection, suggesting that these two themes share conceptual similarities or can be placed at the same level within a

conceptual hierarchy (Pham et al., 2021). This aligns with the findings of Ten Hoeve et al. (2020), who emphasized that nursing education themes evolve based on contextual needs, with foundational concepts often persisting across different timeframes.

For instance, the theme "HUMAN" in the pre-pandemic period retains its conceptual identity in the pandemic period, as indicated by the conceptual nexus. This is consistent with research by Kim et al. (2022), which highlighted that core humanistic aspects of nursing education, such as patient-centered care and ethical decision-making, remain central despite shifts in pedagogical methods.

On the other hand, a broken line indicates a component nexus, implying that the latter theme may be subsumed within the former. For example, "CLINICAL-PRACTICE" evolved as a component of "SIMULATION," as suggested by the component nexus. This transition is supported by recent studies that document the increasing reliance on simulation-based learning as a response to limited clinical exposure during the pandemic (Smith et al 2020; McCarthy et al., 2022). The shift from traditional clinical practice to simulation underscores the necessity of adaptive educational strategies in nursing programs (Jeffries et al., 2020).

Strategic Quadrant Dynamics and Thematic Transitions

Analyzing theme positions across SciMAT strategic diagrams revealed noteworthy conceptual movements:

Motor Themes (Q1 - High Centrality, High Density):

CROSS-SECTIONAL-STUDY maintained a prominent position in Quadrant 1 across both time slices, demonstrating the ongoing reliance on observational, survey-based empirical evaluations in nursing education.

HEALTH-WORKER, MANAGER, and CLINICAL-PLACEMENT migrated into Quadrant 1 during Period 2 (2020-2023), reflecting intensified operational research focused on health workforce management and clinical training continuity during healthcare crises.

Basic and Transversal Themes (Q4 - High Centrality, Low Density):

CLINICAL-PRACTICE and MALE remained anchored in Quadrant 4 across both periods. This stability confirms that direct clinical skills acquisition remains the foundational bedrock of all nursing education scholarship, regardless of global disruptions.

Specialized and Emerging/Declining Themes (Q2 & Q3):

HUMAN shifted from Quadrant 3 (emerging/isolated) in Period 1 to Quadrant 2 (specialized) in Period 2, driven by increased scholarly attention to humanistic care, psychological resilience, and moral injury among nursing trainees during the pandemic.

SIMULATION underwent a major structural movement, advancing toward the center of the strategic map during Period 2 (2020-2023) with substantial gains in keyword co-occurrence frequency and external centrality.

PANDEMIC materialized as a distinct, highly connected thematic node within Quadrant 3 during Period 2, linking strongly to virtual pedagogy, student adaptational stress, and remote instructional technologies.

Figure 3b.

Interrelation of Themes in Nursing Education Research: evolution of theme

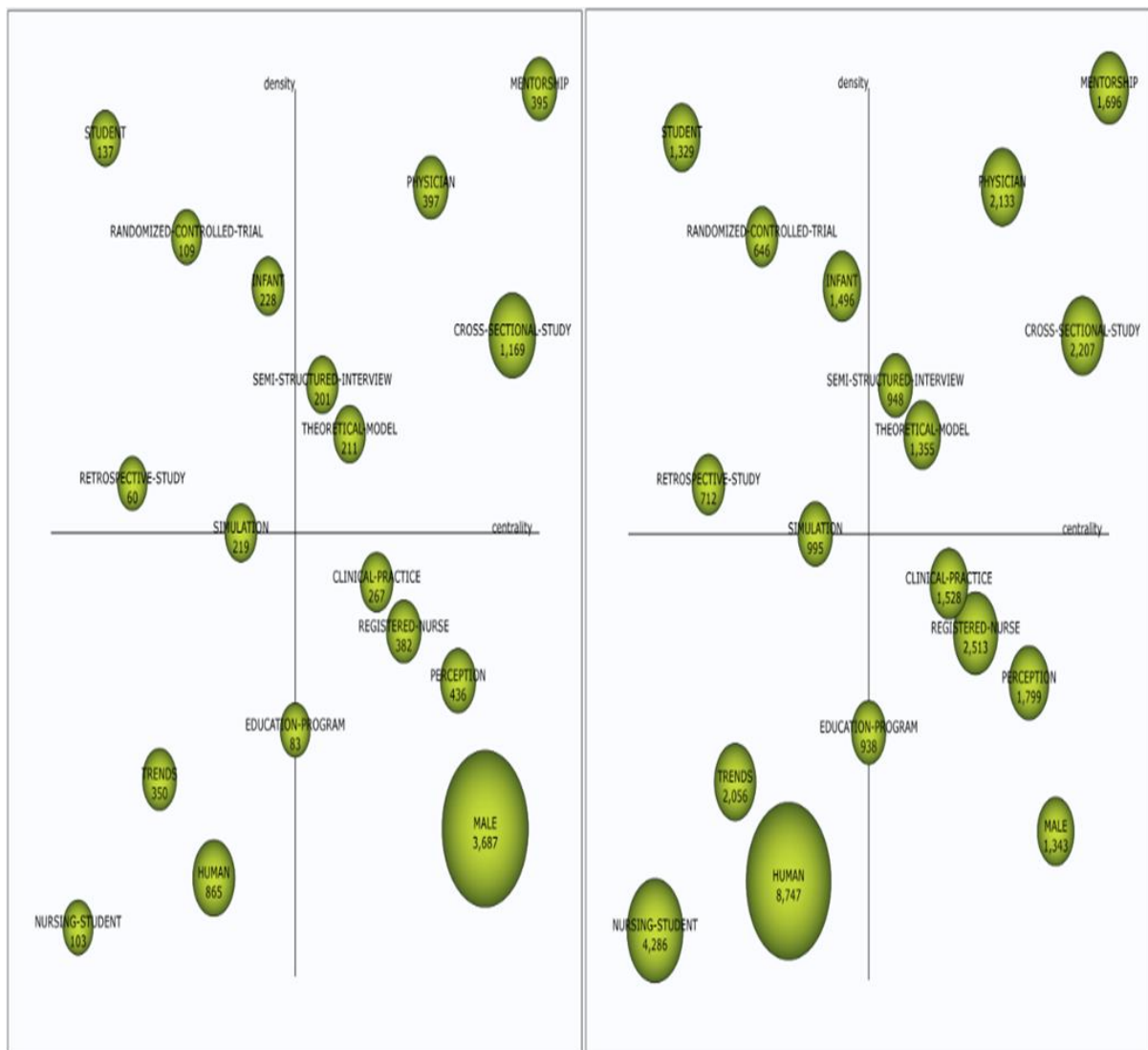


Figure 3c.
Evolution of themes



Figures 3b and 3c in the study illustrate the evolution of themes before and during the pandemic. Five distinct types of thematic development are discernible from these figures. The first type involves movement within Q1, indicating that specific themes have remained well-developed and interconnected. This is consistent with the findings of ten Hoeve et al. (2020), who noted that certain core themes in nursing education—such as clinical reasoning, evidence-based practice, and competency-based learning—have remained central to the discipline despite evolving contexts.

It is exemplified by thematic transitions such as from "CROSS-SECTIONAL-STUDY" to "CROSS-SECTIONAL-STUDY," "SEMI-STRUCTURED INTERVIEW" to "MANAGER," and "THEORETICAL-MODEL" to "RESPONSIBILITY." Although the names of these themes may have varied in different periods, they are believed to share conceptual similarities. For instance, a more in-depth qualitative analysis of relevant documents might reveal that "SEMI-STRUCTURED INTERVIEW" is conceptually akin to "CLINICAL PLACEMENT," a point that will be discussed further in the subsequent sections.

The second type of thematic movement is observed from Q2 to Q3, signifying well-developed themes that have become isolated with minimal connections to other themes. This

pattern is exemplified by transitions like "RANDOMIZED-CONTROLLED-TRIAL" to "RANDOMIZED-CONTROLLED TRIAL." Such transitions are aligned with research by Kim et al. (2022), which suggests that while experimental methodologies, such as randomized controlled trials (RCTs), remain highly relevant in nursing education, their applicability has shifted due to the increasing focus on qualitative and mixed-method approaches during the pandemic.

The third type of thematic movement is exemplified by the shift from "HUMAN" to "HUMAN," moving from Q3 to Q2, indicating a transition from isolation to infrequent connections with other themes. This aligns with the work of McCarthy et al. (2022), which highlights the growing recognition of humanistic and patient-centered approaches in nursing education, particularly in response to the psychological and ethical challenges brought about by the COVID-19 pandemic.

Another notable fourth thematic movement is observed within or into Q4, as seen in the case of "CLINICAL PRACTICE" to "CLINICAL PRACTICE" and "MALE" to "MALE." This type of movement suggests the enduring significance of "CLINICAL PRACTICE" in Nursing Education. Although research in this area has gradually reduced density, it maintains a high centrality, underscoring its continued importance. Studies by Cant and Cooper (2020) reinforce this observation, emphasizing that despite the increasing reliance on simulation-based learning, traditional clinical practice remains a fundamental aspect of nursing education.

The fifth type of thematic movement involves transitions within or into Q3. Movement within Q3 refers to themes that have stayed within the same conceptual nexus, while movement into Q3 pertains to new and emerging themes. Emerging themes may be components of the existing nexus or entirely novel topics that have gradually gained attention in Nursing Education research. An example is transitioning from "NURSING STUDENT" to "PERCEPTION." This aligns with findings by Smith et al. (2020), who documented a shift in nursing education research towards exploring students' perceptions of remote learning, stress management, and adaptability in response to the pandemic. The discussion section will provide further elaboration on these thematic shifts.

Figure 3d.

Evolution of Nursing Education Research Themes During the Pandemic: Stability Index



Figure 3d displays the stability index of thematic evolution. The circles within the figure correspond to distinct periods and the number of keywords associated with each period. Connecting arrows between two circles indicate the keywords common to Nursing Education research in both the pre-pandemic and pandemic periods. In this context, it is evident that research documents from before and during the pandemic exhibit a high degree of similarity, with approximately 1,270 shared keywords. It signifies an approximately 87% similarity between the two timeframes in research documents.

The high degree of similarity in research keywords between pre-pandemic and pandemic periods suggests a continuity in thematic focus within Nursing Education research, indicating that despite the disruptive impact of the pandemic, core research themes remained consistent, which could inform ongoing research priorities and strategies in the field. This finding aligns with the work of Oducado et al. (2021), who noted that while nursing education underwent significant pedagogical transformations during the pandemic, fundamental topics such as clinical reasoning, competency-based training, and patient safety continued to be central to scholarly discourse. Similarly, Johnson et al. (2022) emphasize that long-standing themes in nursing education, including evidence-based practice and interprofessional collaboration, maintained their relevance, albeit with shifts in methodological approaches to accommodate online and hybrid learning models.

Additionally, the incoming and outgoing arrows represent keywords that either persisted or were removed during the transition from one period to another. For instance, there were 218 keywords present in the pre-pandemic period that did not continue into the pandemic. Conversely, 189 keywords emerged during the pandemic period that were absent in the pre-pandemic period. This shift in keyword dynamics aligns with the findings of Swift et

al. (2020), who observed a surge in research focusing on remote learning, resilience training, and the mental health of nursing students during the pandemic, reflecting new academic priorities shaped by the crisis. Moreover, the emergence of new keywords underscores the adaptability of nursing education research in response to rapidly changing healthcare and educational environments (Dewart et al., 2020).

Identifying keywords that either persisted or emerged during the transition between pre-pandemic and pandemic periods highlights shifts in research focus and priorities within Nursing Education, indicating potential areas of adaptation and evolution in response to changing educational and healthcare landscapes. This observation is further reinforced by studies such as those by Morin (2021), who examined the evolution of digital learning in nursing education, and by Jeffries et al. (2022), who highlighted the growing emphasis on student well-being, adaptability, and innovative pedagogical strategies in response to the pandemic's challenges.

Component nexus between Clinical Practice and Simulation

Healthcare education has significantly transformed from traditional clinical practice to simulation-based learning. This shift has changed the way healthcare professionals are trained and prepared. A thematic analysis of this transformation reveals several critical themes. Firstly, the integration of simulation reflects the adaptability and flexibility required to ensure continuous learning, especially during crises like the COVID-19 pandemic. (Kim et al., 2016) emphasize the role of simulation-based education in offering a flexible and adaptable approach, providing students with learning opportunities despite limitations in clinical settings. Secondly, simulation offers a safe yet realistic environment for learners to develop clinical skills, critical thinking, and decision-making. (Lateef, 2010; Okuda et al., 2009) Highlight that simulation-based education allows for repetitive practice and creates a safe space for learners to make and learn from mistakes without compromising patient safety.

Using simulation in clinical practice helps bridge the gap between theoretical knowledge and practical application. According to (Cook and Hatala, 2016), simulation-based learning is significant in facilitating the transfer of theoretical concepts into real-world scenarios, which promotes a more comprehensive understanding among students. The simulation also allows for implementing and evaluating various interventions in controlled settings, preparing healthcare professionals for effective responses in real clinical situations, as highlighted by (Lateef, 2010).

With global crises such as pandemics, simulation-based education enhances the preparedness and resilience of healthcare professionals. (Cuesta-Montero et al., 2023; Kim et al., 2016; Nagata & Kimura, 2017) Emphasize that simulation training significantly contributes to better crisis management and preparedness, underlining its role in cultivating essential skills and readiness among future healthcare providers.

The move from clinical practice to simulation in healthcare education is a significant change that has improved learning opportunities, bridged the gap between theory and practice, and prepared healthcare professionals for real-world situations. The literature highlights simulation's crucial role in education, especially in emergencies, emphasizing its capacity to develop essential skills and readiness among future healthcare providers.

Theoretical Model of Responsibility

In nursing education research, the intersection of theoretical models and responsibility is essential in preparing future nurses to handle complex healthcare situations and make ethical decisions. Tanner's Clinical Judgment Model is a critical theoretical framework in nursing education (Tanner, 2006) emphasizing that nurses' responsibility, clinical reasoning, and judgment are illuminated, highlighting critical decision-making based on evidence and expertise. (Dalton et al., 2015; Hawks et al., 2023) Students' abilities to assess situations, recognize cues, and make informed decisions in patient care settings are shaped by this essential model in cultivating responsible nursing practice.

In addition to clinical judgment, ethical, theoretical models significantly contribute to nursing education, emphasizing the ethical responsibility integral to the profession. Fry and Johnstone's Ethical Decision-Making Model (2002) is a framework used to guide nursing students through ethical dilemmas. The model underscores the responsibility of nurses to navigate ethical complexities in healthcare, emphasizing the importance of reflective and analytical thinking to make morally defensible choices (Fry, Sara T; Johnstone, Megan-Jane; Fletcher, 2003; Honkavuo, 2021). Integrating these ethical models within nursing education nurtures a sense of responsibility, enabling students to develop the ethical sensitivity crucial to delivering patient-centered care.

Nursing education research requires fusing theoretical models with a sense of responsibility. Developing a generation of nurses who can make informed clinical judgments and ethical decisions is crucial. These models are vital educational tools, shaping students' understanding of their responsibilities and ethical obligations in healthcare settings. By incorporating these frameworks into the curriculum, nursing education ensures that students acquire clinical skills and develop a deep sense of responsibility and ethical awareness, essential for providing high-quality patient care.

Semi-structured Interview and Manager

Semi-structured interviews are a popular qualitative research method in nursing education. They are appreciated for their adaptability and ability to gather detailed, context-specific information (Schoonenboom & Johnson, 2017). This technique provides a good balance between standardized questioning and the flexibility to explore new themes, which makes it especially useful when dealing with management personnel.

Managers' roles in nursing education are pivotal in shaping the curriculum, implementing policies, and creating a conducive learning environment. Conducting semi-structured interviews with these managers can provide valuable insights into their decision-making processes and challenges (Zhang et al., 2022). Understanding their perspectives is crucial for identifying areas of improvement and innovation in nursing education.

Semi-structured interviews are particularly advantageous when exploring managerial roles' dynamic and multifaceted nature (Smith & Osborn, 2015). This research method allows researchers to understand managers' decision-making processes deeply. However, specific challenges are associated with semi-structured interviews, such as interviewer bias and socially desirable responses (Opdenakker, 2006). Rigorous techniques such as member checking and triangulation are essential to ensure the reliability and validity of research involving semi-structured interviews (Guest et al., 2006).

Semi-structured interviews with managers in nursing education research can provide valuable insights into the complex nature of managerial roles and the impact of their decisions on educational outcomes. This method is highly adaptable and suits the dynamic nature of nursing education.

Nursing Student and Perception

In nursing education research, there is a constantly evolving study of the connection between nursing students and their perceptions. This field explores the complex relationship between students' educational experiences and perceptions. Research has revealed that a student's Perception of the learning environment significantly impacts their academic performance and engagement. For instance, (Shrestha et al., 2019; Vanaki & Hakim, 2023) numerous studies have shown that a supportive and conducive learning environment directly correlates with higher academic achievement among nursing students. It emphasizes improving the educational environment to encourage favorable perceptions and foster better student academic outcomes.

Furthermore, the literature indicates that the Perception of the nursing profession plays a pivotal role in shaping students' attitudes and commitment to their studies. A study (Al-Osaimi & Fawaz, 2022) examined how students' views of nursing as a career affected their motivation and dedication to their education. The study's findings suggest that students who positively perceive the nursing profession are more likely to be committed to their academic pursuits. Hence, educators and institutions must create an optimal learning environment and work towards shaping students' positive perspectives towards nursing. Doing so will help instill in them a sense of purpose and dedication towards achieving their academic and professional goals.

Perception plays a crucial role in the context of technological advancements in nursing education. (Meum et al., 2021) explored how nursing students perceive and adapt to technology in the educational environment. The study emphasized the importance of

understanding students' views on technology, as it can impact their ability to acquire essential skills required for modern nursing practice. Since technology is increasingly becoming integral to nursing education, educators must address students' perceptions to ensure effective integration and utilization of technological tools.

In nursing education research, the relationship between perception and nursing students encompasses the learning environment, societal perceptions of the nursing profession, and the impact of technology. The studies by (Shrestha et al., 2019), (Al-Osaimi & Fawaz, 2022), and (Meum et al., 2021) emphasize the need for a holistic understanding of student perceptions, educators, and institutions can contribute to practical nursing education.

Thematic evolution analysis demonstrates that, despite the COVID-19 pandemic, research priorities remained relatively stable. However, a notable increase in simulation-based education studies was observed, reflecting a shift towards digital and remote learning solutions (Cook et al., 2021). This aligns with existing literature, which underscores the importance of simulation as a critical component of modern nursing education, especially during crises that limit clinical exposure (Padilha et al., 2018). Furthermore, research in competency-based education and interprofessional collaboration has gained traction, reinforcing the trend toward holistic and integrative approaches in nursing training (Fawaz et al., 2018).

Western Epistemological Dominance and Global Disparities

The bibliometric findings reveal systemic structural inequalities in the production and dissemination of global nursing education literature. High-income Anglophone jurisdictions (United States, United Kingdom, Australia, Canada) produce over 26% of total indexed research and command 26% of all global citations. This concentration of academic influence is supported by institutional research funding, access to high-fidelity educational infrastructure, and proximity to major Q1 publication outlets.

Consequently, the global nursing education narrative is largely driven by Western instructional paradigms, accreditation frameworks, and technological models. Researchers in low- and middle-income countries (LMICs)—such as Brazil, Turkey, Iran, and the Philippines—face persistent structural challenges. These include higher clinical teaching workloads, limited institutional funding for open-access publishing fees (APC), restricted access to subscription databases, and language barriers. As a result, LMIC authors frequently publish in national or regional open-access journals that may not be indexed in major international citation databases, further depressing their international citation metrics. Addressing these disparities requires international journal editorial boards and global research consortiums to foster equitable cross-regional partnerships and implement APC waiver programs for LMIC scholars.

Longitudinal Thematic Shift: Simulation and Digital Pedagogy

The high thematic stability index (87% keyword persistence) confirms that the primary core of nursing education—patient safety, clinical judgment, ethical practice, and humanistic care—remains steadfast across time. However, the COVID-19 pandemic served as a major catalyst for pedagogical restructuring.

The structural advance of SIMULATION from a specialized subfield to a central instructional driver reflects how academic institutions adapted when physical clinical sites were closed. To meet mandatory clinical hour requirements, nursing programs shifted rapidly toward virtual clinical encounters, high-fidelity manikin scenarios, and structured simulation debriefing (Cook & Hatala, 2016; Kim et al., 2016). Rather than acting purely as a temporary crisis measure, simulation-based learning has established itself as an essential tool for developing clinical decision-making without compromising patient safety (Doolen et al., 2016). Similarly, the emergence of PANDEMIC and digital learning topics underscores a permanent shift toward blended learning, remote assessment, and institutional support for student psychological well-being (Meum et al., 2021).

Ethical Compliance Statement

This study analyzed secondary bibliographic metadata retrieved from a publicly available scientific database (Scopus). Human participants were not directly involved, no clinical interventions were performed, and no personally identifiable data were processed. Consequently, formal approval from an institutional review board (IRB) or human research ethics committee was not required.

Conclusions and Recommendations

Conclusions

This study provided a comprehensive mapping and critical analysis of the global nursing education research landscape from 2016 through 2023, capturing both performance metrics and thematic shifts surrounding the COVID-19 pandemic. The findings demonstrate that global knowledge production in nursing education remains heavily concentrated within high-income Western jurisdictions, led by the United States, United Kingdom, Australia, and Canada. While low- and middle-income countries (LMICs) contribute meaningful publication volumes, structural barriers—including publication costs, database indexing limits, and resource disparities—continue to limit their global visibility and citation reach.

Longitudinally, the discipline demonstrated remarkable thematic core stability across pre-pandemic (2016-2019) and pandemic (2020-2023) eras. Core priorities—such as direct clinical practice, patient safety, ethics, and fundamental nursing competencies—remained persistent bedrock topics throughout times of stability and crisis. However, the pandemic

served as a major catalyst for pedagogical adaptation, driving an essential structural expansion toward high-fidelity simulation, blended digital technologies, and institutional support systems for student psychological well-being.

Practical and Policy Recommendations

Based on these findings, the following actions are recommended for key stakeholders in nursing education:

1. For Nursing Educators and Curriculum Designers

Integrate Simulation as a Core Pedagogy: Academic institutions should formally embed high-fidelity simulation and virtual clinical encounters into mainstream curricula—not merely as emergency substitutes, but as structured, evidence-based methods for developing clinical judgment and critical thinking in a risk-free environment.

Strengthen Digital Competencies: Educators must design training programs that enhance both faculty and student digital literacy, ensuring seamless adaptation to online, hybrid, and technology-driven learning platforms.

2. For Institutional Leaders and Academic Publishers

Promote Cross-Regional Collaboration: Academic leaders in high-income Western countries should actively establish equitable research partnerships with institutions in LMICs to align global research agendas with localized healthcare needs.

Expand Publishing Equity: International journal boards and major commercial publishers should expand Article Processing Charge (APC) waiver programs and open-access opportunities for scholars from developing nations to reduce systemic disparities in global scholarly visibility.

Directions for Future Research

To build upon the insights gained in this study, future bibliometric and empirical research should prioritize the following areas:

Multi-Database Literature Synthesis: Future bibliometric reviews should expand data collection beyond Scopus to include databases such as Web of Science, PubMed, CINAHL, Dimensions, and regional indices (e.g., SciELO, LILACS) to capture non-English publications and broaden global representation.

Evaluation of Long-Term Educational Outcomes: Empirical research is needed to track the longitudinal impact of simulation-heavy and digital curricula on post-graduation clinical competency, transition-to-practice readiness, and patient care outcomes.

Investigation of AI Integration in Nursing Education: As artificial intelligence and immersive virtual environments (e.g., VR/AR) emerge in healthcare instruction, future thematic mapping should evaluate their integration, ethical implications, and instructional effectiveness within nursing education.

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