

Bibliometric Analysis: Improving the Clinical Skills of Nursing Students through Tutorial-Based Laboratory Learning

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ABSTRACT

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Recent advancements in nursing education have led to a shift in the paradigm from teacher-centered learning to experiential and reflective learning models. *Tutorial-Based Laboratory Learning* (TBLL) has emerged as an innovative approach to enhance nursing students' clinical competence by integrating reflection, problem-solving, and simulation-based practice. This bibliometric study aims to map global research trends, conceptual structures, and thematic evolution in studies focusing on improving nursing students' clinical skills through TBLL between 2015 and 2025. It also identifies the leading authors, institutions, journals, and countries that contribute to this field. A total of 48 articles were retrieved from the Scopus database and analyzed using VOSviewer 1.6.20 and Biblioshiny (R Studio) to visualize publication trends, keyword co-occurrence, co-authorship, and citation networks. The analysis followed descriptive, conceptual, and evolutionary approaches to illustrate global research patterns. Findings reveal an increasing trend in publications, peaking in 2021, with *Nurse Education Today* as the most influential journal. Dominant themes include *problem-based learning*, *critical thinking*, *self-efficacy*, and *nursing education*. The United States, Turkey, and Australia lead global contributions, reflecting broad international engagement. Key influential contributions were identified through citation network analysis, with several highly cited studies shaping the core knowledge base of TBLL-related clinical skills research. The study highlights TBLL as a transformative pedagogical model that integrates cognitive,

affective, and psychomotor learning dimensions. This research contributes to nursing science by providing an evidence-based roadmap for curriculum innovation, reflective evaluation, and simulation-based clinical education in 21st-century nursing programs.

Keywords

Clinical Skills
Nursing Students
Reflective Evaluation
Self-Efficacy
Tutorial-Based Laboratory

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Introduction

The development of nursing education in the last decade has shown a significant paradigm shift in efforts to improve students' clinical skills. Clinical learning, which previously focused solely on the transfer of knowledge and technical skills, has now evolved into a more reflective, collaborative, and experiential approach. The tutorial-based laboratory learning approach has emerged as one of the innovative strategies that has proven effective in bridging the gap between theory and clinical practice [1], [2].

Research by Quail et al. [2] and Xuto et al. [3] indicate that a combination of nursing skills laboratories, standardized patient laboratories, and real clinical practice can increase confidence, reduce anxiety, and strengthen students' therapeutic communication skills. These findings align with the constructivist learning model, in which students become active participants in a learning process grounded in direct experience. Thus, nursing laboratories not only function as technical spaces for training procedures but also as reflective spaces that encourage students to integrate theory and clinical practice holistically.

In line with that, Jao et al. [4] and Chu [5] emphasize the importance of self-reflection in shaping the clinical competence of nursing students. Through a structural equation modeling approach, they found that self-reflection acts as an important mediator that connects perceptions of the learning environment and mastery of clinical skills. These results show that the effectiveness of learning is not only determined by teaching methods, but also by reflective processes that help students understand the meaning behind every clinical action they take. The tutorial approach in the laboratory provides space for students to engage in critical reflection, discuss experiences, and receive direct feedback from mentors. Therefore, the tutorial-laboratory process becomes an ideal platform for developing clinical skills accompanied by professional awareness and empathy towards patients.

The effectiveness of laboratory learning is also reinforced by research by Cant & Cooper [6], Vihos [7], and Tuzer [8], which shows that the use of standardized patients

increases students' confidence, psychomotor skills, and communication abilities. Realistic simulations provide contextual learning experiences and stimulate clinical decision-making. The tutorial approach allows faculty to become facilitators who help students reflect on their learning experiences, while simulations serve as a bridge connecting theory with clinical reality [9].

Several other studies confirm that reflective components in laboratory learning are key to developing critical thinking and clinical decision-making skills. Shange [10] added that formative assessment during the training process strengthens students' self-reflection and independent learning. In the context of Kolb's experiential learning theory and Schön's reflective practice, the cycle of doing-reflecting-thinking-applying becomes the main foundation for nursing students to develop holistic clinical skills. Thus, tutorial-based laboratories that combine simulation, reflection, and formative assessment become the ideal model that supports 21st-century nursing learning.

In addition to the reflective aspect, the social dimension is also an important element in nursing laboratory learning [11]. The SNAPS and peer-to-peer model show that peer support increases students' confidence and motivation to learn. O'Brien et al [12] found that peer-student validation in the context of OSCE improves interpersonal communication and learning satisfaction. Chen et al. [13] even assert that peer learning creates a hidden curriculum that shapes students' professional values and clinical identity. The tutorial-based laboratory learning approach essentially facilitates this peer interaction, where students learn not only from lecturers but also through discussions and reflections with their peers.

In the psychological dimension, several studies highlight the relationship between repeated practice, self-confidence, and clinical readiness. Uysal [14] found that scenario-based training improved OSCE scores and reduced procedural errors. Lopez et al. [15] emphasized that mock competency skill evaluations improve students' readiness and confidence before competency exams. Meanwhile, Van Horn & Christman [16] explains that self-efficacy increases with repeated experience in the laboratory. All three studies show that successful clinical learning depends on a balance between technical practice and self-reflection. A laboratory environment that provides tutorial guidance allows students to repeat procedures until they become proficient while understanding the clinical context behind these actions. Cernusca et al. [17] adding that video-based reflection strengthens students' self-awareness and evaluative abilities.

Although the effectiveness of tutorial-based laboratory learning models has been empirically proven, there are still significant gaps in research. Most previous studies have focused on the influence of specific methods on student learning outcomes, without describing the global map of the direction of nursing clinical education research development. Doyon &

Raymond [18] stated that the clinical learning environment and clinical reasoning have not specifically highlighted the topic of tutorial-based laboratory learning. This means that further research is needed to map out publication trends, conceptual structures, and future research directions related to tutorial-based laboratory learning in the context of improving the clinical skills of nursing students.

The urgency of this research lies in the need to provide comprehensive scientific evidence regarding the global research landscape on tutorial-based laboratory learning. Through a bibliometric approach, this study can identify publication patterns, inter-country collaboration, and scientific networks that have formed over the past two decades. With keyword analysis, thematic clusters, and conceptual evolution, this study is also able to reveal the scientific structure and direction of research related to improving the clinical skills of nursing students. The findings of this study are expected not only to provide an overview of the existing knowledge map but also to open up space for the development of more effective pedagogical innovations in the future [19], [20].

The main objective of this study is to analyze and map global trends in research on improving the clinical skills of nursing students through tutorial-based laboratory learning. Specifically, this study aims to

- Identify publication trends, author distribution, journals, and countries contributing to the topic;
- Reveal the thematic structure, dominant keywords, and conceptual clusters that form the research map; and
- Evaluate thematic evolution and identify future research directions in the field of nursing clinical learning.

Thus, this study is not only descriptive but also analytical and strategic in tracing the development of knowledge in the field of tutorial laboratory-based nursing education.

This study is closely related to existing literature because all previous empirical findings form the conceptual basis for the bibliometric analysis that will be conducted. Doyon & Raymond [18], strengthening the global perspective on trends in nursing education research. By combining these two perspectives, this study serves as a bridge between empirical results and the global scientific map. Scientifically, this study also has the potential to strengthen the development of experiential learning, social learning, and reflective practice theories in the context of modern nursing education.

Based on this background, the research questions in this study are formulated into three main questions:

- What are the trends in publications, author distribution, journals, and countries in global research on improving the clinical skills of nursing students through tutorial-based laboratory learning?
- What are the main themes, dominant keywords, and conceptual structures that shape the research map on tutorial-based laboratory learning and its relationship to improving the clinical skills of nursing students?
- How has the thematic evolution and direction of tutorial-based laboratory learning research developed in the context of nursing education, and what areas of research have potential for future development?

These three questions are designed to address the need for a comprehensive bibliometric analysis to understand the direction, intensity, and conceptual relationships of global research relevant to improving the clinical skills of nursing students through tutorial-based laboratory learning.

Material and Methods

This study used a descriptive bibliometric approach with a quantitative analysis and scientometric mapping design to map the structure, trends, and direction of global research on improving the clinical skills of nursing students through tutorial-based laboratory learning. The bibliometric approach was chosen because it provides a comprehensive overview of publication distribution, collaboration between authors and countries, and conceptual relationships between research topics. This approach is in line with the research design used by Doyon & Raymond [18], which emphasizes keyword mapping, collaborative analysis, and thematic cluster identification as a basis for understanding developments and directions in nursing education research. In this study, the entire process was designed so that it could be replicated by other researchers by following measurable and systematic steps, starting from data retrieval, document screening, and bibliometric analysis using the software used.

The search process was conducted using filters for the publication years 2015–2025, the fields of nursing and health education, and the document type of journal articles (to ensure the relevance and quality of the data). From the initial search results, some documents were obtained and then selected using inclusion and exclusion criteria. The inclusion criteria included publications relevant to the context of nursing laboratory learning, listing elements of clinical skill improvement, and containing complete bibliometric data (title, author, affiliation, keywords, and references). Exclusion criteria were documents in the form of proceedings, editorials, brief reviews, or publications that did not contain complete metadata. After undergoing manual selection and duplication verification, 48 final documents were obtained, which became the main dataset in this study.

The selection of this number is in accordance with the principles of topic suitability and data completeness, as carried out by previous bibliometric studies Doyon & Raymond [18]. The dataset was then downloaded in CSV (Comma-Separated Values) format to ensure compatibility with the software used in the analysis stage. The main instruments in this study were VOSviewer software version 1.6.20 and Biblioshiny (R Studio), which functioned as bibliometric analysis and visualization tools. VOSviewer is used to construct and visualize networks of relationships between bibliometric elements such as keywords (co-occurrence), authors (co-authorship), publication sources (co-citation), and countries (country collaboration).

This approach was also used by Doyon & Raymond [18] to group clinical reasoning research themes into several conceptual clusters. Meanwhile, Biblioshiny (Bibliometrix R package) was used to perform advanced statistical analysis, including annual scientific production, top authors' productivity over time, most relevant keywords, thematic mapping, and thematic evolution analysis. These two software programs are used complementarily so that the analysis results are not only descriptive, but also interpretive and evolutionary, illustrating the development of research over time.

The data collection procedure was carried out through four systematic stages. First, the data identification and search stage, which is the process of compiling keywords based on the results of literature synthesis that highlight the elements of simulation, reflection, and tutorial laboratories in clinical learning. Second, the data extraction and cleaning stage involved removing duplicates, standardizing author names, and adjusting synonymous terms in keywords such as “simulation learning” and “skills laboratory.” Third, the bibliometric analysis stage, which involved network visualization, co-occurrence analysis, and theme clustering based on the frequency of keyword occurrence at least three times in the entire dataset. Fourth, the interpretation and validation stage, which combines the analysis results from VOSviewer and Biblioshiny to interpret the main clusters, dominant research trends, and new thematic directions in the context of tutorial-based laboratory learning.

The analytical methods in this study consist of three complementary approaches. First, descriptive analysis to identify annual publication trends, prolific authors, dominant journals, and international collaborations. Second, conceptual analysis to reveal keyword clusters, inter-thematic relationships, and research structures through co-occurrence network analysis and thematic mapping. Third, evolutionary analysis to track changes and research directions through thematic evolution and historiographic mapping. This layered approach follows the analytical structure applied by Doyon & Raymond [18], namely a combination of descriptive, conceptual, and evolutionary structures, which allows for an in-depth understanding of scientific developments in the field of nursing education. The results of this analysis are

expected to produce a global knowledge map that not only describes research trends but also identifies research front areas and emerging themes that have the potential to become the focus of further scientific development.

All procedures and analyses were conducted in accordance with the principles of replication and transparency, so that other researchers could repeat these steps with similar results. Raw data (48 Scopus documents) were stored in standard CSV format, and all analysis parameters in VOSviewer and Biblioshiny were recorded in detail, including threshold frequency, normalization method (association strength), and layout visualization (LinLog/modularity) used in network mapping. With this systematic methodological design, the study is expected to provide verifiable scientific contributions while strengthening the empirical basis for understanding the direction of global research on improving the clinical skills of nursing students through tutorial-based laboratory learning.

Results

A. Most influential author, affiliation, and country

1. Summary of the review

Table 1 shows a summary of bibliometric data from studies covering the period 2015–2025. During this time frame, 48 documents were obtained from 17 journal sources relevant to the research topic. The average age of publication was 5.81 years, indicating that most of the literature is still relatively new. Each document has an average of 18.85 citations, indicating a fairly high level of influence and relevance in the field.

Table 1. Summary of the review

Description	Results
Timespan	2015:2025
Sources (number of journals)	17
Documents	48
Average years from publication	5.81
Average citations per document	18.85
References	403
Document types	48
Article	276
Keywords plus (ID)	139
Author's keywords (de)	234
Author appearances	8.333
Co-Authors per Documents	7.92

The total number of references cited reached 403, which illustrates the breadth of the theoretical basis and previous research used. All documents analyzed were scientific articles (48). From the keyword analysis, 276 keywords plus (ID) and 139 authors' keywords (DE) were found, reflecting the diversity of concepts used by researchers in this theme. There were 234 author appearances, indicating quite extensive collaboration, with an average of 8.33 authors per document and 7.92 co-authors per article.

2. Document Growth by year

Fig. 1 shows the trend in document publications from 2015 to 2025. In general, the number of publications fluctuates from year to year. Overall, this pattern shows that 2021 was the peak of research activity, while the subsequent trend indicates a decline.

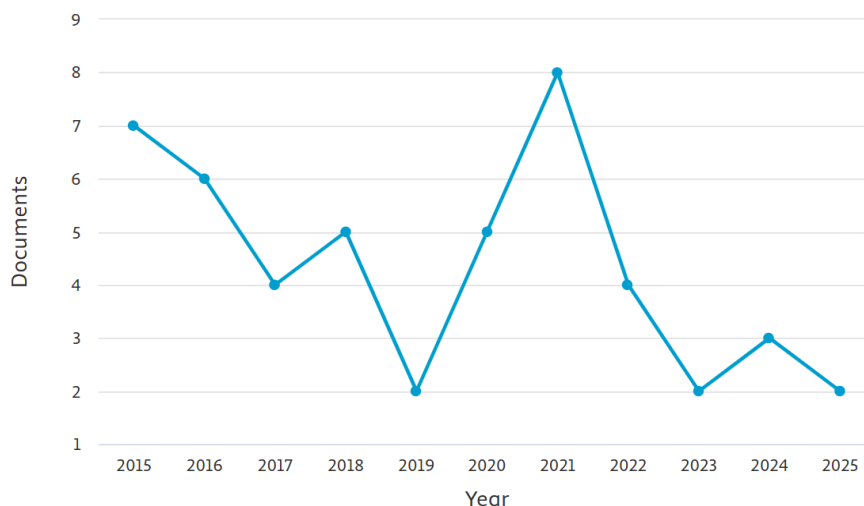


Fig. 1. Document Growth by year

3. Most relevant authors

Fig. 2 shows the distribution of the most productive authors in research on improving the clinical skills of nursing students through tutorial-based laboratory learning. It can be seen that McKenna [21], [22], is the most productive author with 2 published documents, while other authors, such as Aase [23]; Akdağ [24]; Akin [24]; Allen [25]; Allvin [26]; Arslan Gürcüoğlu [27]; Ashouri [28]; Bagheri [28]; and Bahnsen [29] each have 1 published document.

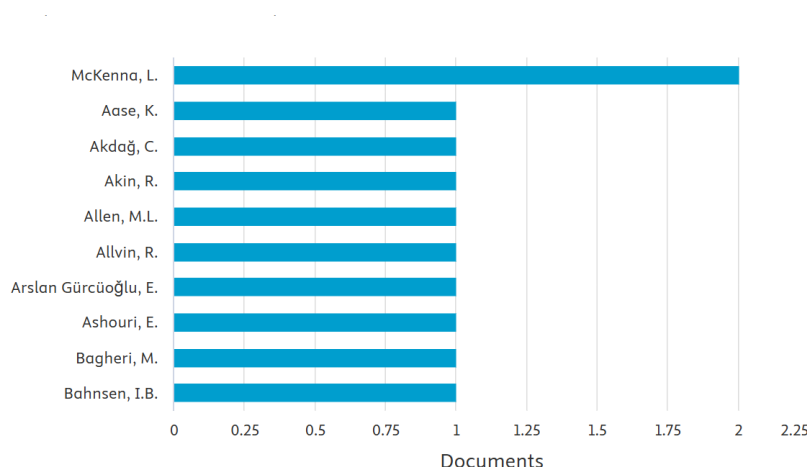


Fig. 2. Most Relevant Author

4. Most relative affiliations

Fig. 3 shows the institutions with the highest number of publications related to the topic of improving the clinical skills of nursing students through tutorial-based laboratory learning. From the graph, it can be seen that Hacettepe University is the most productive institution with 3 published documents, followed by University College Dublin, Mälardalen University, The University of North Carolina, Glasgow Caledonian University, and the University of the Western Cape, each with 2 documents. Meanwhile, several other institutions, such as the University of Medical Sciences, Lishui Maternal and Child Health Hospital, College of Medicine, and Primary Health Care Centre Victoria, each contributed 1 document.

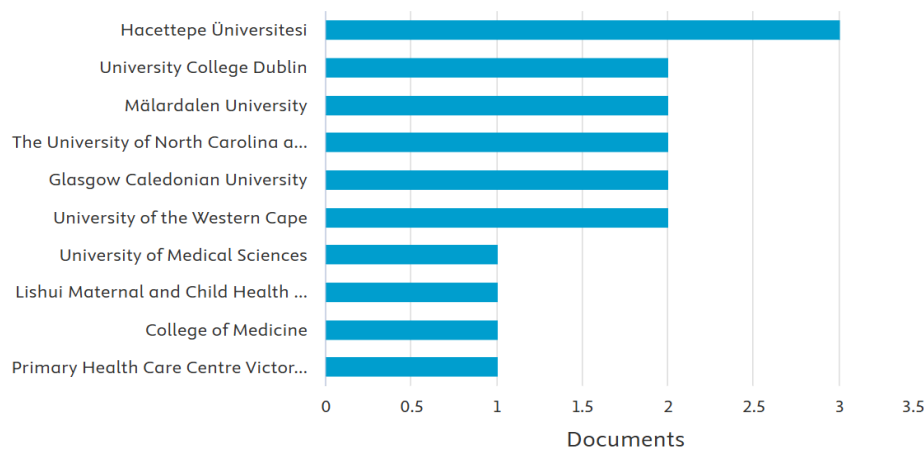


Fig. 3. Most Relative Affiliations

5. Most relevant countries

The graph above illustrates the distribution of publications based on the authors' countries of origin in research on improving the clinical skills of nursing students through tutorial-based laboratory learning. The country with the highest number of publications is the United States, with 17 documents, demonstrating its dominance and global leadership in nursing education research. Turkey ranks second with 8 documents, followed by Australia with 5 documents. Next, South Africa, Sweden, and the United Kingdom each contributed 3 documents, while Ireland produced 2 documents, and Bangladesh, Canada, and China each had 1 document.

B. Citacion Analysis

1. Top ten cited global documents

The table above shows the 10 most cited articles on the topic of improving the clinical skills of nursing students. The article with the highest number of citations is Herron's [30] work entitled "Effect of case study versus video simulation..." with 82 citations, followed by Haraldseid [23] with 77 citations, and Sundler Johansson [31] with 68 citations, all published in Nurse Education Today.

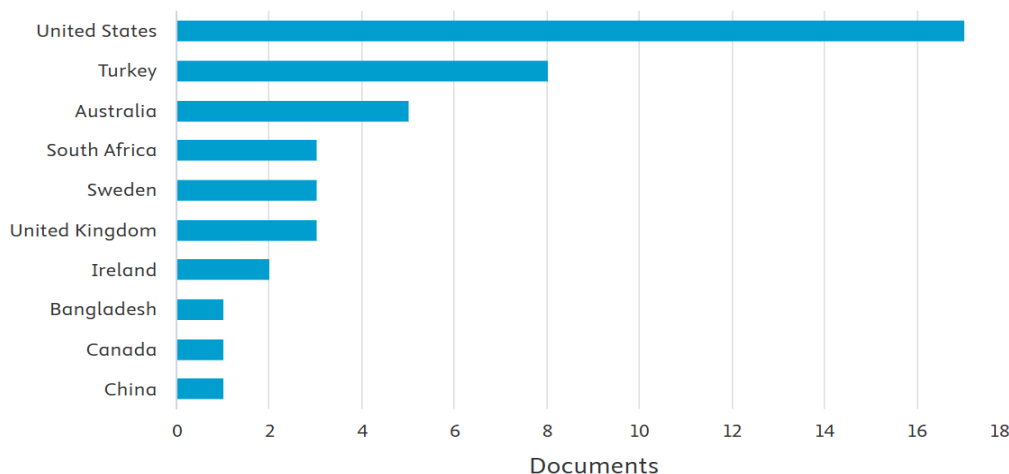


Fig. 4. Most relevant Countries

Other highly cited papers include Ewertsson [26], McKenna [21], Tüzer [8], Sheikhaboumasoudi [28], Chu [5], Vural Doğru [32], and Terzioğlu [24], which collectively reflect the strong influence of simulation-based learning, reflective practice, and skills laboratory environments in nursing education research.

Table 2. Top ten cited global documents

Author	Title	Year	Journal	Citation
Herron	Effect of case study versus video simulation on nursing students' satisfaction, self-confidence, and knowledge: A quasi-experimental study	2019	Nurse Education Today	82
Haraldseid-driftland	Nursing students' perceptions of factors influencing their learning environment in a clinical skills laboratory: A qualitative study	2015	Nurse Education Today	77
Sundler johansson	Undergraduate nursing students' experiences when examining nursing skills in clinical simulation laboratories with high-fidelity patient simulators: A phenomenological research study	2015	Nurse Education Today	68
Ewertsson	Walking the bridge: Nursing students' learning in clinical skill laboratories	2015	Nurse Education Today	55
Mckenna	The hidden curriculum in near-peer learning: An exploratory qualitative study	2017	Nurse Education Today	52
Tüzer	The effects of using high-fidelity simulators and standardized patients on the thorax, lung, and cardiac examination skills of undergraduate nursing students	2016	Nurse Education Today	52
Sheikhaboum asoudi	Improving nursing students' learning outcomes in the fundamentals of nursing course through a combination of traditional and e-learning methods	2018	Iranian Journal of Nursing and Midwifery Research	49
Chu	An integrated model for the effects of self-reflection and clinical experiential learning on clinical nursing performance in nursing students: A longitudinal study	2016	Nurse Education Today	41

Author	Title	Year	Journal	Citation
Vural doğru	The effects of training with simulation on knowledge, skill, and anxiety levels of the nursing students in terms of cardiac auscultation: A randomized controlled study	2020	Nurse Education Today	40
Terzioğlu	A new strategy in nursing education: From hybrid simulation to clinical practice	2016	Nurse Education Today	39

2. Top ten most locally and globally cited references

Table 3 shows the 10 most cited articles locally and globally. Ewertsson [26], article from *Nurse Education in Practice*, is the most influential, with 2 local citations and 55 global citations. Most of the other articles, such as those published between 2022 and 2025, are still new and have not been cited much. Some are beginning to show influence, such as Balante [33], with 8 global citations, and Brereton [34], with 7 global citations. Other locally and globally cited references in Table 3 include Shange-Goba [10], Sharmil S [35], Fan [36], Bourke [22], Murphy [37], Bee [38], and Grey [39], reflecting emerging contributions that have not yet accumulated high citation counts due to their recent publication years.

Table 3. Top ten most locally and globally cited references

No	First Author	Year	Journal/ Source	Local Citations	Global Citations
1	Mona Ewertsson	2015	Nurse Educ. Pract.	2	55
2	Mbalenhe P. Shange-goba	2025	Curationis	0	0
3	Hepsibah Sharmil S	2025	Teach. Learn. Nurs.	0	0
4	Siyu Fan	2024	Nurse Educ. Today	0	0
5	Sharon L. Bourke	2024	Nurse Educ. Today	0	4
6	Glenn Murphy	2024	Nurs. Educ. Perspect.	0	0
7	Rachel Elizabeth Bee	2023	J. Nurs. Educ.	0	2
8	Jay Balante	2023	Nurse Educ. Today	0	8
9	Siobhan Brereton	2022	Nurse Educ. Pract.	0	7
10	Clare Grey	2022	Br. J. Nurs.	0	2

C. Network Analysis

1. Bibliographical coupling

Fig. 5 shows the citation network between authors created with VOSviewer. Larger circles indicate that the author is cited more frequently. It can be seen that Herron [30], Pai [5], and Sheikhaboumasoudi [28] are in the center and strongly connected, meaning that their works are often cited together. McKenna [21] and Tüzer [8] are also influential but more isolated because their research focuses are different.

2. Co-authorship by the author

Fig. 6 shows the authors' collaboration network. The large red groups (such as Yucel, Akin, and Koc [24]) are strongly connected, indicating intense collaboration within a single research group. Meanwhile, the green group led by Elcin Melih [24], [8] is less connected, indicating more limited cross-group collaboration.

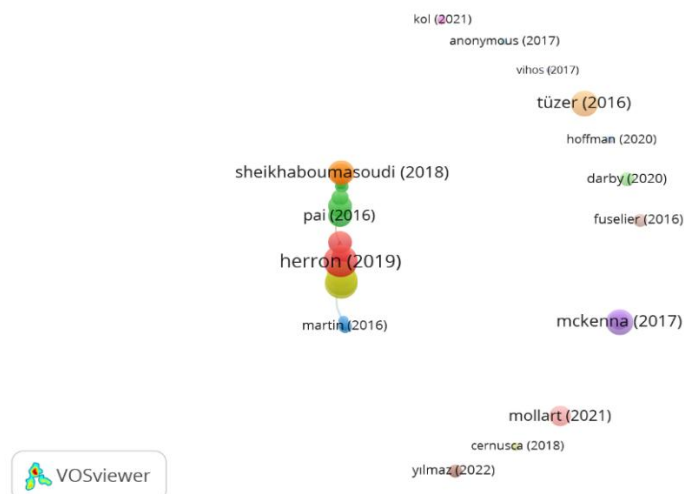


Fig 5. Bibliographical coupling

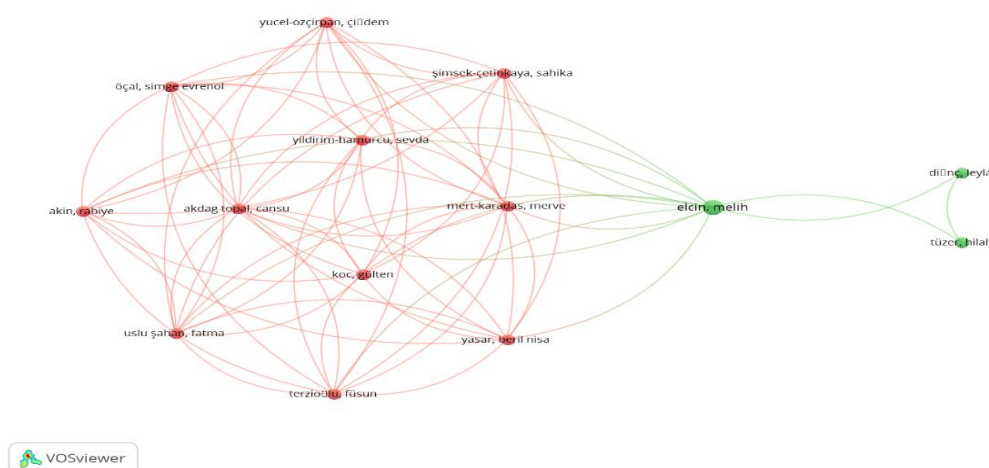


Fig. 6. Co-authorship by author

3. Co-authorship by country

Fig. 7 shows a map of publication density per country. The brightest colors in the United States indicate the highest research activity, followed by Turkey, Australia, Sweden, and Ireland. Other countries, such as South Africa and the United Kingdom, have lower contributions but remain active in this field of research.

4. Keyword co-occurrence

Fig. 8 shows a map of research keyword density. The most frequently appearing and influential words are “human,” “problem-based learning,” “nursing education,” and “critical thinking.” This indicates that the main focus of the research is on problem-based nursing education and the development of students' critical thinking skills.

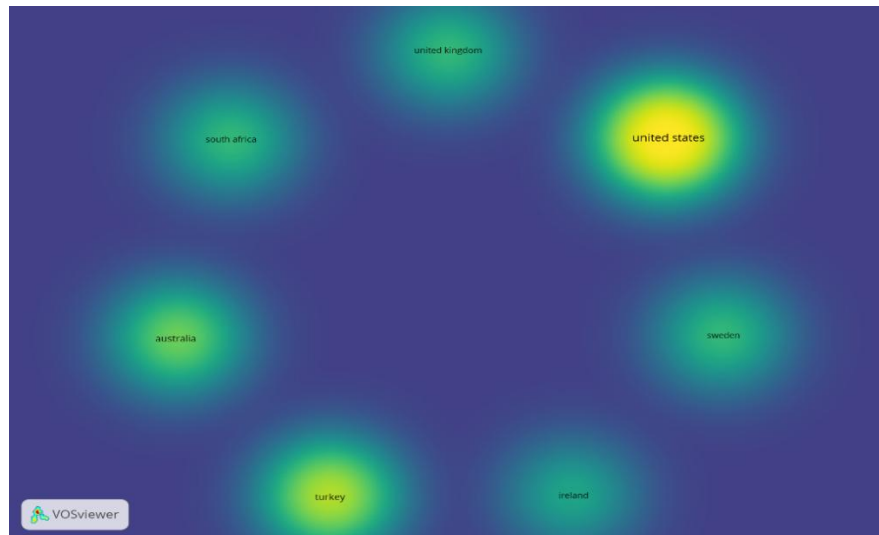


Fig. 7. Co-authorship by country

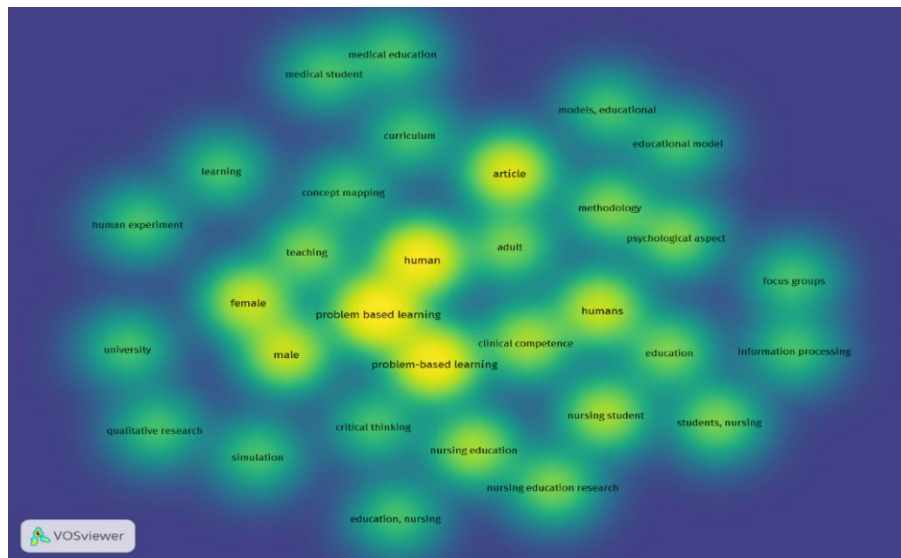


Fig. 8. Keyword co-occurrence

Discussions

A bibliometric analysis conducted on 48 documents from the period 2015–2025 shows the dynamics of research growth that illustrates the evolution of global interest in the topic of tutorial-based laboratory learning (TBLL) in improving the clinical skills of nursing students. The results show that publications began to increase in the period 2018–2021, with the highest peak in 2021. This trend is in line with a period in which nursing education around the world is adapting to the COVID-19 pandemic situation, which has encouraged nursing institutions to innovate with simulation learning, blended learning, and virtual laboratory technology. These results also reflect a paradigm shift in nursing education from teacher-centered learning to a reflective and collaborative approach [40].

The consistency of publications over the past five years shows that TBLL research is no longer considered an alternative method but has become mainstream in modern nursing pedagogy. Based on the data, *Nurse Education Today* dominates as the most productive and most cited journal, followed by *Nurse Education in Practice* and *Nursing Education Perspectives*. In terms of individual productivity, McKenna & Williams [21] emerged as the most active authors with two publications. Meanwhile, Herron et al. [30] becoming the author with the highest number of citations. The fact that the majority of authors only have one article indicates that this field is still fragmented individually but connected thematically—reflecting the multidisciplinary and collaborative nature of modern nursing research.

In terms of affiliation, Hacettepe University ranks highest in publication contributions. Turkey's dominance in this context confirms the role of developing countries in clinical learning innovation, in line with the findings of Uysal [14], which highlight the effectiveness of simulation-based training in the Asian and Middle Eastern contexts. Geographically, the research results show a balanced global distribution—with significant contributions from the United States, Turkey, and Australia, as well as active participation from European countries such as Sweden, the United Kingdom, and Ireland. This finding reinforces the view of Gray et al. [11] and O'Brien et al. [12] that nursing education is cross-cultural and collaborative, so that the tutorial-laboratory approach can be adapted to various social contexts.

The dominance of the United States in terms of publications (17 documents) indicates that the country has a strong research capacity and a well-established nursing education infrastructure. Meanwhile, the contributions of Turkey and Australia show that there is global equality in nursing education innovation. The map of international collaboration shows cross-continental connections, indicating that research in this field has reached a good level of international integration. These bibliometric results answer the first research question by showing that global research on TBLL is growing rapidly and consistently, involving a wide range of authors, institutions, and countries, and concentrated in reputable international journals. These results confirm that TBLL has become one of the globally recognized pedagogical models in nursing education.

Keyword analysis reveals that the most dominant themes are human, problem-based learning, nursing education, and critical thinking. This shows that research in the last decade has not only focused on the technical aspects of clinical skills, but also on the cognitive and affective dimensions of students [10]. These themes are clearly related to the theories of experiential learning (Kolb) and reflective practice (Schön), which also form the empirical basis for the research.

Kang et al. [41]. In this context, TBLL serves as a bridge connecting theoretical knowledge, critical reflection, and the application of skills in real-world contexts. The most

frequently mentioned keyword, problem-based learning, emphasizes that problem-based learning is at the core of TBLL, as it encourages students to solve clinical situations through critical thinking. In addition, topics such as simulation, confidence, and clinical reasoning emerged as keywords connecting clusters. This reinforces the research results, Van Horn & Christman [16] which shows that repeated practice in the laboratory increases students' confidence and clinical readiness. Thus, the keyword network reveals a close relationship between technical skills and the psychological processes underlying clinical performance, namely self-confidence, self-reflection, and peer collaboration.

Keyword mapping also reveals a strong relationship between simulation, formative evaluation, and peer learning, as described by Gray et al. [11] and O'Brien et al. [12]. This theme indicates that the success of laboratory learning is not only determined by simulation tools or clinical scenarios, but also by the social dynamics between students and the role of the instructor as a facilitator of reflection [24]. In this case, the tutorial approach provides space for students to discuss, solve problems, and evaluate themselves, all of which contribute to strengthening overall clinical competence. The results of the keyword and theme analysis answer the second research question: the conceptual structure of TBLL in nursing education is built on three main foundations, namely (1) problem-based learning, (2) reflection and formative evaluation, and (3) peer collaboration. These three are interrelated and form a conceptual framework for holistic, student-centered clinical learning.

From the results of thematic evolution analysis, it can be seen that the focus of research in the last decade has shifted from simulation and skills labs to reflective learning, self-efficacy, and critical thinking. This shift indicates that nursing research has moved from testing the effectiveness of methods to exploring the cognitive and affective aspects that influence the success of clinical learning. In other words, research attention has shifted from what works to why and how it works [42].

Cant & Cooper [6] through his review of nursing education simulations, he reinforces the evidence that high-fidelity simulations and standardized patients are effective tools for improving psychomotor and communication skills. Meanwhile, Aiken is known for his global research on nursing quality and patient safety, which provides a macro framework for the relevance of clinical skills in the context of professional practice.

The inter-journal citation network places Nurse Education Today at the center. This confirms that the journal is a conceptual platform where TBLL studies are connected thematically and methodologically. Nursing Education Perspectives and Journal of Nursing Education are supporting journals that enrich the discourse on reflection, peer learning, and professionalism. This condition indicates that the field of TBLL has reached a phase of maturity,

where research is no longer scattered without direction, but has formed a solid knowledge cluster around reflective and collaborative themes.

Given this trend, it can be concluded that future research will move toward strengthening the affective, social, and technological dimensions of clinical learning. Aspects such as empathy-based simulation, AI-assisted feedback, and interprofessional tutorial learning are predicted to become new areas of focus. Further studies are also expected to explore how the TBLL model can be integrated with the national competency-based curriculum, as emphasized by O'Brien et al. [12].

Conclusion

This study successfully mapped the global landscape of research on improving the clinical skills of nursing students through tutorial-based laboratory learning during the period 2015–2025. Analysis of 48 articles from 17 international journals shows that tutorial-based laboratory learning has developed into a major paradigm in modern nursing education. Publication productivity peaked in 2021, signaling a global momentum for post-pandemic clinical learning innovation, particularly through the application of simulation, reflection, and peer collaboration.

Bibliometric results show that the dominant research themes include problem-based learning, critical thinking, self-efficacy, and nursing education, reflecting a learning orientation towards reflection and collaboration. The journal *Nurse Education Today* is the main publication center, while authors such as Herron [30], McKenna [21], occupy important positions in the development of Tutorial-Based Laboratory Learning (TBLL) theory and practice. This study also reveals that the United States, Turkey, and Australia are the three countries with the highest research contributions, indicating widespread global attention to this topic.

Scientifically, this study confirms that TBLL is not merely a technical strategy, but rather a pedagogical approach that integrates cognitive, affective, and social dimensions in the formation of clinical competence. The main contribution of this research lies in mapping the structure of knowledge and the direction of research evolution, which can serve as the basis for curriculum development, reflective evaluation methods, and simulation-based clinical learning innovations in 21st-century nursing education.

Limitation and Suggestions

This study has several limitations that should be noted:

- Single data source: The dataset was only taken from the Scopus database, so it is possible that some relevant publications from Web of Science or CINAHL were not identified.

- Limited time frame: The analysis covers publications from 2015 to 2025, so the results do not represent longer-term historical trends (e.g., since the early 2000s).
- Limitations of semantic interpretation: Keyword analysis depends on the consistency of the terms used by authors. Variations in terms such as “skills lab,” “simulation training,” or “practical nursing education” may cause groupings to not always accurately reflect substantive relationships.
- No analysis of methodological quality: This study is quantitative-descriptive and does not assess the quality of the research design of the articles analyzed, so the interpretation of the results is limited to thematic relationships and not to the empirical validity of each study.

Future research should continue exploring TBLL as a key approach to strengthening nursing students’ clinical competence and reflective thinking. Nursing educators are encouraged to integrate TBLL with new technologies like virtual simulation and AI-based feedback to enrich learning experiences. Stronger collaboration among universities worldwide is also needed to share best practices and develop common standards for TBLL. Lastly, continuous faculty training is essential so that educators can effectively guide students through reflective and simulation-based learning in modern nursing education.

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Conflict of Interest

The authors declare no conflict of interest.

References

- [1] C. Payne, M. P. Ziegler, D. M. Baughman, and J. Jones, “Implementation of mock competency skill assessments to improve student outcomes,” *Nurse Educ.*, vol. 40, no. 6, pp. 281–284, 2015, doi: 10.1097/NNE.0000000000000173.
- [2] M. Quail, S. B. Brundage, J. Spitalnick, P. J. Allen, and A. J. Beilby, “Student self-reported communication skills, knowledge and confidence across standardised patient, virtual and traditional clinical learning environments,” *BMC Med. Educ.*, vol. 16, no. 1, pp. 1–12, 2016, doi: 10.1186/s12909-016-0577-5.
- [3] P. Xuto, P. Prasitwattanaseree, T. Chaiboonruang, K. Nimrangkul, and L. Khiaokham, “Enhancing clinical performance self-efficacy among nursing students: A virtual clinical laboratory approach,” *Teach. Learn. Nurs.*, vol. 19, no. 4, pp. e667–e671, 2024, doi:

- <https://doi.org/10.1016/j.teln.2024.06.002>.
- [4] J. Y. Jao, S. L. Chen, and J. L. Sun, "A predictive model of student nursing competency in clinical practicum: A structural equation modelling approach," *Nurse Educ. Today*, vol. 95, no. August, pp. 1–7, 2020, doi: 10.1016/j.nedt.2020.104579.
 - [5] P. H. Chu, "An integrated model for the effects of self-reflection and clinical experiential learning on clinical nursing performance in nursing students: A longitudinal study," *Nurse Educ. Today*, vol. 45, pp. 156–162, 2016, doi: 10.1016/j.nedt.2016.07.011.
 - [6] R. P. Cant and S. J. Cooper, "Use of simulation-based learning in undergraduate nurse education: An umbrella systematic review," *Nurse Educ. Today*, vol. 49, pp. 63–71, 2017, doi: 10.1016/j.nedt.2016.11.015.
 - [7] J. Vihos *et al.*, "Debriefing in Laboratory Experiences: A Quality Improvement Project," *Nurse Educ.*, vol. 42, no. 6, pp. 316–319, 2017, doi: 10.1097/NNE.0000000000000367.
 - [8] H. Tuzer, L. Dinc, and M. Elcin, "The effects of using high-fidelity simulators and standardized patients on the thorax, lung, and cardiac examination skills of undergraduate nursing students," *Nurse Educ. Today*, vol. 45, pp. 120–125, 2016, doi: 10.1016/j.nedt.2016.07.002.
 - [9] M. Daneshfar and H. K. Moonaghi, "The impact of clinical simulation on bridging the theory – practice gap in nursing education : a systematic review," *BMC Med. Educ.*, vol. 25, no. 1, p. 1216, 2025, doi: <https://doi.org/10.1186/s12909-025-07790-8>.
 - [10] M. P. Shange-Goba and J. J. Willemse, "Experiences of simulated patients in clinical skills laboratory: A qualitative study," *Curationis*, vol. 48, no. 1, p. 2736, 2025, doi: 10.4102/curationis.v48i1.2736.
 - [11] S. Gray, M. Wheat, M. Christensen, and J. Craft, "Snaps+: Peer-to-peer and academic support in developing clinical skills excellence in undergraduate nursing students: An exploratory study," *Nurse Educ. Today*, vol. 73, pp. 7–12, 2019, doi: 10.1016/j.nedt.2018.10.006.
 - [12] T. O'Brien, L. Talbot, and E. Santevecchi, "Strengthening Clinical Skills Using Peer-Student Validation," *Nurse Educ.*, vol. 40, no. 5, pp. 237–240, 2015, doi: 10.1097/NNE.0000000000000155.
 - [13] Y. Chen, Z. Zhou, and G. Mao, "Beyond the classroom: How hidden curriculum dynamics shape professional identity formation in nursing undergraduates-Evidence from a structural equation model," *Res. Sq.*, pp. 1–16, 2025, [Online]. Available: <https://www.researchsquare.com/article/rs-6399320/latest>
 - [14] N. Uysal, "Improvement of nursing students' learning outcomes through scenario-based skills training," *Rev. Lat. Am. Enfermagem*, vol. 24, p. e2790, 2016, doi: 10.1590/1518-8345.1310.2790.
 - [15] L. P. Lopez, C. S. Juan, T. H. Alboelola, and N. D. Sanchez, "Assessment of Clinical Confidence among Jose Rizal University Level III Nursing Students in the Psychiatric Ward," *Saudi J. Med.*, vol. 10, no. 2, pp. 40–54, 2025, doi: 10.36348/sjm.2025.v10i02.003.
 - [16] E. Van Horn and J. Christman, "Assessment of nursing student confidence using the clinical skills self-efficacy scale," *Nurs. Educ. Perspect.*, vol. 38, no. 6, pp. 344–346, 2017, doi: 10.1097/01.NEP.0000000000000169.
 - [17] D. Cernusca, S. Thompson, and J. Riggins, "Learning sterile procedures through transformative reflection: Use of iPad videos in a nursing laboratory course," *Nurse Educ.*, vol. 43, no. 6, pp. 330–333, 2018, doi: 10.1097/NNE.0000000000000491.
 - [18] O. Doyon and L. Raymond, "Clinical reasoning and clinical judgment in nursing research: A bibliometric analysis," *Int. J. Nurs. Knowl.*, vol. 36, no. 3, pp. 339–350, 2025, doi: 10.1111/2047-3095.12484.
 - [19] A. M. H. Hidigow, N. I. Dirie, and Z. A. Warsame, "Bibliometric Analysis of Research Trends in Clinical Learning Environment for Nursing and Midwifery Education," *J. Multidiscip. Healthc.*, vol. 17, no. October, pp. 4973–4987, 2024, doi: 10.2147/JMDH.S486321.
 - [20] O. Öztürk, R. Kocaman, and D. K. Kanbach, "How to design bibliometric research: an overview and a framework proposal," *Rev. Manag. Sci.*, vol. 18, no. 11, pp. 3333–3361, 2024, doi: 10.1007/s11846-024-00738-0.
 - [21] L. McKenna and B. Williams, "The hidden curriculum in near-peer learning: An exploratory qualitative study," *Nurse Educ. Today*, vol. 50, pp. 77–81, 2017, doi: 10.1016/j.nedt.2016.12.010.
 - [22] S. L. Bourke, L. McKenna, S. Cooper, and L. Lam, "Nurse Education Today Contextual determinants impacting final year nursing students ' emergency team communication during deteriorating patient simulations : A grounded theory study," *Nurse Educ. Today*, vol. 138, no. February 2023, p. 106183, 2024, doi: 10.1016/j.nedt.2024.106183.
 - [23] C. Haraldseid, F. Friberg, and K. Aase, "Nursing students' perceptions of factors influencing their learning environment in a clinical skills laboratory: A qualitative study," *Nurse Educ. Today*, vol. 35, no. 9, pp. e1–e6, 2015, doi: 10.1016/j.nedt.2015.03.015.
 - [24] F. Terzioğlu, C. Yücel, G. Koç, S. Şimşek, B. N. Yaşar, F. U. Şahan, R. Akin, S. Öçal, E. C. Akdağ, M. Elçin,

- M. Mert, and S. Yildirim, "A new strategy in nursing education: From hybrid simulation to clinical practice," *Nurse Educ. Today*, vol. 39, pp. 104–108, 2016, doi: 10.1016/j.nedt.2016.01.009.
- [25] M. L. Allen, "Skills and dosage calculation pilot study: Maybe not in another dimension?," *Teach. Learn. Nurs.*, vol. 16, no. 1, pp. 32–35, 2021, doi: 10.1016/j.teln.2020.07.003.
- [26] M. Ewertsson, R. Allvin, I. K. Holmström, and K. Blomberg, "Walking the bridge: Nursing students' learning in clinical skill laboratories," *Nurse Educ. Pract.*, vol. 15, no. 4, pp. 277–283, 2015, doi: 10.1016/j.nepr.2015.03.006.
- [27] A. Ş. Erenel, Ş. Yaman Sözbir, M. Uzun Aksoy, E. Arslan Gürcüoğlu, S. Pelit Aksu, F. Ünal Toprak, and C. Uçakci Asalioglu, "Effect of Scenario-Based Simulation Training on the Obstetrics and Gynecology Nursing Clinical Practicum," *J. Nurs. Res.*, vol. 29, no. 2, p. e142, 2021, doi: 10.1097/jnr.0000000000000417.
- [28] R. Sheikhaboumasoudi, M. Bagheri, S. A. Hosseini, E. Ashouri, and N. Elahi, "Improving Nursing Students' Learning Outcomes in Fundamentals of Nursing Course through Combination of Traditional and e - Learning Methods," *Iran. J. Nurs. Midwifery Res.*, vol. 23, no. 3, pp. 217–221, 2018, doi: 10.4103/ijnmr.IJNMR_79_17.
- [29] S. L. Voldbjerg, B. Laugesen, I. B. Bahnsen, L. Jørgensen, I. M. Sørensen, M. Grønkjær, and E. E. Sørensen, "Integrating the fundamentals of care framework in baccalaureate nursing education: An example from a nursing school in Denmark," *J. Clin. Nurs.*, vol. 27, no. 11–12, pp. 2506–2515, Jun. 2018, doi: <https://doi.org/10.1111/jocn.14354>.
- [30] E. K. Herron, K. Powers, L. Mullen, and B. Burkhart, "Effect of case study versus video simulation on nursing students' satisfaction, self-confidence, and knowledge: A quasi-experimental study," *Nurse Educ. Today*, vol. 79, pp. 129–134, 2019, doi: 10.1016/j.nedt.2019.05.015.
- [31] A. J. Sundler, A. Pettersson, and M. Berglund, "Undergraduate nursing students' experiences when examining nursing skills in clinical simulation laboratories with high-fidelity patient simulators: A phenomenological research study," *Nurse Educ. Today*, vol. 35, no. 12, pp. 1257–1261, 2015, doi: 10.1016/j.nedt.2015.04.008.
- [32] B. Vural Doğru and L. Zengin Aydın, "The effects of training with simulation on knowledge, skill, and anxiety levels of the nursing students in terms of cardiac auscultation: A randomized controlled study," *Nurse Educ. Today*, vol. 84, p. 104216, 2020, doi: 10.1016/j.nedt.2019.104216.
- [33] J. Balante, D. Candelaria, D. Perez, and F. Koo, "Nursing students' experiences of using flipcharts as a learning tool during the COVID-19 pandemic," *Nurse Educ. Today*, vol. 120, p. 105650, 2023, doi: 10.1016/j.nedt.2022.105650.
- [34] S. Brereton, M. Curtin, E. Greene, P. Hardie, and M. Szafranska, "Nurse Education in Practice: A blended learning perineal suturing programme for midwifery students : An evaluative descriptive study," *Nurse Educ. Pract.*, vol. 64, p. 103453, 2022, doi: 10.1016/j.nepr.2022.103453.
- [35] S. S. Hepsibah, S. Vijayavani, T. Mercy Freeda, M. S. Nikhil, D. Sonika, and J. Anusha Evanjaline, "Student Nurses Competency in Cardiac Auscultation and Heart Sound Recognition: Educational and Clinical Implications," *Teach. Learn. Nurs.*, vol. 20, no. 3, pp. e665–e669, 2025, doi: <https://doi.org/10.1016/j.teln.2025.01.024>.
- [36] S. Fan *et al.*, "Nursing students' perspectives on peer assessment in basic nursing procedures: A qualitative study," *Nurse Educ. Today*, vol. 143, p. 106348, 2024, doi: <https://doi.org/10.1016/j.nedt.2024.106348>.
- [37] G. Murphy and A. Sweeney, "Death of a Simulated Patient: An Innovative Approach to Teaching Dosage Calculations," *Nurs. Educ. Perspect.*, vol. 45, no. 3, pp. 182–183, 2024, doi: 10.1097/01.NEP.0000000000001111.
- [38] R. E. Bee, J. Watkins, and R. Barnes, "The Effects of Low-Fidelity Simulation on Students' Perceived Abilities to Build Therapeutic Relationships," *J. Nurs. Educ.*, vol. 62, no. 10, pp. 575–579, 2023, doi: <https://doi.org/10.3928/01484834-20230815-09>.
- [39] C. Grey, "Can a high-fidelity simulation tutorial improve written examination results? Review of a change in teaching practice," *Br. J. Nurs.*, vol. 31, no. 13, pp. 704–708, 2022, doi: <https://doi.org/10.12968/bjon.2022.31.13.704>.
- [40] K. Yang, L. Wang, G. Yang, and X. Jiang, "Research hotspots and trends in nursing education from 2014 to 2020: A co-word analysis based on keywords," *Journal of Advanced Nursing*, vol. 78, no. 3, pp. 787–798, 2022, doi: 10.1111/jan.15010.
- [41] K. Kang, M. Lee, and H. Cho, "Interpersonal skills mediate the relationship between communicative and clinical competencies among nursing students: A descriptive study," *Nurse Educ. Today*, vol. 99, p. 104793, 2021, doi: 10.1016/j.nedt.2021.104793.
- [42] M. G. Tolsgaard, K. M. Kulasegaram, and C. V. Ringsted, "Collaborative learning of clinical skills in health professions education: The why, how, when and for whom," *Med. Educ.*, vol. 50, no. 1, pp. 69–

78, 2016, doi: 10.1111/medu.12814.

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