

# ANÁLISE BIBLIOMÉTRICA DA PRODUÇÃO CIENTÍFICA SOBRE SIMULAÇÃO NA EDUCAÇÃO EM SAÚDE

BIBLIOMETRIC ANALYSIS OF SCIENTIFIC PRODUCTION ON SIMULATION  
IN HEALTH EDUCATION

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## RESUMO

Este estudo analisa a produção científica sobre simulação na educação em saúde, com o objetivo de caracterizar sua evolução, distribuição, principais atores e estrutura temática. Trata-se de uma análise bibliométrica realizada na base de dados Scopus, considerando documentos publicados entre 2021 e 2026. Foram utilizados descritores relacionados à simulação e educação em saúde, aplicados aos campos título, resumo e palavras-chave. Os dados foram processados por meio do software Bibliometrix, no ambiente R, permitindo a análise da produção temporal, autoria, periódicos, instituições, países, colaboração científica e estrutura conceitual, além da aplicação das leis de Lotka, Bradford e Zipf. Os resultados evidenciaram um total de 539 documentos distribuídos em 224 periódicos, com predominância de autores ocasionais e média de coautoria de 5,35 autores por documento, indicando padrão colaborativo relevante. Observou-se concentração da produção em países desenvolvidos, especialmente Estados Unidos e países europeus, bem como a existência de um núcleo de periódicos mais produtivos, conforme a Lei de Bradford, acompanhado de ampla dispersão nas demais zonas. A análise conceitual revelou forte associação entre simulação, educação e desenvolvimento de competências, incluindo habilidades técnicas e não técnicas. Conclui-se que a produção científica apresenta relevância e atualidade, caracterizando-se como um campo em expansão, porém ainda em processo de consolidação estrutural e temática.

**Palavras-chave:** Simulação em saúde; Educação em saúde; Bibliometria; Ensino baseado em simulação; Formação profissional.

## ABSTRACT

This study analyzes the scientific production on simulation in health education, aiming to characterize its evolution, distribution, main

contributors, and thematic structure. This is a bibliometric analysis conducted using the Scopus database, considering documents published between 2021 and 2026. Descriptors related to simulation and health education were applied to the title, abstract, and keywords fields. Data were processed using the Bibliometrix software in the R environment, enabling the analysis of temporal production, authorship, journals, institutions, countries, scientific collaboration, and conceptual structure, as well as the application of Lotka's, Bradford's, and Zipf's laws. The results identified a total of 539 documents distributed across 224 journals, with a predominance of occasional authors and an average of 5.35 co-authors per document, indicating a relevant collaborative pattern. Scientific production was concentrated in developed countries, particularly the United States and European nations, as well as in a core group of highly productive journals, as described by Bradford's law, followed by broad dispersion in subsequent zones. Conceptual analysis revealed a strong association between simulation, education, and competency development, including both technical and non-technical skills. It is concluded that scientific production in this field is relevant and current, representing an expanding domain that is still undergoing structural and thematic consolidation.

**Keywords:** Simulation in health; Health education; Bibliometrics; Simulation-based education; Professional training.

## 1. INTRODUCTION

Health education has undergone profound transformations in recent decades, driven by the increasing complexity of healthcare systems, the incorporation of new technologies, and the need to train professionals who are better prepared for decision-making in dynamic clinical scenarios. In this context, educational strategies

focused on competency development and active learning have been progressively valued (Recker et al., 2026).

The use of simulation as an educational strategy originated outside the healthcare field, particularly in aviation, where it was developed to reduce human error and enhance operational safety. Beginning in the second half of the 20th century, simulators were widely used in pilot training, enabling the reproduction of critical situations in safe environments without real risk. This model was later incorporated into healthcare, especially after the recognition of the role of human error in adverse events, which drove the adoption of safer training methodologies (Gaba, 2004).

In healthcare, simulation was systematized as an educational strategy by Gaba (2004), who defined it as a technique capable of replacing or amplifying real experiences through guided experiences that replicate essential aspects of clinical practice. This concept established simulation as a central tool in health education and training, particularly in critical areas such as anesthesiology.

From a pedagogical perspective, simulation is grounded in the experiential learning theory proposed by Kolb (1984), according to which knowledge is constructed through experience, reflection, conceptualization, and active experimentation. In this sense, simulation provides an environment conducive to the full learning cycle, allowing students to experience clinical situations, reflect on their actions, and improve their performance.

Classic studies demonstrate that the effectiveness of simulation is directly related to deliberate practice, structured feedback, and repeated experiences—key elements for the development of clinical

competencies (McGaghie et al., 2011; Issenberg et al., 2005). More recent evidence supports these findings by demonstrating improvements in clinical performance and learner self-confidence (Sharma et al., 2023).

In addition to developing technical skills, simulation has proven particularly relevant for training non-technical skills such as communication, teamwork, and decision-making—factors directly related to patient safety. Simulated environments allow interaction among different professionals, promoting interprofessional education and the development of collaborative practices (Velásquez et al., 2022; Mostafa et al., 2025).

The consolidation of simulation in health education is also related to the need to reduce risks associated with training on real patients, especially in high-complexity settings. In this regard, simulation contributes to a safe transition between the academic environment and clinical practice, enhancing professional preparedness (Hayes, 2018).

With the advancement of digital technologies, new simulation modalities have been incorporated, including virtual reality, high-fidelity simulation, and hybrid learning environments. The COVID-19 pandemic intensified this movement, highlighting the importance of innovative and flexible solutions for the continuity of health education (Chong et al., 2021).

Despite these advances, challenges remain, such as infrastructure limitations, the need for faculty training, and difficulties in systematically integrating simulation into curricula. Additionally, the literature points to the need for greater methodological

standardization and evaluation of the impact of these strategies on professional training (Muhumuza et al., 2023).

In this context, there has been a significant increase in scientific production on simulation in health education, reflecting its consolidation as a field of research (Zhou et al., 2024). Therefore, bibliometric studies become essential to understand the evolution of the field, identify trends and gaps, and support future investigations.

## **2. METHODOLOGY**

This is a bibliometric study that analyzed scientific production on simulation in health education, based on documents indexed in an international database, covering the period from 2021 to 2026. Bibliometrics involves the application of statistical and mathematical methods to analyze scientific output, enabling the assessment of publication patterns, authorship, and knowledge dissemination through reliable indicators.

The search was conducted in the Scopus database in January 2026, using Health Sciences Descriptors (DeCS/MeSH) to develop the following search strategy: TITLE-ABS-KEY (“simulation-based education” OR “clinical simulation” AND “medical education” OR “nursing education” OR “health professions education”) AND PUBYEAR > 2020 (...). These descriptors were combined with terms related to health education and applied to the title, abstract, and keyword fields. Articles and review papers published within the defined period were included, while duplicate documents and those not directly related to the proposed topic were excluded.

The choice of the Scopus database is justified by its broad multidisciplinary coverage and recognition within the international scientific community, particularly in the health field, as well as its indexing of peer-reviewed journals and provision of robust data for bibliometric analyses. The data were exported in a compatible format and analyzed using the Bibliometrix software, operated within the R® environment, with support from the Biblioshiny interface. Descriptive analyses of scientific production were conducted, including the temporal evolution of publications, distribution by journals, authorship, institutions, and countries, as well as indicators of scientific collaboration.

Classical bibliometric laws were applied, including Lotka's Law to analyze author productivity, Bradford's Law to evaluate journal dispersion, and Zipf's Law to identify the frequency and relevance of keywords. Additionally, co-authorship, international collaboration, and keyword co-occurrence networks were constructed and represented through maps and graphs. The results were presented in tables and visual maps, enabling the visualization of relationships among the main elements of scientific production.

### **3. RESULTS**

The search retrieved 539 documents published between 2021 and 2026, with an annual growth rate of -7.09%. These documents are distributed across 224 sources, with an average of 5.34 citations per document and a mean document age of 2.42 years. A total of 1,211 author keywords were identified. The total number of authorships/co-authorships was 2,616, with 23 authors responsible for single-authored publications. The average number of co-authors

per document was 5.35, and the rate of international collaboration was 19.67%.

The high average of co-authorship reflects a well-established pattern of scientific collaboration in the field, suggesting strong interaction among researchers and the formation of collaborative networks. Table 1 presents the distribution of scientific production according to Lotka's Law, enabling the analysis of author productivity and the identification of patterns of concentration in scientific output. Table 1 also illustrates the network of collaboration among authors, highlighting the connections established within the field of study.

**Table 1:** Lotka's Law

Documents written	N. of Authors	Proportion of Authors	Theoretical
1	2439	0,932	0,659
2	134	0,051	0,165
3	23	0,009	0,073
4	11	0,004	0,041
5	3	0,001	0,026
6	2	0,001	0,018
8	3	0,001	0,01
10	1	0	0,007

**Source:** Prepared by the authors (2026).

The geographic distribution of publications highlights the leadership of the United States, with 108 documents (20.0%),

followed by Spain with 56 (10.4%) and Brazil with 37 publications (6.9%). This is followed by Australia with 28 (5.2%), Canada and the United Kingdom, both with 26 (4.8%), and China with 24 documents (4.5%).

The analysis of scientific collaboration shows that most publications are concentrated in Single Country Publications (SCP), particularly in the United States (96), Spain (49), and Brazil (30). However, there is also a relevant presence of international collaborations (Multiple Country Publications – MCP), especially in Australia, which presents the highest percentage of international collaboration (32.1%), followed by Canada (19.2%) and Brazil (18.9%).

Table 2 represents the geographic distribution of scientific production, highlighting the concentration of publications in developed countries, particularly in North America and Europe, as well as the growing participation of emerging countries such as Brazil.

**Table 2:** Geographic distribution of scientific production by citation relevance

Country	Articles	Articles %	SCP	MCP	MCP
USA	108	20	96	12	11,1
Spain	56	10,4	49	7	12,5
Brazil	37	6,9	30	7	18,9
Australia	28	5,2	19	9	32,1
Canada	26	4,8	21	5	19,2
United	26	4,8	24	2	7,7

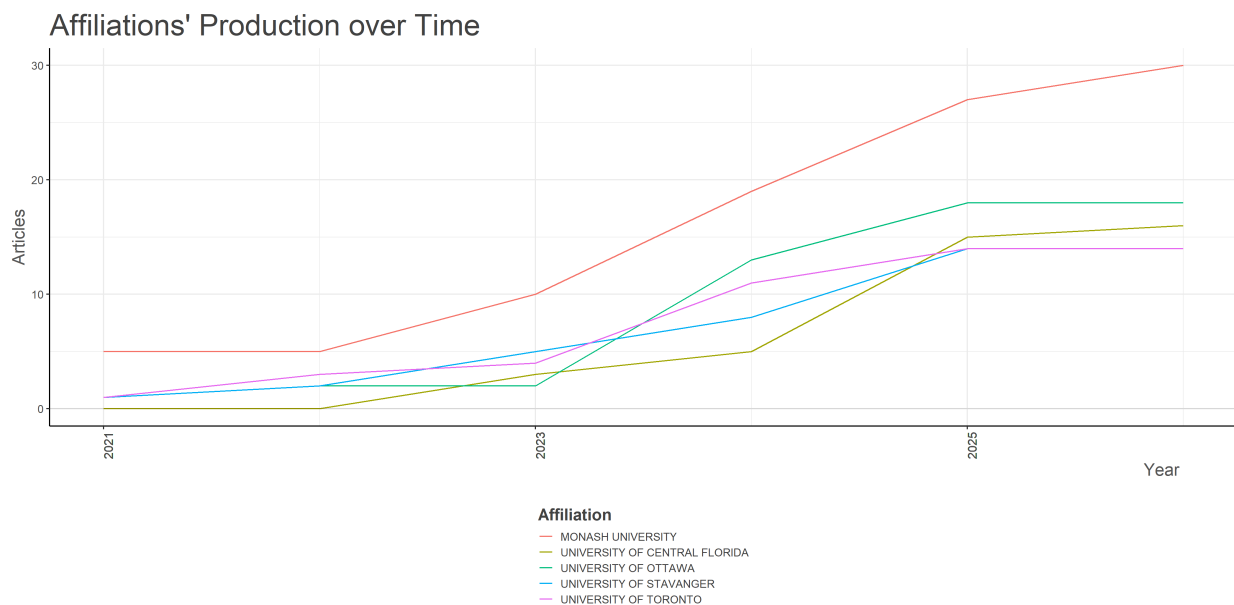
⚠ Esta tabela possui muitas colunas e foi cortada para impressão. Para visualizá-la completa, acesse o artigo original em: <https://revistatopicos.com.br/artigos/analise-bibliometrica-da-producao-cientifica-sobre-simulacao-na-educacao-em-saude?noblockage>

**Source:** Prepared by the authors (2026).

The analysis of the most productive institutions highlights the leadership of Monash University, which showed continuous growth throughout the analyzed period, reaching the highest number of publications, particularly in recent years. This is followed by University of Ottawa and University of Stavanger, both demonstrating a progressive increase in scientific output, indicating the consolidation of research groups in the field. University of Toronto also showed significant growth over time, reinforcing its relevance in the international scientific landscape. Other institutions, such as University of Central Florida, although initially presenting lower output, demonstrated a marked increase in the number of publications in more recent years.

Overall, there is a clear concentration of scientific production in institutions located in developed countries, with progressive growth over time. This trend suggests a strengthening of research lines related to the topic and an expansion of academic interest in the field (Figure 1).

**Figure 1:** Analysis of the most productive institutions



**Source:** Prepared by the authors (2026).

Figure 2 presents a summarized distribution of journals according to Bradford's Law, highlighting the dispersion of scientific production on simulation in health education. The table was constructed based on the number of journals required to publish a given quantity of articles, allowing the identification of the core group of the most productive journals and the subsequent zones of dispersion.

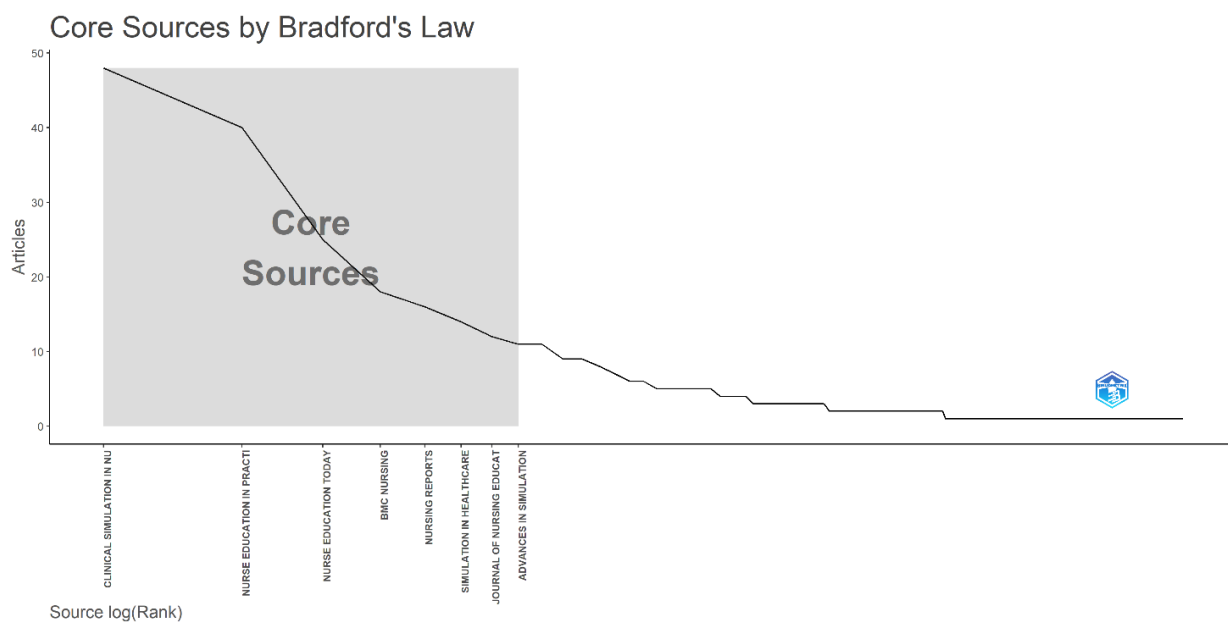
Zone 1 concentrated the journals most dedicated to the topic, with emphasis on *Clinical Simulation in Nursing* with 48 publications, *Nurse Education in Practice* with 40, *Nurse Education Today* with 25, *BMC Nursing* with 18, and *Nursing Reports* with 16 articles. This core also included *Simulation in Healthcare* with 14 publications, *Journal of Nursing Education* with 12, and *Advances in Simulation* with 11 articles. These results highlight the central role of nursing, education, and simulation journals in the development of the field.

In Zone 2, there was an increase in the number of journals, although with lower individual productivity. This zone included titles such as *BMJ Simulation and Technology Enhanced Learning*, *BMC Medical Education*, *Revista Brasileira de Enfermagem*, *Teaching and*

Learning in Nursing, Journal of Professional Nursing, and Frontiers in Medicine. This distribution indicates that, although there is a consolidated core of highly productive journals, the topic is also disseminated across journals in medical education, nursing, public health, and related fields.

Zone 3 showed a marked dispersion of production, comprising a large number of journals with only one or two publications each. This pattern demonstrates that the literature on simulation in health education is concentrated in a restricted group of highly productive journals, while simultaneously expanding across multiple scientific outlets, confirming the dispersion pattern described by Bradford's Law.

**Figure 2:** Distribution of journals according to Bradford's Law



**Source:** Prepared by the authors (2026).

Table 3 presents the comparison between the theoretical calculation and the empirical findings of journal distribution according to Bradford's Law. Scientific production was divided into three zones, each containing approximately one-third of the total of 539 analyzed articles.

In the theoretical calculation, a proportional distribution of journals across the zones was expected, with an exponential increase in the number of journals in each subsequent zone. However, the analysis of empirical data revealed discrepancies between the theoretical values and those observed, indicating that the journal distribution does not strictly follow the classical model proposed by Bradford's Law.

Zone 1 concentrated the most productive journals, with a smaller number of sources and a higher volume of publications, whereas Zones 2 and 3 showed a progressive increase in the number of journals, but with lower individual productivity. This pattern highlights the concentration of scientific production within a restricted core of journals, followed by a wide dispersion across subsequent zones.

**Table 3:** Theoretical calculation and empirical findings in Bradford's Zones

Zones	Total Articles (Theoretical)	No. of Journals (Theoretical)	Total Articles (Empirical)	No. of Journals (Empirical)	In Lir
1 <sup>a</sup>	180	8	184	8	Yes
2 <sup>a</sup>	180	48	176	49	Parci
3 <sup>a</sup>	180	168	179	167	Parci

⚠ Esta tabela possui muitas colunas e foi cortada para impressão. Para visualizá-la completa, acesse o artigo original em: <https://revistatopicos.com.br/artigos/analise-bibliometrica-da-producao-cientifica-sobre-simulacao-na-educacao-em-saude?noblockage>

**Source:** Prepared by the authors (2026).

Regarding the conceptual structure, based on the analysis of author keywords and the application of Zipf's Law, terms such as *simulation training*, *education*, *medical education*, *clinical competence*, *simulation-based education*, and *curriculum* were identified as the most frequent, highlighting the focus of scientific production on the use of simulation as a teaching strategy in health education.

In addition, terms related to the learning process and skill development were observed, including *learning*, *teaching*, *skill*, *knowledge*, *decision making*, *teamwork*, and *debriefing*, indicating the relevance of simulation in the acquisition of both technical and non-technical competencies.

In the context of nursing education, keywords such as *nursing education*, *nursing student*, *clinical simulation*, *patient simulation*, and *virtual reality* stand out, reinforcing the role of simulation as a central tool in nursing education.

Furthermore, terms such as *communication*, *interpersonal communication*, *COVID-19*, and *pandemic* highlight the presence of contemporary themes and the influence of clinical and social contexts on recent scientific production. Figure 3 illustrates the keyword co-occurrence network, revealing the organization of scientific production into interdependent thematic clusters.

**Figure 3:** Co-occurrence Network



publications (539 documents) demonstrates the relevance and timeliness of the topic within the scientific landscape.

Authorship analysis revealed a high participation of occasional authors, as most contributed only one document, as evidenced by Lotka's distribution. This behavior suggests that the field still exhibits author dispersion, with the absence of a consolidated core of highly productive researchers. This finding may indicate that the field is still undergoing consolidation or has an interdisciplinary nature, attracting researchers from different areas.

On the other hand, the average co-authorship (5.35 authors per document) and the percentage of international collaboration (19.67%) reveal a relevant collaborative pattern, consistent with what is observed in health-related fields, where scientific production tends to occur within research networks. However, international collaboration can still be considered moderate, suggesting potential for greater integration among research groups from different countries.

Geographic analysis showed a predominance of developed countries, especially the United States and European nations, reflecting the concentration of resources, infrastructure, and research tradition in these regions. However, the presence of Brazil among the most productive countries indicates the growing participation of emerging countries in the field, although still with relatively lower impact compared to global leaders.

Regarding institutions, there is a concentration of production in universities from developed countries, particularly those that demonstrated continuous growth throughout the analyzed period.

This pattern reinforces the existence of institutional hubs of scientific production and highlights the importance of structured research groups in consolidating knowledge in the field.

The application of Bradford's Law revealed the existence of a restricted core of highly productive journals, followed by a wide dispersion of publications across various journals, a pattern characteristic of scientific literature. However, the comparison between theoretical and empirical data showed that the distribution does not strictly follow the classical model, indicating behavior only partially aligned with the law, which is commonly observed in contemporary bibliometric studies.

Regarding the conceptual structure, keyword analysis revealed a strong concentration on terms related to education, simulation, and competency development, confirming the pedagogical nature of scientific production in this field. The presence of terms associated with non-technical skills, such as communication, decision-making, and teamwork, highlights the expansion of simulation beyond technical training, incorporating behavioral and cognitive dimensions.

Thus, the identification of interrelated thematic clusters demonstrates the multidimensional nature of the field, integrating education, clinical practice, and technological innovation, reinforcing the role of simulation as a central strategy in the training of healthcare professionals. Overall, the findings indicate that scientific production on simulation in health education shows recent growth, high levels of collaboration among authors, and broad dispersion across journals, characterizing a field in expansion, yet still undergoing structural and thematic consolidation.

## 4. CONCLUSION

The present study achieved its objective by analyzing scientific production on simulation in health education, allowing for the characterization of its evolution, distribution, key contributors, and thematic structure. The results demonstrate that the field holds contemporary relevance, with consistent scientific output, although marked by author dispersion and concentration in specific journals and countries.

The analyses confirm that scientific production is structured around a core of highly productive journals, as proposed by Bradford's Law, while also revealing a high participation of occasional authors, indicating that the field is still undergoing consolidation. Collaborative networks among researchers were also identified, although there remains potential for greater international integration.

From a theoretical perspective, the study contributes by highlighting the organization and dynamics of scientific production in simulation in health education, reinforcing its interdisciplinary nature and its consolidation as a relevant strategy in professional training. From a practical standpoint, the findings may support researchers and educators in identifying trends, gaps, and research opportunities, as well as guide the development of evidence-based educational practices.

As limitations, the use of a single database and the reliance on author-assigned keywords are noted, which may influence data retrieval and analysis. For future studies, it is recommended to expand the databases analyzed, include different time frames, and

conduct comparative analyses across health disciplines in order to deepen the understanding of the evolution and consolidation of simulation as an educational strategy.

## REFERENCES

CHONG, Jun Hua et al. COVID-19 and the digitalisation of cardiovascular training and education—a review of guiding themes for equitable and effective post-graduate telelearning. **Frontiers in cardiovascular medicine**, v. 8, p. 666119, 2021. Disponível em: <https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2021.666119/full>. Acesso em: 15 de janeiro de 2026.

GABA, David M. The future vision of simulation in health care. **BMJ quality & safety**, v. 13, n. suppl 1, p. i2-i10, 2004. Disponível em: [https://qualitysafety.bmj.com/content/13/suppl\\_1/i2.short](https://qualitysafety.bmj.com/content/13/suppl_1/i2.short). Acesso em: 15 de janeiro de 2026.

HAYES, Carolyn. Simulation: Smoothing the transition from undergraduate to new graduate. **Journal of Nursing Management**, v. 26, n. 5, p. 495-497, 2018. Disponível em: <https://onlinelibrary.wiley.com/doi/full/10.1111/jonm.12676>. Acesso em: 15 de janeiro de 2026.

ISSENBERG, S. et al. Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. **Medical teacher**, v. 27, n. 1, p. 10-28, 2005. Disponível em: <https://www.tandfonline.com/doi/abs/10.1080/01421590500046924>. Acesso em: 15 de janeiro de 2026.

KOLB, David A. **Experiential learning: Experience as the source of learning and development.** FT press, 2014. Disponível em: <https://cir.nii.ac.jp/crid/1570572700068800640>. Acesso em: 15 de janeiro de 2026.

MCGAGHIE, William C. et al. Does simulation-based medical education with deliberate practice yield better results than traditional clinical education? A meta-analytic comparative review of the evidence. **Academic medicine**, v. 86, n. 6, p. 706-711, 2011. Disponível em: <https://academic.oup.com/academicmedicine/article-abstract/86/6/706/8352665?login=false>. Acesso em: 15 de janeiro de 2026.

MOSTAFA, Shaimaa Khamis et al. Fostering collaborative practice: a pilot study on interprofessional education through simulation-based team-oriented learning sessions among pharmacy and medical students. **Discover Education**, v. 4, n. 1, p. 19, 2025. Disponível em: <https://link.springer.com/article/10.1007/s44217-025-00407-8>. Acesso em: 15 de janeiro de 2026.

MUHUMUZA, Albert et al. Understanding the barriers and enablers for postgraduate medical trainees becoming simulation educators: a qualitative study. **BMC medical education**, v. 23, n. 1, p. 28, 2023. Disponível em: <https://link.springer.com/article/10.1186/s12909-022-03995-3>. Acesso em: 15 de janeiro de 2026.

RECKER, Florian et al. Medical education in obstetrics and gynecology: A global update from 2025. **Acta Obstetricia et Gynecologica Scandinavica**, v. 105, n. 1, p. 166-175, 2026. Disponível em: <https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/aogs.70105>. Acesso em: 15 de janeiro de 2026.

SHARMA, K. Aparna et al. Blended teaching methodology of e-learning and simulation training in obstetrics and gynecology for undergraduate medical and nursing trainees. **Cureus**, v. 15, n. 6, 2023. Disponível em: [https://assets.cureus.com/uploads/original\\_article/pdf/150045/20230707-24673-1xiq74c.pdf](https://assets.cureus.com/uploads/original_article/pdf/150045/20230707-24673-1xiq74c.pdf). Acesso em: 15 de janeiro de 2026.

VELÁSQUEZ, Sadie Trammell et al. Interprofessional communication in medical simulation: findings from a scoping review and implications for academic medicine. **BMC medical education**, v. 22, n. 1, p. 204, 2022. Disponível em: <https://link.springer.com/article/10.1186/s12909-022-03226-9>. Acesso em: 15 de janeiro de 2026.

ZENG, Aiyong et al. Exploration and practice of Medical Simulation Center construction under the background of New Medical Sciences. **Frontiers in Public Health**, v. 13, p. 1619348, 2025. Disponível em: <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1619348/full>. Acesso em: 15 de janeiro de 2026.

ZHOU, Lu et al. Trends in patient safety education research for healthcare professional students over the past two decades: a bibliometric and content analysis. **Medical Education Online**, v. 29, n. 1, p. 2358610, 2024. Disponível em: <https://www.tandfonline.com/doi/full/10.1080/10872981.2024.2358610>. Acesso em: 15 de janeiro de 2026.

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