

# EDUCATIONAL TECHNOLOGIES IN NURSING EDUCATION: CHALLENGES AND CONTRIBUTIONS FROM THE PERSPECTIVE OF RESIDENTS

*Tecnologias educacionais na formação do enfermeiro: desafios e contribuições na perspectiva de residentes*

*Tecnologías educativas en la formación de enfermería: desafíos y contribuciones desde la perspectiva de los residentes*

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## ABSTRACT

The increasing incorporation of educational technologies has transformed nursing education, demanding new forms of pedagogical mediation. This study aimed to analyze educational technologies in nursing education, considering challenges and contributions from the perspective of residents, as well as identifying the most commonly used technologies in the training process. This is a qualitative investigation, with a phenomenological approach based on Creswell and guided by COREQ. Thirteen nursing residents from multiprofessional programs in the public system of a capital city in southern Brazil participated. Data were collected between March and May 2025 through focus groups and analyzed according to Bardin and Minayo. The results showed that the use of simulators, virtual reality, interactive quizzes, podcasts, and digital platforms are associated with increased engagement and active learning. However, challenges emerged such as unequal access, structural limitations, superficial use of tools, and weaknesses in teacher mediation. It is concluded that the formative potential of technologies depends on pedagogical planning and teacher qualification.

**Keywords:** Nursing. Health Education. Educational Technologies.

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## RESUMO

A crescente incorporação de tecnologias educacionais tem transformado o ensino da enfermagem, exigindo novas formas de mediação pedagógica. Este estudo objetivou analisar tecnologias educacionais na formação do enfermeiro, considerando desafios e contribuições na perspectiva de residentes, bem como identificar as mais empregadas no processo formativo. Trata-se de uma investigação qualitativa, com abordagem fenomenológica fundamentada em Creswell e orientada pela COREQ. Participaram treze residentes de enfermagem de programas multiprofissionais do sistema público de capital do sul do Brasil. Os dados foram coletados entre março e maio de 2025, por grupos focais, e analisados segundo Bardin e Minayo. Os resultados evidenciaram que o uso de simuladores, realidade virtual, quizzes interativos, podcasts e plataformas digitais estão associados ao aumento do engajamento e aprendizagem ativa. Entretanto, emergiram desafios como desigualdade de acesso, limitações estruturais, uso superficial das ferramentas e fragilidades na mediação docente. Conclui-se que o potencial formativo das tecnologias depende de planejamento pedagógico e qualificação docente.

**Palavras-chave:** Enfermagem. Educação em Saúde. Tecnologia Educacional.

## RESUMEN

La creciente incorporación de tecnologías educativas ha transformado la formación en enfermería, exigiendo nuevas formas de mediación pedagógica. Este estudio tuvo como objetivo analizar las tecnologías educativas en la formación en enfermería, considerando los desafíos y las contribuciones desde la perspectiva de los residentes, así como identificar las tecnologías más utilizadas en el proceso de formación. Se trata de una investigación cualitativa, con un enfoque fenomenológico basado en Creswell y guiado por COREQ. Participaron trece residentes de enfermería de programas multiprofesionales del sistema público de una capital del sur de Brasil. Los datos se recopilaban entre marzo y mayo de 2025 mediante grupos focales y se analizaron según Bardin y Minayo. Los resultados mostraron que el uso de simuladores, realidad virtual, cuestionarios interactivos, podcasts y plataformas digitales se asocia con una mayor participación y aprendizaje activo. Sin embargo, surgieron desafíos como el acceso desigual, las limitaciones estructurales, el uso superficial de las herramientas y las debilidades en la mediación docente. Se concluye que el potencial formativo de las tecnologías depende de la planificación pedagógica y la cualificación del profesorado.

**Palabras clave:** Enfermería. Educación para la Salud. Tecnología Educativa.

## INTRODUCTION

Nursing education predominantly takes place in bachelor's degree programs, focused on developing technical and care skills in human health care, including the execution of essential technological interventions for the restoration of patients' health<sup>1</sup>.

However, many of these professionals end up working as nursing school teachers without specific pedagogical training, relying largely on the experiences and knowledge gained throughout their careers in clinical practice<sup>1</sup>. In this context, it is observed that most teachers have exclusively a bachelor's degree, without a teaching qualification, which contributes to the reproduction of traditional teaching methods.

This reproduction manifests itself, above all, in the adoption of lecture-based classes centered on the teacher, focusing on the transmission of content, to the detriment of approaches that favor the active construction of knowledge. Such a scenario can weaken the teaching-learning process by limiting student participation and the development of critical thinking<sup>2</sup>.

Given these limitations, health education has undergone significant transformations, driven by the incorporation of educational technologies and digital resources. These tools are reshaping the ways in which knowledge is mediated, impacting both teaching practice and the learning process of students<sup>3</sup>.

In this context, educational technologies emerge as alternatives for pedagogical innovation, enabling the adoption of more interactive, collaborative, and student-centered methodologies. Furthermore, they contribute to overcoming traditional practices, promoting new ways of teaching and learning in nursing education<sup>4-5</sup>.

However, despite advances and incentives for the use of active methodologies and educational technologies, challenges to their implementation still persist, such as lack of knowledge, resistance from teachers, operational difficulties, and uncertainties regarding their effectiveness<sup>3</sup>.

Thus, considering the role of nurses as teachers in nursing education and the challenges related to the use of educational technologies, this study aims to evaluate and discuss the main challenges faced by these professionals in using these tools, as well as to identify and describe the educational learning technologies most applied in this context.

## METHOD

This is a qualitative investigation with a phenomenological approach, anchored in Creswell's guidelines and guided by the Consolidated Criteria for Reporting Qualitative Research (COREQ), with the implementation of focus groups composed of resident nurses working in multiprofessional health residency programs. The phenomenological approach was used as an interpretative framework to understand the meanings attributed by the participants to their experiences. For the organization and systematization of the statements, thematic content analysis proposed by Bardin<sup>6</sup> and Minayo<sup>7</sup>.

The content analysis of the transcripts allowed for the construction of the thematic core: the use of educational technologies and the observed effects of these strategies on student learning. The choice of the phenomenological approach is justified by the need to understand the subjective experiences and meanings constructed by the residents in relation to educational technologies. The use of focus groups facilitated interaction among participants, favoring the emergence of individual and collective perceptions about the phenomenon under investigation.

Initially, planning was carried out, in which a semi-structured script was developed containing guiding questions about the challenges and benefits related to the use of educational technologies in nursing education. Next, data collection took place, developed through focus groups with resident nurses, led by a moderator and accompanied by an observer responsible for supplementary records. Finally, treatment and analysis were carried out, a stage that involved the complete transcription of the speeches, the organization of the material into thematic categories, and its subsequent phenomenological interpretation, based on the contributions of Bardin<sup>6</sup> and Minayo<sup>7</sup>.

The sampling was intentional and non-probabilistic, comprising thirteen resident nurses, organized into two distinct focus group sessions to ensure the quality of interactions and preserve the depth of discussions. Seven residents participated in the first group, and six residents participated in the second. The invitation was extended in partnership with the residency program coordinators, and participation was voluntary, without any remuneration. The document was made available to the residents in advance so they could reflect consciously and voluntarily on their participation.

The study included nursing residents regularly enrolled in multi-professional residency programs of the Curitiba Municipal Health Department (MHD/Curitiba) who fully participated in the meetings and authorized the use of the recordings by signing the Informed Consent Form. Residents who, for personal reasons or incompatibility with the care and teaching demands of their routine, could not reconcile their participation in the focus groups, as well as those who, even when invited, chose not to participate in the research proposal, were excluded from the study.

The project was submitted to the Research Ethics Committee, under the Certificate of Presentation of Ethical Appraisal (CPEA) number 84551624.3.0000.5580, and was approved on November 28, 2024,

according to opinion number 7.254.795. Subsequently, it was submitted to the Research Ethics Committee of the Municipal Health Department of Curitiba (REC-MHD/CTBA), under the CPEA number 84551624.3.3001.0101, and approved on February 27, 2025, according to opinion number 7.415.749.

Data were collected between March and May 2025. Focus groups were held in two face-to-face meetings, each lasting approximately 90 minutes. The discussions were conducted using a semi-structured script that addressed: (a) the main educational technologies used in nursing education; (b) challenges faced in their implementation; (c) perceptions of their effects on the critical and pedagogical training of nurses. The sessions were audio and video recorded and subsequently transcribed in full. The study was conducted in teaching hospitals in Curitiba (PR), which maintain multi-professional health residency programs. These environments were considered suitable for analyzing the impact of educational technologies on the training of resident nurses.

The transcripts underwent thematic content analysis in three phases: pre-analysis, with a preliminary reading of the material; exploration, with identification of recording units and categorization; and treatment, inference, and interpretation of the results. The interpretive process was supported by a phenomenological approach, seeking to capture the meanings attributed by the residents to their experiences with educational technologies. To ensure methodological rigor and transparency, the recommendations of COREQ were followed, which cover aspects of study design, the conduct of focus groups, analysis, and presentation of results. This framework ensured the standardization of procedures and the quality of the scientific report.

## RESULTS

The results highlight the use of different educational technologies in the teaching-learning process in nursing, as shown in Table 1. The participants' statements (P = participant; R = resident) point to experiences related to the use of digital resources and active methodologies, highlighting aspects of interactivity, digital authorship, simulation of practice, and structural challenges in the training context.

Initially, participants reported experiences using simulation and interactivity technologies in the learning process. These resources appear associated with understanding content and relating to practical situations in healthcare: P3-R1: "we had super modern simulators ... this helped me a lot to understand the dynamics of care." P1-R2: "I did quizzes with QR Codes ... the students interacted the whole time." P5-R1: "sometimes the teacher wants to apply it, but the structure doesn't help. There's a lack of rooms, equipment..."

**Table 1** - Educational technologies used in nursing education: Lists the types of digital and educational technologies mapped in the transcripts, such as simulators, videos, digital platforms, etc.

| Educational Technology     | Frequency in speech | Usage category         | Unit of meaning (Representative speech)                                               | Critical interpretation                                             |
|----------------------------|---------------------|------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Realistic simulators       | 10                  | Safe practice          | "With the simulator, I understood the procedure before performing it on the patient." | They provide a controlled environment for error and learning.       |
| Educational videos         | 6                   | Content viewing        | "Watching the video beforehand helped me retain and understand it better."            | They help in retaining practical and theoretical content.           |
| Quiz with QR Code / Kahoot | 4                   | Interactive assessment | "I created a quiz using QR codes, and the class interacted the whole time."           | It motivates, measures learning, and encourages proactive behavior. |
| Canva / Genially / Padlet  | 5                   | Content creation       | "I created interactive material with Canva and shared it in the group."               | Develops technological skills and teacher authorship.               |

|                                              |   |                      |                                                                               |                                                            |
|----------------------------------------------|---|----------------------|-------------------------------------------------------------------------------|------------------------------------------------------------|
| Virtual Reality (VR)                         | 2 | Empathic simulation  | "It was scary and at the same time very real... you really feel it."          | It enhances immersion and ethical and emotional awareness. |
| Podcast and class recording                  | 3 | Self-study           | "I recorded a class and then used the podcast to review it."                  | It facilitates continuous and flexible learning.           |
| Institutional digital platform (AVA, Moodle) | 5 | Course organization  | "Sometimes the content was there, but it wasn't being used in the right way." | Useful tool, but requires a clear pedagogical strategy.    |
| Video conferencing tools                     | 3 | Synchronous teaching | "We had an online class via Meet, it was great to interact live."             | A valid resource when well-planned and mediated.           |

Source: Authors, 2025

## Theoretical Aspects of Educational Technologies

The discussions also highlight the use of digital applications and platforms as tools that promote active learning, allowing for greater student engagement with the content and providing immediate feedback on performance.

*[...] There was a class where we used an app to listen to heart sounds on our cell phones. It was very different from just reading it in the book. We listened and tried to identify the sounds. This helped me retain the content [...]* (P1-R2).

*[...] I like it when we use tools like Kahoot or Padlet. Besides making the class more dynamic, I can see what I know and what I need to review. It's like the technology gives me feedback right away [...]* (P4-R1).

*[...] During our residency, we created a podcast about women's health for a community outreach project. We recorded, edited, and shared it on social media. Technology was our ally in teaching and learning [...]* (P6-R2).

*[...] I used Canva to make an e-book about palliative care. It was a course assignment, but it turned out so well that we even used it as educational material in the unit. This showed me how technology can leave the classroom and go into practice [...]* (P2-R1).

*[...] I organized my study plan using Notion. I set goals, links, reminders. It was a way to track my learning and see where I was doing well or not [...]* (P3-R2).

Furthermore, participants mention the use of different digital tools in collaborative activities and experiences that simulate real care situations, contributing to the development of practical and reflective skills:

*[...] We used Genially to create a quiz about first aid. It was fun and helped to review the content. I had never used this tool before, but I learned by experimenting [...]* (P7-R1).

*[...] In an emergency class, we used virtual reality to simulate a call center scenario. This helped me better understand how to act in a stressful environment. The feeling was different from just watching a class [...]* (P2-R2).

*[...] We had to create an e-book with guidelines for family members of Alzheimer's patients. I did everything on my cell phone, including the layout. It was challenging, but seeing the finished and useful material was rewarding [...]* (P4-R2).

*[...] We used Jamboard to build a collective care plan. Each group added a part. I thought it was very good because it allowed us to see everyone's reasoning at the same time [...]* (P6-R2).

*[...] I participated in a workshop where we created videos simulating mental health care. The instructor gave us freedom and only provided guidance if we asked. I learned by editing, recording, and presenting [...]* (P3-R1).

In contrast, challenges related to the use of educational technologies are also reported, especially regarding access, infrastructure, and the pedagogical use of resources. The statements indicate limitations that can interfere with student participation and the effectiveness of the proposed activities.

*[...] During the pandemic, many students dropped out of their courses because they couldn't keep up with remote classes. There were people who shared their cell phones with their mothers or siblings. It's not just about having the device, it's about being able to use it [...]* (P2-R2).

*[...] Not everyone has good internet or a cell phone with enough space to download an app. It has happened that a teacher asked for an assignment on Moodle and a classmate couldn't access it. She had to ask someone else for help [...]* (P6-R2).

*[...] Sometimes, technology hinders more than it helps. There was a class where the professor wanted to use online quizzes, but the classroom Wi-Fi kept dropping out. It ended up causing stress and the class wasn't productive [...]* (P4-R1).

*[...] I've seen many teachers use technology just for the sake of using it. Like, they show a video and that's it. There's no discussion afterwards, no in-depth analysis. It remains superficial. I think it needs to have a purpose [...]* (P7-R1).

*[...] Cell phones can be useful, but without rules and purpose, they become a distraction. I've seen classes turn into chaos because everyone was messing with something different. When the teacher guides and involves the class, it works better [...]* (P5-R2).

Finally, the participants also point out the importance of teacher mediation in the use of educational technologies, highlighting the teacher's role in guiding activities and assigning pedagogical meaning to the tools used:

*[...] There was a teacher who organized a workshop with us, and we could choose the tools we were going to use. I used Canva, other people made videos. She followed everything from the beginning, guiding each step. It was a different experience because it wasn't just doing it for the sake of doing it [...]* (P3-R2).

*[...] In public policy class, we made a timeline using an app, but the professor helped us think about the important milestones, how to organize and present them. The tool was good, but the way he guided us made all the difference [...]* (P4-R1).

*[...] When the teacher explains the reason for the activity, shows what we need to develop with it, the class takes on a different meaning. There have been times when they just asked us to use tool X and that's it, without context. That doesn't work [...]* (P6-R2).

*[...] During the residency, we conducted an intervention with teenagers and used an interactive online game. But the teacher participated in the construction. He helped us think about the questions, the timing, how to conduct it. This made everything flow smoothly [...]* (P1-R2).

Overall, the results indicate the presence of diverse educational technologies in nursing education, accompanied by potential related to interactivity, authorship, and approximation to practice, as well as limitations associated with structural aspects, access, and pedagogical mediation in the formative context.

## DISCUSSION

The results show that the use of educational technologies in nursing education promotes engagement, active learning, and student protagonism, especially when associated with interactive and practical strategies, such as clinical simulation, production of digital content, and the use of collaborative tools. The experiences reported by the participants demonstrate that these technologies not only make teaching more dynamic but also expand the possibilities for constructing knowledge in a meaningful and contextualized<sup>2</sup>.

The use of realistic and virtual reality simulators stands out as a strategy aligned with experiential learning, as it allows students to experience situations close to clinical practice in controlled environments. This type of approach favors the development of technical and non-technical skills, allowing errors to occur without risk to the patient, which directly contributes to patient safety. Furthermore, these experiences allow for greater integration between theory and practice, an essential aspect in health education<sup>8</sup>.

International studies have shown similar results, indicating that the use of immersive technologies, such as virtual reality, is associated with improved theoretical knowledge, practical skills, and satisfaction among nursing students<sup>8</sup>.

In this sense, simulation-based teaching presents itself as a powerful tool in nursing education, as it allows for the repetition of procedures and the improvement of clinical reasoning and decision-making. When associated with appropriate pedagogical mediation, this resource contributes to the development of student autonomy<sup>1</sup>.

Furthermore, the use of *quizzes, podcasts, videos, and digital platforms demonstrates the incorporation of active methodologies in teaching, in which students cease to assume a passive position and begin to act as protagonists in the construction of knowledge*. The production of content reveals a movement of authorship and active participation in the educational process<sup>3</sup>.

This dynamic fosters the collaborative construction of knowledge, with interaction among participants and exchange of experiences. In this way, educational technologies act as mediators of the learning process, expanding the dialogue between students and teachers<sup>9</sup>.

However, the results also highlight challenges related to unequal access and structural limitations, which directly impact the effectiveness of technology use in education. Digital exclusion appears both in the absence of devices and in difficulties accessing the internet<sup>10</sup>.

The participants comments indicate difficulties in following activities due to technical limitations and institutional infrastructure problems, such as connection failures and lack of adequate equipment. These aspects demonstrate that the integration of technologies depends on adequate structural conditions<sup>11</sup>.

In line with these findings, international qualitative research indicates that students perceive the use of educational technologies as facilitating learning and engagement, although they also point to limitations related to infrastructure<sup>12</sup>.

In addition to structural issues, challenges related to pedagogical mediation and the uncritical use of technologies stand out. In some cases, digital resources are used without a clear pedagogical intent, which compromises their formative potential<sup>13</sup>.

In this context, pedagogical mediation assumes a central role, being fundamental to ensuring that digital resources are used in a way that aligns with learning objectives<sup>13</sup>. Thus, teacher training emerges as an essential element for the critical integration of educational technologies, going beyond technical mastery and involving a pedagogical understanding of their use<sup>13-14</sup>.

From a broader perspective, the results align with the idea that learning occurs through interactions between individuals, technologies, and contexts, highlighting the active role of technologies in knowledge construction<sup>15</sup>.

Furthermore, the continued use of digital platforms and mobile devices indicates a reconfiguration of educational processes, in which learning goes beyond the limits of the classroom<sup>16</sup>. These aspects demonstrate that the incorporation of educational technologies is embedded in a broader context of the transformation of digital society, requiring a critical approach to their uses and implications<sup>17</sup>.

Thus, the findings reinforce that the use of educational technologies in nursing education should be guided by clear pedagogical principles and supported by qualified mediation<sup>18</sup>.

## CONCLUSIONS

It is concluded that educational technologies, when intentionally integrated and critically mediated, have the potential to enhance the training of resident nurses by promoting active learning, engagement, and digital authorship. In this study, resources such as realistic simulators, interactive *quizzes*, virtual reality, *podcasts*, and virtual environments were described as strategies that contribute to the understanding of practical content, student protagonism, and the connection between teaching and care.

However, the findings also point to limitations related to structural aspects, such as unequal access, insufficient connectivity, infrastructure limitations, and heterogeneous teacher training, in addition to indicating risks associated with the superficial or poorly articulated use of technologies in the teaching-learning process. In this sense, technology is not a solution in itself, depending on its articulation with pedagogical objectives and qualified teacher mediation.

In light of the study's objective, the results reinforce that the use of educational technologies in nursing residency programs is associated with both potential and challenges, highlighting the need to integrate these tools into pedagogical planning and training practices. Therefore, the incorporation of technologies in health education should consider not only the available resources, but also the conditions of use and the meanings attributed by teachers and residents in the training context.

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