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SECTION: ARTICLES

Reflections on educational technologies in higher education in Nursing[1]

Reflexões sobre tecnologias educacionais no ensino superior de Enfermagem

Reflexiones sobre las tecnologías educativas en la educación superior en Enfermería

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ABSTRACT

This integrative literature review aimed to understand which educational technologies have been used in higher Nursing education. After analyzing the sample consisting of 17 articles, it was observed that the most used educational technologies in higher Nursing education were realistic simulations, in the form of face-to-face teaching. In relation to distance learning and hybrid teaching, the use of digital educational technologies such as videos and educational games was identified more frequently in the articles of this study. However, an important aspect highlighted by the study is the fact that digital educational technologies, in distance and hybrid learning modalities, are important in higher Nursing education, if they are used to

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complement field activities and help in problematizing issues practical situations experienced by students in academic activities carried out in face-to-face clinical teaching.

Keywords: nursing education; university education; educational technology; teaching method; nursing.

RESUMO

Esta revisão integrativa da literatura teve como objetivo conhecer quais tecnologias educacionais têm sido utilizadas na educação superior de Enfermagem. Após a análise da amostra constituída por 17 artigos, observou-se que as tecnologias educacionais mais utilizadas no ensino superior de Enfermagem foram as simulações realísticas, na modalidade de ensino presencial. Em relação ao ensino a distância e ao ensino híbrido, foi identificada nos artigos deste estudo, com maior frequência, a utilização das tecnologias educacionais digitais, como os vídeos e os jogos educativos. Contudo, um aspecto importante apontado pelo estudo é o fato de que as tecnologias educacionais digitais, nas modalidades de ensino a distância e híbrido, são importantes no ensino superior de Enfermagem, desde que sejam utilizadas para complementar as atividades de campo e ajudar na problematização das situações práticas vivenciadas pelos alunos nas atividades acadêmicas desenvolvidas no ensino clínico presencial.

Palavras-chave: educação em enfermagem; educação superior; tecnologia educacional; método de ensino; enfermagem.

RESUMEN

Esta revisión integradora de la literatura tuvo como objetivo comprender qué tecnologías educativas se han utilizado en la educación superior de Enfermería. Después del análisis de la muestra compuesta por 17 artículos, se observó que las tecnologías educativas más utilizadas en la educación superior de Enfermería fueron simulaciones realistas, en la modalidad de enseñanza presencial. En relación a la educación a distancia y la enseñanza híbrida, el uso de tecnologías educativas digitales como videos y juegos educativos fue identificado con mayor frecuencia en los artículos de este estudio. Sin embargo, un aspecto importante resaltado por el estudio es el hecho de que las tecnologías educativas digitales, en modalidades de aprendizaje a distancia e híbridas, son importantes en la educación superior en Enfermería, siempre y cuando se utilicen para complementar las actividades de campo y ayudar en la problematización de situaciones prácticas vividas por los estudiantes en actividades académicas realizadas en la docencia clínica presencial.

Palabras clave: educación en enfermería; educación superior; tecnologia educacional; método de enseñanza; enfermería.

INTRODUCTION

In August 2020, the Dean of Undergraduate Studies (PROGRAD) of the Federal University of Minas Gerais (UFMG) published an Internal Call 01/2020, to select projects for the Undergraduate Education Development Program (PDEG). Thus, the coordinators of the Undergraduate Collegiate (COLGRAD) and members of the Structuring Teaching Nucleus (NDE) of the Nursing course, prepared a proposal to meet the conditions required by the Call. This proposal, entitled "Development of evaluation processes and support for integrative actions in the training of nurses at EEUFMG in times of Emergency Remote Teaching", was considered and obtained successful results (UFMG, 2020).

From the same perspective, in 2021, there was an Internal Call 02/2021, a continuation of the previous project being submitted, this time under the title "Incorporation of technological, pedagogical and integrative innovations in the training of nurses at EEUFMG", which was also awarded scholarships and concluded in July 2023 (UFMG, 2021).

It is worth highlighting that such Calls came at a unique moment in current history, in which the world was suffering the consequences of the COVID-19 pandemic and in which major challenges were imposed on various areas of human and social life, with diverse impacts, including in teaching. In the specific case of the undergraduate Nursing course, we had to deal not only with all the preparation for carrying out Emergency Remote Teaching (ERE) and Emergency Hybrid Teaching (EHE), but above all with the suspension of clinical teaching and internships developed in health services. However, in addition to the difficult movements, there was an intense and deep need for evaluation of the teaching processes of the Nursing course, in which the PDEG was and continues to be fundamental.

Initially, PDEG's actions focused on teaching evaluation, through analysis of teaching plans and focus groups with graduating students. A generic analysis was also made of student permanence and dropouts in the period before and during the pandemic, comparing the occurrences. Subsequently, the current PDEG project for the Nursing course has been evaluating teaching methodologies and technologies that are most appropriate for the training of nurses.

Furthermore, it is known that since the beginning of the 21st century there has been a growing interest in ways of teaching that use methodologies and technologies that bring possibilities for interventions, breaking paradigms, and a pedagogical praxis capable of changing traditional teachings (RAPOSO NETO; SILVA; CERQUEIRA, 2021, p. 258). In this sense, educational methodologies or technologies are characterized as devices that facilitate the teaching and learning process (ÁFIO *et al*., 2014). To this end, educational practices are required that challenge and encourage students to be protagonists of their learning,

proposing activities that allow their autonomy in the training process, representing the core of so-called active teaching methodologies (FIALHO; MACHADO, 2017; ZWICKER, 2017).

Therefore, it is important that pedagogical strategies different from the traditional teaching model are used in higher Nursing education, as this model has been shown to be insufficient to train nurses with clinical reasoning and practices based on scientific evidence (AYED *et al*., 2022). At the same time, the use of new teaching technologies has been associated with active methodologies, contributing to efficiently preparing Nursing students for clinical practice (SVELLINGEN *et al*., 2021), reducing errors, ensuring patient safety (OZ; ORDU, 2021) and increase students' confidence when carrying out procedures and making decisions (AYED *et al*., 2022).

According to Barbosa *et al*. (2021), active methodologies present some fundamental characteristics that are based on the centrality and autonomy of the student; in the figure of the teacher as "mediator, facilitator and activator of the desired skills and competencies"; in problematizing real situations; in encouraging reflection; and in collective work (BARBOSA *et al*., 2021, p. 102). In this sense, higher education in the health area is undergoing significant transformations to align with the concepts that guide the training of professionals.

In the specific case of Nursing training, it is essential that, in addition to theoretical knowledge, students develop practical skills and dexterity to carry out activities inherent to the profession, as well as acquire a comprehensive view of the field of activity (GUIMARÃES; MENDES; FIGUEIREDO, 2021). Therefore, it is known how important it is to use new educational technologies aimed at the progressive construction of knowledge and the formation of autonomous, critical students capable of developing their potential (KRISTENSEN, 2021, p. 101).

However, in implementing new teaching technologies, there are difficulties, such as the demand for work and time for the professor to work on the content through interactive processes, research, and various activities, to streamline classes and make learning more efficient (SANTOS, 2021). It should be added that, as Moran (2019) says:

> The physical environment of the classrooms and the school as a whole also needs to be redesigned within this new, more active, student-centered conception. Classrooms should be more multifunctional and allow for the combination of group, plenary and individual activities. Environments need to be connected to wireless networks, to use mobile technologies, which implies having a bandwidth that supports the necessary simultaneous connections (MORAN, 2019, p. 19).

In addition to these complex challenges, it is added that educational systems present countless other difficulties in keeping up with the changes that occur in health services,

highlighting the slowness in carrying out curriculum reviews, which are sometimes fragmented, static and outdated (FRENK *et al*., 2010). Therefore, in line with the PDEG project for the year 2021, and to support reflections and debates on the use of new teaching technologies in the Nursing course at the Federal University of Minas Gerais (UFMG), initially, it became necessary to carrying out a literature review, with the aim of identifying which educational technologies have been used in higher Nursing education. There is no doubt that the results of this study will contribute to debates and reflections on the training of nurses and in proposing new teaching approaches for higher education Nursing courses.

METHODOLOGY

The present study, classified as an integrative literature review, sought to answer the following question: "What educational technologies have been used in higher Nursing education?". As a likely hypothesis, it was thought that, in the training of nurses, the educational technologies used in the face-to-face teaching methodology would be predominant. In this sense, the following steps were considered: Identification of the topic and elaboration of the research question; searching databases and establishing inclusion and exclusion criteria; categorization of studies and information to be extracted; evaluation of selected articles; interpretation of results; and review synthesis (SOUSA, L. *et al*., 2017).

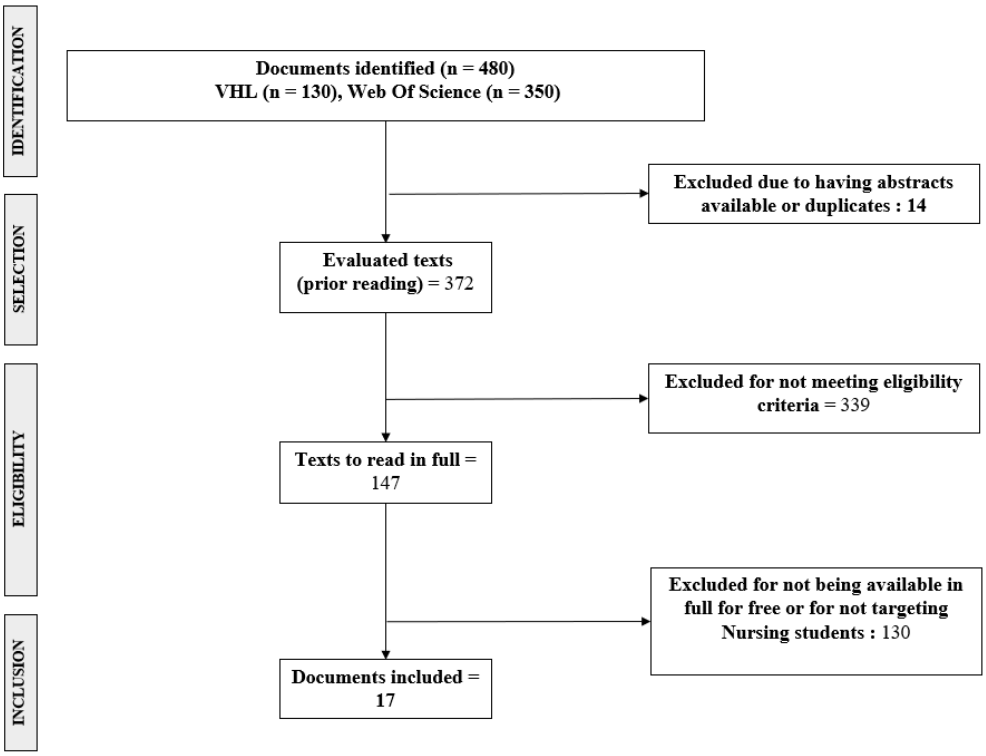
For data collection, searches were carried out in the literature, using the Web of Science and Virtual Health Library (VHL) databases. The descriptors used in the search were selected from the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH), namely: "educação em enfermagem" ["nursing education"], "ensino superior" ["higher education"], "tecnologia educacional" ["educational technology"]. The inclusion criteria included the selection of articles obtained in research carried out with primary data, which addressed the topic under study, with the descriptors and their variations in Portuguese, English and Spanish, available online, in full and free of charge, published in period from 2012 to 2022, which targeted undergraduate Nursing students. Furthermore, duplicate articles were excluded, in addition to studies that did not show incentives for Nursing students to take a leading role.

This integrative review was guided by the PRISMA (Reporting Items for Systematic Reviews and Meta-Analyses – PRISMA) guidelines (GALVÃO; PANSANI; HARRAD, 2015). Following the inclusion criteria, as described in the flowchart below (FIGURE 1), 480 articles were initially found. After reading the title and abstract, works that were not related to the research topic were excluded. Therefore, 147 publications were selected to be read in full, of which 130 were excluded, with the final sample being 17 articles.

In summary, articles that did not deal with the topic of teaching technologies used in higher Nursing education, duplicate articles, articles that did not show encouragement for the

protagonism of Nursing students and articles in other languages that were not available online, in full and free.

Figure 1 – Flowchart of the process of identification, selection and inclusion of articles adapted from PRISMA



Source: The authors, 2023.

To evaluate the selected articles, the most relevant information about each article was compiled, such as: Identification of the original article; objective of the study; type of methodology; number of participating students; teaching modalities and educational technologies used. It should be added that, for this analysis, the articles were categorized and compared according to the teaching modality, whether face-to-face or distance learning, the type of teaching methodology and/or educational technology used (TABLE 1). It is worth adding that the studies were evaluated and reevaluated individually by all authors.

RESULTS

It was decided to present the articles in a synoptic table (TABLE 1), identifying them in the first column with the letter A plus Arabic numerals. It was observed that, of the 17 articles analyzed, the majority - 10 studies (58.82%) - were carried out in Brazil and published in Portuguese. The remainder (41.18%), published in English, originate from other countries, such as Turkey, Egypt, USA, Ireland, Australia, Saudi Arabia, and China. The total number of students participating in the studies was 1,150, with one article (A1) only reporting the division into 5 groups and did not define the total number of participating students.

Regarding the level of evidence, 100% of the articles included in the sample were carried out with primary data. Of these, 7 articles (41.20%) were classified by the authors as quasi-experimental studies, 4 (23.50%) as experimental studies and 06 (35.30%) as descriptive studies with a qualitative approach.

Regarding the teaching modality used in the studies, it was found that 8 articles (47%) refer to face-to-face teaching (A3, A5, A7, A8, A9, A12, A15, A16); 7 articles (41%) on distance learning (A1, A4, A6, A11, A13, A14, A17); and 2 articles (12%) on hybrid teaching. It should be added that of the 8 studies carried out in the face-to-face teaching modality, 6 (75%) used realistic simulation as a teaching technology and 2 (25%) were anchored in problematization and theoretical-practical integration. In relation to the 7 studies carried out in the distance learning modality in virtual learning environments (VLE), the authors combined interactive games, video classes, reusable learning objects (RLOs), parodies, gymkhana, etc.

Regarding the 2 studies (A2 and A10) carried out in the hybrid teaching modality, that is, combining distance learning activities with face-to-face activities, one of them was carried out developing an activity in a virtual learning environment associated with the face-to-face activity in the classroom and another combined activity in a virtual learning environment with practical activity in health services.

Quadro 1 – Caracterização geral dos estudos analisados.

Articles	Year of Publication / Country	Title	Type of Study / Approach	Objective	Teaching Modality / Number of participants	Educational Technologies
A1	2022/ Brazil	Planning and development of creative activities in distance learning about eye health: an experience report (HONORATO *et al*., 2022)	Descriptive study/ Qualitative	Describe the planning and development of creative activities in distance learning about eye health.	Distance learning / 5 groups	Virtual learning environments and objects
A2	2021/ China	Online courses combined with face-to-face activities versus classroom teaching methods for the Nursing course (CAO *et al*., 2021)	Descriptive study/ Quatitative	Examine the effects of mass hybrid online course-based learning versus in-person classroom teaching methods on test scores, critical thinking skills, and feedback from third-year undergraduate Nursing students.	Hybrid teaching / 181	Video classes with face-to-face discussions
A3	2021/ Brazil	Effectiveness of the Maguerez Arc in Nursing teaching about bladder catheterization (SOUSA, J. *et al*., 2021)	Descriptive study/ Quatitative	Evaluate the effectiveness of the Maguerez Arc in teaching Nursing students about indwelling bladder catheters.	Face-to-face teaching / 29	Problematization methodology
A4	2021/ Brazil	Students' knowledge about intestinal ostomies before and after educational intervention on an online platform (CAMPOOS *et al*., 2021)	Quasi-experimental study/ Quantitative	Evaluate the knowledge of undergraduate Nursing students about intestinal elimination stoma before and after educational intervention on an online platform.	Distance learning / 197	Technology and online platforms
A5	2021/ Brazil	Active methodologies in peripheral venous catheterization: development of skills with a low-cost simulator (CANEVER *et al*., 2021)	Descriptive study/ Qualitative	Understand the perception of Nursing students about the contribution of using a low-cost simulator in the development of technical skills for peripheral venous catheterization.	Face-to-face teaching / 25	Low-cost realistic simulation
A6	2021/ Saudi Arabia	Using computer-based scenarios for clinical teaching: impact on Nursing students' decision-making skills (ELCOKANY *et al*., 2021)	Quasi-experimental study/ Quantitative	Investigate and evaluate the impact of computer-based scenarios on the decision-making skills of undergraduate Nursing students.	Distance learning / 112	Technology and online platforms

Articles	Year of Publication / Country	Title	Type of Study / Approach	Objective	Teaching Modality / Number of participants	Educational Technologies
A7	2020/ Brazil	Realistic simulation in Nursing consultations aimed at elderly people (RAIOL *et al*., 2021)	Descriptive study/ Qualitative	Report the experience of Nursing students in carrying out a realistic simulation of Nursing consultations aimed at elderly people, using clinical cases.	Face-to-face teaching / 15	High fidelity simulation
A8	2019/ Brazil	Multi-victim incident simulation: training professionals and teaching university students (LIMA *et al*., 2019)	Quasi-experimental study/ Quantitative	Describe a teaching strategy based on the simulation of an incident involving multiple victims, discussing, and evaluating the performance of students involved in initial care for trauma victims.	Face-to-face teaching / 56	Realistic simulation
A9	2019/ Turkey	Using high-fidelity to low-fidelity simulation in teaching safe medication practices (ONTURK *et al*., 2019)	Quasi-experimental study/ Quantitative	Evaluate the effects of simulation techniques on learning outcomes in teaching safe medication applications to first-year Nursing students.	Distance learning / 58	Low, medium, and high-fidelity simulations
A10	2018/ United States of America	Training students to assess feeding safety of premature infants using a videotaped patient simulation approach (FERGUSON; ESTIS, 2018)	Quasi-experimental study/ Quantitative	Determine whether brief videotaped patient simulation training increases students' ability to assess feeding skills in premature infants.	Hybrid teaching / 52	Realistic simulation
A11	2018/ Ireland	Using Reusable Learning Objects (RLOs) in wound care education: undergraduate Nursing students' assessment of their learning gain (REDMOND *et al*., 2018)	Experimental study/ Quantitative	Evaluate the media attributes of Reusable Learning Objects (RLOs) to identify Nursing learning enablers.	Distance learning / 192	Online videos
A12	2017/ Australia	Using simulation to improve the capacity of undergraduate Nursing students in mental health care (KUNST; MITCHELL; JOHNSTON, 2017)	Quasi-experimental study/ Quantitative	Determine whether simulation scenarios are an effective learning format for improving Nursing students' confidence, knowledge, and ability to manage mental health issues in the acute care setting and determine whether these benefits can translate into improved capacity in clinical practice.	Face-to-face teaching / 44	Realistic simulation

Articles	Year of Publication / Country	Title	Type of Study / Approach	Objective	Teaching Modality / Number of participants	Educational Technologies
A13	2016/ Brazil	Role Playing Game (RPG) na graduação em Enfermagem: potencialidades pedagógicas (SOARES *et al*., 2016)	Descriptive study/ Qualitative	Evaluate the potential of an RPG game as a pedagogical strategy in undergraduate Nursing, with an emphasis on its subjective implications in understanding aspects of the profession.	Distance learning / 32	Digital technologies
A14	2016/ Brazil	Moodle platform for building knowledge in intensive care (DOMENICO; COHRS, 2016)	Experimental study/ Quantitative	Understand students' perception regarding the use of Moodle associated with teaching hospital practice in an intensive care unit for the construction of knowledge.	Distance learning / 34	Virtual learning environments and objects
A15	2016/ Turkey	Communicative dynamics: evaluation of educational technology about drugs with university Nursing students (SABÓIA *et al*., 2016)	Descriptive study/ Qualitative	Analyze the results of the assessment of Nursing students regarding educational technology called communicative dynamics about the risks of drug use.	Face-to-face teaching / 31	Commuicative dynamics
A16	2015/ Brazil	Simulation training for Nursing students in lung and heart auscultation (ARSLAN *et al*., 2015)	Quasi-experimental study/ Quantitative	Evaluate the effects of simulation training in Nursing students on lung and heart auscultation skills.	Face-to-face teaching / 70	Realistic simulation
A17	2015/ Brazil	Virtual learning object about diagnostic reasoning in Nursing applied to the integumentary system (COSTA; LUZ, 2015)	Descriptive study/ Qualitative	Describe the development of a virtual learning object about diagnostic reasoning in Nursing applied to the integumentary system at a public university in Piauí.	Distance learning / 21	Virtual learning environments and objects

Source: The authors, 2023.

DISCUSSION

Aiming to deepen reflections, it was decided to highlight, from the articles included in the sample, content that shows the contribution of educational technologies used, in different teaching modalities, to the teaching-learning process of higher education Nursing students. It is important to emphasize that this option does not exclude a critical view of the findings, which will be explained in the final considerations of this article.

Thus, as previously stated, regarding the studies carried out in the face-to-face teaching modality, it was observed that the majority used realistic simulation as a teaching technology, as can be seen in A5. Canever *et al*. (2021) discuss low-cost realistic simulation that, in addition to static dummies, uses other resources produced with simple materials, such as paper, latex and cardboard. For these authors:

> The use of a low-cost simulator allowed the identification of errors and the possibility of carrying out the procedure in a controlled situation before performing it on the patient. The students pointed out as difficulties, among others, the distance of the technique, when compared to a real situation, as well as the impossibility of training relational skills, such as communication (CANEVER *et al*., 2021, p. 4-5).

In A7, unlike the low-cost simulation, Raiol *et al*. (2020) address high-fidelity simulation, in the field of elderly health, with third-year undergraduate Nursing students and reinforce that:

> The realistic simulation brings reality closer to an interactive environment and encourages the student to reflect on their theoretically acquired knowledge and represents a great tool that favors learning and effectively acquires knowledge, increasing the student's self-confidence, in addition to being a strategy promising teaching method for the development of clinical practice (RAIOL *et al*., 2020, p. 3-4).

In A8, Lima *et al*. (2019) approach realistic simulation with Nursing and Medicine students together with the Emergency Mobile Care Service (SAMU) team, Fire Department and Public Security team, helping multiple victims of a simulated collision between a bus and a car and conclude that:

> The simulated environment consisted of an enriching experience that enabled the exercise of work in a multidisciplinary healthcare team and reminded those involved of the need for greater training and early insertion, even during graduation, of situations such as the simulated one, to guarantee excellence in the teaching and service (LIMA *et al*., 2019, p. 7).

Onturk *et al*. (2019), in A9, include first-year undergraduate Nursing students in their studies. In this study there is a new perspective, as academics will have contact with low, medium, and high-fidelity simulations.

Initially, the academics had reviewed theoretical content, and it was noticed that the simulation had a positive effect on learning results, but mainly in relation to the theoretical classes carried out before the simulation. They considered case studies and task trainers as low fidelity (like A5), non-interactive online simulators as medium fidelity, and standardized patients (simulated) and high-level controlled and interactive simulators (online) as high fidelity. Onturk et al. (2019) report that:

> Student satisfaction with the simulation activity was assessed as high, promoting a greater level of permanence, continuity of learning and increased motivation, making students feel confident, which positively affects the level of satisfaction with the simulation experience. (ONTURK *et al*., 2019, p. 198-199).

In A12, Kunst, Mitchell and Johnston (2017) describe the simulation in mental health care involving third-year Nursing students, with them stating that:

> Participation in the simulation allowed students to integrate a range of skills into their practice, including communication, focused assessment and patient listening, as well as enabling the development of expertise in a low-risk environment (KUNST; MITCHELL; JOHNSTON, 2017).

However, in study A16, developed by Arslan *et al*. (2015), the authors concluded that:

> The development of heart and lung auscultation in simulated practice resulted in improved assessment of heart and lung sounds, but this improvement was not significantly better than that observed after training with traditional methods. Thus, the results of this study showed that simulation was as effective as traditional methods in cognitive gains, skill development and self-confidence assessments (ARSLAN *et al*., 2015, p. 257).

Furthermore, J. Sousa *et al*. (2021), in A3, address the use, in face-to-face teaching, of the problematization methodology through the Maguerez Arc, seeking to expand interaction and exchange of knowledge between students and teachers. The authors report that the findings of this study allowed us to infer that there was an improvement in the knowledge and skills of students after the educational intervention (SOUSA, J. *et al*., 2021, p. 10).

In this sense, the authors of A15, Sabóia *et al*., (2016), sought to expose communicative dynamics as a form of interaction and critical-analytical survey among Nursing students, in the first and last year of their undergraduate studies, on the risk of use of drugs. In view of the findings, Sabóia *et al*. (2016) state that:

> Nursing in the university context, the use of interactive materials in line with the principles of educational technology seems to enable the triggering of a questioning and participatory cognitive process, which can facilitate the teaching-learning process and still be enjoyable, interesting, and challenging. The evaluation showed that Communicative Dynamics enabled the opening

> of a transversal and democratic space for problematization and construction of knowledge (SABÓIA *et al*., 2016, p. 5).

From this point on, referring to studies carried out in the distance learning modality, in A1, Honorato *et al*. (2022) discuss the use of teaching technologies, such as parodies, video classes, scavenger hunts and quizzes, with students in the 5th period of the Nursing course. According to the authors, these activities proved to be coherent with active teaching and learning methodologies and contributed to the development of students' autonomy and other skills necessary for their future professional performance (HONORATO *et al*., 2022, p. 14).

Anchored in the use of an online educational platform on Moodle with Nursing students in the last two years of their undergraduate studies, Campos *et al*. (2021) state, in A4, that:

> The importance of using online educational platforms in the teaching-learning process became very evident with the 2020 pandemic. However, it is necessary to apply evidence-based tools capable of promoting student engagement with learning and completing online educational programs. In this sense, the dropout percentage observed among undergraduate Nursing students participating in the intervention reinforces the need to implement strategies that promote adherence to these technologies, while simultaneously offering face-to-face activities (CAMPOS *et al*., 2021, p. 4 -5).

The use of technology and online platforms can also be seen in A6, carried out by Elcokany *et al*. (2021). For these authors:

> Computer software has improved understanding of a nurse's future professional role. The software improved the ability to link concepts and principles from Nursing and other sciences in decision making. This included 'critical life' scenarios and conflict management (ELCOKANY *et al*., 2021, p. 8-9).

In A11, Redmond *et al*. (2018) discuss the use of Reusable Learning Objects (RLOs) with third-year undergraduate Nursing students. These objects relate to digital teaching, through online videos aimed at chronic wound care. The results showed improvement in performance, learning and critical reflection. In the words of the authors:

> Although evidence that the use of RLOs promotes deep learning is currently scarce, students in this study reported that the use of RLOs helped with both knowledge gain and retention of difficult-to-grasp material (REDMOND *et al*., 2018, p. 15-17).

Still on the use of digital technologies, in A13, Soares *et al*. (2016) discuss the use of games such as Role Playing Game (RPG) with second-year Nursing students, concluding that:

> Thinking about the game as an opportunity to exercise skills is to think about its contribution to the social agencies that define the codes of the profession. However, it is also necessary to think about the possibility of the player

> building local agencies, in which the subject introduces himself into the game, inserts his singularity and elaborates his own agencies. In the exercise of active participation in the RPG, players were able to reflect on themselves (self-reflection) and on their future role as a nurse (SOARES *et al*., 2016, p. 7-8).

In A14, Domenico and Cohrs (2016) reaffirm that:

> The association of a virtual learning environment (VLE) with hospital practice enabled the acquisition of new knowledge, as well as favoring clinical decision-making in patient care, as demonstrated in the category "Moodle favors the acquisition of new knowledge, skills and decision making." Carrying out activities that simulate Nursing care for patients in a virtual and, therefore, safe environment, allowed the student to anticipate the learning experience of caring for patients in a real situation. Taking advantage of the digital skills of the current generation of young people to sophisticate the teaching and learning process, as well as favoring quality health care policies, has been a trend not only in educational institutions with teaching hospitals, but also in institutions exclusively hospitals (DOMENICO; COHRS, 2016, p. 386-387).

Addressing virtual learning objects, Costa and Luz (2015) showed, in A17, that:

> The process of developing Virtual Learning Objects, based on problematizing education, enabled learning to have individual repercussions by giving importance to systematic observation, analysis, evaluation, association of ideas, extrapolation of the content covered and practical utility and collective repercussions by providing the student engagement, the collective construction of knowledge and sharing of knowledge and experiences culminating in a new way of thinking and doing. This educational instrument assists in the formulation of Nursing diagnostic reasoning, an essential practice that should guide the exercise of the Nursing profession, as it is seen as a cognitive process that goes beyond the technical dimension of knowledge and is fundamental for the formulation of effective Nursing diagnoses which reflect the affected needs of the patient (COSTA; LUZ, 2015, p. 6-7).

In A2, Cao *et al*. (2021), when analyzing the difference between students undergoing traditional face-to-face teaching and students undergoing hybrid teaching, with intensive video classes and face-to-face discussions, concluded that:

> Hybrid teaching strategies based on online courses combined with face-to-face activities are associated with significantly improved final grades, specifically in terms of operational performance and theoretical achievements, while daily performance in the hybrid teaching group based only on online courses was lower than that of the group of face-to-face teaching (CAO *et al*., 2021, p. 4).

Finally, the use of realistic simulation in video format, studied by Ferguson and Estis (2018), in A10, with third- and fourth-year Nursing students, associated with clinical practices, made it possible to conclude that:

> Online video simulation has proven to be a viable approach for teaching students to use information about the development of preterm infants' subsystems in the extrauterine environment and commonly recognized warning signs to make accurate clinical judgments. After this brief video simulation, students quickly learned to recognize and document subtle changes in children's behavior. Educators seeking to introduce beginning students to the feeding behaviors of premature infants, prior to access to human infants, may benefit from using this video simulation training approach (FERGUSON; ESTIS, 2018, p. 6-7).

In view of the above, some teaching technologies used in the articles of this literature review cannot be considered active teaching and learning methodologies, as they do not promote the development of student protagonism and autonomy (FIALHO; MACHADO, 2017; ZWICKER, 2017). As seen in the sample studies (A2, A4, A10, A11, A14, A17), despite reporting the use of new teaching technologies, especially digital technologies, the student's active participation in this use is not mentioned.

However, in a recent study, Canever *et al*. (2021) say that:

> When active participation was promoted in the use of digital technologies such as videos and games, the significant contribution to the student's knowledge, autonomy and protagonism became evident. As explained, these methodologies allow the student to make mistakes, clarify doubts, express their critical reflections that, in the assistance environment, there would be no space for. Thus, it allows students to increase their confidence, knowledge and confidence in professional practice and performance (CANEVER *et al*., 2021, p. 6-7).

From the perspective of maintaining the protagonism of students, it is observed that, whether in the virtual learning environment in the distance learning modality, or face-to-face one, the use of problematization generated beneficial results, mainly related to the theoretical discussions carried out before the practical application. Therefore, for Onturk *et al*. (2019) it is important to add to traditional teaching methods that instigate reflection, discussions and elaborations that enable the student for the practical professional field. Furthermore, it is important that the experience of practice is also problematized to give meaning and promote learning, especially regarding overcoming real barriers experienced, which may clash with the prescribed theoretical learning (ONTURK *et al*., 2019, p. 198-199).

FINAL CONSIDERATIONS

The present study, carried out within the scope of the actions foreseen in the Program for the Development of Undergraduate Teaching at UFMG (PDEG/UFMG), which aims to promote the quality and innovation of the teaching, learning and assessment process in undergraduate courses, through the use of pedagogical strategies and/or actions to reduce permanence, dropout and completion time and increase average undergraduate performance, made it possible to delve deeper into the use of educational technologies used in higher Nursing education.

Thus, responding to the guiding question of this study it was observed that the most used educational technologies in higher Nursing education were realistic simulations of low, medium, and high fidelity, in the form of face-to-face teaching. This finding signals the need to carry out other studies, debates and reflections that reinforce the importance of using realistic simulations, strategies that, above all, favor the integration between theoretical and practical knowledge and promote the safety of the care that will be provided by students in clinical teaching activities.

In this sense, it is noteworthy that the analysis of the articles included in the study sample made it possible to confirm the hypothesis that educational technologies used in face-to-face teaching have been predominant in higher nursing education. This finding is in line with the conviction that Nursing education can never be reduced to distance learning, as has recently been defended by some schools, and reinforced the view that the real context of caring for people is essential in training of nurses.

In relation to distance learning and hybrid teaching, the use of digital educational technologies such as videos and educational games was identified more frequently in the articles of this study. From this perspective, it is important to emphasize that both distance learning and hybrid teaching are modalities that remained present in the Nursing course, even after the COVID-19 pandemic. Therefore, it cannot be denied how important it has been for higher Nursing education to integrate educational technologies used in face-to-face teaching with those used in distance learning, which has provided more efficient, active, and dynamic learning.

However, an important aspect highlighted in the studies is the fact that digital educational technologies, in distance and hybrid teaching modalities, are important in higher Nursing education, if they are used to complement field activities and help in problematizing issues. practical situations experienced by students in academic activities carried out in face-to-face clinical teaching.

Therefore, due to this study, it is concluded that to advance in the construction of more consistent pedagogical practices in higher Nursing education, it is essential to expand debates

on the challenges imposed by the combination of educational technologies, such as realistic simulations in the face-to-face teaching modality, with digital technologies used in distance learning that encourage student protagonism, the development of critical thinking and meaningful learning, as suggested by active teaching methodologies.

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