Innovating in nursing education - A brief review of literature

C. Sá[1], A. Nabais[1], A. Oliveira[2]

[1] *Escola Superior de Enfermagem, de Lisboa (ESEL), UI&DE, Lisboa (PORTUGAL)*
ceu.sa@esel.pt, ana.nabais@esel.pt
[2] *Instituto Universitário de Lisboa (ISCTE-IUL), ISTAR-IUL, Lisboa (PORTUGAL)*
abilio.oliveira@iscte-iul.pt

Nursing education has undergone many changes over the years. The development of new medical technologies challenges the present education systems to prepare nurses for the near future. The adoption and use of Information and Communication Technologies (ICT) is increasingly important for nursing teachers to be up to date with pedagogical advances, and prepare the nursing students with theoretical and technical-practical skills, through simulated situations, close to the reality of hospital units (where they'll be as professionals). The use of ICT in nursing education is essential to facilitate the acquisition of knowledge and, particularly, to promote competences, being a challenge both for teachers and students.

Aim: The main goal of this paper is to Identify and analyse the innovation in nursing education, i.e., how nursing teachers use ICT in the teaching-learning process.

Methodology: We started with the question research: How do nursing teachers use ICT in the teaching-learning process? Data sources were online databases, including CINHAL, MEDELINE and PUBMED. The selection of the articles for the present review was made according to the titles and the abstracts. The selected papers were analysed using a content analysis method.

Results: Findings revealed that the teaching of future nurses in laboratories using advanced technologies, such as mannequins and equipment that provide realistic simulations, and the use of ICT facilities, facilitate the pedagogical process, both in classroom and through e-learning methods.

Conclusion: The results from the different articles suggest that ICT promote knowledge for students and these information technologies are crucial in nursing education and a great challenge for the teachers, helping to train professionals prepared to deal with the technological scenarios they will encounter in health institutions.

Keywords: Information and Communication Technologies (ICT); Nursing students; Nursing teachers; Education

INTRODUCTION

The use of ICT in education has been associated with significant pedagogical and educational advances and it is beneficial to the learning process of both, students and professors. Studies have shown that the use of ICT in education promotes active, collaborative learning and contributes to the development of creative thinking(1). Nowadays the ICT has already been included in the educational process and become an essential part of training tomorrow's nurses(2).

ICT's are increasingly used in the teaching of classes in the area of health, allowing the student to access important contents for their studies anywhere and in a quick way besides providing the interaction between students and professors(3).

Therefore, health care educators need to update their traditional pedagogical methods so that they conform more to the current era of technology(4, 5). The Internet is a keyway in which students find information. There are several new and advanced ways of using ICT and creating alternative teaching methods (6), which can be applied to nursing and health care education(7).

ICT's are increasingly used in teaching nursing, either inside the classroom or in laboratories of practical classes, introducing the concept of simulated practice. In the simulated practices, it is used mannequins of essentially average and high fealty. Literature refers that these mannequins (Medium-fidelity HPSMs and High-fidelity HPSMs) are full-body manikins that have embedded

software that is controlled by an external, handheld device. They can have set breath sounds, heart sounds, and pulse and blood pressure, and they are also capable of coughing, moaning, or producing basic verbal communication. The High-fidelity HPSMS are more realistic and have embedded software that can be remotely controlled by computer to allow for individualized programmed scenarios real-time interactions, and cue response(8).

Today's healthcare environment practice of nursing is influenced by emerging information technologies and medical innovations designed to improve patient care. The emphasis on patient-focused care challenges nurses to practice in an environment that requires competencies in human interactions, clinical skills, and ICT(8).

Literature is unanimous when referring that there is a wide technological variety used by nursing professors and that these technological resources make studying more dynamic, developing knowledge and abilities contributing as such for the acquisition of competences by the student as a future professional relating it to he practice of the profession. Among those, the ones that stand out are the ones that are linked with the maintenance of daily life activities, such as body hygiene, feeding and hydration, elimination, sleep and rest, moving and maintaining a proper body posture as well as: the ones relating with therapeutic actions such as the administration of therapeutics, catheters, evaluation of vital signs, amongst others(9).

Nowadays, teaching nursing is constantly updated, always following the development of science and, most of all, due to the complexity of the process of nursing, as this one should always be based on the scientific evidence and integrate theoretical knowledge in the according to practice. It should also be highlighted the safety of the patient, regardless of its health condition. In this way, the integrated ICT's in nursing teaching has as a goal to allow the student the competences to develop the patient's safety(9).

Furthermore, in professional education and college education, active learning, which is a learning method in which a learner engages in his/her tasks actively, attracts more attention than does a passive class. Besides, the effects of adopting ICT or reflective writing into passive learning are starting to be reported(10, 11). A learning method using ICT in nursing education is expected to be increasingly used because of low dropout rates, flexibility and low cost, which appeal to people of wider generations(10, 12).

Nursing education and learning with ICT have recently a great development however, few studies have analysed the objective effects of learning with ICT and, how nursing professors use ICT in the teaching-learning process.

METHODS:

To answer the aim of this study, it was carried out an in integrative revision of the literature. This allowed through the studies resulting from different methodologies, to summarize the knowledge about a certain subject. On the other hand, allows the identification of knowledge gaps that justify the development of new studies serving, as well, as support for making a decision and improvement of the clinical practice(13, 14).

To carry out this revision the following phases were followed: the creation of an investigation question, research in the literature/selection of articles in databases, gathering data and content analysis of the discussion and conclusion of the selected articles.

The following investigation question was created: How do nursing professors use ICT in the teaching-learning process?

The research was carried out in the CINAHL Complete, MEDLINE Complete, PUBMED and in the Google Scholar tool databases. Different research descriptors were used, carrying out the following associations with the Boolean operators "or" and "and". The research had the following orientation: [(nursing education OR nurse educator OR nurse teacher education) AND (Information and Communication Technology)].

The selection of articles was initially carried through the reading of the title, summary, mainly the goal of the study, followed by the integral reading, in which articles that presented relation with the investigation question. As an inclusive criterion, it was used the period, 2008-2018 and the idiom in which they were written, being only included articles that are written in English, Portuguese, Spanish or French. Articles without correlation with the aim of the study, repeated in the different databases and not available in the integral text were excluded. The selection of these was carried out by the three authors being requested the opinion of yet two exterior experts, in

which their experience contributed to the determination of eligibility of the content of the researched studies.

The operationalization of this research was carried out in the months of May and June of 2019. figure 1 illustrates the research process.
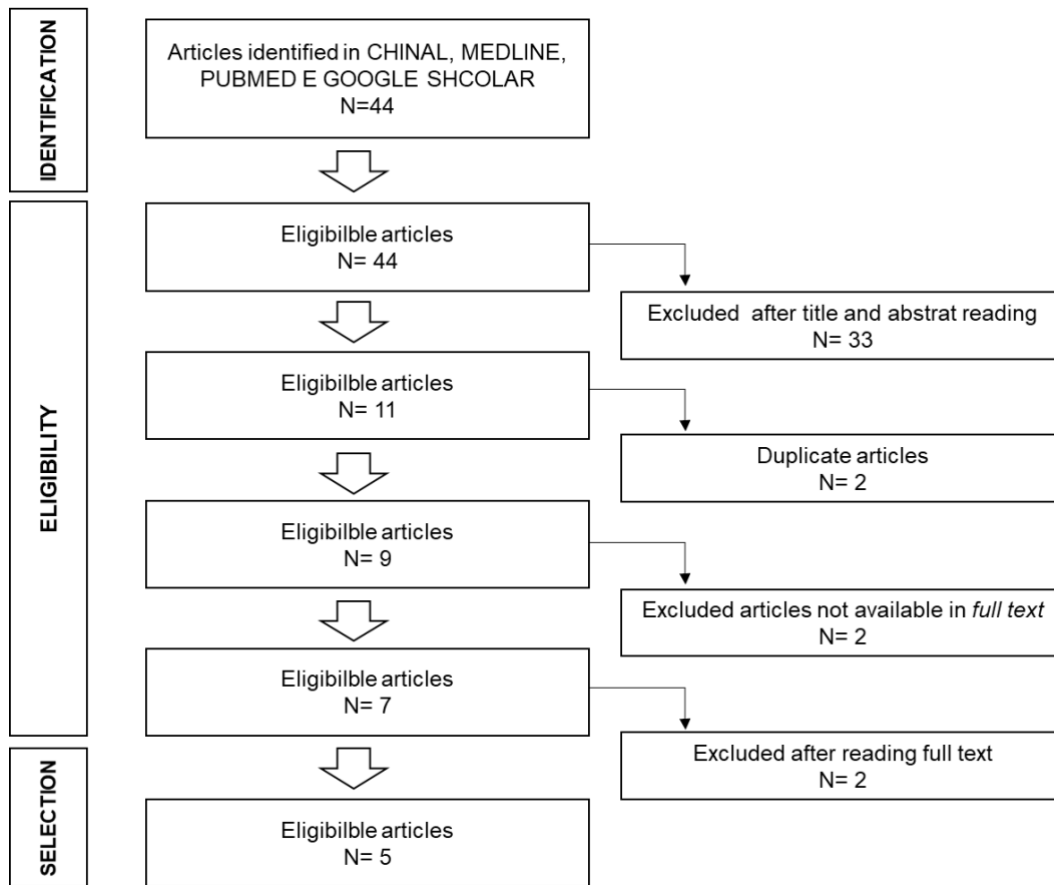

Fig. 1. *Operationalization of Integrative Review*

To extract the relevant data of the selected articles it was used a registration instrument to minimize the risk of errors and the omission of data. This instrument consists of a data collection table composed by: identification of the article, authors, year of publication, type of study, goal and main results.

The obtained data was analysed through the methodology of content analyses, being afterwards systematized and discussed in the light of the current literature.

RESULTS

In this chapter we present the summary of the results that were found.

Article (title, authors and year)	Tipe of study	Objetive	Results
Nursing studants' perceptions of their resources toward the development of competencies in nursing informatics (Jetté, Tribble, Gagnon & Mathieu, 2010)	**Deescrive correlational study**	Describe the internal and external nursing informatics resources perceived by nursing students.	In the learning process the professor has the responsibility to guide the student to use ICT, using scientific databases and health websites with reliable information.

Human Patient Simulation Manikins and Information Communication Technology Use in Australian Sholls of Nursing: A Cross-Sectional (Arthur, Kable & Levett-Jones, 2011)	**Cross-sectional survey**	Explore de use and tipe of human patient simulation manikins (HPSMs) and ICT employed in Australian undergraduate nursing programs and identify the pedagogical principles.	The nursing degree has a theoric-practical and practice component relevant and it is in the clinic laboratories that the students train technical procedures applied in mannequins of average and high fidelity that allow more real simulations, allowing the students to acquire tecnic competences and reflect about the situation. In nursing schools, the existence of sharing platforms for documents (professor-student) and discussion forums, are important methods of teaching-learning.
E-learning & information communication technology (ICT) in nursing education: A review of the literature (Button, Harrington & Belan, 2013)	**Review of the literature**	To examine primary research articles that focused on the issues for students and educators involved with e-learning.	Nursing teachers use e-learning as a teaching methodology. It has as advantages the flexibility and speed to the access of information. As disadvantages the non-existence of a present professor, making it harder to establish a pedagogic relationship. The mixed learning methodthat combines face-toface method and e-learning, allows to combine the positive aspects of both methodologies. Professors can incorporate in their teaching for future nurses the use of informatic programs used in health units.
The Use of Information and Communication Technology from the Educational Staff of the Nursing and Physiotherapy Departements of the Alexander Technological Educational Institution of Thessaloniki, Greece (Tzitzolaki, Tsiligiri & Kostouda, 2014)	**Quantitative study**	Investigate de opinion of the educacational staff about the ICT tools and explore whitch factores influence the use of ICT tools by the educational staff	The use of ICT's is influenced by the experience of professors and their use. In the teaching process the use of computer (word, e-mail, internet, search engines) projectors, electronic presentations, web pages, video-conference systems, forums, chats, information management systems, intelligent teaching and simulation.
Use of social media by nurse educator students: Na Exploratory Survey (Lahti, Haapaniemi-kahala & Salminen, 2017)	**Cross-sectional exploratory survey**	To describe nurse educator students' use of social media and the ways in which their educational needs are related to social media	Nursing professor use Social Media as YouTube and Facebook that allow to sustain their teaching-learning methodology.

DISCUSSION:

After the analyses and synthesis of the articles of this revision, these proofed that nursing professors use different ICT's that contribute to the efficiency of the teaching-learning process of students. Various categories stood out such as: ICT's as a tool for study orientation (learning stimuli), learning virtual environments and technologies of support to the simulated practice.

Relative to the ICT's category as an orientation tool for this study, for the professors the use of ICT's is important in the orientation of the students, mainly in researching scientific contexts in databases. In reality, the literature is unanimous when referring that the competencies should be based on scientific evidence, so this method is indispensable in the research on reliable websites(15). Computers are an important support in the production of documents and contents for showing in theoretic and theoretic-practical classes, in which professors rely as well on the use of projectors(16). Another category evident during the research was the virtual learning environments. In this, the methodology e-learning is referred to as a stimulating environment for the independence of the student as proposed by the Bologna process(17)

giving him responsibilities and making him more active in the learning process. Sharing platforms also allow the orientation of autonomous study of the student by the professor, directing their research, giving him written and audio-visual document, like videos about nursing, cares such as: hygiene and comfort cares, feeding, elimination, therapeutic administration, manipulation of sterilized material, amongst others(8, 18). The creation of forums and chats also constitutes a useful way of promoting the discussion and idea and content exchange, promoting reflexion about nursing contents. On the other hand, social media, such as Facebook and YouTube are nowadays also used by professors as an important means of transmission of knowledge and exchange for the acquisition of knowledge and competences(19). The creation of digital tools is referred by other authors as a means of reinforcement of the learning process, it being a useful and reliable resource used by the professor in the teaching of nursing competencies, allowing the cut back as well on expository lessons(20, 21). The analyses of articles suggest that the method of mixed teaching that combines face to face teaching and e-learning can combine the advantages of both methods, matching the flexibility and speed of access to the information with the presence of the professor and the establishment of a pedagogical relation(18).

Gabardo, Quevedo & Ulbricht (2010) also refer that the ICT's, as well as the internet and digital platforms, can be used both for teaching long-distance or as a complement to on-site educational activities and practice of professionals(22).

Another category is the technologies to support simulated practices. Nursing professors consider that in the context of the acquisition of practical competencies inside the laboratory, the use of simulation software together with the mannequins of average and high fidelity, besides offering better precision and realism of the procedure, making it easier to learn manual abilities and the reflexion about real-life cases(8). Simulated practices allow the student to practice repeatedly, allowing the consolidation and acquisition of practical competencies which are important to answer the fundamental human needs compromised in patients. To some authors, this methodology offers higher confidence to the student which contributes positively to the safety of the patient in the context of the exercise of cares(23). These also consider that the access to theoretical contexts, images, videos and exercises of the problems before laboratory classes is of extreme importance for the study and preparation for the laboratory practices. The professor assumes the roll of learning advisor, enlightening the students' questions in the laboratory practices(24).

To complement a close to real learning of cares, teaching and practice of the use of informatics programs, such as the ones used for registration in health institutions are also considered as an enabler for students to transit for internships and the professional life(18).

This study confirms previous research that electronic teaching media are at least non-inferior to traditional teaching methods applicable to nursing education. It also indicates value-added benefits for adopting ICT in a range of teaching formats which, while not demonstrated to impact directly on student academic performance, allow faculty members to deliver better quality learning.

The use of ICT enables learning and acquisition of competences, perspective also highlighted by students. However, the success in the use of these technologies in teaching nursing demands the mutual involvement and dedication between students and professors.

CONCLUSION:

The rapid advances in ICT have important implications for both nursing students and educators all over the world. So, the ICT opens up new possibilities for introducing innovative teaching and learning methods to deliver educational areas(19).

This revision confirms the significance that the ICT-s have taken by professors in nursing schools, granting the student more flexibility and willingness in the way the knowledge is made available, making the learning process more attractive and participative. It is in this fundamental sense that the professors guide their students to use the most resources and helping guides offered by the ICT's, as this are by themselves updated and prepared to accompany the advances in modern days.

These technologies are important not only in the teaching-learning process during the degree, but also they are tools that future nurses will use daily in their work. The technologies used during the nursing degree constitute as well tools that are hoped to help and stimulate the reflective practice of future nursing professionals, allowing these to act with safety and consciousness regarding the ethical and social implications.

The use of these technologies in nursing teaching are considered a pedagogic innovation useful in the acquisition and update of knowledge, not only to bibliographic research, but also to help learning and critical thinking as well as to develop self-learning.

One of advantage of integrating the use of clinical information systems into the nursing curriculum is the capacity to incorporate ICT such as nursing diagnoses and care plans within the nursing education process. This extends the learning process to help students see the connection between the use of technology to transform the healthcare delivery system(25).

Also, this review suggests that ICT offers benefits to nurse education regardless of directly enhancing learning efficacy. However, human and environmental barriers need to be addressed, namely staff belief and motivation, and faculties which need to provide time for training and preparation, technical support and efficient systems.

The results from the different articles suggest that ICT promote knowledge for students and these information technologies are crucial in nursing education and a great challenge for the teachers, helping to train professionals prepared to deal with the technological scenarios they will encounter in health institutions

The limitations of this study are mainly related with the lack of standardization of the nomenclature of keywords associated to this theme which restricted the research.

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