TECHNOLOGY IN HEALTH AND ITS INFLUENCE ON NURSING EDUCATION

Tecnologia em saúde e sua influência no ensino em enfermagem

Tecnología en salud y su influencia en la enseñanza en enfermedad

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ABSTRACT

Objective: to analyze the influence of technological innovation on teaching in nursing. **Method:** this is an integrative review carried out in January 2018, with a time cut from January / 2015 to December / 2017. We included 21 articles available online, and the six recommended steps were performed, in which a validated instrument was used to collect and analyze the data. **Results:** the categories "Information Technology and Communication in education; "Environments and Virtual Learning Objects and their impact on the teaching-learning process". **Conclusion:** the influence of technological innovation on nursing teaching brings a dynamic, innovative and proactive aspect to the nursing student, which requires changes in the format of the teaching-learning process. Such changes have encouraged the student to be active and constructor of their knowledge, which contributes directly to the process of developing critical-reflexive thinking, autonomy and security for performing procedures.
DESCRIPTORS: Educational technology; Information technology; Internet; Teaching; Nursing.

RESUMO

Objetivo: analisar a influência da inovação tecnológica no ensino em enfermagem. **Método:** trata-se de uma revisão integrativa realizada em janeiro de 2018, com recorte temporal janeiro/2015 a dezembro/2017. Foram incluídos 21 artigos disponíveis on-line, sendo realizadas as seis etapas preconizadas, na qual para a coleta e análise dos dados, utilizou-se de um instrumento validado. **Resultados:** emergiram as categorias "Tecnologia da Informação e Comunicação no ensino; "Ambientes e Objetos Virtuais de Aprendizagem e seu impacto no

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processo de ensino-aprendizagem". **Conclusão**: a influência da inovação tecnológica no ensino em enfermagem traz um aspecto dinâmico, inovador e de proatividade ao aluno de enfermagem, o que exige mudanças no formato do processo ensino-aprendizagem. Tais mudanças vem incentivando o aluno ser ativo e construtor do seu conhecimento, o que contribui diretamente para o processo de desenvolvimento de pensamento crítico-reflexivo, autonomia e segurança para realização de procedimentos. **DESCRITORES:** Tecnologia educacional; Tecnologia da informação; Internet; Ensino; Enfermagem.

RESUMEN

Objetivo: analizar la influencia de la innovación tecnológica en la enseñanza en enfermería. **Método:** se trata de una revisión integrativa realizada en enero de 2018, con recorte temporal enero / 2015 a diciembre/ 2017. Se incluyeron 21 artículos disponibles en línea, siendo realizadas las seis etapas preconizadas, en la cual para la recolección y análisis de los datos, se utilizó un instrumento validado. **Resultados:** emergieron las categorías "Tecnología de la Información y Comunicación en la enseñanza; "Ambientes y Objetos Virtuales de Aprendizaje y su impacto en el proceso de enseñanza-aprendizaje". **Conclusión:** la influencia de la innovación tecnológica en la enseñanza en enfermería trae un aspecto dinámico, innovador y de proactividad al alumno de enfermería, lo que exige cambios en el formato del proceso enseñanza-aprendizaje. Tales cambios vienen incentivando al alumno a ser activo y constructor de su conocimiento, lo que contribuye directamente al proceso de desarrollo de pensamiento crítico-reflexivo, autonomía y seguridad para la realización de procedimientos.
DESCRIPTORES: Tecnología educacional; Information technology; Internet; Enseñanza; Enfermería.

INTRODUCTION

Postmodernity has brought important changes to society, whether in the economic, political, social, cultural or technological areas. These changes led to new possibilities and challenges, which reflected directly on the development of the educational field. Technology has been incorporated as a teaching strategy and considered as an important tool to streamline it and develop active learning projects.[1]

In the educational field the need for such changes is urgent, above all, in the search for innovative and more effective methods, with didactic strategies that make students the builders of their knowledge, making them creative, thoughtful, reflective, participative and active.[2]

Nowadays, with the diversification of the media, resulting from the technological innovation itself, an infinite amount of information is produced at all times. Given this reality, the biggest challenge in health education has been to obtain qualified, up-to-date, real-time information for the success of any initiative.

Over time, nursing seeks changes in order to innovate in training the professionals. In 2001, through the National Curriculum Guidelines of the Undergraduate Nursing Course, a student-centered nurse training was instituted and the teacher began acting as a facilitator, providing a generalist, humanist, critical and reflective training. Such training is focused on active and differentiated teaching, which uses active teaching-learning methodologies and enables curricular flexibility.[3]

Even with innovation, it is also clear that health education is mostly centered on theoretical classes, practices and printed materials. However, with technological advances, innovation must accompany health education. Given that online education strategies can have great potential for knowledge generation, including health.[4]

Higher education has been marked by profound changes as a result of advances in science and technology. One of these changes is directly linked to Information and Communication Technologies (ICT), as well as the Virtual Learning Objects (VLE) and the Virtual Learning Environments (VLE) that have been used by both society and academia.[5]

It is essential that nursing teachers keep an eye out for the identification of active methodologies that encourage the search for knowledge. It is known that one of the biggest challenges that teachers face in nursing education is the identification and application of methodologies that arouse the students' interest and encourage them to develop their skills and expand their knowledge.[6] Thus, the objective of the study was to analyze the influence of technological innovation on nursing education.

METHOD

This study is an Integrative Review of the literature. It proposes to broaden the knowledge on a given subject based on the analysis of publications on health concepts.[7] The study included six stages: 1. Identification of the theme and selection of the research question; 2. Establishment of inclusion and exclusion criteria; 3. Identification of pre-selected and selected studies; 4. Categorization of selected studies; 5. Analysis and interpretation of results and 6. Presentation of the review / synthesis of knowledge.[8-9]

To guide this review, the following guiding question was formulated from the PICo strategy: "What is the influence of technological innovation on nursing education?" P represents population: nursing, I: interest: technology innovation, Co: Context: Teaching-learning process.[10]

The bibliographic search was performed in January 2018, with a temporal interval from January 2015 to December 2017, using the following Keywords in Health Sciences section (DeCS) of the Virtual Health Library and in English Medical Subject Headings (MeSH) using the Boolean And operator: Educational Technology, Teaching, Information Technology, and Nursing.

The articles were selected from the databases Medical Literature Analysis and Retrieval System (MEDLINE), Nursing Database (BDENF), Latin American and Caribbean Health Sciences Literature (LILACS), Spanish Bibliographic Index on Sciences of Health (IBECS) and virtual libraries Scientific Electronic Library Online (SCIELO) and National Library of Medicine (PubMed).

The inclusion criteria listed were: articles available online and in full, from 2015 to 2017 (last three years), written in Portuguese, English or Spanish, within the theme of the study. This period is justified by the search for what is most current in nursing education through health technology. Duplicate articles, theses, dissertations, experience reports, integrative reviews, editorials, integrative review articles and articles with theme incompatible with the purpose of this study were excluded.

For data collection and analysis, a validated instrument was used[11] and adapted to fit the objective of the study. The topics of interest addressed in the instrument were: article title, year of publication, language, country of origin of the publication, database, objective, method, results, conclusions and level of evidence.

For the levels of evidence, the following criteria were adopted: Level I: Systematic reviews or meta-analysis of a randomized clinical trial, level II: randomized clinical trial, level III: non-randomized clinical trial, level IV: cohort and case control, level V Systematic review of descriptive / qualitative studies, level VI: Descriptive / qualitative studies, level VII: Opinion. According to this classification, levels 1 and 2 are considered strong evidence, moderate 3 and 4, and weak 5 to 7.

The selection of studies was performed by reading titles and abstracts in detail. For the final selection of articles, the full text was read, and those that focused on the impacts of technological innovation on nursing were selected. After excluding papers that did not meet the inclusion criteria, the basis of this review was composed of 21 articles.

As it is a literature review, the authorship of the researched articles was confirmed through citing and reference of the authors to ensure the ethical aspects. Considering that there was no direct involvement of human beings as research participants, there was no need for approval of the investigation by a Human Research Ethics Committee.

RESULTS

A total of 146 studies were identified, of which 21 were selected to be part of the sample, 20 (95%) were published in English and one (5%) in Spanish. Of these studies, 18 (85%) were from Brazil, one (5%) from New Zealand, one (5%) from Chile and one (5%) from Portugal. 19 (90%) were authored by nurses from departments or schools of nursing, while two (10%) studies did not specify.

Of the studies, four (19%) were from BDENF, three (14%) from MEDLINE, seven (33.5%) from SCIELO and seven (33.5%) from LILACS. Figure 1 illustrates the article selection process of this integrative review and Table 1 lists the articles included in descending order.

Figure 1 - Flowchart of study selection process according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA 2009). Alfenas, MG, Brazil, 2018
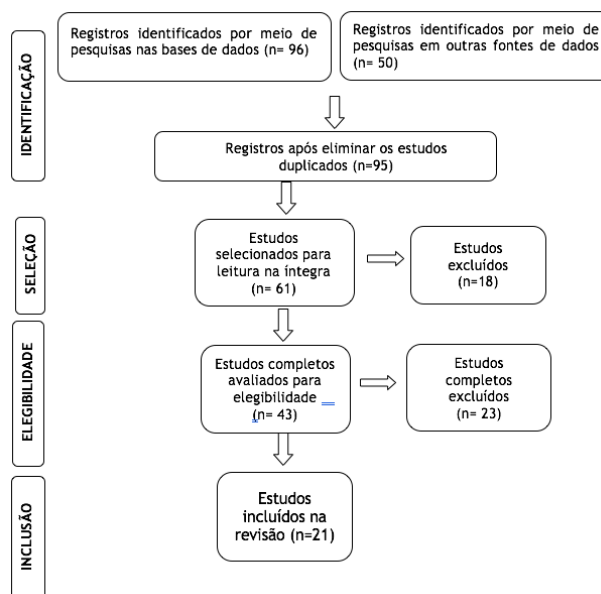

Table 1 - Results found in the studies according to the author, year of publication, country, type of study and level of evidence. Alfenas, MG, Brazil, 2018

Author	Year	Country	Type of study	Level of evidence
Pereira FGF, Frota NM, Silva DV, Sousa LMO, Almeida JC, Cysne Filho FMS.[17]	2017	Brazil	Methodological	VI
Mackay BJ, Anderson J, Harding T.[31]	2017	New Zealand	Descriptive, qualitative	VI
Salvador PTCO, Bezerril MS, Mariz CMS, Fernandes MID, Martins JCA, Santos VEP.[3]	2017	Brazil	Descriptive, Mixed	VI
Avelino CCV, Costa LCS, Buchhorn SMM, Nogueira DA, Goyatá SLT.[22]	2017	Brazil	Mixed	VI
Pereira EBF, Modesto BCM, Valença MP, Silva Junior WS, Souza CFQ.[18]	2017	Brazil	Methodological, quantitative and qualitative	VI
Leite KNS, Santos SR, Andrade SSC, Zaccara AAL, Brito KKG, Silva SCR.[5]	2016	Brazil	Exploratory, qualitative	VI

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Author	Year	Country	Type of study	Level of evidence
Pereira FGF, Caetano JA, Frota NM, Silva MG.[12]	2016	Brazil	Experimental	II
Jensen R, Guedes ES, Leite MMJ.[14]	2016	Brazil	Survey	VI
Domenico EBL, Cohrs CR.[24]	2016	Brazil	Experimental	II
Yánez AC, Ortiz LS, Espinosa VE.[2]	2016	Chile	Descriptive, analytical and transverse	VI
Pereira FGF, Silva DV, Sousa LMO, Frota NM.[13]	2016	Brazil	Methodological	VI
Fonseca LMM, Aredes NDA, Fernandes AM, Batalha LMC, Apóstolo JMA, Martins JCA, et al.[30]	2016	Brazil	Quasi-Experimental	III
Holanda VR, Pinheiro AKB, Holanda ER, Santos MCL. Brasil, 2015.[4]	2015	Brazil	Quasi-Experimental	III
Aredes NDA, Góes FSN, Silva MAI, Gonçalves MFC, Fonseca LMM.[28]	2015	Brazil	Quasi-Experimental	III
Holanda VR, Pinheiro AKB.[21]	2015	Brazil	Quasi-Experimental	III
Castro FSF, Dias DMV, Higarashi IH, Scochi CGS, Fonseca LMM.[26]	2015	Brazil	Descriptive	VI
Kobayashi RM, Leite MMJ.[15]	2015	Brazil	Descriptive	VI
Landeiro MJL, Freire RMA, Martins MM, Martins TV, Peres HHC.[25]	2015	Portugal	Exploratory, quantitative	VI
Frota NM, Barros LM, Araújo TM, Lopes MVO, Almeida PC, Caetano JA.[23]	2015	Brazil	Methodological	VI
Góes FSN, Camargo RAA, Fonseca LMM, Oliveira GF, Hara CYN, Felipe HR, Caldas NB.[32]	2015	Brazil	Methodological	VI

To better understand the influence of technological innovation on nursing education, the following categories emerged: 1) Information and Communication Technology: innovation in teaching-learning process; 2) Object and Virtual Learning Environment: construction of new learning horizons. Both categories will be analyzed and discussed below.

DISCUSSION

Information and Communication Technology: innovation in teaching-learning process

ICTs is a set of resources, procedures and techniques used for storage and transmission of information, based on computer science, telematics and multimedia. In health sciences, ICTs are used from diagnosis, to patient monitoring and control, and they go beyond management, which is relevant for its impact on health care.[2]

Notably, the application of technological resources has provided the acquisition of knowledge and cognitive skills that has significantly improved the performance of procedures in nursing, increasing security and self-confidence. Such resources include applications, forums, OVA, VLE, social networks and Moodle.[12-13]

In Brazil, it is evident that the use of ICTs in undergraduate nursing courses was incipient and these resources are underused in the curriculum of the courses.[14] It is observed that even considering the contribution of ICTs in the teaching-learning process, there is still resistance from teachers.

The resistance of many teachers to the use of ICTs in the educational process can be explained by the lack of knowledge, lack of training, availability or access to cyber resources or the thought that care is provided through human contact and that it should not use virtual teaching. As a result, there is still little use of informatics in nursing education.[5]

Moreover, the barrier is often not only the teacher, but also the student. The study indicates that the level of computer literacy among undergraduate students is low, requiring institutional investments, because with technological progress these skills will be necessary for further adaptation to the labor market.

Furthermore, technological innovation does not stop, and the internet has been widely used. One of the studies points out how much the internet has benefited teaching, by allowing to clarify doubts on medications, procedures, theoretical data, among others, and has contributed to the student's education and consequently to the improvement of care.[5] Notably, despite the immense contribution of technology to teaching, it does not mean that it will replace books or teachers, but, on the contrary, will provide support and aid in the teaching-learning process.

Nursing teachers need to understand how much ICT can help them in the process of knowledge acquisition by students, as it allows access to various forms of learning.[5] Since each student has his or her own specific form of learning, whether by reading, writing, audio or visualization (visual, audiovisual and auditory learning).

With the inclusion of ICTs in nursing education, there is a need to rethink the role of teacher / student in the teaching-learning process and the paradigms of pedagogical practice.[16] The teacher will no longer be seen as having all knowledge and the student as a passive being, but the teacher will rather be the facilitator of the teaching-learning process and the student an active, critical and reflective being.

ICTs have led to changes in traditional teaching models, reducing barriers to differentiated teaching, overcoming time and space, enabling students to take active learning approaches without passive reception of knowledge, and promoting continuous learning and exchange of experiences and information among the learners.[17-21] In the meantime, ICTs have provided innovations in both teaching and learning processes.[3]

Object and Virtual Learning Environment: construction of new learning horizons

ICTs have collaborated in nursing education by advancing the use of computers and the internet. In this sense, OVAs and VLEs stand out and are considered supporting tools in the teaching-learning process.[3,22-23]

VLEs are used for promoting educational activities through a computational system in the virtual space, which allows to aggregate different types of media. They integrate functionalities and tools that help in the construction of an online interactive teaching-learning process use internet resources for it.[3-4,17]

VLE when combined with technological resources, provides a more reflective, problematic, interactive and collaborative learning, which favors decision making within the hospital practice.[22, 24]

VLEs have some useful attributes. One that has been widely used for nursing is Moodle tool that allows creating a more dynamic and interactive environment for students, is free to use and allows the inclusion of various technological resources, such as forums, chats, learning content management, storage, as well as allowing flexible learning in time and space, provides control of the didactic process and enables evaluation through user access and participation in the tutorial system.[3,22,24-26]

As for OVA, it is a digital resource that can be reused within various pedagogical strategies and activities, but has a limited size. Nevertheless, it does not prevent OVA from encompassing a variety of teaching materials such as videos, games, websites, images, among others. They feature interactivity, accessibility, durability and portability and are also used in the teaching-learning process.[3,27]

Notably, the use of OVA encourages students to adopt electronic media when based on active methodologies, which allows to overcome the barrier of distance and facilitates group work incorporated in teaching. They can be used as a complement in education and allow constant search for new knowledge, but as a didactic resource it does not replace the presence of the teacher either.[28]

Study points out that teachers are suggesting VLE as support to classroom classes, however, in order to create a VLE, it is necessary that they understand its concept, so that they can convey their goals in the teaching-learning process and so that learners are encouraged to explore the resource for new knowledge.[29]

VLE and OVA proved to be great tools in teaching-learning process in nursing. Both are considered self-directed and flexible resources that enhance technology-mediated learning.[3]

For a better understanding of these tools associated with ICTs, it can be inferred that a VLE can bring together different types of OVA in a single pedagogical context.[3] It also reinforces the need to interlink different educational tools, considering that studies show it as more advantageous than using them alone. Furthermore, it is up to the teacher to use innovative and creative strategies during the teaching-learning process.[30]

Teachers play key roles as mediators in teaching and technological resources are complementary to the learning process, but it is the teachers' role to assist students in using computers to be able to receive information and turn it into critical thinking and reflective nursing. The goal is to make teaching more dynamic, attractive, interactive and enable the development of student autonomy.[31-34]

We note that this research was limited as it involved only information and communication technology in nursing education and not in other healthcare areas, which could have increased the sample number and perhaps even diversified the findings. It is possible that if the inclusion criteria of the studies allowed including other areas of healthcare such as: Nursing Medicine, Occupational Therapy, Physical Education, Nutrition, Psychology, among others, it could have brought broader contributions and allowed reflection on other issues.

CONCLUSION

Studies show that the influence of technological innovation in nursing education is dynamic, innovative and generates proactivity for nursing students. Furthermore, such findings will require, in the short term, major changes in the teaching-learning process strategies, both in the teaching and in the learning process. These changes encourage nursing students to be active and become builders of their knowledge, which contributes to the development of critical-reflective thinking, autonomy and consequent increase in their security in performing the procedures.

However, such initiatives require faculty flexibility, continuously updated skills and knowledge, active, critical, contextualized, reflective discussions in face-to-face or virtual environments, so that the identification of such content is in fact pertinent to professional practices and is based on reliable sources of research in order to ensure the quality and timeliness of the content learnt.

New studies on the influence of technology on teaching in different healthcare areas and not only on nursing should be carried out. These studies should be repeated over the years and should involve technology in nursing education, so that teaching-learning process and technology in health and nursing are always kept up to date.

FINANCING

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