USE OF MOBILE APPLICATIONS IN THE TEACHING-LEARNING PROCESS IN NURSING GRADUATION

USO DE APLICATIVOS MÓVEIS NO PROCESSO DE ENSINO-APRENDIZAGEM NA GRADUAÇÃO EM ENFERMAGEM

USO DE APLICACIONES MÓVILES EN EL PROCESO DE ENSEÑANZA-APRENDIZAJE EN LA GRADUACIÓN EN ENFERMERÍA

Tiago Ribeiro dos Santos[1]
Luciano Gualberto Soares[2]
Lucas Dias Soares Machado[3]
Nayara Santana Brito[4]
Maria Augusta Vasconcelos Palácio[5]
Maria Rocineide Ferreira da Silva[6]

Objective: to identify the mobile applications available for the teaching of physical examination and nursing procedures and how they have contributed to the teaching-learning process in nursing graduation. Method: integrative literature review, conducted in April 2020, according to predefined protocol and PRISMA recommendations. Results: the applications Oiva®, Vital Easy®, Whatsapp®, Facebook® and e-mails were identified as usable in the teaching-learning process in nursing graduation, contributing to greater interaction between students and professors, clarification of doubts and as a source of information for lookup. Conclusion: the use of mobile applications is relevant in the teaching-learning process in nursing graduation, because they provide opportunities for the exchange of experiences and information between individuals belonging to different realities, expanding access to content, enabling engagement, limiting geographical barriers and adapting to specific realities.

Descriptors: Mobile Applications. Physical Examination. Education, Nursing.

Objetivo: identificar os aplicativos móveis disponíveis para o ensino de exame-físico e procedimentos de enfermagem e como estes têm contribuído com o processo de ensino-aprendizagem na graduação de enfermagem. Método: revisão integrativa da literatura, realizada em abril de 2020, conforme protocolo pré-definido e recomendações PRISMA. Resultados: os aplicativos Oiva®, Vital Easy®, Whatsapp®, Facebook® e e-mails foram identificados como

[1] Nursing Student. Universidade Regional do Cariri. Iguatu, Ceará, Brazil. https://orcid.org/0000-0002-8614-0818.
[2] Nursing Student. Universidade Regional do Cariri. Iguatu, Ceará, Brazil. https://orcid.org/0000-0003-0349-3288.
[3] Nurse. MSc in Nursing. Universidade Estadual do Ceará. Professor at the Universidade Regional do Cariri. Crato, Ceará, Brazil. lucasdsmachado@hotmail.com. https://orcid.org/0000-0003-4450-3796.
[4] Nurse. Universidade Estadual do Ceará. Professor at the Universidade Regional do Cariri. Crato, Ceará, Brazil. https://orcid.org/0000-0002-9782-5513.
[5] Nurse. PhD in Sciences and Health Education. Professor at the Universidade Federal do Vale do São Francisco. Petrolina, Pernambuco, Brazil. https://orcid.org/0000-0002-2780-125X.
[6] Nurse. PhD in Collective Health. Professor at the Universidade Estadual do Ceará. Fortaleza, Ceará, Brazil. https://orcid.org/0000-0002-6086-6901.

utilizáveis no processo de ensino-aprendizagem na graduação em enfermagem, contribuindo com maior interação entre estudantes e professores, esclarecimento de dúvidas e como fonte de informação para consultas. Conclusão: a utilização de aplicativos móveis é pertinente no processo de ensino-aprendizagem na graduação de enfermagem, por oportunizar a troca de experiências e informações entre indivíduos pertencentes a diferentes realidades, ampliando o acesso ao conteúdo, possibilitando o engajamento, limitando barreiras geográficas e adequando-se a realidades específicas.

Descritores: Aplicativos Móveis. Exame Físico. Educação em Enfermagem.

Objetivo: identificar las aplicaciones móviles disponibles para la enseñanza de los procedimientos de examen físico y procedimientos de enfermería y cómo han contribuido al proceso de enseñanza-aprendizaje en la graduación en enfermería. Método: revisión integrativa de la literatura, realizada en abril de 2020, de acuerdo con el protocolo predefinido y las recomendaciones PRISMA. Resultados: las aplicaciones Oiva®, Vital Easy®, Whatsapp®, Facebook® y correos electrónicos fueron identificados como utilizables en el proceso de enseñanza-aprendizaje en la graduación enfermería, contribuyendo con una mayor interacción entre estudiantes y profesores, aclarando dudas y como fuente de información para consultas. Conclusión: el uso de aplicaciones móviles es relevante en el proceso de enseñanza-aprendizaje en la graduación en enfermería, ya que proporciona oportunidades para el intercambio de experiencias e información entre personas pertenecientes a diferentes realidades, ampliando el acceso a los contenidos, permitiendo el compromiso, limitando las barreras geográficas y adaptándose a realidades específicas.

Descriptores: Aplicaciones Móviles. Examen Físico. Educación en Enfermería.

Introduction

The current processes of living and producing, influenced by globalization and approximation between individuals and nations mediated by the advent of the Internet, have demanded constant updating and consumption of information. Access to information is provided by the common and routine use of mobile phones, computers and other instruments with information systems connected to the Internet, fostering the union of life in today's society and the use of digital information and communication technologies (DICT). In the educational context, the use of these tools in the teaching-learning process strengthens the construction of knowledge, expanding the potential of this process[1]. Moreover, they promote the student's authorship, active participation and collaboration, since the possibility of learning in these environments mediated by the DICT is able to reconfigure the paths taken by the students to acquire knowledge[2].

In the field of health education, there are numerous innovations in teaching and learning methods to better meet the learning demands of students, including the incorporation of DICT inside and outside the classroom, with diversification of themes and applicability in different training contexts[3].

The DICT comprise the advances brought by digital resources and tools that have added new forms of interaction and communication to information and communication technologies (ICT), which include electronic and technological devices, such as computers and the Internet[4]. The DICT, in turn, represent the universe promoted by Web 2.0 and its digital tools, allowing the user greater interaction and production of content, such as blogs, social networks and educational software[5].

Among the DICT, the development and use of mobile applications (apps) stands out, configuring a grouping of technological resources produced based on a scientific parameter to ensure greater attractiveness and communication to the formative procedures[6]. The use of these applications has acquired space in people's lives, directly influencing public policies and moving society towards modern knowledge about democratic and sociocultural values, undertaking an educational and informative resource. Thus, the construction of individuals' relationships with their professional education process is strongly

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influenced by the use of these technologies, being relevant to stimulate their pedagogical integration in the various panoramas of health education[7].

Regarding the nursing area, it is appropriate to contextualize that the development and applicability of these technological resources contribute positively to building and disseminating knowledge, since the learning of basic techniques is commonly pointed out by students as a mixed period of identification and professional achievement, but also with anguish and fear due to lack of knowledge and inexperience. Thus, this type of technology promotes a more attractive and interactive educational process[8].

The scenario mediated by the use of these applications offers new pedagogical possibilities inherent to the virtual environment, promoting active participation of students and greater interaction between them and professors, contributing with innovative practices aligned with current demands for nursing teaching. In this perspective, technological resources promote the decentralization of pedagogical work, enabling new ways of constructing knowledge through the interactivity between the student and the professor[6].

The integration of these technologies into the training process of nursing professionals becomes a relevant object, because of their potential to favor engagement, participation, curiosity, student-professor and student-student interaction. In this sense, the objective was to identify the mobile applications available for the teaching of physical examination and nursing procedures and how these have contributed to the teaching-learning process in nursing graduation.

Method

This is an integrative literature review, which sought to identify, analyze and synthesize evidence on the use of mobile applications for the teaching-learning process in undergraduate nursing. For its operationalization, a research protocol was constructed contemplating the stages of elaboration of the review question, search and selection of primary studies, extraction of data from studies, critical evaluation of the primary studies included, synthesis of the results and presentation of the review[9].

In the first stage, to operationalize the search for the references that comprised the review in question, the PICO strategy was used to formulate the guiding question of the research: What are the mobile applications available to the teaching of physical examination and nursing procedures and how these have contributed to the teaching-learning process in nursing graduation.

This definition allowed searching for the material for analysis, in a paired way, through the portal of the Coordination for Higher Education Personnel Improvement (CAPES) at the Latin American and Caribbean Health Sciences Literature (LILACS) database, the Public Medical Literature Analysis and Retrieval System Online (PubMed) portal and the Scientific Electronic Library Online (SciELO) database.

The search crossings were articulated through the relationship of the descriptors selected from the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH), namely: *aplicativos móveis* (mobile applications), *exame físico* (physical examination) and *educação em enfermagem* (education, nursing). These descriptors were associated by the Boolean operators AND and OR and added to synonyms to increase the sensitivity of the searches, structuring four equations:

a) ("Aplicativos móveis" OR "*Apps* móveis") AND ("educação em enfermagem" OR "ensino de enfermagem" OR "estudantes de enfermagem");

b) ("*Mobile applications*" OR "*Apps, Mobile*" OR "*Mobile App*") AND ("*Education, Nursing*" OR "*Nursing Education*" OR "*Educations, Nursing*");

c) "Exame físico" AND ("Aplicativos móveis" OR "*Apps* móveis"); e

d) ("*Physical Examination*" OR "*Examinations, Physical*" OR "*Physical Examinations*") AND ("*Mobile applications*" OR "*Apps, Mobile*" OR "*Mobile App*").

Operationalizing the searches, the inclusion criteria delimited were: studies published in the period from 2015 to 2020, in Portuguese, English and/or Spanish, fully available and that contemplated the use of applications in the process of nursing education, object of the study. The temporal delimitation to search for the studies considered the recent progress in the implementation of the strategies of the National Policy of Health Science, Technology and Innovation and the advent of the use of DICT in teaching in the health area.

Articles that did not address nursing graduation and/or use of applications in this education were excluded. The process of identification, triage, eligibility and inclusion is summarized, according to the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) instrument, illustrated in Figure 1.

Figure 1 – Process of selection of the studies for analysis
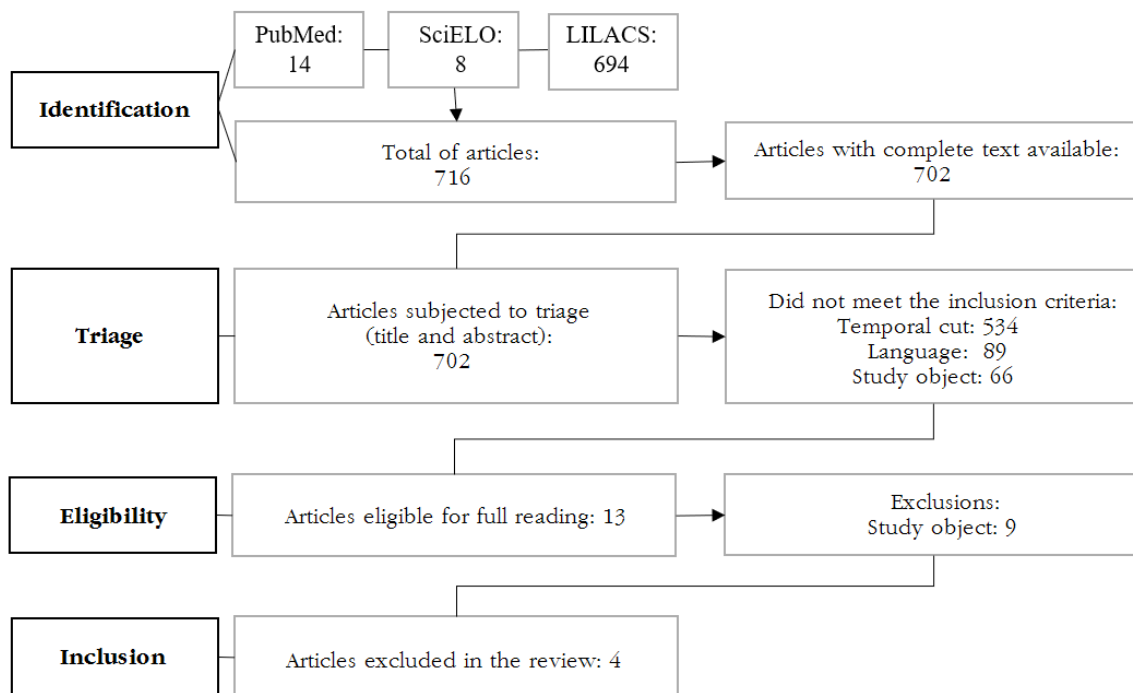
Source: Created by the authors.

After selecting the studies that would compose the review, in the third stage, the data of the studies were extracted, summarizing them based on an instrument elaborated by the researchers, containing the variables of interest: theme addressed, authorship, country, application, application characteristics pertinent to nursing education and type of study.

For the methodological evaluation of the selected articles, the Critical Appraisal Skills Program (CASP) was used, which allows qualifying systematically the reliability, relevance and results of the published works. In this sense, the studies were classified according to methodological adequacy and risks of bias in A, for those with good methodological quality, and reduced bias, when, in the evaluation, the score was between six and ten points; and in B, when the methodological quality was satisfactory, even with an increased risk of bias, representing those with a score below six points. This process involves questions such as: What is the question of the study? Was the study question answered? Did the study achieve its objectives?

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Two researchers performed the stages of literature search and selection, data extraction and critical evaluation of the studies concomitantly. In case of disagreements, a third researcher carried out the evaluation, contributing to the clearance of the decision. Finally, the data were synthesized, presented and discussed with the pertinent literature. To ensure ethical and legal rights related to the authorship and development of the analyzed publications, the authors were referenced, upon mentioning their findings.

Results

The studies that comprised the analyzed sample were published from 2017 to 2020 and in English and Portuguese. Regarding the level of evidence, all were classified as belonging to class A, demonstrating adequate methodological structure in their development. Chart 1 presents an overview of the publications analyzed, covering the theme worked, authorship, country of origin, mobile application used and type of study.

Chart 1 – Information on the articles included in the review

Theme worked	Authorship	Country	Application	Type of study
Applicability of mobile devices in the treatment of mental disorders	Kaipainen K, Välkkynen P, Kilkku N[10]	Finland	OIVA	Reflective study
Theory and clinical practice of the nursing course through the exploration of mobile devices	Willemse JJ, Bozalek V[11]	South Africa	E-mail, SMS, WhatsApp and Facebook	Exploratory, descriptive study
The use of WhatsApp to improve primary health education	Willemse JJ[12]	South Africa	WhastApp	Exploratory, descriptive study
Building a digital app for teaching vital signs	Pereira FGF, Rocha DJL, Melo GAA, Jaques RMPL, Formiga LMF[13]	Brazil	Vital Easy	Methodological study

Source: Created by the authors.

Of the identified mobile applications, only the Vital Easy®[6] was built specifically for the teaching of attributes related to nursing practice, essentially focusing on the techniques of measurement and interpretation of vital signs. This technological tool was constructed according to Galvis-Panqueva's reference, in its stages of analysis, design and development, not being pointed out its validation by specialists or target audience.

The OIVA®[10] application, although it can be used in the learning of mental health issues in nursing graduation, is not essentially intended for this purpose, being adopted for the development of skills to deal with depression. In the study analyzed, there is no description of the construction process of this technology.

Social media and habitual contact presented potentialities regarding the use in training processes, due to factors such as easy access, gratuity and possible interaction between teaching-learning actors, such as professors and students[11-12]. There was greater identification with e-mail, among the possibilities on mobile devices, since this type of mobile application already composes the collection of current smartphones and allows sharing files in larger size and different formats, such as texts, images, videos, software, among others[11].

WhatsApp® was pointed out as a resource for conducting discussion groups, providing opportunities for access to information in a timely place and time, as needed, ensuring guidance for practice, source of information for

testing and clarification of doubts[12]. Facebook® was recognized as a possibility to promote involvement among students, as well as with the community, in view of the frequent use of this technology[11].

Figure 2 condenses the main aspects related to the use in the teaching-learning process of the applications pointed out in the studies.

Figure 2 – Aspects related to teaching-learning in the use of digital applications identified in the literature
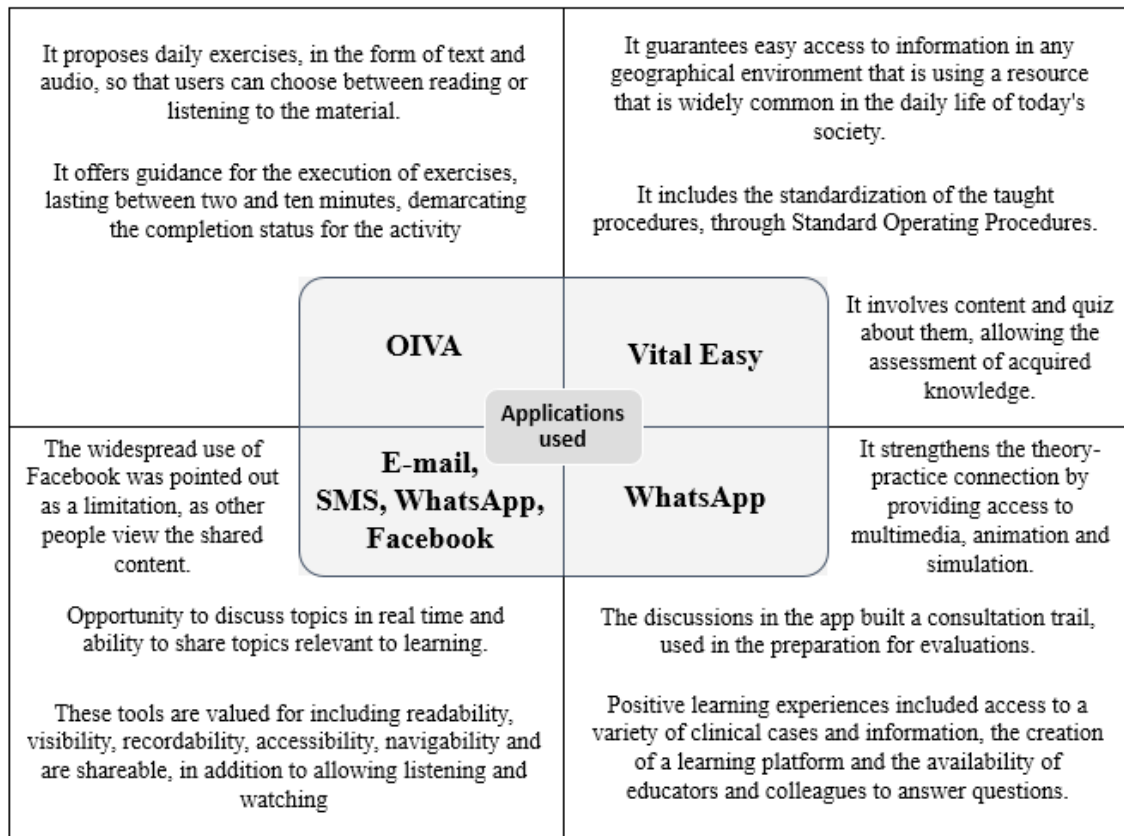
Source: Created by the authors.

Some challenges are pointed out for the use of mobile applications in the teaching-learning process, including the need for validation by judges and target audiences and the adoption of institutional pathways, in order to ensure formal teaching issues, such as non-sharing of material, opinions and positioning with people outside the teaching reality[11].

Discussion

The adaptations of the teaching-learning process, in order to provide a more adequate response to social demands and training needs, have requested updates in pedagogical strategies,

didactic tools and educational skills, adding the dynamics and use of technology to provide meaningful learning[14]. In this context, mobile applications demonstrate their potential to make teaching more flexible and promote active learning, responding to the needs of users and materializing as innovation in professional training.

The use of mobile applications in nursing education concerns the contemporaneity of the profession and its affirmation as a science, adopting educational technologies capable of promoting theoretical knowledge and critical and reflective thinking necessary for greater dialogue between theory and practice and the development of competencies[13].

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The use of DICT, concerning teaching and learning aspects through mobile applications, aims to improve students' learning. It has become usual in higher education, especially, effectively contributing to practical classes. The DICT permeate the daily lives of students and professors and offer abundant access to communication and information. Educators and students can use these tools in various contexts for learning purposes, for example, discussion forums and content distribution[12].

The applications identified in the studies promote a contribution to the teaching-learning process in the scenario of higher education of nurses, emphasizing that the production and/or evaluation of these technological resources, in the context of teaching and learning, provides a greater relationship between students and educators within the digital scenario.

There are numerous possibilities for integrating technologies to teaching, including nursing education[15]. Among these, there stands out the increasing use of mobile applications, justified by their practical access and availability in the current technological conjuncture in which the world is inserted, and can be accessed in an extra-class environment, as a complement to teaching. Moreover, the university environment becomes conducive to the application of mobile apps, since they can be created and executed by the students themselves, enabling the acquisition of knowledge and skills in this process[16].

The apps developed in the university space, by the professors themselves, aligned with the curricular component and supported by inter-collaboration with students, are better suited to educational practices because they structure a more favorable and attractive environment, enhancing and facilitating engagement in these actions[17].

By incorporating mobile applications into the teaching-learning process in the health field, educators are innovating in the relationship between teaching and learning as they adapt to the need for contemporary educational models. In this perspective, nursing follows this renewal, by using virtual environments, enabling interactivity and favoring the learning process[18].

The inclusion of digital environments in undergraduate courses provides students with autonomy in learning, besides fostering the digital inclusion of those involved, making the process more dynamic and motivating[16]. It also demonstrates the possibility of use in situations that hamper the direct contact with the professor, such as performing activities in the home environment, developing actions in the community and periods of remote classes.

It is important to discuss that expanded use of DICT, such as apps, does not represent a process of robotization of education and replacement of the teaching being in the teaching-learning process, since these didactic tools require organizational preparation, methodological adequacy and appropriate theoretical framework. Their good use also depends on the proper interaction between professors and students, based on complementary and non-substitute resources for the face-to-face moments of training[19]. It is not the simple integration of DICT that can transform pedagogical practices, but certain uses of these technologies, especially their contextualized integration into each reality[20].

Among the positive aspects of the use of mobile applications, the stands out the disruption of barriers of access to education and innovative learning contexts, supplying geographical distances, didactic deficiencies of professors and deficits of educational materials, making the teaching process more attractive, complete and dynamic[7].

Thus, applications can be effective because they are characterized as innovative instruments in health-related teaching, presenting themselves as tools capable of arousing interest and motivation to learn, since mobile apps are used in a ratio between 45% and 85% more than lookups with books and magazines[21].

The creation of digital educational objects is always positively evaluated, upon considering that individuals are intrinsically linked to a globalized world, enabling communication

facilities and access to additional researches provided by the virtual environment. However, there are premises for the use of these objects in educational practices, such as the formulation according to the need, a structuring according to the recommendations of experts and the survey of users' acceptance[18].

Based on these premises, the use of e-mails, WhatsApp® and Facebook®, although with the potentialities evidenced in the studies analyzed regarding their use and possibilities in nursing education, do not meet the recommendations previously defended of construction, adequacy and validation. In this way, they should be adopted secondary to other primary tools and strategies.

Regarding the use of the Whatsapp app® in training processes of other health professions, such as medicine, the ability of this technology in the transfer of information, such as texts, audios, images and videos, was considered, enabling synchronous and real-time interaction between individuals. Moreover, it is effective for the consolidation of theoretical concepts already introduced in the axis of discussions with students, promoting debates, expanding possibilities for content application and strengthening the critical view of the realities of the territory[19].

Facebook, in turn, is recognized as a timely environment for health interventions, and can help in the involvement, responsibility and empowerment of users, conditions that are essential for behavior change[22]. Nevertheless, some nursing students who tried this tool in training did not consider it the best option, because of the easy sharing of posts, likes and comments with individuals who do not belong to the educational environment in question, inhibiting participation or restricting it[11].

A systematic review of the literature previously conducted indicates that the digital applications developed in the health area, including nursing, address aspects of diagnosis, telemedicine, surgical simulation, training, data collection, patient education, behaviors and surgical planning[23]. The construction of apps aimed at the education of graduate students in their

theoretical, theoretical-practical and practical dimensions is still incipient.

In relation to education, the enthusiasm for progress and application of digital resources in graduate programs demonstrates growth and expansion, with a view to the dissemination of educational software in various courses and disciplines, whose center is the improvement of teaching in the process of students' training. This dissemination is inserted in the contexts of development of actions in education and health, learning of theoretical and practical contents and in the role of the student in the learning process[24].

Finally, it raises the consideration that digital software and applications cannot be idealized as the best or the only alternative for teaching, but in a complementary way to face-to-face teaching, since the use of these technologies, even in an appropriate way, does not ensure the effectiveness of learning amid its complexity, influenced by the didactic way of presenting information , as well as the interest expressed by students in learning[13].

It is also worth recognizing the limitations of access to these technologies, still persisting in several regions, such as instability in internet access, lack of infrastructure of computer labs and the limitation of skills in handling the applications by professors and students less familiar with the technologies[17]. Regarding internet access in Latin America and the Caribbean, countries such as Nicaragua and Guatemala are identified with a very low level of access by the population, reaching 10% of individuals, while countries such as Brazil, Chile and Argentina have a percentage of access close to or slightly higher than 50%. European countries and the United States have an internet access rate equal to or greater than 70%[25].

With the advancement of educational methods and technology increasingly present in the teaching of nursing students, it is expected to stimulate the construction, validation and evaluation of digital applications relevant to nursing teaching, especially in the graduation, and may benefit students with the incentive in

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the search for new knowledge, in addition to expanding the use of technologies so present in other spheres of life.

A relevant limitation of this review is the small number of digital applications analyzed, convergent with their low production for educational purposes in nursing education, and the absence of quasi-experimental studies evaluating the use of these technologies with educators and students, in order to improve them and inspire other applications under construction.

Conclusion

The teaching and learning in nursing is complex and requires, from all involved, active postures in the search for innovations so that the necessary knowledge and skills are always useful in decision-making. Currently, DICT can contribute to relevant changes in the ways of teaching and learning of students and professors in the development of a more meaningful learning, putting into practice new ways of teaching and learning in the training of nursing professionals, so necessary to current social demands and the disruption with the traditional teaching model.

The results presented reveal these possibilities of integration of DICT, especially in contexts of use focused on specific practices in nursing teaching. The rationale and dissemination of the use of mobile applications become relevant, by providing opportunities for the exchange of experiences and information between individuals belonging to different realities, expanding access to content, engagement, and limiting geographical barriers and adapting to specific realities.

Thus, nursing graduate courses should evaluate the most adequate and effective resources to be used in their reality, associating the best technology with the best teaching method and characteristics of the student body, as well as the approximation between workers and researchers in the areas of informatics, education and health, in order to promote the

development of mobile applications consistent with reality.

Collaborations:

1 – conception, design, analysis and interpretation of data: Tiago Ribeiro dos Santos, Luciano Gualberto Soares and Lucas Dias Soares Machado;

2 – writing of the article and relevant critical review of the intellectual content: Tiago Ribeiro dos Santos, Luciano Gualberto Soares, Lucas Dias Soares Machado, Nayara Santana Brito, Maria Augusta Vasconcelos Palácio and Maria Rocineide Ferreira da Silva;

3 – final approval of the version to be published: Lucas Dias Soares Machado, Nayara Santana Brito, Maria Augusta Vasconcelos Palácio and Maria Rocineide Ferreira da Silva.

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