Original Article

Building a digital application for teaching vital signs

Construção de um aplicativo digital para o ensino de sinais vitais

Construcción de una aplicación digital para la enseñanza de los signos vitales

Francisco Gilberto Fernandes Pereira[a]
Débora Valente da Silva[b]
Luciana Maria Oliveira de Sousa[b]
Natasha Marques Frota[b]

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ABSTRACT

Objective: To describe the steps in creating a digital application directed to teaching vital signs for nursing students.
Method: This is a methodological study, conducted from March to October 2014, in which have followed the stages of analysis, design and development of technological tool, based on the theoretical framework of Galvis-Panqueva. We conducted a narrative review of the literature on the subject, and then picked up the best platform for application hosting.
Results: Once the steps proposed in the theoretical framework were followed, the analysis outlined the content and technological infrastructure. As for the design, it provided the assessment of the environment and its interface and operation, and finally the development materialized the projection of the design and interactive features proposed in previous steps.
Conclusion: The application is an interactive support in the training of nursing students, and it is suggested that validation of content be performed for further practical application.
Keywords: Educational technology. Nursing education. Vital signs.

RESUMO

Objetivo: Descrever a etapa de criação de um aplicativo digital direcionado ao ensino de sinais vitais para acadêmicos de enfermagem.
Método: Trata-se de um estudo metodológico, desenvolvido entre março a outubro de 2014, no qual foram seguidas as etapas de análise, desenho e desenvolvimento da ferramenta tecnológica, com base no referencial teórico de Galvis-Panqueva. Realizou-se uma revisão narrativa da literatura sobre o tema e, em seguida, escolheu-se a melhor plataforma para a hospedagem do aplicativo.
Resultados: Seguidas as fases propostas no referencial teórico, a análise permitiu delimitar conteúdo e infraestrutura tecnológica; já o desenho proporcionou a avaliação do ambiente e sua interface e operacionalização e, por fim, o desenvolvimento materializou a projeção do desenho e recursos interativos propostos na etapa anterior.
Conclusão: O aplicativo constitui um suporte interativo na formação de estudantes de enfermagem, e sugere-se que seja realizada sua validação de conteúdo para aplicação prática posterior.
Palavras-chave: Tecnologia educacional. Educação em enfermagem. Sinais vitais.

RESUMEN

Objetivo: Describir la etapa de creación de una aplicación digital, dirigido a la enseñanza de los signos vitales para los estudiantes de enfermería.
Método: Se trata de un estudio metodológico, realizado entre marzo y octubre de 2014, en el que se han seguido las etapas de análisis, diseño y desarrollo de la herramienta tecnológica, con base en el marco teórico de Galvis-Panqueva. Se realizó una revisión narrativa de la literatura sobre el tema, y después se eligió la mejor plataforma para el alojamiento de la aplicación.
Resultados: Seguidos los pasos propuestos en el marco teórico, el análisis ha puesto de relieve la infraestructura tecnológica y de contenido, ya que el diseño proporciona la evaluación del medio ambiente y su interfaz y funcionamiento, y finalmente se materializó el desarrollo del diseño de proyección y características interactivas propuestas en el paso arriba.
Conclusión: La aplicación es un soporte interactivo en la formación de los estudiantes de enfermería, y se sugiere llevar a cabo la validación de contenido para una mayor aplicación práctica.
Palabras clave: Tecnología educacional. Educación en enfermería. Signos vitales.

[a] Universidade Federal do Piauí (UFPI). Picos, Piauí, Brasil.

[b] Centro Universitário Estácio do Ceará. Fortaleza, Ceará, Brasil.

INTRODUCTION

The use of Information and Communication Technologies (ICT) in the teaching-learning process has proven to be a tool in strengthening the construction of knowledge and, through playfulness, assist in the formation of concepts and the development of manual skills in various areas of education, from the elementary to the upper level[1].

The development and use of ICTs is increasing in nursing, forming a contemporary teaching mechanism which focuses on process automation, even serving to increase security in the decision making process of care[2].

The themes observed have been those dealing with sexual and reproductive health[3], evaluation and treatment of wounds[4], nursing management[5], and basic procedures of the profession[6], which were developed in a hypermedia type Virtual Learning Environment (VLE), in order to provide means to facilitate the learning of the execution of activities in nursing through virtual interaction.

Still in this perspective, some studies[2,4,6], raised by investigating the state of the art, have shown that the application of technological resources, such as: *Moodle,* applications, social networks, forums and VLE, making it possible to acquire information and cognitive skills to perform nursing procedures, increasing security and confidence as to their realization.

Therefore, the idealization of this study originated from the perception that during the first contact of the academic with the specific universe of nursing, there is often difficulty in learning the new typical coding of health, especially in relation to semiotics, highlighting the most fundamental and basic of actions that is checking Vital Signs (SSVV). Studies[2,5] corroborate that the teachable moment of this action is permeated with joy because of the new discovery, and because the students feel more in touch with the profession, but it is also permeated by fear and insecurity about the correct way to check, interpret the findings and attribute specific nomenclature.

Thus, the importance of developing a multimedia resource is hereby highlighted, one of the application type for mobile devices that offers the academic a means of quick, easily transported consult to various practice scenarios in health facilities. Therefore, it is understood that by accessing this type of platform, the academic is able to address some questions, and, with more autonomy, will feel more prepared to perform the semiotics checking of vital signs, and can better understand what this result means in terms of clinical outcome for the patient.

The implementation of this research is also justified due to the need to readapt ways of teaching in the health area, allowing the academic a more interactive form of study, in addition to being a prerogative currently adopted by universities in order to support classroom teaching. In this sense, the objective of this study is to describe the steps involved in creating a digital application directed towards teaching vital signs to nursing students.

METHOD

The study consists of a methodological applied research that focuses on technology production, characterized by development and creation of a new product, activity or service[7], since there the construction of a digital application on vital signs from ICT took place.

Among the different methodologies for the development of ICT in virtual learning environments, the methodology by Galvis-Panqueva was chosen for this study[8] because of its clarity and cohesion with the aims and objectives of the research. Thus, the phases of this research were two: analysis and design; and development[8].

The step of analysis and design is the accurate search of the real need or demand of strategies that justify the topic, as well as the creation and use of VLE. Even at this stage, elements such as goals, content, target audience, learning environment and technology infrastructure are analyzed. The development comprises the materialization of media used in VLE[8].

The study was developed in a University Center in the city of Fortaleza, Ceará, and the chosen target audience were nursing students, in order for it to be a support material to classroom learning and contribute to the professional training in the subject of vital signs.

The application was built during the analysis and design step, which happened between the months of March and October of 2014, where in this period the entire topic to be approached was researched through a narrative review of the literature found in national and international databases, from which the need to include the following topics evolved: temperature[9]; blood pressure[10]; Respiratory frequency[9]; heart rate[9]; pain[11]; and Body Mass Index (BMI)[12], that despite not being considered a vital sign, is an important finding of semiological evaluation. It is important to note that references that sustain the values of vital signs will be reviewed in periodic updates of the application.

Human resources for preparing the content were: two nurses, Master's in nursing; a professional *web-designer* to digitalize the material; and two scientific initiation scholarship awardees to describe the media *layouts* and the define how to assess learning.

The materialization of the design created previously occurred in the development stage, when the programs to be used were chosen. The application was named *"Vital Easy"*, which can be used on mobile devices. As for the language used in the interface, the prerogatives of simplicity, clarity and objectivity were followed, making the contents more accessible to users, in a way that they can learn and advance their studies more easily. The presentation of the program is: free, easy to handle, indexed with the *web's* best information in one location, and is only available for use on mobile devices.

In compliance with Resolution 466/12[13], of the National Health Council, the project was approved by the Ethics and Research Committee of the Department of Nursing of the Federal University of Ceará, with file number 983.129. The concession of copyrights over the product was guaranteed to the participants/developers of the application, and all involved signed a Free and Informed Consent Form with information related to the project and their participation.

RESULTS

The application is available for *download* for free at the *GooglePlay* virtual store, compatible with devices that operate with android type technology, and can be found using the search engine named *VitalEasy*. The choice for android compatibility was made due to the fact that, in the Brazilian reality, this type of operating system is compatible with most mobile phones and *tablets,* which makes the application accessible to a greater number of people[14].

The student/user will need Internet access to perform the *download,* and after it is saved in the memory of the mobile phone or *tablet*, it will also be available for offline use, without the need to create profiles or specific access accounts to use the application.

Six topics that will enable the student's intuitive interaction with the application were developed: temperature, respiratory rate (breathing), blood pressure, heart rate (pulse), pain and BMI. In addition, a tab entitled Test was also created, using a *quiz* type strategy that serves as a method to evaluate the student's acquired knowledge on the subject. For each topic, except for the Test, four modules were included: concept, measurement, reference values and the procedure's performance technique.

Each functionality related to SSVV measurement was coded with numeric ranges of normal and physiological abnormalities and associated with their respective terminology according to the semiotic language. Thus, the student chooses the vital signs to be observed, enters the values found, and the application shows the proper terminology for this situation (Figure 1).

As for pain parameter, the visual analogue scale was used in combination with the numerical scale which will classify the facial expression automatically according to the value inputed by the student (Figure 1).

A Standard Operating Procedure (SOP), was also designed for each item, based on a literature review, to lead the student in the performance of the procedure, in order to remedy any doubts as to the verification of the semiotics of that particular type of vital sign, and therefore provide greater security as for the step by step execution (Figure 2).

In the test (Figure 3) tab, the student can answer direct questions with multiple alternatives, on topics such as terminology, reference values, semiotics, equipment

Figure 1 – Verification Screen of vital sign Pain and BMI. Features that present a Pain Scale with variations between 1 and 10, reference values for the BMI together with the concept and nomenclature. Fortaleza, CE, 2014.

Source: *VitalEasy* Application

Figure 2 – Blood pressure and SOP tab access screen. A feature that presents concept, nomenclature, reference values and description of the procedure. Fortaleza, CE, 2014.

Source: *VitalEasy* Application

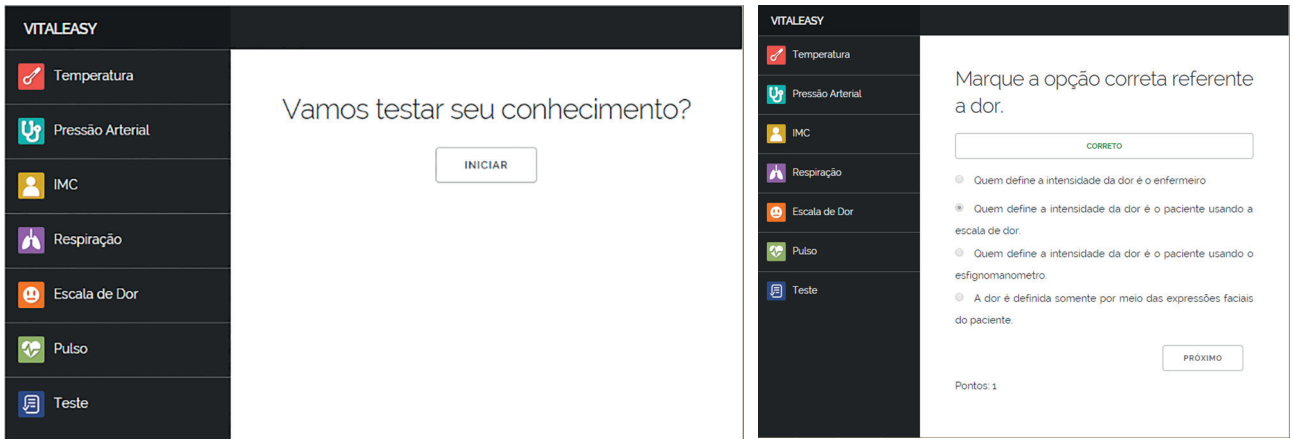

Figure 3 – Test tab access screens. A feature that provides real-time use of learning through questions and answers. Fortaleza, CE, 2014.

Source: *VitalEasy* Application

used and professional attitude, in order to help identify the greatest difficulties and, thus, be able to study focusing on their needs.

DISCUSSION

The introduction of computer technology in education is innovating the teaching-learning relationship, as it is adapted to the needs of contemporary educational models. Nursing follows this innovation, and through experience with the use of virtual learning environments, has demonstrated that interactivity favors the learning process[3,4].

The use of applications as a teaching tool in the health area is very innovative, and is presented as a method to generate interest and motivation in wanting to learn more and more, given that the mobile devices that host these applications are used by health professionals in a proportion of 45% to 85%, with a higher rate of consultation than books and magazines[14].

An application developed with focus on immunization education in Brazil has shown, at the end of its construction, that devices like this generate interest in users, facilitate and streamline the consultation in cases of doubt, and are a reliable means of finding information. But, it is emphasized that to meet these goals, it is necessary to achieve a high degree of usability and reliability[15].

Thus, in the application developed in this study, focus was set on questions concerning the attractiveness and usability, so that the choice and the font size, as well as the standardization of colors and the choice of hosting plat-

form, could generate a greater sense of visual comfort, use dynamics and consultation speed.

The literature points to the creation of digital educational materials on the topic of vital signs in the Rio Grande do Sul region, where nursing students evaluated the technology positively, especially emphasizing the communication facilities and access to additional research that the virtual environment provides, and it was also said that the multimedia features present in digital objects such as videos and animations on the procedures were facilitators and motivators of the learning process[15].

The main advantage in developing educational materials is their reuse, being made available on *websites,* allowing access to and use of these materials by any individual in search of the content[16]. In the case of the application developed with this research, it is believed that its use will be on a large scale, since it offers the possibility for consultation on mobile devices and in *offline mode*.

ICT's disrupt barriers in education access and enable innovative learning environments that are increasingly less distant, geographically apeaking, making the teaching process more attractive and dynamic. This makes individuals have a greater desire to learn the topics proposed through the interactivity produced by new technologies, which reach a greater number of fans every day[2].

The adoption of ICT in education has brought significant changes to the traditional educational paradigm by promoting new forms of teaching and learning, inducing new behaviors in teachers and students, new forms of relationships and ways of thinking and producing knowledge[1].

In nursing, these findings do not differ, for it is known that there are favorable results in various scenarios of teaching that increase access to *Web-based* learning methods[17]. It is also noteworthy that nursing has followed the process of introducing computer technologies to education, promoting innovation, as it seeks to adapt them to the needs of nursing, so that there is an approach between the student and technological resources[2].

Conducting research related to the use of computers in nursing as a teaching method can support the use of learning technologies in schools. This can be done by integrating nursing education to the virtual environment and collaborating with the development of new strategies to improve the teaching-learning process.

The scenario offered by new ICTs offers the educational option for the virtual environment by optimizing the relationship between professors and nursing students, enabling a new means of interactivity in the daily activities of teaching in this profession. Technological resources bring the decentralization of educational work, where education is no longer only held through the transmission of content and increased interactivity between the student and the teacher, in general.

Mobile applications, when targeted to health, can be an interactive tool and means for information exchange between users, which is seen as a limitation for *VitalEasy*. It is important that interaction is taken into account when developing this type of educational technology, as it would enable users to exchange experiences and ask questions in real-time when connected to the internet[17].

A study held in the United Kingdom[18] advocates a pedagogical proposal associated with a nice simulation scenario *layout* for performing tasks offered through the Internet to encourage the student to imagine the playing field and develop an action plan based on the needs presented. In this study setting, the authors used a hypothetical case with a video of the patient and information on him. The developed activity consisted in answering a problem situation with the planning of nursing actions. This educational resource has been evaluated as easy to use by students and showed improvements in learning experiences.

Another study in the United States held in a nursing program, showed that the use of an educational video for planning and nursing interventions mediated by the Internet enabled the students to have a practical way of holding logical reasoning about various problem situations. Upon completion of the proposed activities, the student should participate in a *chat,* socializing their questions and experiences regarding the use of this new means of learning. The findings of the study showed significant results regarding the performance and decision-making ability of students from what was posted in *chat rooms*[19].

The impact generated by the use of applications can be directed to patients or professionals, and in the latter case, the greatest contribution would be to aid the capacity to make assertive decisions facing the diagnosis and treatment of patients. In addition, it allows to conduct research in real time on issues that often lead to questions[20].

Because of this contemporary technological reality, it is necessary for the health care professional, especially in this sector, to acquire skills that include the use of ICTs in order to enrich and expand their professional practice, their continuing education and social practices in the fields they may act in.

In a study conducted in São Paulo, with nursing students enrolled in the first semester, the importance of the integration of educational technology in education to complement the training of nurses was evaluated. From the results, some positive points were highlighted, such as the ability to obtain information beyond the classroom,

greater communication among students, and between them and the teacher, and the positive influence of the use of this resource in professional practice[2].

Another study conducted in the city of Fortaleza with nursing students from a public university, before and after the use of an educational hypermedia on peripheral venous puncture, pointed out that the students considered this an important tool for clinical practice, demonstrating that the use of this type of teaching resource encourages learning and has significant repercussions in a professional career[6].

In this context, it is important for undergraduate students to be familiarized with technology resources, favoring their use. Nursing education should cover the training of graduate students towards a society of knowledge, making the knowledge necessary information for the development of the profession.

The computer resource must be used to complement the teacher and should be viewed as a teaching aid. Even knowing the potential of computer use, there is still a shortage of computerized educational material in various educational institutions.

In this sense, the creation of the digital application on vital signs becomes of great importance to elevating the profession and improving the quality of education, since it will be available for student use after the validation process with experts from the field of nursing and computing.

FINAL CONSIDERATIONS

The construction of the application is the first step to boost the teaching of SSVV for nursing students, considering the difficulties encountered regarding the measurement of SSVV, the technique, terminology and concepts.

It is urgent that dynamic, interactive and innovative strategies be adopted in nursing education, so that the crystallized practice of stagnant memorization of concepts is reduced, and value begins to be given to the reflection and decision-making in clinical findings.

This technological product will therefore act as student support to ensure easy access to information in any geographical environment, and the use of a largely common feature in the everyday activities of today's society.

Therefore, it was shown that the application can be used in the teaching practice of SSVV, making learning most attractive and dynamic, and the results suggest that the application can achieve greater impact with the inclusion of more features, and it is recommended this technology be validated with experts and students / members.

It has as main study limitation in the fact that the digital application is directed only to a point belonging to the area of nursing fundamentals, consisting of vital signs. Therefore, it is recommended: that the application be validated by experts in nursing and computer science; that it be validated with academics; and that complementary materials be created, with a view to enhancing nursing education in this area of work and other issues is also defended, not only for teaching in the academia, but so that there is scope for nurses who are already in the health service, in order to enhance their knowledge.

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Corresponding author:
Francisco Gilberto Fernandes Pereira
E-mail: gilberto.fp@hotmail.com

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