The use of applications in distance learning specialization course as a support tool for students living in remote areas without internet

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Abstract

The world is experiencing the popularization of mobile devices made possible by the increasing technological advances and the advent of Internet as a communication and information main tool. These facts show that the development of applications compatible with such devices is an effective mean to provide content to diverse audiences. In the educational field, these devices can be seen as technological supportive artifacts for distance education, serving as strategy for continuous and permanent education for health professionals. The Open University of Brazilian National Health System (UNA-SUS) offers distance learning courses, including specialization with free access. In order to increase public reach, UNA-SUS started developing mobile applications as supporting material for students. These applications can be accessed in offline mode, increasing the range and efficiency of the material. The 57 applications developed with responsive online books format reached the milestone about 7,000 downloads and they are now gathered at the Saite Store, an online library in the form of application. This number shows the positive acceptance of the format used, accentuated by the ease of having material downloaded from the device, not requiring the user to be connected to access content.

Keywords: *Mobile Applications; Distance Education; Continuing Education.*

Resumen

El uso de aplicaciones en un curso de especialización a distancia como una herramienta de apoyo para los estudiantes que viven en zonas remotas sin internet

Estamos experimentando la popularidad de los dispositivos móviles, posible gracias a los avances crecientes y el advenimiento de la Internet como la principal herramienta de comunicación e información. Estos hechos demuestran que el desarrollo de aplicaciones compatibles con este tipo de dispositivos es un medio eficaz para proporcionar el contenido a audiencias diversas. En el campo de la educación, estos dispositivos pueden ser vistos como artefactos tecnológicos de apoyo a la Educación a Distancia, sirviendo como estrategia para la educación de los profesionales de salud. La Universidad Abierta del Sistema Brasileño Nacional de Salud (UNA-SUS) ofrece cursos a distancia, incluyendo especialización, con acceso libre. Con el objetivo de alcanzar mayor audiencia, la institución ha desarrollado aplicaciones móviles como material de referencia para alumnos. Estas aplicaciones pueden acceder en modo offline, aumentando el alcance y la eficacia del material. Las 57 aplicaciones desarrolladas en formato de libro online responsivo actualmente alcanzan la marca de cerca de 7.000 descargas realizadas y ahora están reunidos en Saite Store,, una biblioteca virtual en la forma de aplicación. Esta marca indica la aceptación positiva del formato utilizado, acentuada por la facilidad de tener el material descargado en el dispositivo, no requiriendo que el usuario esté conectado para acceder al contenido.

Palabras-Clave: *Educación a Distancia; Aplicaciones Móviles; Educación Continua.*

Resumo

O uso de aplicativos em um curso de especialização a distância como ferramenta de apoio para os estudantes que vivem em zonas remotas sem internet

Estamos vivenciando a popularização dos dispositivos móveis, possibilitada pelos avanços tecnológicos crescentes, e o advento da internet como ferramenta principal de comunicação e informação. Estes fatos evidenciam que o desenvolvimento de aplicações compatíveis com tais aparelhos é um meio eficaz de disponibilizar conteúdos para diversos públicos. No campo educacional, estes dispositivos podem ser vistos como artefatos tecnológicos de apoio para a Educação a Distância, servindo de estratégia para a educação continuada e permanente para profissionais da saúde. A Universidade Aberta do Sistema Único de Saúde (UNA-SUS) oferece cursos a distância, inclusive de especialização, com acesso gratuito e, objetivando maior alcance de público, desenvolveu aplicativos para dispositivos móveis como material de apoio para os alunos. Estas aplicações podem ser acessadas no modo off-line, aumentando a abrangência e eficiência do material. Os 57 aplicativos desenvolvidos em formato de livros online responsivos tiveram isoladamente aproximadamente 7.000 downloads e agora estão reunidos na Saite Store, uma loja virtual em forma de aplicativo. Tal marca evidencia a aceitação positiva do formato utilizado, acentuada pela facilidade de se ter o material baixado no dispositivo, não necessitando que o usuário esteja conectado para acessar o conteúdo.

Palavras-Chave: *Aplicativos Móveis; Educação a Distância; Educação Permanente em Saúde.*

INTRODUCTION

Information technology (IT) applied to education has transformed school environment and generated innovations in the forms of learning. The trend in teaching-learning models is to try to overcome time and space boundaries and reach students regardless of where they are or when they are available. Although this claim has not been fully achieved yet, Distance Education (DE) has occupied a significant space among the pedagogical tools used.[1]

DE is a technological two-way communication system that may be considered as an option to the old classroom teacher-student interaction model and allows learning without the need of those involved in the process to be present in the same location interacting at the same time.[1,2] By this means, with the physical distance between teacher-student, distance education makes use of means and technologies in order to not to compromise the process of transmission and reception of knowledge. In this case, mobile devices can be seen as a supportive technological artifact option, so that distance education reaches the virtual integration of learning vectors.

As in many fields, the difficulties faced by health professionals generate the need for constantly update of their technical, technological and social skills, in respect for the ethical principles governing their conduct. For these workers, distance education would be a strategy for continuing and permanent education, given the numerous technological advances and pedagogical innovations in education.[3]

Working in strengthening the relationship between continuing education – based on DE – and the training of health professionals, Open University of Brazilian National Health System (UNA-SUS) is a project from the Brazilian Ministry of Health, developed in partnership with the Work and Health Management Secretariat – SGTES, that offer Brazilian National Health System (SUS) workers a democratic, flexible and quality education, respecting employee's working time and their place of residence.

Seeking the qualification of health workers, UNA-SUS, in partnership with the Federal University of Maranhão (UFMA), reach a target-audience whose particularities – residents of remote areas with limited internet access, lack of time to study and intense days of work – would hardly allow them to attend tradicional face to face education. If we associate the increasing demand for distance learning courses to the popularization of mobile communication devices, we have the ideal result for the development of innovative teaching methods.

Studies show that distance education has been regarded as an important tool within the Brazilian National Policy of Permanent Education in Health, being well accepted by participants. However, the difficulties concerning the access to internet have still been a limitation to the growth and success of these initiatives.[4]

MATERIALS AND METHODS

Theoretical basis for applications development

According to a research from Business Insider – Online Newspapers – five years ago, much of Internet accesses were performed using desktop computers. In 2013, 22% of the population owned a smartphone, which counts as an increase of aproximatelly 1.3 million in the number of smartphones since 2009.[5]

Therefore, it can be affirmed that the rise in mobile devices use to access internet requests Distance Learning

to make changes in its educational tools to reach mobile devices audience, since it is not feasible to build specifics websites or applications to each platform and device that the user can use. Adjustments must be made so that applications work correctly in any variety of mobile equipments that you can use to access educational material.[6]

For this, the Responsive Web Design (RWD) was found as a solution that enables adaptation to the user behavior and to the environment used to access information, also taking into account the platform, the resolution and screen orientation. Responsive Web Design includes techniques and technologies that are adjusted to make a single application run on a variety of devices in the most utility way possible.[7]

Besides Responsive Design's aspects, to obtain quality material capable of providing a motivational and pleasant educational experience, it is essential to develop it on pedagogical notions basis about educational interfaces able to favor learning and knowledge assimilation.

Applications created and made available by UNA-SUS/UFMA are developed based on learning objects concept, aiming its achievement in different hardware platforms, including mobile devices, besides enabling access without the requeriment for internet connection. The design of these learning objects prioritizes content, student interest and learning theories.[8]

Academics software from UNA-SUS/UFMA provide for students the educational content of their course in a digital book format, ensuring interactivity, a key aspect to learning process. Hypertexts and images meet visual adaptation criterias set by Cognitive Theory of Multimedia Learning, becoming attractive and understandable to students, besides enabling the possibility of 'navigation' the way they want, respecting their time of learning.[9]

Therefore, a major concern of UNA-SUS/UFMA during the creation of its applications is to make adaptive images, so they do not suffer changes able to make them dysfunctional in the transmission of available content.

Educational planning

Within the production of educational resources, UNA-SUS/UFMA performs planning content that will be used in its applications: there is definition of all supporting materials to be used in the module and, later on, didactic planning of these modules. Always trying to choose these materials carefully, evaluating the possibility of their access in the application.[10]

As for applications, which work in offline mode, it is taken into account that the purpose of their construction is to facilitate access to course content developed by UNA-SUS/UFMA, especially for students who work in locations with limited access to internet services. Therefore, the option for not providing online supporting materials and assessment learning activities is purposeful, so that didactic and modular planning is architected with the necessary adaptations for this technology.[10]

Applied technology

Applications created by UNA-SUS/UFMA are developed in HTML5 (HyperText Markup Language 5) CSS3 (Cascading Style Sheets 3) and JavaScript. In addition, mobile version of digital books is generated as an application for Android and iOS platforms, using Phonegap/Apache Cordova technology.

Markup language HTML5 is suitable for the development of responsive interfaces. It offers advantages that HTML4 and XHTML languages do not, such as the fact that most mobile devices have browsers that support HTML5 and CSS3. This type of approach in cross-platform development frameworks for mobile devices is intended to provide better user experience, with greater flexibility and media insertion possibilities.[11]

Application presentation

All applications for mobile devices are available in both platforms of Google's store (Play Store) and Apple's store (App Store).

Figure 1 illustrates the presentation screen of said online book, visualized from both desktop and mobile device screens. All the elements of each page (navigation bar with arrows, navigation between pages, the tool to increase the font size) can be well accessed through the application, because the buttons were designed to be compatible to human finger size.

Figure 2 shows the contents view of a unit of digital book about Postpartum Depression (PPD) in the application.

By clicking on each gray button (Baby Blues, Postpartum Depression and Puerperal Psychosis) the text box below the woman's figure changes, providing detailed information concerning the gray button clicked on. This way, there is a saving of space on the screen, allowing a significant amount of content on a page without it being polluted with too much text, which would make the read-

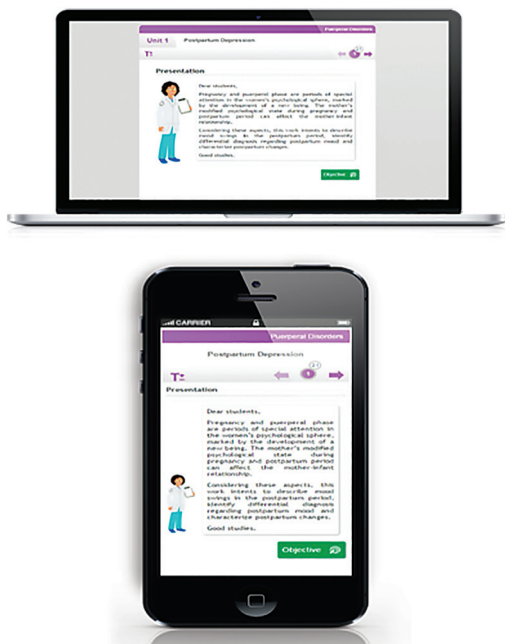ing difficult and tiresome, especially on the small screens of mobile devices.

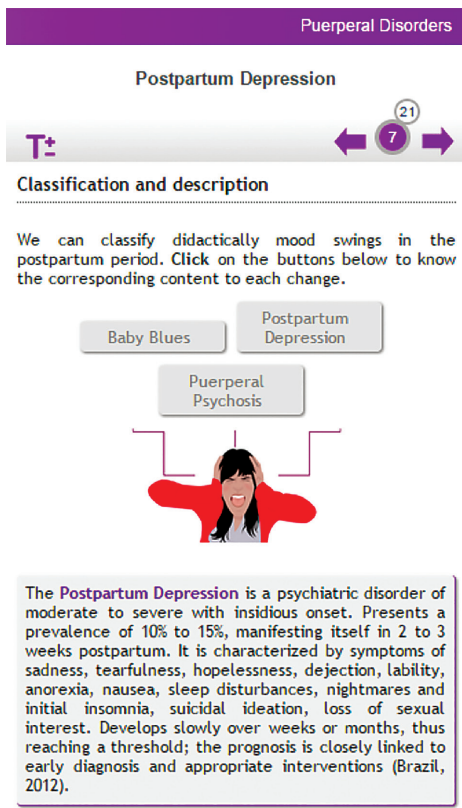Figure 1 - Screen Presentation Mobile X Desktop.

Figure 2 - Screen of a content from a digital book in the app.

Given the experience of UNA-SUS/UFMA in applications for mobile devices, some points can be highlighted as positive in the use of this material as a resource for students living in remote areas without internet access, such as[10]:

Mobility, that refers to the fact students can load applications everywhere, due to its multiple features and possibilities for locomotion. Ease of access is directly related to offline availability: students only need to install the application once on their device, from this, the application is available on your mobile device and can be accessed even without internet connection. This attribute is one of the most relevant to UNA-SUS/UFMA, since most of its students live far away from the state's capital and have difficulties accessing internet.

Another positive and differential point regarding UNA-SUS/UFMA's applications can be found in the experience made available to the user. This is because content, images and animations and others features offered to students in the digital book of Virtual Learning Environment on their computer are available in the same way on the corresponding application for mobile devices. This means that students will not be harmed in relation to content or in any pedagogical sense for studying on screens with lower resolutions.[10]

CONCLUSION

The major advantage of this application is that it requires only one internet access, the one in which the user downloads the app. After that the online book is available on users' devices without the need for internet access. Therefore, although the students of the institution face problems accessing the internet, the course content might be always available for consultation and studies.

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