Chen, W. et al. (Eds.) (2017). Proceedings of the 25th International Conference on Computers in Education. New Zealand: Asia-Pacific Society for Computers in Education

Responsive eBook based on the Principles of Educational Interfaces

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Abstract: The growing popularity of mobile devices with internet access has created a unique opportunity for exploration in e-learning modality. When developing educational content for mobile devices, it is necessary to pay close attention to the technical aspects involved in educational interfaces. This paper presents a mobile educational object developed by UNA-SUS/ UFMA: the online responsive book. Its interface design is based on the Theory of Multimedia Learning and on the development standards for Responsive Web Design.

Keywords: Online eBook, responsive web design, educational interfaces.

1. Introduction

The internet is increasingly available to more people, as well as it is accessible by a wider range of devices, such as mobile phones and tablets. This fact has motivated the exploration of educational content to mobile devices, in order to increase the reach of the target audience.

Both the teacher and the designer are architects of the learning environments in the project and development of digital objects with educational interfaces. They should be aware that a good design of interface has to assure the student's attention and focus on the content, otherwise, the disorientation occurs, which causes the students to worry first about the particularities of the interface and later to the contents to be learned, according to Lima & Capitão (2003).

Therefore, when developing a multi-platform educational object adapted for mobile devices it is necessary to think of pedagogical principles to guide the interface design. It should be consistent with the purpose of the educational object, regardless of the access device.

The objective of this paper is to present a multimedia educational book adaptable to mobile devices through responsive web design technology. It is a learning object elaborated by UFMA through UNA-SUS (the Open University of Brazilian National Health System) to be used in e-learning courses.

2. Online eBook as an Educational Object in e-Learning

Technological evolution has made it possible to explore digital books, and some e-learning courses use this type of resource on a large scale. According to Vasileiou & Rowley (2008), digital books are educational objects containing texts and other elements, integrating the concept of a traditional paperback book with resources from the electronic environment. These resources are: search tools, crossed references, hyperlinks, multimedia objects and interactive tools.

In UNA-SUS' experience with e-learning, the digital books, or online books, are adopted as the main source of presentation of contents of the institution's courses. They are books made available in a web accessible format.

The online book is one among many other resources gathered in the Virtual Learning Environment (AVA), which is an application used to manage institutions online courses. The book presented in this work was implemented to be used in any Internet browser that supports the use of HTML5. The informational design was organized with well-defined elements, in order to facilitate the navigation and visualization of content. Some Interface criteria were applied in its development. They are described by Reategui, Boff & Finco (2010):

- Use of images: according to the principle of multiple representation, it is better to represent an explanation with texts and illustrations, than just texts;
- Presentation texts: it is important to present the texts properly, noting some aspects such contrasts between the sources and the background wallpaper, facilitating the reading of the texts;
- Orientation and navigation: to allow the users to locate in the resource what was done and what is available, among others;
- Interactivity: the user must interact with the learning object, being able to have a range of possibilities during its handling;
- Aesthetics: the learning object must have features that make it pleasant in its visualization;
- Affectivity: to allow the resources presented in the learning object to express affective states, such as moving images.

3. Responsive Online Book Interface

Responsive Web Design is a web interface development methodology that uses custom languages to construct pages in such a way that they respond dynamically to changes related to browser screen size. This concept originated from the publication of an article by Ethan Marcotte (2011), which shows a set of techniques that guarantee responsiveness to a web design.

By adopting a responsive design in an educational object, it is necessary to think about the processes of adapting the elements of its interface to various devices so that the pedagogical principles of educational interfaces are maintained in the transition between different screen resolutions. The responsive design can avoid inconsistencies in the fulfillment of the objective of the educational resource, respecting what was planned by the various actors in the process of teaching learning.

Next, we will show how the elements of the responsive online book interface were conceived and implemented, based on the technical principles of educational interfaces discussed in section 2.

3.1 Orientation and Navigation, Presentation of Texts and Visual Resources

Below we analyze the orientation and navigation scheme, text presentation and visual resources of the online book in two views: on a desktop and on a smartphone (figure 1).

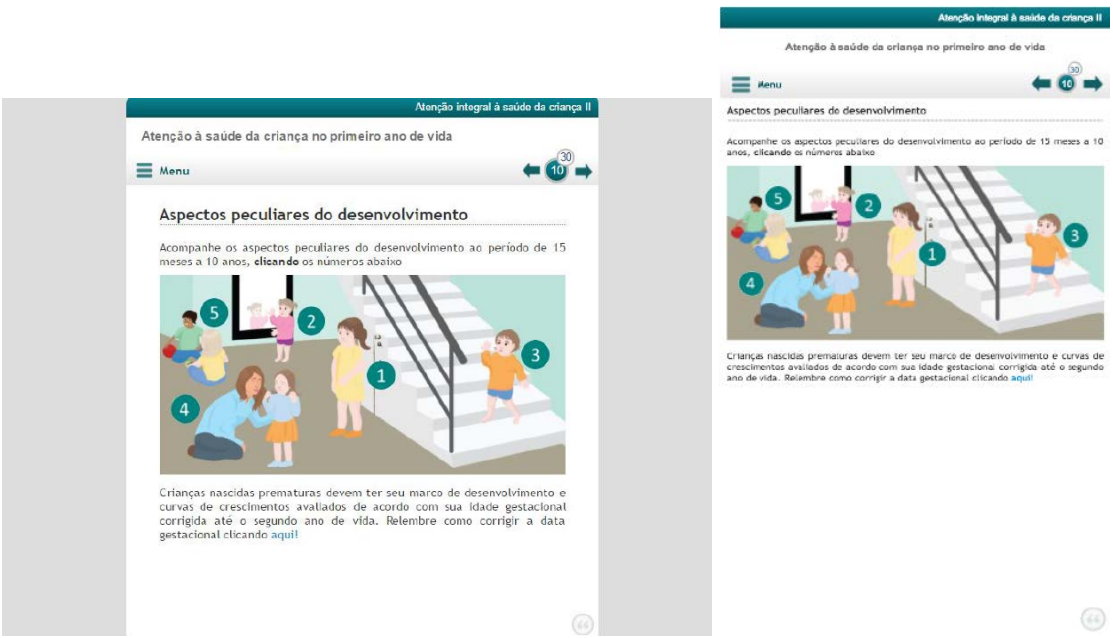

Figure 1: Desktop (left) and smartphone (right).

The production of interfaces for different platforms has the challenge of bringing a clear orientation perception to all devices (Barbosa 2009). Analyzing the figure 1, we see that the menu icons are composed of images without text that intuitively suggest their functions, to properly use the space in various resolutions without losing meaning.

The navigation buttons clearly show the current page, how many pages there are, and how to move between pages. The header layout automatically adapts to the screen resolution change, maintaining the identification of the activity currently being developed in the course.

Fonts have an appropriate size whatever the screen size, but there is also an accessibility button to increase or decrease font size to the student's preference.

3.2 Fluid Images

In the construction of interoperable interfaces it is important that the images have adequate visualization in all the platforms since they are part of the educational content (Barbosa, 2009).

The images in the book are essential to illustrate the concept presented, making it more familiar and attractive to the student. Therefore it is important that the images continue to accompany the text independent of the screen resolution. To guarantee this, the images had to become fluid, changing sizes according to the access device.

3.3 Interaction and Layout

Regarding the design of multi-platform educational materials, to adjust interaction features is essential, mainly because they can be used through different devices with different settings (Barbosa, 2009). A special case is the change of the interaction that occurs in desktops and in smartphones. The interaction through touchscreen requires a touch area with a size suitable for the fingers of a human being. Therefore, when resizing icons that represent some function of the educational object, a minimum size limit must be established, to allow easy access to the features offered when touching the screen.

4. Conclusions

The main point of this work was the presentation of a responsive online book as a mobile educational object, developed by UNA-SUS / UFMA. The important features in the implementation of this online book for mobile devices were presented with the intention of contributing with other researchers and developers of responsive web design. The proposed mobile web interface adapts content in a way that does not harm contents visualization regardless of the screen resolution of mobile devices.

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