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

Authoring Tool: a Collaborative Web Tool for eBooks Creation

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Abstract: The educational system is constantly changing mostly due to new technologies incorporated during the teaching and learning process. An example of these new educational technologies is the eBook. This tool has been considered of great importance, especially in the e-learning modality. Its development process may require a long time and a multi-professional team. Because of this, the production of quality eBooks may be discouraged among education professionals who do not master the necessary technological skills. Considering this reality, this paper presents the Authoring Tool (AT) as an alternative to optimize the process of eBooks creation for non-programmers. To accomplish it the tool uses a WYSIWYG interface. To test the tool's effectiveness in saving time during the eBooks production process, we will run initial tests. The results of these tests will be presented in this paper.

Keywords: eBook. Education. Authoring tool.

1. Introduction

The use of Information and Communication Technologies (ICT) has radically transformed the way people communicate, conduct business, do banking transactions, etc. These transformations have also reached the pedagogical paradigm, that is, they have altered the way people teach and learn and, consequently, how educational materials are developed and offered to the public (Audino & Nascimento, 2012).

In other words, with the emergence of technological resources in education, the teaching-learning process has gained the support to optimize its processes and achieve the practicality and efficiency necessary to promote an interrelation with the students during their learning. Among these supports there are the digital learning objects that have emerged in recent years as internationally recognized elements for the construction and publication of educational contents (Silva, Silva & Guedes, 2014). In this context, the eBook stands out as a book in digital format that can be used as a resource for Distance Education courses. However, although it is a widely used resource, its creation requires considerable time and effort. In order to improve the efficiency in the creation of these eBooks, we planned the development of an authoring tool.

This article presents a web authoring tool for the optimization of the eBooks development process. It will also be presented its authorial process, the functionalities, a pre-experiment to evaluate the tool's efficiency and a workshop evaluation of the tool with designers.

This paper is organized as follows: in Section 2, the model of eBooks adopted by the tool is presented. In Section 3, the tool's functionalities are explored, with details of the pedagogical design stages and the transformation in the learning object (LO). In Section 4, the result of the pre-experiment performed on the tool and the outcomes of the workshop evaluation are explained. And finally, in Section 5, there is a discussion of the partial results and the next steps for the improvement of the tool.

2. Ebook Template

With the advent of new technologies, education has undergone changes in the way of representing its learning objects, seeking to keep pace with technological evolution. The printed book, for example, has

been improved and adapted to a new format that accompanies this evolution. This new format, called eBook, besides presenting texts and images, has new elements such as hyperlinks and multimedia objects (Seadle, Vassiliou & Rowley, 2008).

The focus of the eBook is to allow the reader a more engaging and interactive reading experience with the content presented (Dziekaniak, Moraes, Medeiros & Ramos, 2010). Thus the eBook template used in the Authoring Tool was made taking into account some pedagogical aspects (Reategui & Finco, 2010).

Figure 1 shows an example of the eBook. It was developed using a set of technologies: HTML5 (Developed by MIT, ERCIM, Keio, Beihang, 2014), CSS3 (Developed by MIT, ERCIM, KEIO, 2011) and Javascript (Developed by MIT, ERCIM, Keio, Beihang, 2014). The informational design was organized with well-defined elements, in order to facilitate the navigation and content visualization. Some interface criteria involved in its development are described below, following the model defined by Reategui & Finco (2010):

- Use of images: according to the principle of multiple representation, it is better to represent an explanation with texts and illustrations than with texts only;
- Presentation of texts: it is important to present the texts in an appropriate way, observing some aspects such as contrast between the fonts and the background of the screen, facilitating the reading;
- Orientation and navigation: to allow the user to locate in the presented resource, visualizing what was done and what is available;
- 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 their affective states, such as a movement of images.

Figure 1. Template of the eBook following the principles of Reategui: (1 and 2) orientation and navigation, (3) images, texts, interactivity, aesthetics, and affectivity.

The eBook page is divided into header and content. The header is where the navigation menu, configuration and information menu are located. Page navigation is the area where the reader can access the pages. In the setup menu, the reader can choose the font size and access the summary to select units.

With the popularization of mobile devices such as smartphones and tablets, a learning object with a mobile web interface should allow the same page to be displayed correctly by all types of devices. A simple solution that fulfills this requirement is an interface based on Responsive Web Design (Baturay & Birtane, 2013). Figure 2 shows how the eBook is displayed on screens of different resolutions.

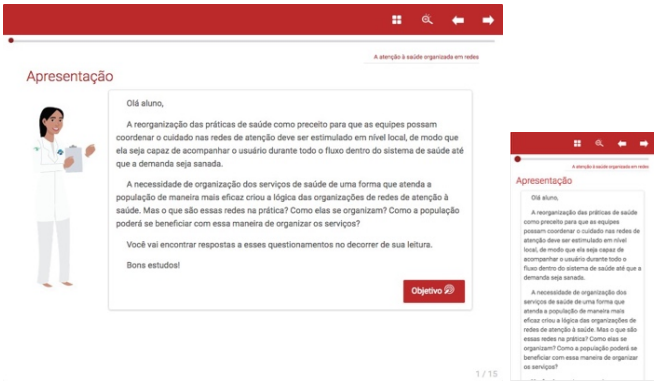

Figure 2. Example of eBook responsiveness: desktop screen (left), smartphone screen (right).

3. The Authoring Tool

The eBooks development process, explained in Section 2, requires the integration of three teams: IT (Information Technology), ID (Instructional Design), and GD (Graphic Design).

At the beginning of the process, ID team elaborates the pedagogical part and a prototype of the eBook. In parallel, they request DG team the graphic materials that will compose the book. With the prototype and graphical features ready, this artifact is sent to IT that initiates the development of the eBook. At the end of creation, IT forwards the book for validation. Once approved, it is made available to the VLE (Virtual Learning Environment).

Based on this scenario, it was proposed the creation of an authoring tool that would aid in the optimization of eBooks development process: the Authoring Tool.

The eBooks authoring process in the tool has two actors responsible for the conception of the learning object, the designer, and the layout editor, who operate in five functionalities during the process. The eBook authoring flow can be summarized as shown in Figure 3:

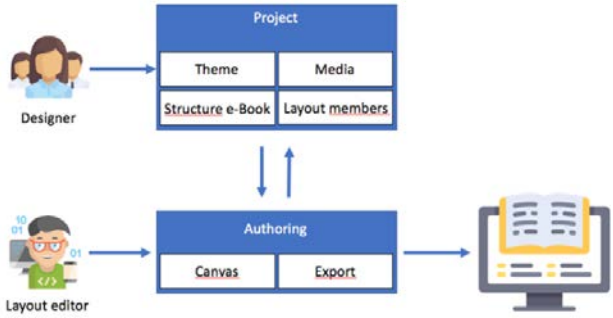

Figure 3. Authoring flow.

3.1 Project

The project is the beginning of the eBook authoring process. The designer should be concerned with the definition of three variables in the creation of the project. The first is the definition of the data that make up the project, the second is the definition of the layout editors and, finally, the establishment of the structure of the eBook.

In the eBook structure, the designer defines the module (s), unit (s) and chapter (s) that will compose the project. Each of these items can be edited, deleted, or moved by the designer. Pages are created next to chapters during the authoring process, in the Canvas step.

3.2 Theme

The themes are the definitions of the templates containing the characteristics that will be presented in

the eBook, such as colors, font size, and spacing, among others. The themes are represented through a script in CSS3 format, being injected into the export process.

3.3 Media

The tool has a media library. It offers support for JPEG (Joint Photographic Experts Group), SVG (Scalable Vector Graphics) and PNG (Portable Network Graphics) images. Another feature in the library is the ability to associate tags with images, to classify the elements that make up the image bank. In the current version of the library, the upload of videos is not supported yet.

3.4 Canvas

One of the most prominent features in the Authoring Tool is the Canvas area. This feature is the working area of the layout editor. The interface follows the WYSIWYG principle, allowing the user to directly manipulate eBook pages with clear feedback on what the final presentation will look like. Figure 4 shows the Canvas interface.

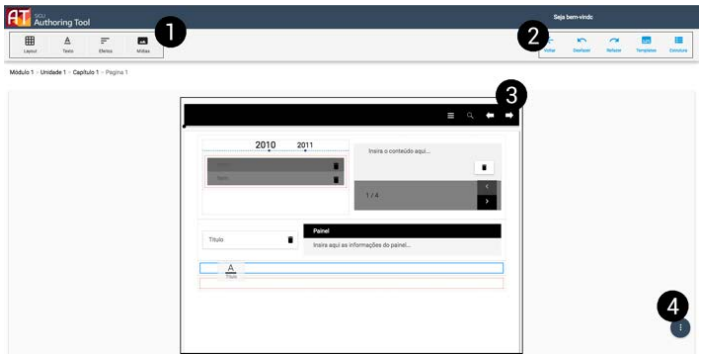

Figure 4. Canvas Interface.

Canvas has a palette of components (1) grouped by types: layout, text, effects, and media. Each group has a range of components that can be added and manipulated on the canvas (3). The toolbar (2), provides the user with some shortcuts, for example: undo, redo, and manipulate book structure, among others. Together with the canvas, the users obtain auxiliary navigational resources (4), which allow them to save, preview the project, export and access the project media.

The project structure is the area where the layout editor will manage the pages, and then define the content that will be part of the eBook.

3.5 Export Process

The export process is the end of the authoring process in the tool. In this step, the user can export the eBook developed. Currently, the export format supported by the tool is HTML5 (W3C, 2014) along with Javascript and CSS3 (W3C, 2001). The export process is executed in 3 phases: First, the CSS of the template is injected into the eBook; second, all pages undergo a cleaning process, executed by a Garbage Collector, contained within the tool, and finally, the book is compressed in zip format and made available for download.

4. Results of the Tool's Evaluation

4.1 Pre-experiment: Partial Results

We attempted to evaluate the time for development of an eBook created directly in the authoring tool. The focus was to identify the work evolution. For the experiment, developers in the technology field with Web development experience were invited to participate in the test. They were in an assisted environment, with the same conditions usually established for the development of an eBook with 30

pages, using as the theme "Public Health Management".

In the common production scenario, without using the Authoring Tool, it took an average of 8 hours to complete the task. The development of the eBook with the Authoring Tool proved to be promising as developers were able to finalize the same material in half the time. In this initial sample it is possible to highlight positive and negative points.

As negative points of the process, it was observed:

- The eBook follows a system of grids, rows, and columns to position its elements. During the authoring process, the participants had difficulties in handling with the elements of the grids;
- Because it is a version in development, some problems interfered in the eBook authoring process.

As positive points, it is worth mentioning:

- The tool encapsulates the complexity of creating the components. This factor was crucial for accelerating the development of the eBook;
- The components grouped into menu allow easy location and inclusion in the canvas.

The results obtained with the experiment show a promising scenario, since it was observed that the tool helped to optimize the production of the eBook. It is clear that more experiments should be applied in other scenarios to validate the proposal.

4.2 Outcomes of the Workshop Evaluation

In order to assess the information design aspects of the Authoring Tool (e.g., user interface, interactive graphic resources), a workshop evaluation was conducted with 10 participants with expertise in this field. Initially, an explanation of the AT functions was provided to the participants through a live tutorial. Afterwards, participants were asked to design an eBook with any content of their choice. At the end of the workshop, each participant presented their eBooks to the group. Then, they answered an online questionnaire to evaluate the tool on its ease and difficulty of use and to give suggestions for improvements. The questionnaire resulted in a total of 109 responses, which were compiled into the following categories: (a) Perception of Experience, (b) System Design, (c) Interface Design, and (d) Task Execution (Table 1).

Table 1: General results of the questionnaire.

	Facilities	**Dificulties**	**Sugestions**	**Total**
Perception of Experience	9	3	4	**16**
System Design	6	19	17*	**42**
Interface Design	5	15	8	**28**
Task Execution	14	9	-*	**23**
Total	**34**	**46**	**29**	**109**

Number of responses per category:
Less than (<) 10: respondent did not express an opinion in the category
More than (>) 10: more than one respondent expressed an opinion in the category
(*) For compiling the results on suggestions, the categories System Design and Task Executions were integrated, as it was not possible to differentiate the participants' responses on them.

The responses on Perception of Experience consider participants' overall impression of their experience with the AT during the workshop. These were expressed through opinions of an emotional nature and/or value judgment. A total of 16 responses fit into this category. In general, participants found the AT easy to use (N=9), considering it an innovative and user-friendly tool. Participants also considered the tool functions and features easy to use when carrying out tasks to design their eBooks during the workshop. This was shown by the 14 positive responses out of 23 in the Task Execution category, among then, the inserting of rows, columns, graphics, images, videos, pages and texts.

On the other hand, most responses on the System Design category (N=19 out of 42) were related to participants' difficulties in using the tool. These concerned features or functions that were not available or limited the users'/participants' actions when interacting with the AT. Statements about restrictions on typographic features and choices (e.g., typefaces, text alignment, font size, color), and

the excessive number of actions to insert an image are examples of responses found in the questionnaire. Similarly, most responses on the Interface Design category (N= 15 out of 28) reveal participants' difficulties, due to problems in the visualization of elements and/or functions in the AT interface. Inappropriate labelling of buttons, unclear icon designs, lack of visual/graphic cues to indicate the selection of an element in the interface are examples of the participants' responses in this category.

Finally, a total of 29 suggestions to improve the AT were made by the participants. These suggestions mainly relate to the System Design and Task Execution categories, as for instance to include floating menus or shortcuts to menus, to add image editing tool (e.g., resize, crop), and to enable the categorization of images by an eBook project. The suggestions were then, organized on a checklist addressed to the AT developing team so that they could make the adjustments to the tool.

5. Conclusions and Follow up

This paper presents the Authoring Tool to develop eBooks with the purpose of assisting in the optimization in the development of these learning objects. Still in its beta version, it was possible to perceive a promising future for the use of the technology. Based on the experiment, a 50% gain in eBook production time was observed, a satisfactory but not conclusive result.

Despite the promising results regarding the optimization of the eBooks creation time with the Authoring Tool, more experiments will be conducted in order to identify successes and potential problems, and, based on these results, follow with the development of the tool to supplement the proposal described in this article. In this sense, the outputs of the evaluation workshop also contributed to improve the AT with regard to information design aspects. A revised version of the AT with a user centered design approach is currently being developed for further evaluation.

Acknowledgements

Thanks are due to the participants of the evaluation studies presented in this article, and to the Brazilian Ministry of Health, and to FAPEMA- PRONEM for funding the development of the Authoring Tool and the related research project.

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