The Design of the SaiteBooker: An Authoring Tool for E-books for Health Distance Learning Courses in Brazil

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Abstract. The demand for e-books for distance learning courses in the health field in Brazil has increased. Thus, it is necessary to accelerate the e-book production process. In this regard, this article reports the development and evaluation of saiteBooker, an authoring tool for e-books proposed by the Open University of the Unified Health System (UNA-SUS/UFMA) in Brazil. Within an information design approach, a qualitative evaluation was conducted, with 32 participants, through: (a) Expert assessment (n = 16) by technology and design experts, and information design researchers; followed by (b) Users' assessment (n = 16). The results of the Expert assessment showed deficiencies in the visualization and consistency of components and functions of the tool. Based on these results, the saiteBooker tool was improved for the Users' assessment (online questionnaire prior and post interaction). The results indicated that the improved tool was positively evaluated, meeting users' expectations. To conclude, it is highlighted the importance of an evaluation method that combines technology and information design views with user testing.

Keywords: Authoring tool · E-books · Information design · Health

1 Introduction

The use of digital means to communicate content has increased worldwide, particularly in distance learning. In the health field, in particular, there is a high demand for distance learning courses to train professionals, such as doctors, nurses and pharmacists. E-books have then, become an essential tool in such courses. This is due to the fact that the e-books' production process is faster compared to that of printed books, since the printing and binding stages are not necessary.

Another advantage of e-books over printed books is that e-books allow the use of dynamic and interactive resources. Readers/users can access contents through audio text, videos, animations or kinetic typography. These can be employed to draw users' attention to particular contents and/or to motivate reading. Moreover, e-books can make use of hyperlinks to add complementary content to the main topic. The use of technological resources makes it possible for e-books to break the paradigm of linear narrative [1, 2].

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In this sense, Rojeski [3] adds that the popularity of e-books is also due to the fact that they can be easily accessed via digital devices, such as smartphones and tablets; and to their low purchase cost.

Several studies have been conducted on the design and use of e-books. Some of the aspects which have been investigated are users' preference and attitude towards e-book reading; effectiveness and suitability of e-books' graphic interfaces, and their interactivity and usability [4–9]. For instance, Bidarra et al. [7] discuss the effect of interaction and elements of the interface on preference for the graphic interface design by e-book users. Similarly, Huang [2] investigates users' preference for page turning in e-books. Marshall and Bly [10] discuss users' reading experience with e-books, claiming that navigation is strongly affected by components of the graphic interface.

Although the studies conducted have generated a variety of results, the recognition of e-books as a valuable type of publication seems to be a point of convergence among authors.

1.1 The Need of E-book Authoring Tools in Brazil

In Brazil, tools for authoring e-books in Portuguese are scarce, particularly those with open access to users. These are essential to meet the demand for e-books for distance learning courses in the health field. According to the Brazilian Ministry of Health, from 2010 to 2017 a total of 1,097,330 professionals enrolled on the distance learning courses offered by the Open University of the Unified Health System [11]. Thus, there is a need for authoring tools in Portuguese to facilitate e-book production in the health area in Brazil.

By taking this into account, the Open University of the Unified Health System of the Federal University of Maranhão (UNA-SUS/UFMA) has developed a collaborative, open access authoring tool for e-books - the SaiteBooker. SaiteBooker is intended to account for particular editorial aspects of the health field, such as medical images, and health related icons for interface menus. This article reports the process of developing and evaluating the SaiteBooker within an information design approach.

2 Information Design Approach

Information design aims at providing efficient communication through printed and/or digital artifacts/systems [12]. According to the International Institute for Information – IIID [13], information design is concerned with 'the defining, planning and visualization of the contents of a message with the intention of achieving particular objectives in relation to the needs of the target users'. By focusing on the visualization of contents (graphic interface) addressed to users, an information design approach was adopted to the development of the authoring tool for e-books proposed by the UNA-SUS/UFMA. To set the ground for this paper, information and interaction design principles are briefly presented in the next section.

2.1 Information Design Principles

In order to guide the development of graphic artifacts and their interfaces, the literature on information design and related areas presents principles and recommendations regarding users' cognitive aspects, visual perception, attention and motivation [14–17]. A comprehensive view of the aspects to be considered in design processes for information artifacts/systems is provided by Pettersson [14] through a set of principles. These principles are divided into four categories: functional, aesthetic, cognitive and administrative principles. The functional and aesthetic principles concern usability of artifacts/systems and their graphic presentation of information. The cognitive principles refer to aspects of the users' domain, and the administrative principles refer to legal, cost, safety and ethical aspects in the design of artifacts/systems.

Since authoring tools make use of interactivity, it is also important to consider interaction design principles. Blair-Early and Zender [16] present principles to support the development of interfaces in digital artifacts/systems. For the authors 'interface is content', that is, the interface should be part of the content, and the interaction should lead directly to it. The principles proposed by Blair-Early and Zender [16] are in line with those proposed by Nielsen [18] and which have been widely employed by researchers and professionals in the development and evaluation of digital artifacts.

Of the principles proposed by Pettersson [14] and those proposed by Blair-Early and Zender [16], the following were considered pertinent to the design of authoring tools for e-books.

Functional Principles

- Simplicity: the components should be presented in a concise and accurate manner
- Unity/Consistency: the presentation of components, their graphic relations and functions should be consistent throughout the interface
- Proximity/Chunking: related components/functions should be placed closely to allow visual grouping
- Hierarchy: components/functions differing in degree of importance should be ordered accordingly, from broader topics to more specific topics.
- Structure: components and functions should be arranged in a logical and clear manner
- Emphasis: elements which require users' attention (e.g., hyperlinks) should be highlighted
- Alignment: the components of the interface should be lined up
- Clarity in language: plain language should be used for labels and texts.

Aesthetics Principles

- Harmony: the components/functions should be displayed/organized in a sensible way so as to produce a pleasant and coherent interface
- Proportion: the components should be in a balanced ratio to promote harmony.

Interaction Design and Usability Principles

- Interface is content: elements of the interface should be designed to 'minimize interface and maximize content'

- Obvious start: a starting point of the interaction should be easily spotted in the interface
- Clear reverse: the interaction design should make reversing any actions possible (e.g., end a section)
- Conventions: components/functions which are conventions for interaction should be employed as they are familiar to users (except when they impose difficulties/limitations to users)
- Feedback: tasks should produce prompt and noticeable feedback to inform users of the effects of their actions.
- Landmarks: way showing components should be provided to inform users of their location in the interface space.
- Adaptation: the interface should be flexible/adaptable to users' needs and/or to patterns of interaction
- Help: supporting resources to assist users should be made available on the interface
- User control and freedom: interface should be designed to empower users to freely achieve their goals during interaction
- Error prevention/management: the system/interface should be designed to avoid errors.

The above-mentioned principles were considered in the evaluation of the saiteBooker tool. Before presenting the evaluation process, aspects of the authoring tool design process are introduced together with information about UNA-SUS/UFMA.

3 The UNA-SUS/UFMA and the SaiteBooker Tool

The Open University of the Unified Health System (UNA-SUS) was created in 2008 by the Brazilian Ministry of Health. UNA-SUS aim is to broaden the access to health education through distance learning courses offered by university partners. Fourteen universities are currently part of the UNA-SUS system, and provide doctors and nurses, among other professionals, access to courses in a number of areas (e.g., family health, environmental health surveillance, maternal and child health, mental health, and management of pharmaceutical assistance). The Federal University of Maranhão - UFMA is the university partner with the highest production of courses. From 2014 to 2017 the UNA-SUS/UFMA offered a total of 60 distance learning courses to health professionals throughout the country.

The saiteBooker authoring tool has been developed to accelerate the design process of e-books produced by the UNA-SUS/UFMA, making it a more efficient and accessible process to non-computing/programming specialists. Previously, the process to create an e-book involved three teams of professionals: instructional designers, graphic designers and information technology experts.

The instructional design team was responsible for the pedagogical contents and for defining the draft of the visual structure of the e-books. The graphic designers were responsible for the production of images (e.g., infographic, drawings, motion graphics) and for the typesetting. The information technology team was responsible for programming the e-book features/functions.

The e-book development process is an iteractive process, requiring approval rounds by the instructional designers until the e-book is considered ready to be made available in the Virtual Learning Environment. The approval round process can be time-consuming for the graphic design and information technology teams as well as for the instructional designers. The authoring tool has improved this process by providing graphic and technological resources to the instructional design team. This has made it possible to skip two stages of the process: the typesetting/image production and the programming.

A diagram illustrating how the development process for e-books has improved with the saiteBooker authoring tool is shown in Fig. 1. The dotted arrows indicate the possible iteractions during the process before the authoring tool. The full arrows indicate the flow.

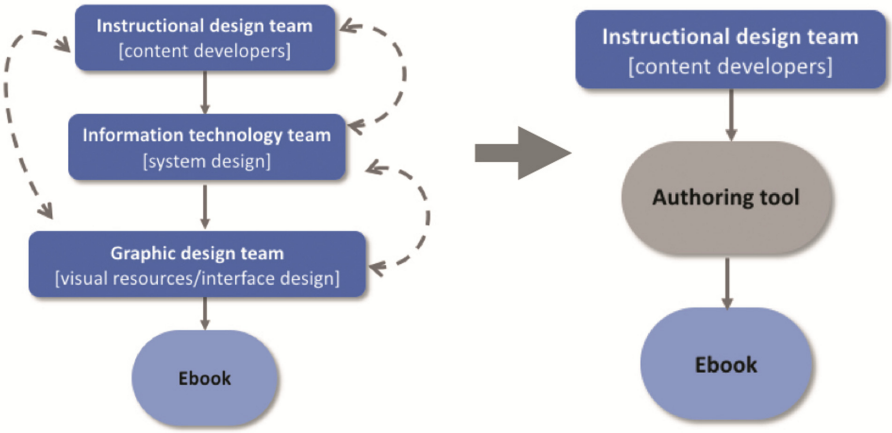

Fig. 1. On the right, the improved design process of e-books with the saiteBooker authoring tool, in relation to the conventional process (on the left).

3.1 Characteristics of the SaiteBooker Tool

The saiteBooker tool was designed according to the following criteria:

- to be an easy-to-use and intuitive tool to enable ordinary users to create their e-books;
- to be used online by users of different operating systems (e.g., Android, IOS);
- to be open access, requiring only a user registration;
- to be simple and compact with specific features for creating e-book designs;
- to allow previews for desktops, tablets and smartphones during the e-book design process; and
- to be used by a single user or by a team of users (collaborative tool), since it offers autonomy for the former, and may fit into a workflow for the latter.

The saiteBooker has five main areas:

1. The Project area is for entering general information about the e-book project;
2. The Theme area is for creating the layout features of the e-book (e.g., color, font size, line spacing) and/or for choosing from a range of themes available;
3. The Media area is for uploading, storing and for adding images to an ongoing project;
4. The Canvas area is for typesetting the e-book pages and;
5. The Export area is for uploading/exporting the created e-book.

Regarding healthcare professionals, the saiteBooker offers specific functions/features to support the design of e-books, such as the library of icons and images on health-related topics. It was developed by information technology professionals and information designers, as well as researchers and health professionals. As a result, it is a consistent and coherent library that facilitates the inclusion of icons and images in the e-books by healthcare users (individuals or teams). The UNA-SUS/UFMA design team will soon include audio and video/animation materials to broaden the library scope for the saiteBooker users.

The following section briefly presents how the SaiteBooker tool has been assessed. The assessment aimed to improve the tool by identifying its weaknesses with regard to technology, information design and user experience.

4 Overall Method for Improving the SaiteBooker Tool

To improve the saiteBooker tool, a qualitative evaluation was conducted through: (a) Expert assessment by technology and graphic/information design professionals and researchers, followed by (b) Users' assessment. The former used a Beta1 version of the saiteBooker tool, which was enhanced (Beta2 version) for the Users' assessment, based on the outputs of the Expert assessment. A total of 32 participants equally divided into Expert assessment and Users' assessments, evaluated the tool. Figure 2 shows a synthesis of the evaluation process.

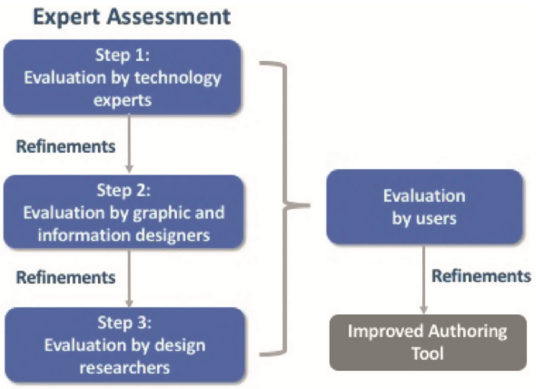

Fig. 2. Synthesis of the evaluation process of the saiteBooker authoring tool.

4.1 Expert Assessment

The Expert evaluation was conducted in three consecutive steps. The information obtained in each step led to refinements in the saiteBooker tool, as briefly explained below.

Step 1: Evaluation by Technology Experts
This step consisted of a hands-on-workshop to identify problems related to the system design. It was conducted with three experts in web development. An explanation of the features of the authoring tool was provided to participants, who were then asked to develop an e-book for a given medical content: "Public Health Management". The outputs of this step were analyzed qualitatively. The problems/difficulties encountered by the participants when creating the e-book were adjusted in the system design of the saiteBooker tool which was then, assessed in the next step.

Step 2: Evaluation by Graphic and Information Design Experts
This step aimed at identifying problems regarding the graphic interface and interaction design of the saiteBooker. The same procedures for Step 1 were adopted, but now participants could choose the theme of the e-books to be created. Participants were requested to use all available features of the authoring tool. The hands-on-workshop was conducted with 10 experts in graphic and information design. At the end of the workshop, participants were asked to fill in an online questionnaire on the usability of the tool. The outputs of this step were also analyzed qualitatively, taking into account the problems/difficulties pointed out by the participants in order to improve the tool.

Step 3: Evaluation by Design Researchers
This step was carried out by three design researchers. The aim here was to rank the improvements to be made in the authoring tool based upon the drawbacks pointed out in the previous steps. For this, the FIP - Frequency, Impact, and Persistence - technique [9, 18] was used to measure the frequency of occurrence of the identified problems, their impact on usability, and their persistence. A score (1–10) was assigned to each aspect of the problems (frequency, impact and persistence) by the researchers, individually. Then, the scores were discussed by the researchers. Next, the agreed scores were put into the formula (1) for calculating each problem's severity. The scores varied from 0 to 100: 70–100 high severity problems, 30–69 medium severity problems, 0–29 low severity problems.

$$\text{severity} = \frac{\text{score (frequency)} \times \text{score (impact)} \times \sqrt{\text{score}}\,\text{(persistence)}}{\sqrt{10}} \tag{1}$$

Improvements made in the authoring tool according to the outputs of this step resulted in the Beta2 version of the tool for users' assessment.

4.2 Users' Assessment

The evaluation by users aimed at verifying their experience when interacting with the SaiteBooker tool (Beta2 version). The evaluation was conducted individually with 16 volunteer attendees during a national conference on telemedicine and tele-health, held in Brazil. Participants were invited to answer an online questionnaire prior and post interaction. Before interacting with the tool, participants were asked to state their expectations regarding authoring tools to create e-books on health education/training (online question). Next, participants were briefly introduced to the tool and invited to freely interact with it. Participants then, answered a number of online questions with Likert-type scale, each question with seven levels of agreement (1 = disagree to 7 = agree). The questions regarded satisfaction with the tool, its usability, navigation and graphic interface. The online questionnaire ended with an open question asking for suggestions for further improvements to the saiteBooker tool. The results were analyzed qualitatively.

5 Synthesis of the Results of Expert Assessment

5.1 Step 1: Evaluation by Technology Experts

The results of the assessment showed that the saiteBooker tool greatly improved the production process of a 30-page long e-book on "Public Health Management". There was a reduction in the development time of the e-book. In general, creating 30-page e-books would take around eight hours, but with the authoring tool the process took four hours or less. Another positive aspect was the grouping of functions and of interface components of the saiteBooker, which were also hierarchically presented in the menus. This was considered a facilitating aspect of the authoring tool interface by the participants.

However, some problems were pointed out by the technology experts when using the tool. The main difficulty was to place elements (images, texts, titles) on the pages using the available grid system (rows and columns). Based on these results, some adjustments were made in the Beta1 version of the saiteBooker tool for the next step of the evaluation.

5.2 Step 2: Evaluation by Experts in Graphic and Information Design

In general, participants evaluated their experience with the authoring tool positively. All of them were able to develop e-books using the various functions of the saiteBooker tool. The evaluation questionnaire had a total of 109 responses, regarding how easy or how difficult it was to use the authoring tool, as well as suggestions for improvements.

However, most responses were on participants' difficulties (N = 46 out of 109) in using the tool. They mainly regarded the interface (N = 15) and functions of the system design (N = 19). The most recurrent problems were related to: poor/lack of visualization of functions and components of the interface, unclear/ambiguous labels for buttons and icons, unnecessary actions to add an image to a page, inappropriate relation between buttons/icons and their functions. These problems were compiled for evaluation by design researchers so as to identify their severity in the next step.

5.3 Step 3: Evaluation by Design Researchers

For the evaluation of the problems/deficiencies pointed out in Step 2, the researchers considered the criteria used in a previous evaluation study of the graphic interface of virtual learning objects of the distance learning courses offered by UNA-SUS/UFMA [9]. These were:

1. Inadequate aspects of the interface,
2. Probable usability problems as a consequence; and
3. Negative implications on usability. These refer to effectiveness, efficiency and satisfaction with the use of the tool.

A total of 44 problems/deficiencies in the authoring tool were identified. These were then hierarchized: 22 were considered of high severity, 18 of medium severity, and four of low severity. The interface of the authoring tool presented problems of greater severity which were related to the visualization and consistency of components and functions, particularly with regard to icons and buttons. The typographic resources for page creation were considered as of medium and low severity, while those referring to the production and inclusion of images (e.g., graphics, timeline) were considered as of high and medium severity. These results were taken into account in order to generate the recommendations to improve the saiteBooker tool (Beta2 version).

The recommendations for the SaiteBooker tool were ranked according to their degree of severity, and grouped into the following categories: interface design, system design and task execution. To facilitate the visualization of the recommendations proposed, a spreadsheet was created with visual examples of the problems and possible alternatives for adjustments. The graphic interface and functions of the saiteBooker tool were then properly adjusted by the team of developers. As a result, a Beta2 version of the saiteBooker was designed to be assessed by users in the final stage of the evaluation process.

5.4 Synthesis of the Results of Users' Assessment

The results of participants' experience with authoring tools for e-books showed that most of participants (n = 9 out of 16 participants) were familiar with such tools, but only four of them had previously created e-books. Participants' expectations of e-book authoring tools (n = 59 responses) prior to the interaction with the saiteBooker were mainly: to publish in various formats such as HTML, ePub, and PDF (n = 14); to speed the design process (n = 13); to allow inserting photos, videos, audio and other interactive resources (n = 12); and to have online publishing facility (n = 11). Participants' responses after interaction indicated that the saiteBooker is likely to match their expectations.

In general, the tool was positively assessed by the participants. They found the experience of interacting with the saiteBooker quite satisfactory (n = 12 out of 16 participants). The tool was considered ease to use (n = 12), to learn (n = 11) and to navigate (n = 11). The graphic interface was considered intuitive and friendly (n = 10) with a clear sequence of screens (n = 13), and with an adequate number of elements/information. The icons (n = 11) and color (n = 9) were also positively assessed. Nevertheless, only half of the participants (n = 8) found that interface layout facilitates interaction.

This suggests that adjustments should be made to enhance interaction design in the saiteBooker tool.

Finally, when asked to indicate whether they believe people would be interested in using the saiteBooker, 14 out of 16 participants considered it to be of interest by marking 6 and 7 in the Likert scale (1 = non-interested to 7 = very interested).

Although generally satisfied with the tool, participants considered that the saite-Booker tool could be further improved by: providing an online tutorial, showing history of (track) adjustments in the e-book project, and broadening the image library.

6 Discussion and Improvements in the SaiteBooker Tool

The results of the Expert evaluation indicated that some design principles were not properly met. The problems identified on the graphic interface showed disagreement with the functional principles (Proximity, Chunking, Hierarchy, and Structure) and the interaction principles (Interface is content, User control and freedom). This seems to be due to the fact that principles are general in nature, so that they can be applied in different

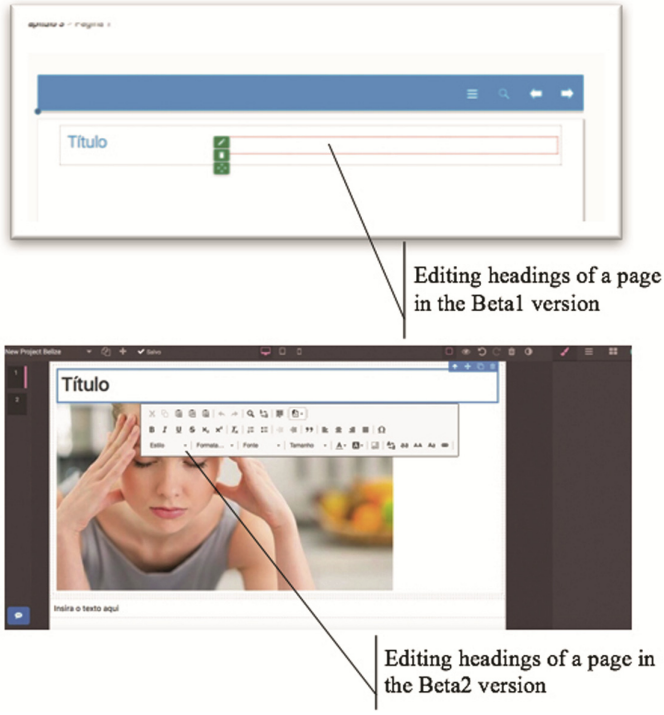

Fig. 3. In the improved version (Beta2 version) of the saiteBooker visual emphasis is employed to allow identification of the selected object. The object's properties are grouped and placed near the object to be edited. These resources were not made available as such in the Beta1 version of the tool.

contexts and design processes. Therefore, they must be adapted by the developers to the particular demands of each project/artifact. For that reason, the authoring tool developers may have made specific decisions (e.g., position of buttons, visualization of functions) based on their knowledge and experience, which may not have been the most appropriate ones for the authoring tool users.

Considering this, the users' evaluation of the saiteBooker tool after the assessment by technology and design experts/researchers was of prime importance. The evaluation allowed the identification of deficiencies which were not perceived by the developers during the design process of the tool. This made it possible to improve the usability and efficiency of the saiteBooker tool, ratifying the importance of an interdisciplinary approach to the design of digital artifacts/systems to support distance learning in the health field.

Thus, based on the results of the expert and users' assessments, improvements were made to the SaiteBooker tool, which were also aligned with the principles of information design, interaction design and usability, earlier mentioned in this paper. The following figures show examples of the improvements made. These are mainly related to the following principles: Interface is Content, Adaptation, User control and freedom, Emphasis, Hierarchy, Proximity/Chunking (Figs. 3, 4, 5 and 6).

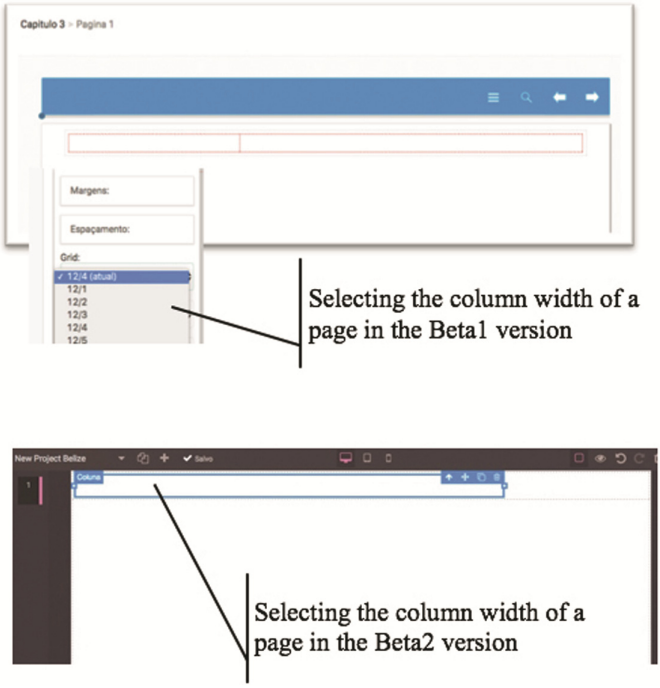

Fig. 4. Improvement in the selection of column widths to ease decision making on the page column layout by users. In the Beta1 version the selection of column widths was made through menu options, whereas in the Beta2 version users can freely select the area for a column.

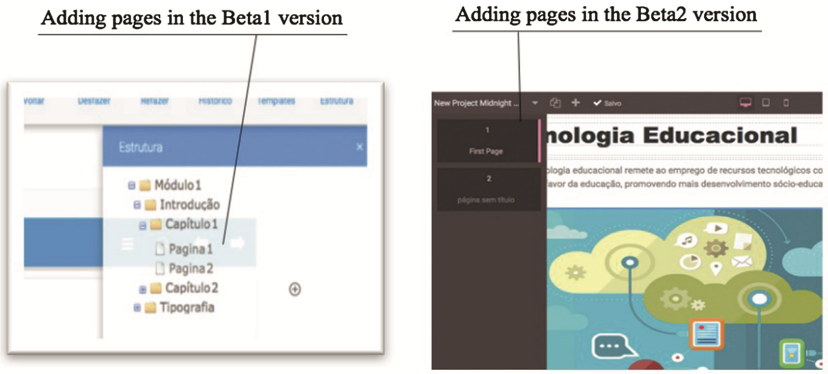

Fig. 5. Improvement in the way pages are added to facilitate visualization of the number of pages of an e-book section.

The saiBooker tool also improved the development process of e-books by making it shorter/faster, therefore more efficient. The conventional process involves steps of type-setting/image production and programming, which are not necessary when using the saiteBooker tool. Thus, the siteBooker tool empowers users to create and display elements of a page (e.g., texts, images, infographics, videos), to order e-book content (e.g., chapters, sections), and to publish the produced e-book.

Nevertheless, the decisions made by users (non-specialists) in the domain of graphic-information design may negatively affect the quality of the e-books produced with the authoring tool. To support users in their decision-making process, the siteBooker provides page templates created according to graphic-information design and interaction design good practices.

Therefore, it is pertinent to state that the saiteBooker tool enhances the quality of e-book production, especially the e-book design process.

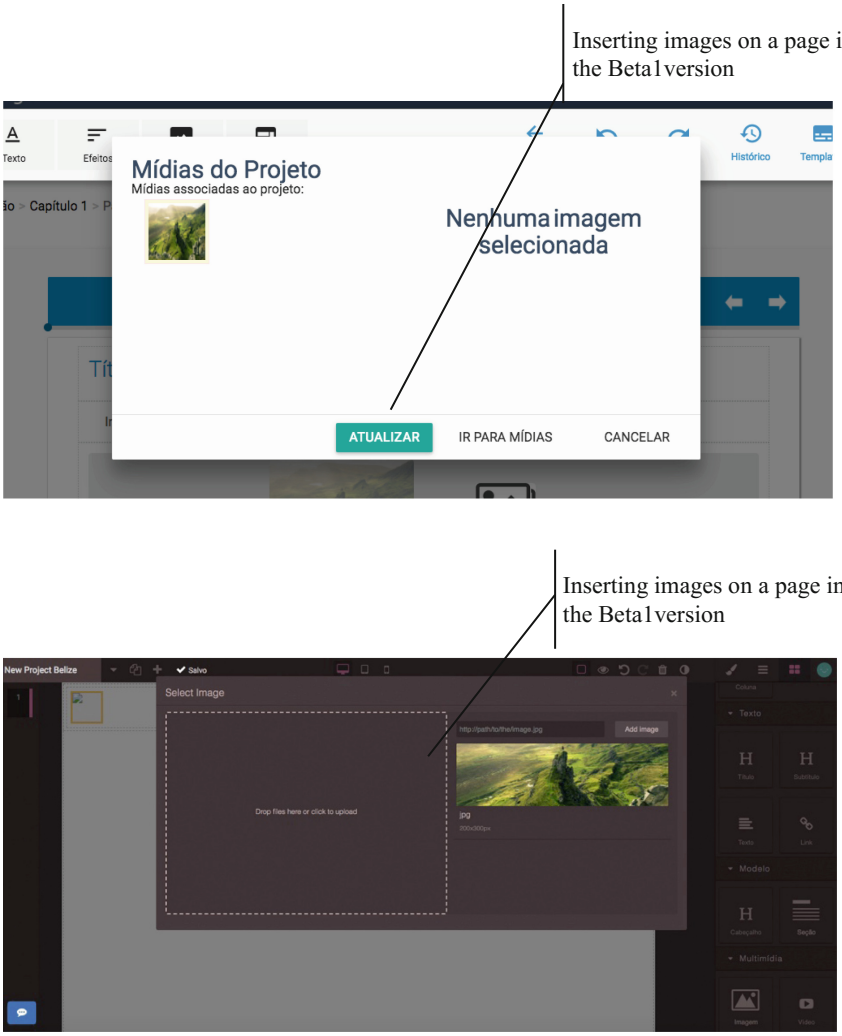

Fig. 6. Improvement in the insertion of images on an e-book page, making the task of importing images from the web and from computer files easier.

7 Conclusion and Final Comments

This article reported an information design approach to the development of the saite-Booker, an authoring tool for e-books produced by the Open University of the Unified Health System (UNA-SUS/UFMA) in Brazil. Principles and design criteria were presented, as well as the features of the tool and its evaluation process (Expert and Users' assessments). Based upon the results of the evaluation process, it is pertinent to conclude

that the information design approach effectively contributed to enhance the saiteBooker tool proposed by the UNA-SUS/UFMA.

It is worth stressing that both information design and technology fields were paramount to the development of the saiteBooker as a useful authoring tool for e-books. Moreover, since the saiteBooker is an open access tool in the Portuguese language, that can be used online in different operating systems, and is addressed mainly to healthcare professionals, it differs from the other available tools for creating e-books (e.g., Atavist, iBooks Author, LucidPress, and Maestro ebook).

Finally, it is hoped that the saiteBooker will contribute to the creation of useful e-books on health in Brazil, and that interacting with this tool will be a pleasant experience to users.

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References

1. Martin, C., Aitken, J.: Evolving definitions of authorship in Ebook design. Inf. Serv. Use **31**(3–4), 139–146 (2011)
2. Huang, J.: How Interface Elements for Page Turning in eBooks Affect Reader Preference. Unpublished Master Dissertation, The University of Waikato (2017)
3. Rojeski, M.: User perceptions of ebooks versus print books for class reserves in an academic library. Ref. Serv. Rev. **40**(2), 228–241 (2012)
4. Wilson, R.: Ebook readers in higher education. Educ. Technol. Soc. **6**(4), 8–17 (2003). https://strathprints.strath.ac.uk/2510/6/Wilson_ETS_2003_Ebook_readers_in_higher.pdf
5. González, J.C., Guzmán, J.L., Dormido, S., Berengel, M.: Development of interactive books for control education. In: Proceedings of the 10th IFAC Symposium Advances in Control Education. The International Federation of Automatic Control, pp. 150–155 (2013)
6. Fojtik, R.: Ebooks and mobile devices in education. Procedia – Soc. Behav. Sci. **182**, 742–745 (2015)
7. Bidarra, J., Natálio, C., Figueiredo, M.: Designing ebook interaction for mobile and contextual learning (2015). https://www.researchgate.net/publication/268446567_Designing_eBook_Interaction_for_Mobile_and_Contextual_Learning
8. Yalman, M.: Preservice teachers' views about e-book and their levels of use of e-books. Procedia – Soc. Behav. Sci. **176**, 255–262 (2015)
9. Spinillo, C.G., Padovani, S., Smythe, K.C.A.S., Bueno, J., Figueiredo de Oliveira, A.E.: The open university of the unified health system in Brazil (UNA-SUS/UFMA): identification and hierarchization of problems in distance learning courses. In: Marcus, A., Wang, W. (eds.) DUXU 2017. LNCS, vol. 10290, pp. 724–739. Springer, Cham (2017). https://doi.org/10.1007/978-3-319-58640-3_52
10. Marshall, C., Bly, S.: Turning the page on navigation. In: Proceedings of the 5th ACM/IEEE-CS Joint Conference on Digital Libraries, pp. 225–234. ACM (2005)
11. UNA-SUS. The Open University of the Unified Health System. unasus.gov.br/page/una-sus-in-numbers/arouca-offers-educational-and-matriculas. Accessed 12 Nov 2017
12. SBDI - Sociedade Brasileira de Design da Informação. http://sbdi.org.br/. Accessed 12 Nov 2017

13. IIID - International Institute for Information. http://www.iiid.net/home/definitions/. Accessed 12 Nov 2017
14. Pettersson, R.: It Depends: ID – Principles and Guidelines. Institute for Infology, Tullinge (2007)
15. Lipton, R.: The Practical Guide to Information Design. Wiley, Hoboken (2007)
16. Blair-Early, A., Zender, M.: User interface design principles for interaction design. Des. Issues **24**(3), 85–107 (2008)
17. Frascara, J.: Communication Design: Principles, Methods and Practice. Allworth Press, New York (2004)
18. Nielsen, J.: Usability Engineering. Academic Press, Boston (1993)