Inclusive Design: An Interface for Users with Disabilities

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Abstract. This paper shows the interface development process for learning objects interface of the “Accessible WebGD” – a Virtual Environment of Education-Learning. This environment is destined for people without disabilities and deaf or blind people. Thus, in the interface it will have different technological resources, for example, LIBRAS interpreter for deaf people; media with high contrast for people with low vision; narration and didactic materials in braille for blind people; and others accessible and inclusive actions.

Keywords: Interface Design, Web accessibility, Digital Inclusion.

1 Introduction

“Accessible WebGD” is a Virtual Learning Environment (VLE) that was developed by researchers from Federal University of Santa Catarina, Brazil. The purpose of this environment is to teach spatial-graphic representation in an easy way, interactive and collaborative. Another relevant point, it refers to the proposal inclusive, i.e., should make possible the learning of this subject to a greater number of people, including those with disabilities, such as deaf people, blind people or with low vision. The “Accessible WebGD” is going to use the Moodle platform because of the following advantages: it is an intuitive tool and easy to use (usability), both for students and for teachers; it enables the creation of online courses; working groups and collaborative learning communities; it allows access through the Internet or local network; it is free software.

In this environment, the learning content will be presented through learning objects due to the following characteristics:

- Reusability is the possibility to use a single learning object in multiple contexts and different applications.
- Adaptability is the capability of adapt to different educational environments.
- Granularity is the possibility to encapsulate the content in parts.
- Accessibility allows access on different platforms.

- Durability is the property that guarantees the material survival independently of changes and technology upgrades.
- Interoperability is the ability to work together (inter-operate) on different platforms.

Different technological resources are going to use in this environment, all with the same instructional objectives of the educational program and seeking to adequately serve needs of users learners.

In this context, the interface of learning objects is an important component to the success of this learning environment because through it is going to happen the understanding of the learning content and communication between the user-system. The interface is going to offer different medias destined for people with disabilities, such as LIBRAS¹ interpreter for deaf people; media with high contrast for people with low vision; narration and didactic materials in braille for blind people; and others accessible and inclusive actions. This paper shows the interface development process of learning objects by “Accessible WebGD” and preliminary results of the research.

2 Interface Design

In a Virtual Learning Environment (VLE), the graphical user interface is the interlocutor scenario in Online Distance Education. This digital artifact should provide communication support during interaction between learners and, also, between them with the objects of study.

An interface poorly designed can present problems related to lack of usability, communication failures, compromised interaction, inappropriate layout, in the end it compromises the functionality and jeopardizes quality of web applications [2].

2.1 The Project Method

The project methods propitiate the realization of a structured, systematic and organized work, and help to identify specificities of the problem, because they provide a logic support for the development of projective activities [3].

Fig. 1. Iterative Interface Design Process (Source: Mandel, 1997, p. 251)

¹ Brazilian sign language.

In this study, it was adopted the project method proposed by Mandel [5]: Iterative Interface Design Process; this method involves users, focuses prototyping and evaluation of the project, from the initial stages to the final product development. The figure 1 shows the process model:

Analysis Phase

In the analysis phase, the user information was collected and analyzed, such as: identification of the user profile, user tasks, and user requirements. The figure 2 shows the user model constructed on the basis of information from users.

Fig. 2. Conceptual Map of User Profiles

Design Phase

In the design phase, it was established the following interface requirements:

- The interface must meet the Principles of Universal Design. In this way, all features are available in one interface is identical for all. Users can customize the interface manually according to your preference and needs.
- For deaf users: the interface must meet the “Brazilian standard about Accessibility in Communication – Subtitles on TV”, specifically in item 7 that corresponds to the Guidelines for the window with LIBRAS interpreter (this window should occupy 1/4 of the screen).

- For low vision users: the interface should provide a function to adjust high contrast.
- For blind users: the interface must be implemented according to the W3C accessibility guidelines, enabling efficient use of the screen reader. Also, it should provide feature to print the content in Braille.

The Icons of the Interface

On the interface of “Accessible WebGD” (VLE), command buttons will be available to enable/disable functions necessary for user-system interaction. Icons will be used to communicate the functions of the buttons. The board 1 shows the icons proposed to represent the interface functions.

Board 1. The icons representing the functions of the interface

Function of Command Button	Icon
Next
Return
Exit
Increase font size
Reduce the font size
Enable/Disable accessibility for deaf
Enable/Disable the audible narration content (text and images)
Enable/Disable high contrast (for low vision users)
Help
Alert
Glossary
Print content in Braille
Search

Interface Layouts.

The figures 3, 4 and 5 show interfaces developed for the “Accessible WebGD” (VLE).

Fig. 3. Interface for users without disabilities and also blind user who will hear the information via screen reader. Static images, animations and videos contain audio description

Fig. 4. Interface for users with low vision. Dark blue background and white or luminous yellow text are efficient contrast for reading and are considered enjoyable for users with low vision [4]

Fig. 5. Interface with window for LIBRAS interpreter destined for deaf users.

3 Final Considerations

The “Accessible WebGD” (VLE) the environment was not completed. Currently, the project is in the construction phase, where the content is being implemented. The ergonomics and usability evaluations of the interface will be made after implementation of the content.

It is emphasized that the socio-economic relevance of this research lies in the development of accessible digital material for learning (one of the bottlenecks to inclusive distance education).

References

1. Alvarenga, F.B.: Uma Abordagem Metodológica para o Projeto de Produtos Inclusivos. Tese (Doutorado) Universidade Estadual de Campinas, São Paulo (2006)
2. Batista, C.R.: Modelo e Diretrizes para o Processo de Design de Interface Web Adaptativa. Tese (Doutorado em Engenharia e Gestão do Conhecimento) – Programa de Pós-graduação em Engenharia e Gestão do Conhecimento, UFSC, Florianópolis (2008)
3. Bomfim, G.A.: Metodologia para Desenvolvimento de Projetos. Editora Universitária - UFPB, João Pessoa (1995)
4. Kulpa, C.C.: A Contribuição de um Modelo de Cores na Usabilidade das Interfaces Computacionais dos Usuários de Baixa Visão. Dissertação (Mestrado em Design) – Programa de Pós-Graduação em Design, UFRGS, Porto Alegre (2009)
5. Mandel, T.: The Elements of User Interface Design. John Wiley & Sons, Inc., New York (1997)