

HUMAN-TECHNOLOGY INTERACTION

Accessible Interfaces Design in Spanish University e-Learning Platforms

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Abstract At the moment e-learning platforms are being applied in the University studies of ascending form. The objective of this work is to analyse the e-learning platforms of different European Universities, to analyse their user interaction capacities and the degree of accessibility developed in these platforms. Interaction in e-learning platforms is vital for potential users; in many cases the bad development of these platforms encourages the abandonment of these studies. Starting off with this hypothesis, we develop an evaluation study of the interaction of e-learning platforms in European Universities and we study the degree of interaction with the user, we also consider the level of accessibility developed according to W3C standards.

1 INTRODUCTION

The study considers the necessity to know the repelling factors in the interoperability and interaction of the e-learning platforms when they must fulfil accessibility and standards, these have an influence on its design and the development of the system. For the accomplishment of this study we have analysed the platforms of diverse European Universities from the viewpoint of user interaction by means of the design of interfaces and services of a high level of interoperability of this selection obtained 10 platforms to analyse of deeper form. The methodology of the study forces us to make diverse types of evaluation both of users as of design. Once this part of the project had been analysed, the analysis of the accessibility of these platforms, manual as much as automatic, was made in order to appreciate the implanted degree of accessibility. Until levels arrived within the service, that guidelines had been followed according to the W3C and that appreciation users with disability of these services perceived. The data collected from the study denote that in platforms of a high degree of interaction and interoperability in many cases the application of accessibility criteria is reduced. We analyse the e-learning platforms and make the study of interactivity according to guidelines described in the study, the analysis of users and the

test of interoperability. Help menus and user-guides: website. We also make the study of the accessibility standards, the evaluation of the use of the W3C guidelines and we test the validation of the accessibility of these platforms using software.

2 STATE OF THE ART

The year 2003 was declared the “European Year for the Disabled”; the European Union committed itself to developing all the actions tending to guarantee the better integration of the disabled into all aspects of social life, according to the endorsement of the European Social Agency in December 2000.

In the knowledge society in which we currently find ourselves, the concept of accessibility goes further than mere access to the infrastructures, currently access to information through the Internet is posed as a fundamental basis for the integration of all the collective groups and the respect of equal opportunities for all citizens.

The Region of Valencia has posed the technological challenge as one of the basic pillars of economic and social development. To this end it presented, in its day, the “1st Region of Valencia Modernisation Plan” and it is currently working on its “2nd Modernisation Plan” in which there is special

emphasis on the accessibility of the services for citizens.

This being one of the basic premises of the Plan, a *UPV* team has been carrying out a study on the degree of implementation of these recommendations in the e-learning platforms of various Universities on a European level. In order to carry out the aforementioned study all the services offered by the Valencian *Generalitat* in the various institutions that offer on-line training have been analysed, as well as a sample of 10 European Universities, and of these those that are really capable of being true e-learning platforms in view of their level of accessibility have been selected, from this selection interactive services to be studied were obtained. The methodology of the study forced us to carry out various types of evaluation, both manual and automatic, so as to be able to appreciate the degree of accessibility implanted. To what extent the levels were reached within the service, which guidelines had been followed according to the W3C and what appreciation disabled users perceived of the said services.

The data obtained from the study denote a lack of precision in the application of the accessibility criteria, which in many cases makes access with minimum levels of disability impossible. This communiqué presents in detail how the study has been carried out, the conclusions and some minimum recommendations as regards the optimisation of the services offered in the matter of accessible e-learning.

2.1 Accessibility and Accessible Design

Accessibility can be defined as: The set of characteristics that an environment, product or service should have in order to be usable in comfortable, safe and equal conditions for all people and, in particular, for those who are in some way disabled. Accessibility can be understood in relation to three basic forms of human activity: mobility, communication and understanding; the three are subject to limitations as a consequence of the existence of barriers. The barriers are any impediment, hindrance or obstacle that limits or impedes normalised, dignified, comfortable and safe ways of access, use, enjoyment, interaction and understanding of the environment, product and service. To be specific, the advances insofar as the degree or level of accessibility that characterises the environments, buildings and public spaces in society, are not isolated cases but depend on the interaction between the three components of that same society:

- The normative and institutional structure, which establishes the minimum demands

of accessibility, should encourage their compliance.

- The technological level, which establishes the development of solutions and their application possibilities.
- The social organisation, which is at the same time the receiver, mediator and executor of the conditions established by the regulations, institutions and technology.

The interaction between these three components makes up a system that, in an aggregate way, will determine the possibilities that make an asset or service appropriate for its use with all people or, on the contrary, inaccessible for a segment of the population.

The consequence is that it is not enough to work in an isolated fashion on one aspect of the system, but rather that it is essential to work jointly between the institutional, regulative, social and technological spheres in order to achieve that, both for the suppression of barriers as for the Design for All, it be a reality applied to any asset or service, i.e. that what is new should be made accessible and what is old should be transformed in order to become accessible. Only through planned action and taking the system as a whole will it be possible to tackle the area adequately.

Accessibility is a necessary condition for the social participation of people with different functional limitations and a guarantee for the best design for everyone. In a society in which the information technologies and communications are being used more and more so as to be informed, in order to study, to relate to others, for entertainment and for work, and in which there are increasingly more services provided via telematics, assuring the accessibility of the new technological resources, Internet in particular, is a priority.

In fact, currently, accessibility in the Internet is very limited, above all due to indifference, or ignorance of the problem, on the part of many web designers, and bearing in mind the great number of disabled all over the world – some five hundred million people – it is a very important aspect to be considered.

Before entering into the web design, strictly speaking, it is a good idea to talk about accessible Design, broadly speaking, in general terms, given that many of the principles used here are also applicable to web design as a result of being included in the design of a product in general.

The concept of Design for All (as it is known in Europe, whereas in America it is known by the name Universal Design) is a synonym of “meant for everyone”. In a strict sense it is the process of

creating products, services and systems that are usable by all people, encompassing the greatest type of situations possible.

According to this philosophy the equipment and services should be designed to satisfy the needs of all the users; as much the average user as users with different functional profiles should be able to use the product as much as possible and with the maximum features, without the need for adapting or additional specialised design.

Seven Universal Design principles have been established to guide a wide range of disciplines of design including: the environmental design of products and communications. These seven principles can be applied to evaluate existing designs, to guide the process of design and to educate both the designers and the consumers on the most usable characteristics of products and environments. The Principles are described below, indicating its definition and the guidelines to be followed for its observance.

Principle One: Equitable Use

The design is **useful and marketable** to people with different capabilities. Guidelines:

- a. It provides the same means of use for all users: wherever possible identical; equivalent if not.
- b. It avoids segregating or stigmatising any user.
- c. The provisions for privacy, security and protection should be equally available for all users.
- d. It makes the design interesting for all users.

Principle Two: Flexibility of Use

The design should have sufficient **flexibility** to accommodate the greatest range of preferences or individual capabilities. Guidelines:

- a. It provides options in the methods of use.
- b. It incorporates means of access and forms of use for both the left and the right handed.
- c. It facilitates exactitude and precision for the user.
- d. It provides adaptability at the user's rate.

Principle Three: Simple and Intuitive Usage

It should be **simple and intuitive**, easily understood independent of the experience, knowledge, language or the level of concentration of the user. Guidelines:

- a. To eliminate unnecessary complexities.
- b. To be consistent with the expectations and the intuition of the user.
- c. It incorporates a wide range of instruction and skill in the language.
- d. It arranges the information according to its importance.

Principle Four: Perceptible Information

The design provides the user with the **information necessary** for its use independently of the environmental conditions and his sensorial capabilities. Guidelines:

- a. It uses different methods (graphic, verbal, tactile) for a redundant presentation of the essential information.
- b. It provides an adequate contrast between the essential and the additional information.
- c. It maximises the legibility of the essential information.
- d. It differentiates the elements such that they can be described (i.e. it makes it easy to give instructions or directions).
- e. It provides compatibility with the variety of techniques or devices used by people with sensorial limitations.

Principle Five: Error Tolerance

The design is **error resistant**. It minimises the risks and the adverse consequences of both accidental and deliberate errors. Guidelines:

- a. It adds elements in order to minimise dangers and errors: the most used elements should be more accessible; the dangerous elements should be eliminated, isolated or shielded.
- b. It provides warnings about dangers and/or errors.
- c. It provides escape routes with safe characteristics.
- d. It discourages unconscious actions in tasks that require vigilance.

Principle Six: Low Physical Effort

The design should be used efficiently and comfortably with a minimum of effort or fatigue. Guidelines:

- a. It allows the user to maintain a neutral body position.
- b. It uses reasonable functioning strength.
- c. It minimises repetitive actions.
- d. It minimises the physical effort sustained.

Principle Seven: Size and Space for Access and Use

The environment provides a space and conditions that are adequate for its use independent of the body size, posture and mobility of the user. Guidelines:

- a. It provides a clean line of vision of the important elements for any user whether seated or standing.
- b. The components should be within reasonable reach for any user whether seated or standing.
- c. It includes variations in the hand holds for different hand sizes.

- d. It provides adequate space for help or personal care devices.

These are the criteria that define a design that is *usable* for everyone. Of course other aspects should also be borne in mind throughout the design process such as aesthetics, the cost, safety/security, or respect towards diversity.

3 ACCESSIBILITY AND WEB DESIGN

With reference to the accessibility problems related to webpage design, one should bear in mind that many users may be operating in contexts that are very different from one's own:

- They may not be able to see, hear, move or may not be capable of processing certain kinds of information easily or at all.
- They might have difficulty in reading or understanding a text.
- There is no reason why they must have or be capable of using a keyboard or a mouse.
- They might have a screen that only displays text, a small screen or a slow connection to the Internet.
- They may not speak or understand the language in which the document is written fluently.
- They may well find themselves in a situation in which their eyes, ears or hands are occupied or hindered (e.g. driving a car, working in a noisy environment etc).
- They might have a previous version of the navigator, a completely different navigator, a voice operated navigator or a different operative system.
- The contents developers should bear in mind these considerations while designing the pages.

Given that there are many different situations to be taken into consideration, each accessible design chosen generally speaking benefits many groups of disabled people as well as the entire Web community. On this aspect, the World Wide Web Consortium (W3C), through a work group known as WAI (Web Accessibility Initiative), took up the challenge and has made the effort to "standardise" the webpage design procedure in order to make them accessible. This has been embodied in a series of recommendations in the form of Guidelines. And it is in these guidelines that the key to providing equalitarian access for all Web users is to be found. The WAI, in association with organisations from all

over the world, is promoting the accessibility of the Web through five complementary activities:

- To assure that the essential technologies of the Web support accessibility.
- To develop guidelines for the authorship of pages, user applications and author tools.
- To develop evaluation and reformation tools for accessibility.
- To direct training and technical assistance.
- To follow up on the research and development that could affect the future accessibility of the Web.

Of all the groups of guidelines dealt with by the WAI we are mainly interested in one, above all others, for this project. We are referring to "Web Content Accessibility Guidelines".

4 METHODOLOGY OF THE EVALUATION OF THE ACCESSIBILITY OF E-LEARNING PLATFORMS

The steps that were taken to carry out the aforementioned study were the following:

- In the first place the whole platform was visited in search of pages claiming to be accessible, that is to say, pages that had a WAI logo or that had an alternative accessible version. These signs of accessibility should be found in the main page of the website, given that this is their entrance point.
- Once having detected the accessible pages an automatic tool was then applied to them to check whether they really were or not.
- We also saw fit to pass the said tools on to the most important Institution Webs, independently of whether they claimed to be accessible or not.
- The next step was to analyse the results obtained and to compare the results of the two analyses carried out thus obtaining pertinent conclusions.
- Finally a series of improvements were contributed, the most common detected, which helped us to make the said webpages accessible.
- The levels of priority that were taken into consideration were 1 (A) and 2 (AA), 3 (AAA) was rejected given that it was very exacting and no platform was found that could comply with it, not even the webpage of ONCE.

- Insofar as the levels of exploration of the platforms, level 3 (the main page and the two levels below it) was the maximum level explored, because if one of the platforms of dynamic webpages is not accessible up to level 3, it is difficult for it to be accessible in subsequent levels.

The study was carried out on the 15 platforms analysing the levels of priority required by the W3C regulations. Each point of verification is assigned one of the three “**levels of priority**”.

• **Priority 1:** The Web content developer **has to** satisfy this point of verification. Otherwise, one or more groups will find it impossible to access the document information. That this point of verification be satisfied is a basic requirement so that some groups are capable of using the Web documents.

• **Priority 2:** The Web content developer **should** satisfy this point of verification. Otherwise, one or more groups will find it difficult to access the document information. The satisfaction of this point of verification will remove important obstacles for accessing Web documents.

• **Priority 3:** The Web content developer **can** bear this point of verification in mind. Otherwise, one or more groups could find some difficulty in accessing the document information. The satisfaction of this point of verification will improve access to Web documents.

The specification of three “**levels of adaptation**” to facilitate reference for other organisations.

- The adaptation level "A" (A) includes the points of verification of priority 1;
- The “Double A” (AA) level includes priorities 1 and 2;
- The “Triple A” (AAA) level includes priorities 1, 2 and 3.

Examples of habitual barriers found in all the platforms studied:

- Images without alternative text;
- Absence of alternative text for the sensitive points of the maps of the image;
- The incorrect use of the structural elements in the pages; the unsubtitled sounds or the undescribed images;
- The absence of alternative information for the users who cannot access the frames or the scripts;
- The tables that are difficult to interpret when they justify;
- Or, the sites with poor colours contrast.

The Relation of these Guidelines to Other Guidelines of the Web Accessibility Initiative (WAI) of the W3C

We could say that the WAI divides its guidelines into four large groups:

1. *Web Content Accessibility Guidelines (WCAG)*. They study how accessible the content of a website is. These are the guidelines that interest us the most.
2. *User Accessibility to Applications Guidelines (UAAG)*. They study the accessibility of the navigators.
3. *Author Tools Accessibility Guidelines (ATAG)*. They study the accessibility of the author tools employed to develop websites.
4. *XML Accessibility Guidelines (XAG)*. The XML applications with accessibility support.

As well as the development of the guidelines, WAI is also working on the use of the Web technologies, such as HTML, CSS, SMIL, XML, DOM, which are collaborating in accessibility.

WAI co-ordinates with other organisations to develop tools that can help in the evaluation, to readjust pages, and provide alternative solutions to support accessibility.

5 CONCLUSIONS

In spite of the great existing legislative cover on the subject of Web accessibility we have confirmed that in practice all this legislation is not really taken seriously given that our analysis carried out on 15 platforms has demonstrated that very few comply with the web accessibility requisites in levels 1 and 2. Only 2 platforms complied with level 2 and 5 with level 1, the rest did not comply with any accessibility requirement.

As regards the *Web Accessibility Guidelines*, let us repeat and make quite clear that these guidelines don't just make the pages more accessible for the disabled but also for all users in general. In the case of training the inobservance of these guidelines makes the better use of training impossible on the part of any user given that the said users have to be in front of the computer for many hours in order to obtain their training, for which reason it should be much more of a priority in these services than in others.

However, in spite of their seeming usefulness one also has to make clear that the *Web Accessibility Guidelines* are a recommendation and not a law, with all that that entails, and, moreover, the decision

to place the accessibility logo in a website is the responsibility of the Content Provider, who is able to place the icons (if he wishes) without having complied with the guidelines themselves with the requisite responsibility and without any kind of legal penalisation for having done so.

This is one of the reasons for the lack of seriousness and the contradictions found in our analysis already commented upon in previous points of the project.

As general conclusions relating to the analysis carried out one should say that:

- It is to be highlighted that the majority of the platforms have used the versions 1.0 and 1.1 of the TAW analyser and we can say that these versions are much less “exacting” than the version used in our analysis (3.0). As a result this has given numerous “exacting” errors meaning that we have had to analyse them far beyond the numeric data returned to us by the TAW tool. But despite this we recommend always using the most up-to-date versions of the tools because in general they are more thorough and detect more errors.
- Many pages within the same platform have the same heading or menu, for which reason many errors in this part of the website are repeated throughout all the pages that contain the aforementioned heading or menu. For this reason these errors, which should only appear once, crop up many times. We have kept this in mind when it came down to evaluating each platform.
- One should also bear in mind that many errors unleash or provoke, to some extent, other errors, for which reason one should take this into consideration when evaluating the page errors.
- One should not assume that all automatic errors are valid given that the experience in the analysis has demonstrated that, on various occasions, the programme has detected an error where none was to be found.
- For a definitive analysis of accessibility we can not base our conclusions on applying just one tool, like TAW, but also the experience of the person analysing, as well as the context of the platform, its structure and the programming method used are also going to affect the final result of the Analysis to a large extent.

As a final conclusion on the objective of our study, it has to be said that, in spite of the fact that many of the platforms appear to be accessible, their contents are not, given that only 4.5% of the pages analysed passed our accessibility tests. We could sum up by saying that the majority of the platforms show a “pretty face” aiming to provide an aspect and image of accessibility, which in reality they do not possess. This leads us to conclude that it is necessary for the Universities, in general, and those that have distance learning platforms, in particular, to approach this topic with greater seriousness and to make a real effort in this regard given that we are talking about Public Administrations, entities that should show more concern for making the information reach the citizen, although this means a loss in the aesthetic beauty of their services, which, as a result of having a more attractive image full of images, movements, striking menus etc., only serve to increase the probabilities of inaccessibility and place the distance learning student in a backward situation as regards his real training.

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