Software Requirements for Inclusive Employment: Accessibility, Usability and User Experience Contributions

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ABSTRACT

With the purpose of reducing prejudice, changing existing indices and highlighting the abilities of people with disabilities, this article presents an assessment of existing tools in the market that provide training and connection of people with companies, from the perspective of user centred design, usability heuristics and international accessibility guidelines, to, from the improvement points found, present a prototype idea of a platform that brings together qualification and employability for these people, promoting greater engagement and access to all.

Keywords: User Centered Design, Accessibility, Usability Heuristics, Employability, People with Disabilities, Skills, User Experience

INTRODUCTION

There is one billion people with disabilities in the world. Of these, 785 million are of working age; but only 26.9% have a job, according to Research on Disability (Research on Disability, 2014). One of the biggest reasons for this phenomenon can be the lack of qualification of these people and the most common strategies used to find vacancies in companies are direct referral or referral through support entities, according to the Brazilian Association of Human Resources (ABRH, 2016). Digital media have an important role in creating new opportunities in this field; it is in this scenario that this study is being developed aiming to follow a user with disabilities-centered approach. This research aims to identify the characteristics of a digital application to promote the employability of people with disabilities. The concept of the application is based on a matching engine that will enable a mutual recognition of the candidates' skills and of the characteristics of the opportunities available in the labor market.

To understand the current scenario of using digital solutions to support the employability of people with disabilities, a brief benchmarking analysis was made; several tools were found that serve as a search engine for professional and talent opportunities. Some of them allow people to register their resume for free, including professionals of all profiles. Few of these tools use an assessment from the perspective of usability, accessibility, participatory culture, and experience of users with disabilities. It was also found that there are some inaccessible features in these tools that, consequently, hinder the integration of people with disabilities in the labor market.

ACCESSIBILITY AND USABILITY

Accessibility is the term generally used to indicate the possibility of any person take advantage of all the benefits of one life in society, among them the use of the internet (LBI, 2015). The web accessibility is the right of accessing to the network of information and elimination barriers of communication and programs appropriate in content and presentation of information in alternative formats (Trenton et al. 2014). Usability is the quality of use of a system, directly associated with its operational context and the different types of users, tasks, physical and organizational environments (Dias, 2006). It´s possible to say that any change in one relevant aspect in the context of use can change the usability of the software. The usability heuristics were created to evaluate with aiming to avoid common errors (Nielsen & Mack, 1994).

The ratio of these two areas is presented in the book e- Usability (Ferreira & Nunes, 2008) where the authors create a taxonomy of usability heuristics aligned to the accessibility guidelines, summarizing the items of both disciplines to facilitate the identification of problems that occur in the context of the presentation of information and data entry. The information can be presented in several ways: texts, images and sounds, however, for it to be complete and intelligible, it is necessary to take into

account the concern with the positioning and the elements sequentially of the screen, the filling of forms, the use of buttons and controls, and other aspects that turn the interface accessible by the assistive technologies – tools used by people with disabilities. To elaborate the testing criteria for this work, beyond the guidelines of accessibility, defined by the W3C (W3C, 2018), were involved research on the usability, as complement of the present study, since the ease of interaction between the user and the interface depends also the ability of the user to detect, interpret and respond appropriately to the system information, having special needs or not. The Table 1 presents the relation between the four principles of the accessibility guidelines (W3C, 2018) with the usability heuristics (Nielsen & Mack, 1994).

Table 1 - Relation between accessibility and usability

Accessibility Principles	**Related Usability Heuristics**
Perceptible: Information and user interface components must be presented in a way that users can understand them. Example: Text Alternatives - Provide text alternatives for all non-text content so that it can be presented in other ways, according to users' needs	- Visibility of the system status: Keep users informed about what is happening, through appropriate feedback, in a reasonable time. - Aesthetics and minimalist design: Dialogues should not contain irrelevant or rarely needed information, as they can decrease their relative visibility
Operable: The user interface and navigation components must be operable. Example: Keyboard Accessible: Make all the functionality available from the keyboard	- User control and freedom: Provide a clearly marked "emergency exit", so that the user can leave the unwanted state - Flexibility and efficiency of use: Shortcuts can often speed up the interaction of advanced users
Understandable: The information of the user interface must be understandable. Example: Data Entry Assistance - Helping users to avoid and correct errors.	- Correspondence between the system and the real world: Words, phrases and concepts familiar to the user - Consistency: Prevent different words, situations or actions from meaning the same thing - Error prevention: The project must be careful that prevents a problem from occurring

	- Clear error message: Express in clear language (without codes), accurately indicate the problem and suggest a solution
Robust: Content must be robust enough to be interpreted reliably by a wide variety of user agents, including assistive technologies. Example: Compatible - Maximize compatibility with current and future user agents.	- Reduced memory overhead: Make objects, actions and options visible - Help and documentation: Documentation must be objective, easy to search and focused on the user's task.

ACCESSIBILITY AND USABILITY

This section presents the analysis of qualification tools: Coursera and employability tools: Infojobs. The number of users, market maturity and areas available for testing defined the tool selection criteria. Experts and users with disabilities on personal computers and Android mobile applications performed automatic and manual evaluations. Some guidelines of accessibility of the W3C, along with usability heuristics as described on the Table 1 were prioritized because they are crucial to determine if the software is accessible. The Table 2 shows the criteria and the types of assessment performed.

Table 2 - Criteria for assessment of accessibility and usability

Usability	**Accessibility**	
	Manual	**Automatic**
Decreased memory overhead	Option with sign language translation	Non-text content with text description
Error prevention	Correct order of keyboard access	Contrasts between screen and letter font
System status	Option to go to	Spacing for people to

visibility	main content	touch smartphone screens

Evaluation Results

The results point to the existence of several critical errors that can prevent the use by many users (especially those with blindness, deafness, and reduced mobility). It is therefore, mandatory to: (i) Increase the accessibility and usability of the existing tools, as the majority of them make it very difficult or even prevent the use of people with disabilities; (ii) improve the behavioral analysis component, considering the lack of information systems that simply survey and characterize profiles and the importance given to the technical characteristics of some companies evaluated; (iii) integrate features related to learning paths recommendation, because people with disabilities do not always know those paths, nor are they included in the qualification processes, a problem often inherited since basic education; follow a participatory approach, to support and verify the approximation of people with companies and their sense of belonging, reception and integration by the existing recruitment and selection processes. In the platform prototype presented the following were prioritized the suggestions of people with disabilities, the accessibility guidelines, along with usability heuristics that enable this greater connection technology, creating environments more welcoming and accessible.

ACCESSIBILITY AND USABILITY

From the applied tests and inspired by methodological strategies such as co-design, Design Thinking and Educational Design Research, a set of requirements was identified involving the user in this design process. Those requirements gathering process proved to be the basis for the proposal and allowed the specification of the digital solution. The final solution aims to allow the connection between people with disabilities and companies, in a simple and intuitive way, and considering not only a set of technical dimensions, but especially behavioral ones, through an accessible interface, and promoting greater equity in inclusion people with disabilities in the labor market, like any other professional.

RF01 – Candidate Registration: On this registration for addition of information basic to data personal, experience academic and professional, will be asked questions about dreams and applied behavioral testing.

RF02 - Job Registration: The employees of the company will carry out the registration of vacancies, entering information such as title, description of job, wages, hours, benefits, requirements, education, knowledge and profile based on the behavior characteristics that more is suited to vague. Besides this information, the software will have one space for the staff to record videos, describing how to work the day by day of who works in that position.

RF03 - Match: This feature makes the match between the characteristics of the job and the people who signed up. If the combination der 70%, will be sent notifications to the company and person, with their respective paths of learning indicated.
RF04 - Offer of vacancies in the notification sent by the result of the process match of the vacancies will be offered also to from the reviews that the staff are the positions and the companies in which they work.

RF05 - Indication of candidates: In the notification sent by the result of the process match of the candidates will be given to companies to from the endorsements made by professionals who have worked with these people, if they have experience professional prior.

RF06 – Trail suggestions: A from the result of the match, will be created one track from learning technique with several courses to qualify the people on issues in accordance with the requirements of the jobs and skills of the candidates. There will be Tracks behavioral suggestions too. This is for the case to be necessary to develop better the skills communication, for example, if one job to service the customer.
RF07 - Presentation of courses: On page of the courses, will be presented the summary of lessons, time duration of the course, the number of practices and information of the teacher, as well as the characteristics of accessibility that it has.
RF8 - evaluation technique by means of accessible components will be made the tests with the candidates for, as well as the behavioral, assessing whether people are prepared to follow for the process of hiring.

In addition to the features that differentiate the definition of the requirements of this software, from the classifications made in Infojobs and Coursera, with a perspective of accessibility and usability and the user experience with disabilities. The errors raised served as a guide for a better understanding of the path to be developed, as well as opportunities for improvement for the evolution of the prototype.

CONCLUSIONS

The Convention UN on the Rights of Persons with Disabilities states that "each person has the right to work, to free choice of their work and the conditions fair and satisfactory to work and to protection against unemployment " (UN, 2008) . The UN also determines, as one goal of developing sustainable Agenda 2030, which should -

If eliminate the disparities of gender in education and ensure the equality of access to all the levels of education and training professional for the most vulnerable, including the people with disability, people indigenous and children in situation of vulnerability (Agenda 2030, 2015) .

In this work has been verified as the lack of accessibility of tools employability and education can create barriers for people with disabilities create social connections, which can be felt welcomed. The creation of the software requirements tries to solve these problems and going to the meeting of these two determinations of UN in relation to employability and skills of people with disabilities. There is still one long path to follow, to which the prototype is transformed into a real software, to get scalability, but the 1st steps were done, and the idea is to evolve to the next level of evaluation with the users and proofs of concept.

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