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Inclusive Dictionary for People With Disabilities Through an Accessible Technological Platform

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ABSTRACT

One of the greatest challenges for people with disabilities is the lack of accessibility to information, and communication, in addition, to learning processes, which results in few possibilities for labor and social inclusion. Currently, in this sense, research and projects are carried out to promote strategies that allow greater use of ICTs in the acquisition and exchange of knowledge to reduce inequalities in terms of accessibility, especially for people with disabilities and, in general, for priority care groups. However, sustained processes are required that allow comprehensive accessibility to people with disabilities. According to studies carried out by the World Health Organization (WHO), it is estimated that 5% of the world's population has a hearing impairment (World Health Organization, 2018). This community generally presents learning problems given the low effectiveness in the transmission of messages between listeners and non-listeners, and, regarding information and communication technologies, there are not enough computerized educational materials that facilitate communication and Autonomous Learning. It is important to mention that ICT plays a decisive role in teaching-learning in various educational environments. Undoubtedly, new technologies can supply means for improving teaching and learning processes, and managing educational environments in general, since they facilitate cooperation and collaboration between students. In addition, they contribute to overcoming social inequalities. Because sign language is the first language of the deaf community, and since it is expressed spatially and visually, it is necessary to produce multimedia content for the generation of computerized educational tools to properly transmit these messages. The present work is oriented toward facilitating sign language learning in people with hearing impairment, which contributes to their coexistence and interaction. We cannot fail to mention that the approach to nature is mediated by language. Without sufficient lexical background, any formative action is limited. It is essential to have a sufficient repertoire of terms that help the speaker understand and know her environment. Under regular conditions, vocabulary acquisition may be conditioned by diverse, but drawing events or conditions: access to physical or digital bibliography, limited educational experience, family environment little related to reading, etc. The increase in vocabulary in a speaker facilitates learning. Many reading comprehension problems begin with the impossibility of properly decoding words. The problem of access to vocabulary improvement is exacerbated for the deaf community and people with visual disabilities.

The aggravation is because they do not exist in the Ecuadorian environment, dictionaries that offer information from the Ecuadorian lexicon not defined in general dictionaries and that, at the same time, contribute to the interpretation of sign language for the deaf community or that meets the standards of inclusion necessary to facilitate reading in users with visual disabilities. In this context, part of our work will be focused on determining which is the lexicon of Ecuadorian speech that deaf people do not know. We consider as a hypothesis that the lexicon unknown by deaf people mostly comprises terms with abstract or very localized references. In addition, we propose to propose the structure of the design of a technological platform of the dictionary. This web application would present the set of lexical entries defined in Spanish and expanded with an author appointment, accompanied by an image of the referent and a video with sign language interpretation of both the definition and the appointment. Each dictionary entry will offer automatic reading on the screen for the accessibility of no seers. The dictionary macrostructure will be composed of basic words and expressions of sign language to promote educational interest and facilitate and energize learning. The work will also be based on a methodology specialized in web applications such as OOHDM (Object Oriented Hypermedia Desing Methodology), on free tools for the manipulation of multimedia audio, video, and images such as Avidemux, Audacy, and Gimp respectively, in the Netbeans 14.0 development tool with JSF 2.0 framework. For integration with the database, PostgreSQL will be used.

Keywords: Deaf people, Visual disability, Lexicon, Web dictionary

INTRODUCTION

Language plays an important role in people's educational training. With adequate acquisition and development of linguistic skills, every person can access knowledge through reading and writing. The dictionary is one of the most complete and useful tools for the improvement of lexical capacity and the understanding of texts. Within the Ecuadorian community, in the same way, as in any speaking community, groups of people with disabilities whose access to information offered by a dictionary is limited precisely because of the tools that allow these difficulties to be overcome. Ecuador's deaf and blind communities do not have a dictionary that facilitates their lexical acquisition and reading comprehension. This research analyzes this panorama and presents the initiative of a basic and digital basic dictionary of the Ecuadorian language for the use of the entire speaking community, specially designed to be accessible to deaf people or with visual disabilities.

The Importance of a Broad Lexicon

The development of thought, the acquisition of knowledge, human interaction and many other social or intellectual activities depend, among other things, on lexical capacity. This means that mental lexicon contributes to multiple human tasks. Lexical availability, that is, the volume of terms of a language is related to the ability to develop these tasks. In the same way, a broad, strengthened lexicon will allow more effective performance in such tasks. Reading, learning, professional skills, among others, are activities that

require the domain and use of a lexicon in various linguistic records (Bruning, Schraw, Norby, & Ronning, 2005).

Role of the Dictionary

The lexical acquisition is produced by various ways: in linguistic interaction, in learning and reading. In all these areas, the dictionary is a fundamental ally (Peralta de Aguayo, 2016) (Mahecha Mahecha & Pedraza Pedraza, 2009) (Rico-Martín & González-Ortega, 2021). But the dictionary is not only an ally for lexical acquisition. It is also a cultural testimony of an era and a society. In it you can know the discoveries, the thought and the forms of social relationship of a society at a time.

Need for the Dictionary of Ecuadorianisms With Appointments

Being, in this way, the dictionary a necessary and useful instrument in various ways, each language should have this tool appropriately constructed and accessible to all users. In the case of the Spanish language, its linguistic variety is not appropriately registered in the Spanish Language Dictionary (DLE) of the Royal Spanish Academy (Real Academia Españóla de la Lengua, 2022). This is because it is a dictionary elaborated from the Spanish perspective and that, at the same time, must face the commitment to reflect the wide lexical variety of Spanish in all areas where this language is spoken. Although digital resources should allow solving these problems more easily, the DLE still fails to become the dictionary that also reflects the lexical use of Spanish in all its varieties.

Given this circumstance, the need to have a dictionary that presented and defined the terms of Ecuadorian speech was evidenced. This dictionary must also present guarantees of the existence and use of the terms that contained. That guarantee, as in the best lexicographic tradition, should consist of presenting quotes for use for each meaning. In this way, the drafting of the "Dictionary of Ecuadorianism with appointments" was undertaken, a lexicographic work that would present the terms of Ecuadorian speech not defined in the Spanish dictionaries and accompany each definition with an appointment of use (Araujo, 2021).

Corpus Construction

The construction of a dictionary currently requires support in a corpus that reflects the use of the language (Bolaños, 2015). With this purpose, a linguistic corpus was first built. 200 literary works distributed among the narrative genres (novel and story), essay and theater were processed digitally. Around 2000 press items were added from the websites of the newspapers with the highest circulation throughout Ecuador. This corpus allowed to extract the appointments of all meanings.

Preparation of the Dictionary of Ecuadorianisms With Appointments

For the writing of the Dictionary of Ecuadorianisms with appointments (Dec) several computer resources were used. First, the corpus was processed with the Texstat software (Freie Universität Berlin, 2022). The Tlex program

(TshwaneDJe Software and Consulting, 2022). It allowed in a second phase to improve the processes of drafting the definitions, inclusion of quotations and the elaboration of referrals.

Focal Groups With Users Without Disability Condition, Deaf and Visual Disabilities

In order to achieve the objective of preparing an accessible Ecuadorian speech dictionary, the word base was already ready from the Lemio of the DEC. The accessible character raises the difficulty of determining which Spanish words group have equivalent in sign language and which are not. Although all words can be translated into sign language, a first phase should understand the terms that are equivalent in sign language.

With this objective, focal groups were formed with deaf people and interpreters of sign languages. The methodology of focus groups allows to collect information through semi-structured group interviews (Escobar & Bonilla-Jimenez, 2011). In our case, it facilitated access to the knowledge that we require to lay the foundations for the writing of the dictionary. These groups allowed to know the difficulties of access to the information found by deaf people and the little access with which they have readings in the Spanish language.

With these inputs a route of selection of terms of the Ecuadorian lexicon was determined to be analyzed by a group of interpreters so that they could be included in the web dictionary and have a video for interpretation in sign language.

METHODOLOGY FOR THE CONSTRUCTION OF DIBACEC

Technological Resources

It is important to mention that ICT play a decisive role in the teaching - learning process in the various educational environments, as many studies have been demonstrating (Castillo López, 2020) (Islas Torres, 2017). Undoubtedly, new technologies can supply means for the improvement of teaching and learning processes, and for the management of educational environments in general, since they facilitate cooperation and collaboration between students. In addition, they contribute to overcome social inequalities. Because sign language is the natural language of the deaf community, and since this language is expressed spatially and visually, it is necessary to produce multimedia content for the generation of computerized educational tools in order to achieve the proper transmission of these messages. The present research is basically oriented to facilitate sign language learning in people with hearing impairment, and provide a new resource in the actions of sign language interpreters through the use of technology.

The problem of access for vocabulary improvement is exacerbated for the deaf community and for people with visual disabilities. The aggravation is because they do not exist in the Ecuadorian environment, dictionaries that offer information from the Ecuadorian lexicon not defined in general dictionaries and that, at the same time, contribute with the interpretation in sign

language for the deaf community or that meets the standards of inclusion necessary for ease of reading in users with visual disabilities (Toledo, 2021).

In terms of web accessibility for deaf people, it is said that the internet, telecommunications and technology have broken communication standards, although this is true for the listening population, the population with deafness has been excluded again because there are web pages and web pages and Applications that do not meet the basic requirements for communication between this group of people.

There are tools, as detailed below, which will be used in the web application, to facilitate sign language translator. One of them is Hetah. This product is part of the "Foundation for the Development of Technological Tools for Humanitarian Aid", this tool is free, offers the avatar called Iris, and translates to sign language written phrases or words (Hetah, 2022).

Deaf people see the movements that Iris performs with their hands, although it is a single -direction system for deaf people, it uses artificial intelligence to find sign language images that are related to the words written in your search engine (Hetah, 2022).

With Svisual you can connect in real time with both audio and video, the interpretation required by a user. It is done through an interpreter video to maintain continuous communication with the interlocutor, whether these people who have hearing impairment or in turn people who listen without problem. This tool is free and is available for mobile devices with Android and Apple operating systems (López, Jaramillo, Mendoza, Baena, & Baena, 2016).

With the desire tool, animations for sign language are generated. Its main objective is to interpret the written language to sign language. It is designed to facilitate deaf people to understand information in public places. Use a 3D character that performs realistic movements in order for the deaf community to recognize and understand them. It consists of three modules: the editor module determines the position and turn of each 3D character bone in order to create gestures and facial expressions. These in turn combine in the following module called composition. Here the phrase written in sign language is formed, to reuse the same gestures in phrases and with different virtual characters.

Textsign will be used as a tool that converts the text written to Spanish sign language, supports with the translation in real time and on demand, this tool will be integrated into the website, additional the virtual assistant, screen where you want to make an interpretation of the text In sign language, LSE (Xataka móvil, 2022).

Additional Characteristics of Technological Resources

At the level of development, a methodology specialized in web applications such as OOHDM (Object Oriented Hypermedia Desing Methodology), free tool for the manipulation of multimedia audio, video and images, additional to this with Avidemux, Audacy and Gimp respectively, for angular interfaces and for integration with the post-living database.

Gabriel Román Dictionary Analysis

The only Ecuadorian lexicographic initiative for deaf people is the Gabriel Román dictionary, available through a website (Fenasec, 2022). This dictionary offers a 5000 words corpus in Spanish with its corresponding interpretation in sign language. This was a dictionary built by a team of signs language interpreters and deaf people of the National Federation of Deaf people of Ecuador (Fenasec). However, the lack of consensus against the creative dynamics that every language has prevented the dictionary from being positioned as a resource used by target users. Its format also seems not friendly. Focal groups showed that many terms of Spanish in this dictionary have interpretation in a sign that is not used by Ecuadorian deaf. On the other hand, having used the YouTube platform to project the videos in a free account affects somehow in the interface, since, after the projection, the screen offers content outside the dictionary theme.

From this analysis, it was determined that the Debasec must present the videos in a payment account on a video platform (YouTube). In the same way, the sign design for words that do not have their sign language equivalent must arise from a consensual work with various groups of deaf people, who must have the leadership and prominence to propose them. This will guarantee to some extent its acceptance and use among the deaf community.

Analysis and Selection of 100 Terms of the Dictionary of Ecuadorianisms with Appointments With Presence in the Gabriel Román

In a web contrast work, a team of linguistic students compared the 1200 DEC tickets with the Gabriel Román sign language dictionary. They found that 104 terms of the DEC presented their equivalent in sign language. This percentage gives a measure of the difference in lexical flow between Ecuadorian speech and Ecuadorian sign language.

This set of terms will be the basis for the interpretation of sign language of the Dibacec. In a first phase, 2000 Ecuadorian speech terms will be presented on a web page. Several entries will count on their various meanings with a photo of the referent. One hundred words will present interpretation to Ecuadorian sign language. The website will have an embedded screen reader for the accessibility of people with low vision or blind.

CORPUS PREPARATION FOR THE CONSTRUCTION OF DIBACEC

For the construction of the Dibacec it is essential to have a corpus of works from which the appointments can be extracted for each of the meanings of this resource. The construction of this corpus is based on the corpus already used for the DEC: 200 narrative and essay works of Ecuadorian authors and 2000 press articles downloaded from the web pages of the largest newspapers of national circulation in Ecuador.

This corpus will be expanded with 500 more articles of the same national newspapers. The Corpus, in digital format, will be composed of HTML and Doc files. They will be prosecuted with the Tlex Corpus program of the Tlex Suite.

CONCLUSION

The lexical acquisition needs of deaf people in Ecuador are urgent and notable.

The lexical acquisition needs of Ecuadorian speakers, the deaf community and the community of people with visual disabilities are high.

These needs were determined from the consultation in focus groups with deaf people, sign language interpreters, people with visual disabilities and speakers in general.

A dictionary of Ecuadorian speech lexicon is necessary in the context of a country that does not have catalogs that help readers to understand the texts.

A dictionary of the Ecuadorian speech lexicon should be accessible if it seeks to contribute to the cultural and educational improvement of the entire Ecuadorian population.

In order to undertake a solid proposal, we start from the Dictionary of Ecuadorianisms with appointments to build an accessible dictionary of Ecuadorian speech for consultation through the web.

The technology will be the main tool for the construction of this dictionary because it will allow it to be consulted through a web page, have embedded videos with signs language interpretation, photographs of some references and screen reader.

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