Using Libras to Support People with Communication Disabilities: An Alternative Communication Tool

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Abstract. Communication is accounted as one of the main abilities related to humankind development, as it allowed people to pass on acquired knowledge. However, conventional communication favors those with great communication skills, i.e. reading, writing or typing skills summed up to oral language; thus, part of the population is excluded from conventional means of communication. Using assistive technologies such as Augmentative and Alternative Communication (AAC), IVA prototype was developed, enabling communication between patients with motor or cognitive difficulties and health professionals. In addition to their basic needs such as hygiene or food, patients were able to express their wishes, for example to choose which type of food they preferred or which activity they wanted to perform. During the validation and testing of the prototype, healthcare professionals considered that learning LIBRAS would be valuable for patients and other professionals. Thus, the prototype was expanded so that it includes LIBRAS resources, allowing patients and professionals in education and health to use a form of communication through gestures and facial expressions. This new prototype was called LIVA. LIVA assumes the use of communication boards, in which the user selects by click what they want. When selecting an option to express patient's desire, the information is presented in synthesized voice and the sentence is written in Portuguese; in addition, a pre-recorded video with a LIBRAS expert is presented, showing the same information in LIBRAS. Thus, user can understand what the sequence of gestures and expressions represents. The objective of LIVA is that when viewing the word, phrase or expression in LIBRAS the user reproduces the same signals to express themselves and this may allow greater autonomy for individuals with communication difficulties.

Keywords: Communication process
Augmented and alternative communication
Communications technologies · LIBRAS · Sign language

1 Introduction

The main role of technology is to approximate people. It is common to observe technology playing this role through social networks, instant messaging tools, tele-calls, and other forms of communication. Technology allows people to be together by transposing

physical distance. However, most tools are developed for users with broad communication skills, specifically users with reading, writing and/or typing skills and oral language, and are not intended and appropriate for individuals with communication difficulties or cognitive and motor restrictions.

To support the communication process of people with communication disabilities, assistive technologies provide mechanisms and resources that extend the communication skills of these people, and this area of assistive technologies is called Augmentative and Alternative Communication (AAC). AAC is defined as other forms of communication beyond the oral communication, such as the use of gestures, sign, facial expressions, use of alphabet boards, graphic symbols, use of sophisticated computer systems with synthesized speech and others [3]. AAC support people who has no speech, or who has a lag between their communicative need and their ability to speak or write.

In order to allow communication between people with communication disabilities, who may have some cognitive and motor restrictions too, it is proposed a tool that helps the communication process using technology and sign language. The presented tool proposes, besides the communication through voice and image, the use of Brazilian sign language.

This paper is organized as follow: Sect. 2 presents contextualization and motivation. The proposed tool LIVA is presented in Sect. 3, as well as the results of the usability tests. Finally, Sect. 4 presents the conclusions and future work.

2   Contextualization and Motivation

2.1   Augmentative and Alternative Communication

According to [1] Communication is a basic need of human beings. It is required in professional, social and personal relationships, establishing a fundamental aspect for survival. Communication can be considered a set of signs that refers to behaviors that occur among two or more persons and which provide a way to create meanings between them. When individuals have no forms of communication or have some form of communication, but this is not enough to maintain communication links, establishing social relationships, it is necessary to use some resources to promote communication, integrating this individual in social life.

Silva et al. [7] define as cruel the quality of people's life with communication difficulties. The greatest existing barrier in the communication of individuals with some disability is the verbal language and this causes other communication techniques to be adopted. Radabaugh [5] says that for people with communication difficulties technology makes things easier and for people with communication disabilities makes things possible. Thus, some alternative ways of communication can be used as writing, sign language, images, symbol boards, etc.

When we use different technology resources and alternatives to adapt or create a form of communication, we are entering the area of knowledge called Assistive Technology (AT), which proposes to promote or extended skills in people with all types of disabilities. When AT is used specifically to solve problems with access to knowledge, writing production, information exchange, etc., which is directly related aimed at expanding communication skills, they are called Augmentative and Alternative

Communication (AAC). The AAC is intended for people who are not speakers or have only a non-functional speech, or people who are in the gap between their communication needs and their ability to speak and/or write [3]. The term "alternative" is intended for individuals with no communication resource and the term "extended" those who have it, but insufficiently to establish socializing. Thus, the AAC is a term that is used to describe some communication methods that can help people who are unable to use verbal discourse to communicate, creating adaptations and communication alternatives that help them in this process, through expressions, images, gestures and signs.

In this way of communication, it is common to use many different learning tools, such as the alternative communication board, which uses the intuitive graphic images (photos, symbols, figures) with characteristics common to the real objects and actions. These figures have the purpose of representing actions through according to individual's needs and feelings, in order to further expand the communicative repertoire of these boards, using vocalizers that produce pre-recorded messages, which are accessed by keys through the images in the boards.

2.2 LIBRAS

The Brazilian Sign Language (LIBRAS) is a language in its full concept, with morphology, syntactic and semantics and uses gestures and facial expressions in the communication process. Albres [2] emphasizes that LIBRAS is composed of linguistic universals, because it presents phonological, morphological, syntactic and semantic-pragmatic aspects. In addition, the Brazilian government, by means of Federal Law No. 10,436, of April 24, 2002 effective LIBRAS as the second official language in the country. In this work, it was adopted as an alternative communication technique, whose communication process occurs through gestures, facial and body expressions, allowing the exchange of information between individuals and therefore allows people with oral communication disabilities to interact socially.

The LIBRAS had influence of the Portuguese language because they are in contact, but had as fundaments, the French sign language. Some of the Brazilian individuals who have LIBRAS as their native language do not know Portuguese and, consequently, feel difficulty due to the structure of the sign language, which when it is translated to the written language does not resemble to Portuguese language structure. Many words, concepts, expressions in Portuguese do not exist in LIBRAS, causing difficulty for the native individual in LIBRAS to understand texts in Portuguese [4]. Thus, to assist these individuals, assistive technologies can be used as ways of communication, to providing the inclusion of these individuals in society.

2.3 Motivations

Previous works carried out by these researchers with Augmentative and Alternative Communication tools [1, 6] showed that technology helps the communication process and allows the inclusion of individuals in society, facilitates the process of learning of children in the classroom [1], sharing information and learning new ways of communication.

The development of the IVA tool [6] allowed to these researchers lots of knowing, and we realized that using a sign language, associated with IVA would increase the usefulness of the tool, presenting a new form of communication to the individuals with communication disabilities. Also, during the researches we have identified several tools that use LIBRAS to help the communication for hearing impaired, applications that reproduction prerecorded videos with real people or even digital characters, but with limited resources to translate oral communication to gestural one. However, we did not identify any tool or research that uses communication boards and LIBRAS to foster the communication of people with cognitive and/or motor disabilities. Thus, the motivation for this work was the development of a tool that joins the two techniques of communication: boards and signs to broaden the ways of communication.

3   LIVA Tool: Communication with LIBRAS

The prototype of LIVA - Accessible Interaction with LIBRAS was developed to individuals that need to learn another form of communication besides oral communication, or because they do not have it or because they need to communicate with those who do not have it.

Therefore, through functions of the LIVA tool, in addition to the resources for alternative communication with images and sounds, users can use signals to communicate. The tool also serves as an option in learning the sign language LIBRAS, since it shows in a simple way the use of signs, facial and body expressions in the communicating.

We use an integrated development environment to create and develop the LIVA prototype. The prototype was evaluated through usability inspections performed by usability specialists and, at the end of this evaluation, the requirements were validated.

Considering the difficulties of communication, we seek to develop the prototype with the adoption of images and sounds to help and facilitate recognition and memorization, facilitating the adoption of the prototype.

It has the following features: on the main screen (Fig. 1), the user has options to express what he wants to do: choose a food, a drink, a song, a game, express a feeling or write a message to be spoken or transformed into signs. Still in this main screen, the user can access specific LIBRAS functionalities: button at the bottom of the screen.

Fig. 1. Main screen

By accessing the specific functionalities of LIBRAS on the main screen the functionalities are presented, as in Fig. 2. The user can select what he would like to learn in sign language: the alphabet, the greetings, days of the week and months of the year, colors, numbers and other options that have not yet been developed but can be created.
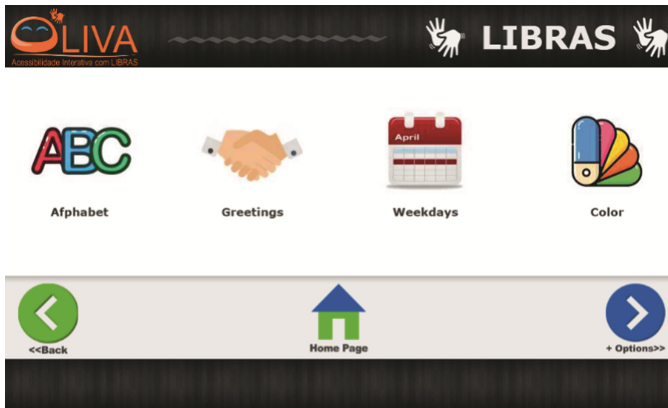

Fig. 2. LIBRAS functionalities. (Color figure online)

For the evaluation of the LIVA tool, the usability inspection technique was used to verify the usability and functionalities, concentrating on the Nielsen heuristics. And as it can be done at any stage of development, this type of technique has become suitable for the work, in the prototyping phase.

The analysis of heuristic evaluation shows us that LIVA is simple to use and the user can recognize where he/she is without having to remember the path he/she have been navigating. Furthermore, the use of metaphors and patterns provides greater ease in recognition of the objects to interact. Besides that, this tool minimizes

number of click's (actions) to perform a task, based on user's needs who have deficits in motor coordination.

4   Conclusion

We present the prototype LIVA that's support the communication process in an alternative and Augmentative way for people with little or no oral communication. And we used as a resource of this alternative communication, the Brazilian Language of Signs - LIBRAS.

Other existing tools were tested, but they did not meet the needs of individuals with cognitive and/or motor deficits, besides the difficulty of communication, using signals as an alternative in this process. During the usability inspections, we realized that the integration of the signals with other resources so common in such tools proved to be a great differential and provided users with or without communication difficulty to learn a new language.

We understand that people with multiple disabilities need specific technology to support communication and that these resources must be tailored to each user. Our prototype is constantly evolving and adapting to meet the different users with their various differences in the communication process.

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