

# Libras Portal: a Way of Documentation, a Way of Sharing

Ronice Müller de Quadros , Renata da Silva Krusser , Daniela Satomi Saito 

Universidade Federal de Santa Catarina, Instituto Federal de Santa Catarina, Instituto Federal de Santa Catarina  
[ronice.quadros@ufsc.br](mailto:ronice.quadros@ufsc.br), [renata.krusser@ifsc.edu.br](mailto:renata.krusser@ifsc.edu.br), [daniela.saito@ifsc.edu.br](mailto:daniela.saito@ifsc.edu.br)

## Abstract

The Libras Portal is a platform that makes available in one place a series of materials and tools related to the Brazilian Sign Language (Libras) that integrate the documentation of Libras. It can be used both for research and educational purposes. Among the artifacts developed are tools that support the constitution of an education network and/or community of practice, enabling the sharing of knowledge, data and interaction in Libras and Portuguese.

**Keywords:** Sign language documentation, Sign language visualization, Visual design

## 1. Introduction

Libras Portal (2022) involved the creation of a technology-mediated collaboration environment meets Davidson's (2008) definition of a generation of tools that is called Humanities 2.0: "openness about participation grounded in a different set of theoretical assumptions, which decenters knowledge and authority" (Davidson, 2008, p. 711-12). According to Wenger, McDermont, and Snyder (2002), communities of practice benefit from technologies, since they act as amplifiers of networks of relationships and encourage communication between people, stimulating learning and the social construction of knowledge through creative techniques and the use of new tools.

Considering the target audience of the platform and the constitution of the community of practice, which should be composed of deaf and hearing people, the Portal was designed considering aspects related to web accessibility and usability, especially with regard to communication in sign language. For this, the platform was implemented valuing the use of videos in Libras in the access to the menu and hyperlinks, as well as in other available artifacts related to the indexing of information and video upload.

Regarding the human-computer interface, the layout seeks to present a design that facilitates navigation by exploring visual and textual resources compatible with the visibility of deaf users.

The Libras Portal<sup>1</sup> offers resources for research and language teaching as the Grammar of Libras, Libras corpus, Bank of signs and literary anthology of Libras. In addition, we can highlight the repositories for sharing literary, academic and teaching materials, courses, glossaries, anthologies, sample lessons and grammar studies.

The development of this research and resources for accessibility will be described in this article.

## 2. Libras Portal Resources

### 2.1 Technical Architecture

The technical architecture of the Portal consists of two web applications: (1) the web app frontend (developed in the JavaScript language, in a reactive way using the Quasar Framework (<https://quasar.dev>) and the Node.js (<https://nodejs.org>); and, (2) the web app backend (which counts with all the application management rules), developed with the PHP language (<https://www.php.net>),

with the Laravel Framework (<https://laravel.com>). To materialize the platform structure for the database MySQL (<https://www.mysql.com>) and Phpmyadmin (<https://www.phpmyadmin.net>) were used. For all applications the Linux OS Ubuntu (<https://ubuntu.com>) with Apache (<https://www.apache.org>) was used for service support.

### 2.2 Available Modules

As reported by Krusser, Saito & Quadros (2020), the Libras Portal contemplated the following resources:

- a. materials module (literary, academic and didactic) with the tools of filters for searches, favorite materials, download materials and publication of new materials;
- b. course module (courses offered in the country related to Libras, such as Libras courses, technical courses, undergraduate courses, graduate courses, other courses for the deaf and inclusion of new courses);
- c. language module (different specific materials about Libras, including Libras Grammar, Libras Literary Anthologies, Reference for teaching Libras as L2, Libras corpus (Quadros et al., 2014) and Signbank of Libras<sup>2</sup> (Libras Signbank, 2021);
- d. research module (registration of research in development and statistics of the Libras Portal);
- e. evaluation module (the materials published in the Libras Portal can be evaluated by users);
- f. user profile module (users can create a profile and save their preferences and materials in their profile)
- g. interactive space which allows interaction in Libras and in Portuguese. This Portal includes tools that follow the philosophy of open source software design.

### 2.3 Educational Practices and Tools

With respect to educational practices, under the Libras Portal, a public environment was created that includes materials in different formats such as videos, images, animations, articles, theses, dissertations, teaching materials, on contemporary issues related to Libras, aiming to democratize access to information.

<sup>1</sup><https://portal-libras.org.br> (not yet public; access through developer link: <https://app-hmg-libras.levantelab.com.br/>).

<sup>2</sup> <https://signbank.libras.ufsc.br/>

It should be considered that the technologies developed to enable this environment seek to make new forms of learning, called ubiquitous learning (Santaella, 2010), possible due to the advantages that networks present in terms of flexibility, speed, adaptability and open access to information.

The tools developed for the Libras Portal enable the management of resources in addition to favoring accessibility, evaluation of materials available, indexing information and uploading videos, constituting a possibility of research and development of products that can be reverted to the entire deaf and hearing community. It is noteworthy that these technologies and educational resources enable and enhance the guidance in Libras, with proven effectiveness in previous experiences.

Considering that the Libras Portal and the Community of Practice and / or Training Network aims to promote interaction in Libras and Portuguese, the following tools were developed, customized and / or integrated:

- resources for visual search considering the specificities of Libras;
- asynchronous interaction tools
- collaboration tools
- search system for signs in Libras.

To enable the implementation of all tools and educational practices, the Libras Portal comprised the following points:

- generation of a multimedia database in Libras or about Libras and deaf education;
- the possibility of users to manage their learning, from tools built for this purpose (e.g., reading progress, management of materials accessed, bookmarks, indication of related content, collaboration between users, etc.);
- possibility of evaluating the learning materials according to detailed criteria that cover the pedagogical context, aspects of deaf culture, translation and interpretation, appropriateness and quality of digital media used and interface design;
- support the implementation of research projects, public policies and dissemination of courses and materials in Libras that are in line with the philosophy of the digital humanities, especially Humanities 2.0;
- organization and generation of a multimedia base for the Signbank on the Signbank global platform;
- development of a search system in the portal by words in Portuguese or signs in Libras;
- development of platform management tools with resources for material development, content and user management, information about the most accessed content, semantic and relational search tools;
- integration of the information and statistics of use of the portal and the databases used and generated.

### 3. Human Computer Interaction (HCI)

The Libras Portal involved research in the design area for the development of a visual identity project that valued the deaf culture and the forms of visual orientation of the deaf. In addition to considering web accessibility guidelines, it observed recommendations from specific studies that analyzed the use of web environments by deaf people such as those of Flor (2016) and Fajardo, Parra, and Cañas

(2010). Such studies highlight the importance of the use of sign language and the use of contextualized visual resources. According to the authors, the use of known and iconic images facilitates the understanding by the deaf, but abstract images or with unknown symbolism can hinder navigation.

The complexity of the information collected in the bilingual environment and the need to provide navigation that values visual and gestural orientation posed significant challenges for the designers. The information architecture design and interaction design took into account the user experience which was analyzed throughout the development of the project.

The portal was developed in a responsive format, aiming to make the Libras Portal a space that allows users to develop their communication skills at any time, through different devices.

The organization of the materials resulted in a layout that prioritized clarity, using a distribution of information with little depth, i.e., with few clicks required to access any content of the Libras Portal, following information architecture proposals designed by Rosenfeld, Morville and Arango (2015), cf. Figure 1.



Figure 1: Interface of the Libras Portal, home page

The graphic interface, in turn, was designed to enable navigation through images, Libras, and written texts. In the presentation of the materials, we sought to explore visual resources along with filters to locate the information more efficiently. To this end, the option was included to view the materials with information such as the cover image and title of the material or photo and name of the authors (Figure 2 and Figure 3).

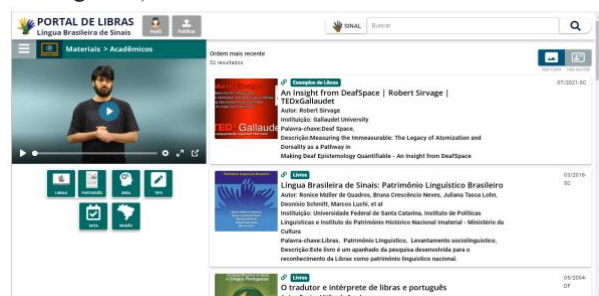


Figure 2: Presentation page of the Academic Materials list with the filters and view by cover.

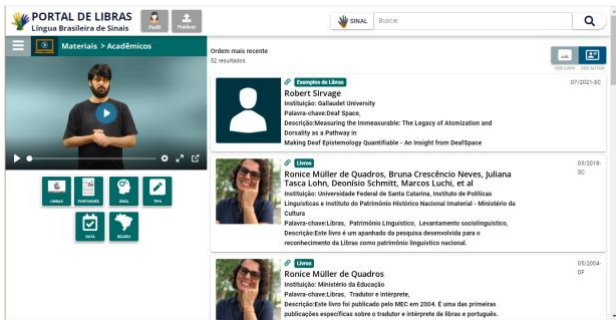


Figure 3: Presentation page of the Academic Materials list with the filters and view by author.

## 4. Platform Features

Some of the main innovations of the portal, which required specific studies in doctoral research, are: the possibility of searching for content in the portal using a sign and the use of a tool for evaluating teaching materials developed considering the characteristics of deaf people and bilingual education.

### 4.1 Sign Searches

The project included in one of its stages the redesign of the Signbank interface to facilitate the search for signs in Libras. The redesign was one of the great challenges of the project, since the search in sign language dictionaries presents a much greater complexity due to the phonological parameters that sign languages present (Scolari, Braviano, and Crasborn, 2022).

The proposal was to develop a system of quick localization by image of the hand configuration using a slider resource. To this end, studies were conducted with usability tests considering the phonological parameter of hand configuration in order to identify the form of organization to be used. The choice for this organizational approach is based on Van der Helm's (2017) and Scolari's (2022) argument that the perceptual organization process is much faster than the thinking process.

Although there are systems that organize the signs for searches from some parameters such as hand configuration, number of hands used, location of articulation of the sign, type of movement, for example, most sign language dictionaries and glossaries do not use the search for signs, only the search for written words.

Studies around the world have sought to develop computer systems capable of recognizing a sign on video in sign language, but the contrasts between the color of the signer's skin and the clothes or the background of the video, and the different types of gestural expression in the execution of movements which vary according to each person and the communication context, make this recognition difficult, and there are still no efficient resources for this.

When the search for signs is offered, the process can be slow and discouraging, requiring choosing different parameters to then selecting the sign in a list of images extracted from the beginning of the video, and usually organized in alphabetical order, being necessary to click to view the sign.

In Libras, the initial selection is usually made by selecting one hand configuration from approximately 60 images that can be grouped by similarities for ease of localization. A

word search follows an alphabetical order, which is widely known, but in Libras there is no standardized order or organization by categories of hand configurations that is adopted nationally.

According to Scolari and Braviano (2020) a systematic literature search showed that there are still no usability and design guidelines for the project of these interfaces, and the scientific production focused on the development and evaluation of bilingual interfaces with sign language search systems is still in its early stages.

From there, Scolari, Crasborn, and Braviano (2022) investigated how to classify and order images of hand configurations. To do this, a cluster analysis was performed using three variables, resulting in groups based on visual similarities between the hand configurations. The images were reordered based on similarity and shape gradation principles, aiming for an organization with good visualization, which can contribute to sign search by requiring less metalinguistic skills from users.

Based on these studies and the usability tests, we sought to classify and order the hand configurations within groups considering the visual similarities (Figure 4).

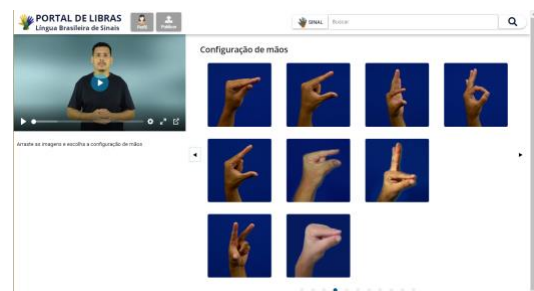


Figure 4: Sign search - Slider for locating a hand configuration.

Once a hand configuration is selected, a list of signals is presented in images with the frame in which the signal is made, making it easier to locate the signal. The organization of this list also allows the use of filters to choose to view only the signals made with one hand, two symmetrical hands, or two asymmetrical hands, and at a given location (Figure 5).

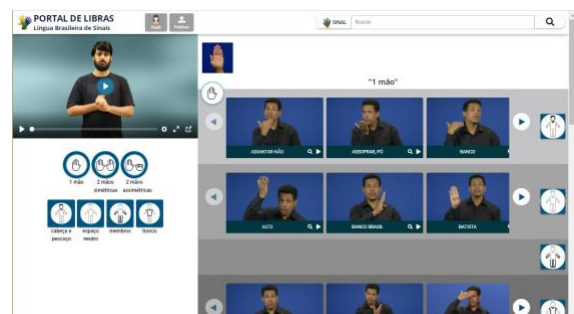


Figure 5: Signal search - finding a signal with a particular hand configuration.

Thus, with the integration of Signbank, it was possible to develop a search system in the portal that enables searches not only by the written word, but also by the sign in Libras. This was feasible because the cataloging of the signs was done in a database with phonological information about each sign: number of hands used to make the sign, hand configuration, location of the articulation of the sign, hand

orientation, alternating movement, repeated movement, direction, form of movement, and type of contact between hands.

It is important to point out that the tools developed were designed to be easy to use on different equipment without the need for programming knowledge, and that the modules and materials produced will be available on the Portal for download in accordance with the open source philosophy. This definition aimed to disseminate the knowledge developed, as well as to stimulate the free contribution of the user community for the improvement of the tools and technologies developed.

#### 4.2 Evaluation of the Design of Teaching Materials

Since the Libras Portal aims to enable the sharing of knowledge and resources for teachers, students, and translators-interpreters, we sought to develop a way to evaluate the different contributions received on the platform in order to facilitate the identification of the most appropriate materials for each audience.

According to Moraes et al. (2017), there has been a significant increase in the production of instructional materials for deaf students in the last ten years. However, research that addresses a way to evaluate and select materials for both teachers and students that are more congruent with the specificities of this audience is still scarce, considering that aspects such as the use of sign language and attention to different reading/writing skills should be considered in an evaluative process (Moraes, 2020, Debevc et al., 2014).

The evaluation categories were developed throughout the doctoral research of Moraes (2020), and they are: pedagogical context, deaf culture, translation and interpretation, digital media and interface design, which were implemented in the portal for the evaluation of teaching materials in the format of electronic form of quantitative/qualitative character.

### 5. Final Considerations

The development of the Libras Portal aimed to support the dissemination of content related to Libras and deaf education, promoting the formation of communities of practice (researchers, teachers, interpreters and translators of sign language and communities). The complexity of the relationship between information, the amount and variety of content available, the prospect of growth due to the demand for materials related to Libras, and the need to value the visual and Libras, required the development of different theoretical research on accessibility and perspectives of deaf people facing the choice of technologies to be used, as well as the development of innovative technological resources. The project involved studies for the development of an information architecture that would clarify the organization of the content, allowing its location by visual orientation and sign language. Studies were also developed for the construction of tools for searches in Libras, bilingual interaction, sharing, management and evaluation of multimedia materials, and the availability of statistical data about the types of users, authors, published materials and courses, aiming to serve as subsidies for research, teaching and public policies.

### 6. Acknowledgements

Current research was funded by the National Council for Scientific and Technological Development – CNPq (# 440337/2017-8).

### 7. Bibliographical References

- Davidson, C. N. (2008). Humanities 2.0: Promise, Perils, Predictions. *Publications of the Modern Language Association of America*. 123(3):707–717. <https://doi.org/10.1632/pmla.2008.123.3.707>
- Debevc, M., Stjepanovic, Z. and Holzinger, A. (2014). Development and evaluation of an e-learning course for deaf and hard of hearing based on the advanced Adapted Pedagogical Index method. *Interactive Learning Environments*. 22(1):35–50. <https://doi.org/10.1080/10494820.2011.641673>
- Fajardo, I., Parra, E. and Cañas, J. J. 2010. Do sign language videos improve web navigation for deaf signer users? *Journal of Deaf Studies and Deaf Education*, 15(3):242–262. <https://doi.org/10.1093/deafed/enq005>
- Flor, C. da S. (2016). *Recomendações para a criação de pistas proximais de navegação em websites voltadas para surdos pré-linguísticos*. Doctoral Thesis. Programa de Pós-graduação em Engenharia e Gestão do Conhecimento, Universidade Federal de Santa Catarina, Florianópolis. <https://repositorio.ufsc.br/handle/123456789/174271>
- Krusser, R. da S., Saito, D. S., and Quadros, R. M. de (2020) Portal de Libras. *Forum Linguístico*. 17(4):5561–5574. <https://doi.org/10.5007/1984-8412.2020.e77375>
- Moraes, L., Scandolara, D., Velloso, B.P., Bubniak, F. and Figueiredo, S. (2017). Interface Design and Accessibility. In: *International Technology, Education and Development Conference*, 2017. Valencia, pp. 7439–7444.
- Moraes, L. (2020). *Um modelo para avaliação do design de Recursos Educacionais Digitais Bilingues (Libras/Português)*. Doctoral Thesis. Programa de Pós-graduação em Design, Centro de Comunicação e Expressão, Universidade Federal de Santa Catarina, Florianópolis. <https://repositorio.ufsc.br/handle/123456789/219342>
- Rosenfeld, L., Morville, P., Arango, J. (2015). *Information architecture: for the web and beyond*. O'Reilly Media, 4th edition.
- Santaella, L. (2010). *A ecologia pluralista da comunicação: conectividade, mobilidade, ubiquidade*. São Paulo: Paulus.
- Scolari, S., Braviano, G. (2020). Usabilidade no design de sistemas de busca em língua de sinais: Revisão Sistemática da Literatura. In: Martins, N., Brandão, D. (Eds.) *DIGICOM, 4th International Conference on Design and Digital Communication*. IPCA - Instituto Politécnico do Cávado e do Ave. pp. 179–190. [https://digicom.ipca.pt/docs/DIGICOM2020-Atas\\_PT-ES.pdf](https://digicom.ipca.pt/docs/DIGICOM2020-Atas_PT-ES.pdf)
- Scolari, S., Braviano, G., Crasborn, O. (2022). Search Engines Interfaces for Sign Languages: Designing Multilanguage Questionnaire to Collect Signers Perception Similarities. In: Martins, N., Brandão, D. (Eds.) *Advances in Design and Digital Communication II*. pp. 31–43. [https://doi.org/10.1007/978-3-030-89735-2\\_3](https://doi.org/10.1007/978-3-030-89735-2_3)

- Scolari, S., Crasborn, O., Braviano, G. (2022) Searching for Signs: Developing a handshape taxonomy based on visual similarity. *International Journal of Lexicography*. ecac004:1–24. <https://doi.org/10.1093/ijl/ecac004>
- Van der Helm, P. A. (2017). Human Visual Perceptual Organization Beats Thinking on Speed. *Attention, Perception, & Psychophysics*. 79:1227–1238. <https://doi.org/10.3758/s13414-017-1281-1>
- Wenger, E., McDermont, R., Snyder, W. M. (2002) Cultivating communities of practice: a guide to managing knowledge. Boston, Massachusetts: Harvard Business School Press.

## **8. Language Resource References**

- Libras Portal (2021). Web Portal. <https://portal-libras.org.br/>
- Libras Signbank (2021). Website. <https://signbank.libras.ufsc.br/>
- Quadros, R. M. de, Schmitt, D., Lohn, J. T., Leite, T. de A., et al. (2014) *Corpus de Libras*. <http://corpuslibras.ufsc.br/>