https://dx.doi.org/10.22161/ijaers.77.53 *ISSN: 2349-6495(P) | 2456-1908(O)*

InterLib: Collaborative Tool for Translators and Interpreters

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Abstract *— The spread of information and communication technology (ICT) has revolutionized the way we share information. Collaborative tools have a great importance for teaching-learning activities, so as to assist in the dissemination of knowledge. In the area of education, the Brazilian Sing-Language translator or just Libras translator and interpreter is the main agent enabling the communication between teachers and Deaf students. This specialist needs to overcome different challenges, such as proficiency in the languages they translate, interpretation techniques, history and deaf culture. They also must lead with to specific contents taught to the Deaf student during different disciplines. This paper presents the development of a collaborative tool called InterLib, which has as main objective the qualification of these professionals toward these specific contents through the socialization and dissemination of knowledge. Thus, in regards of the lack of specific technologies for this purpose, a mobile application was developed aiming at facilitating the interactivity and collaboration of the Libras interprets.*

Keywords *— **Collaborative tools. Libras translator and interpreter. Mobile application. Socialization of knowledge.***

I. INTRODUCTION

Communication is the way to transfer knowledge and interact into the society and this can be done by speaking, writing or else through signed language. Communicating is also sharing [1].

In this way, where there is language, there is also communication, since it is linked to dialogue. Knowledge is disseminated by languages enabling human expression of thoughts and feelings [2].

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Furthermore, the socialization of information is the relationship between the sum of several activities that grants participants (Transmitters-Receives or Producer-Users) equal conditions for the production, treatment and dissemination of knowledge [3].

However, if a large part of the population easily feels apart from the society that surrounds each one, some peoples, because of cognitive or physical barriers, face many difficulties in communicating. It is the case of Deaf peoples suffering for the lack peoples dominating the sign language and able to maintain a full dialogue with them.

In Brazil, through the promulgation of Law nº 10.436 / 2002 [4] Libras, as a form of communication and expression that has a linguistic system of visual and motor nature, has officially been recognized as the support for transmission of ideas and facts coming from communities of Deaf people.

Libras, also legally recognized as a means of communication and expression within the Brazilian educational system, must be included as a discipline in special education courses, speech therapy and Universities. This sign language allows better interaction with the Deaf, and at school, between teachers and students, or between them and their colleagues. [5].

Gonçalves et al. [6] points out an extremely important fact that is the attention given by Deaf students during a class to translators and interpreters, because they are the final transmitter of what is being taught. However, these professionals are graduated in Letters/Libras, without having necessarily a deep knowledge and great technical vocabulary in a taught technical area such as engineering, psychology or laws, for instance. It considerably complicates the knowledge transmission [7].

Furthermore, another important issue is the scarcity of specific signs making sometimes the Libras' Translator or Interpreter unable to assist the Deaf in the teaching-learning process of specialized disciplines. When no existing specific sign exists to represent a term or concept, they need to use the technique called "Typing", which is the spelling of a word using the digital or manual sign language alphabet. Thus, this difficulty makes the information transmission slow and difficult for Deaf students in the educational context.

However, according to Melo and Da Silva [8], accessibility in communication can be optimized with the use of Digital Technologies (DT). Schimiguel et al. [9] exposed that it is possible to create content covering different languages and media, transforming them into Assistive Technologies (AT).

AT have gain notoriety during the last years. They are defined by as a set of resources and services designed to improve the skills of people with special needs, providing better independence and social integration [10].

A common type of DT that has great acceptance according to this theme is the Collaborative Digital Systems (SDC). This kind of technology provides a way to people that have a common goal to interact between them in order to optimize their tasks. In the vision of Gerosa et al. [11], creative knowledge is better stimulated when the work is performed in groups.

Thus, understanding the challenge for the Libras Translator and Interpreter to act efficiently in every areas of knowledge into the Brazilian Educational System, a strategy to assist this professional was suggested, based on the creation of collaborative software: InterLib. InterLib enables to feed and share a database with information, such as a sign video, a sign classification, and contextual and conceptual descriptions for the sign, for every technical discipline. These data come from the community of Deaf people or professionals from this area of activity so that, through collaboration, knowledge about the various types of signs can be shared and disseminated at a larger scale.

Therefore, this paper describes the creating process of a mobile application named InterLib, that in addition to the main objective explained above, aims to achieve some other important goals, referencing the public in which this software intended to reach as: Integration, usability, functionality, appearance, reliability, navigability, security, among others.

II. METHODOLOGY

The steps that were taken to build the tool proposed by this work are shown in Figure 1:

2.1 Literature review

A bibliographic review was carried out in order to map the theoretical basis of the themes involved, such as the importance of Libras translators and interpreters as vectors in the teaching-learning process; and collaborative tools providing interaction mechanisms that contribute to these activities.

A technique called Systematic Review (SR) was used in the literature review of this research. Thus, it was intended to conduct a comprehensive survey on the State of the Art related to the operation of the software that helps teamwork with teachers, translators, and sing-language interpreters. The RS is a research technique that is based on finding specific evidence in the scientific literature, for project feasibility study purposes. RS is defined by a search process and a protocol that originates the steps of planning, execution, and results of the summarization.

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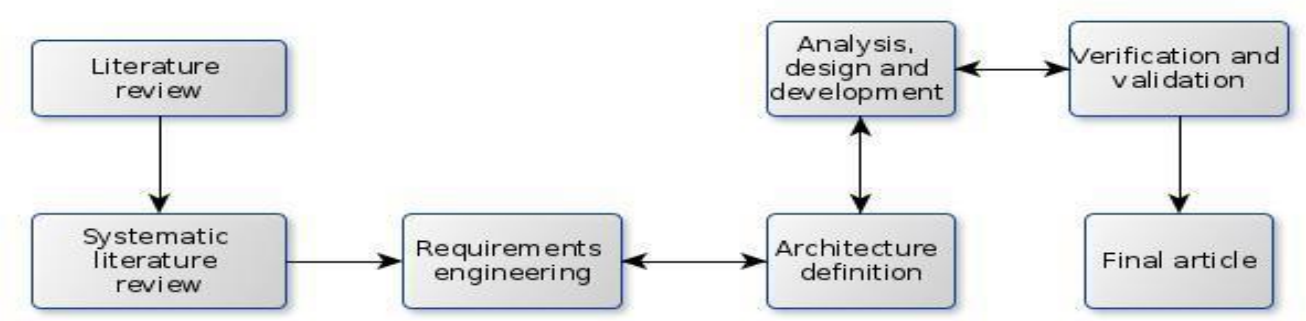

Fig. 1: Overview of activities developed in the methodology.

2.2 Requirements engineering

In this stage, it was sought to gather information about the existing systems related to this area of study to obtain the functional and non-functional requirements for building the tool, as well as from this information extract the user and system requirements. Information sources have included documentation, key, and potential stakeholders, as are some specifications that were used to build similar systems.

The techniques used in this point of work to obtains these specific data is described in the Table 1.

2.3 Architecture definition

From the collection of requirements mentioned in the previous step, researches were carried out in the literature in order to verify the appropriate architecture and the ideal structure of the components to compose the tool. Due to a wide variety of scenarios that can be presented, the scope of the main available architectures was analyzed.

Therefore, the choice by Model-View-Controller architecture was determined based on the resource, context, and platform restrictions in which InterLib intend to be inserted. In this sense, connectivity, processing power, security, development productivity, and usability were also evaluated.

2.4 Analysis and design of the tool

In this phase of the project, the prototyping technique and application development were implemented through an incremental cycle, as can be seen in Figure 2, with the delivery of intermediate functional versions.

The InterLib was analyzed and designed using the main UML (Unified Modeling Language) diagrams to better clarify the application's functionalities as well as update the documentation. The diagrams prioritized the interaction perspectives, internal, structural, and behavioral of the modeling as can be seen in Figures 3 and 4.

Table.1: The specific techniques used to collect requirements in the development of InterLib.

Techniques	Description of the use
Point of View	Brainstorming 13 was carried out with stakeholders to structure the requirements in order to obtain different perspectives on the tool.
Scenarios	Prototypes were built to simulate the suggested requirements in order to better prioritize them.
Closed-Ended and Opened-Ended interviews	Questionnaires with varied subjects were applied through a set of predefined questions, as well as unstructured questions, in order to obtain the main functionalities of the software.

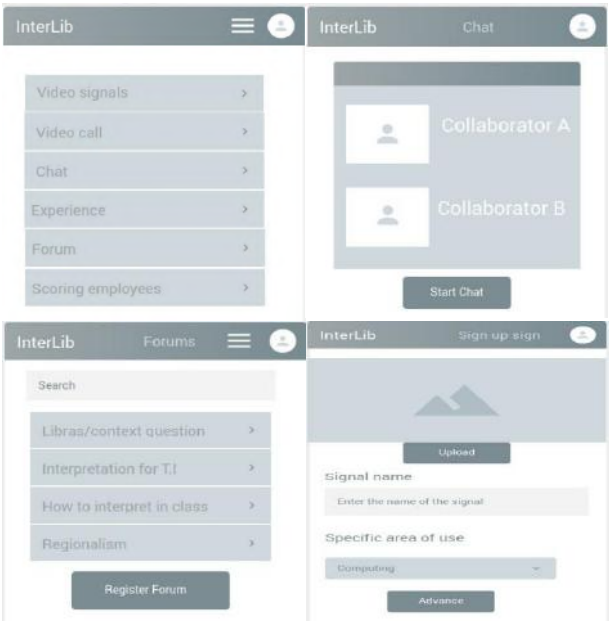

Fig. 2: Prototype – InterLib.

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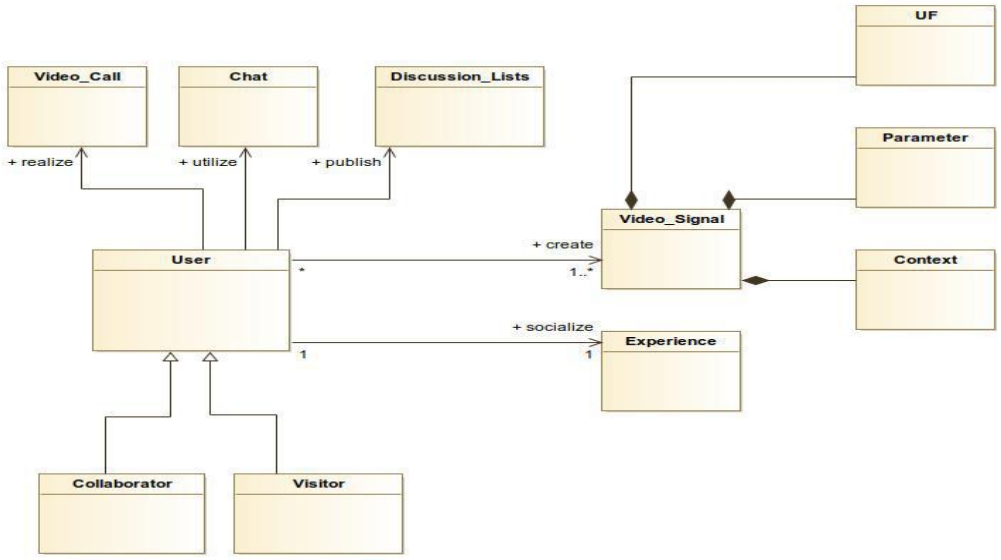

Fig. 3: Class Diagram - InterLib.

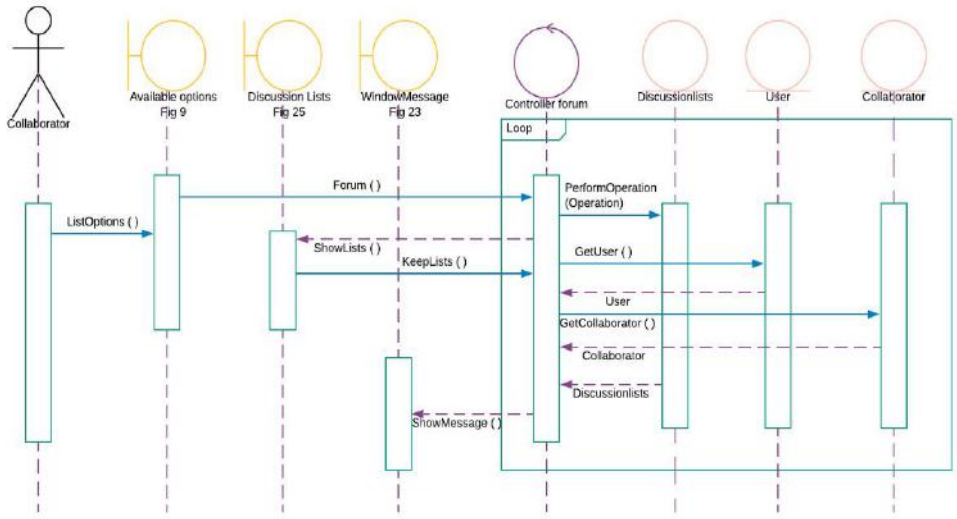

Fig. 4: Sequence Diagram - InterLib.

For every intermediate versions tests involving users were applied in order to find out if the implemented functions attended their purpose, and, in addition, to discover and correct possible functional errors before the system effective deployment. The following tests were performed: Interface, unit, components, user, system, performance and releases.

2.5 Verification and validation

At last, a final evaluation and validation processes were carried out to analyze whether the tool matches with the requirements and then offers the features expected by users.

To this purpose, user satisfaction questionnaires and acceptance tests were applied in order to compare the developed application in relation to its original requirements, in addition to the current needs of the user. Twelve experts received the app to test and give their qualitative opinions about the tool.

An evaluation form in which the user would answer the questions displayed in Table 2 collected the opinions about the application.

The specialists invited to evaluate the InterLib tool were teachers, professionals who have been working in the field of Pedagogy for more than 10 years and have extensive experience in the use of Sign Language in large Educational Institutions in Brazil, interpretation in seminars and

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congresses or who are leaders of entities linked to the social inclusion of the Deaf, specifically in the state of Pará.

Table.2: Questions applied to the experts.

Number	Question
1	*Does the tool serve satisfactorily for use by Libras translators and interpreters in order to improve their knowledge?*
2	*What are the weaknesses and strengths identified in the application?*
3	*What is the analysis regarding the usability of the application, that is, does it perform its tasks easily and quickly in the shortest possible time, without requiring a great knowledge of its use or long learning process?*
4	*What improvements and/or new features are suggested for the tool?*

III. RESULTS AND DISCUSSION

The first final version of the application, with the main features outlined in the requirements gathering stage, was made available to the evaluators for a period of 30 days. Figure 5 shows the main screens of the InterLib App. Besides, tutorial videos were provided to easy the user's familiarization during their first contacts with the tool.

Considering the assessments from the experts, two of them emphasized the importance of this type of software and how it is improving the work of Libras translators and interpreters by helping to transmit information more accurately. They explained that this initiative is relevant both nationally and regionally.

Five evaluators classified InterLib as a new proposal for visualizing linguistic variations, cataloging usual and unusual signs, as well as a new and viable proposal for the creation of a video database of signals, divided by area of knowledge, and accompanied by its regionalization.

Meanwhile, another expert highlighted the project's originality and its importance for expanding knowledge in Libras. In addition, all the evaluators reported, as the application's main contribution, the initiative to promote interaction between Libras professionals and how it favors knowledge sharing.

IV. CONCLUSION

From the observation of the importance of an Interpreter or Libra Translator for Deaf students in a classroom, this research aimed at building a collaborative tool focusing on qualifying Libras translators and interpreters through the socialization of knowledge, and in addition to ease interactivity and information sharing.

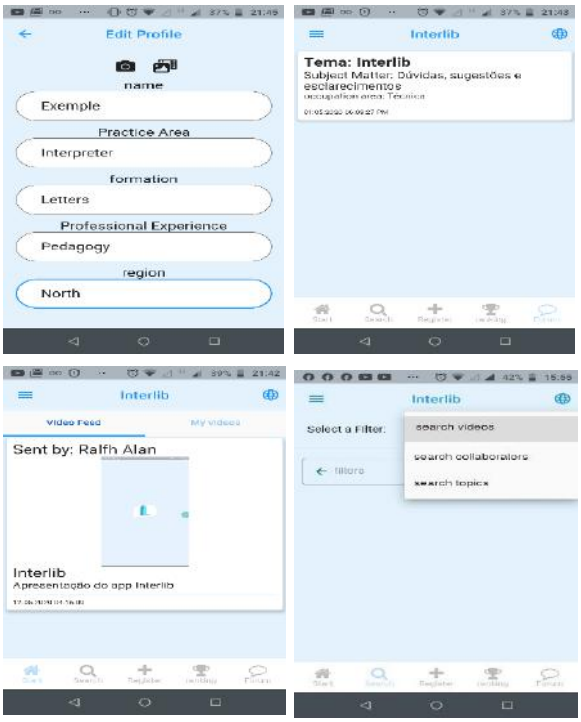

Fig. 5: Main Screens of InterLib.

Based on the possibilities offered by this new application, such as the publication of videos showing new signs and the exchange of information between professional interpreters of Libras with little knowledge and others with more experience in specific areas, there will be a condition of improvement in the performance of the translation and transmission of the information correctly and accurately.

As future works, the improvements suggested and validated by the specialists will be considered. Based one of those observations, there is the intention to develop one mechanism, similar to a ranking, trying to involve the active users, so that there is an improved performance in a great part of the platform's users.

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