A twelve-year retrospective of research for, with and by Sign language communities in two Latin American cities

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In this paper, we share an overview of twelve years of research for, with and by the Sign language community in a countryside location of Brazil and one year of research experience in urban Mexico. We first refer to our standpoint, in order to provide background for the reflections and decision-making processes along our research experience. We use a timeline to contextualize our contributions for others who wish to conduct investigation in this line of work. We highlight moments of learning about D/deaf culture, our engagement with local communities, adaptations in techniques and instruments to work with sign language users, changes in the way we interact with and include people who are D/deaf in research projects, and our ongoing efforts to learn more and improve our strategies to be more inclusive in the choices we make.

Additional Keywords and Phrases: People who are Deaf, Deaf culture, assistive technology, universal design.

1 INTRODUCTION

The term *Sign language community* refers to a subpopulation among the diverse and larger group of D/deaf persons who uses a sign language, such as the Brazilian Sign Language (Libras, *Língua Brasileira de Sinais*), or the Mexican Sign Language (LSM, *Lengua de Señas Mexicana*), as their first mode of communication. The related term *D/deaf persons* includes people who are hard of hearing, since both communities also comprise members who prefer to be referred to as D/deaf. The Sign language community "represent a collectivist culture in which participants are bound to one another through common culture traditions, beliefs, actions and responsibilities - both personal and communal" [1]. We consider D/deaf persons, their families, teachers and interpreters are part of this community.

Attending to the workshop's theme, we aim to tell our story on what was the spark that motivated our research for, with and by the Sign language communities in our hometowns in Latin American (LATAM) countries. Also, how we explored context and learned about D/deaf culture, engaged with the Sign language community, managed to reach out to collaborators and achieved maturity in conducting research in this line of work.

2 OUR STANDPOINT

We refer to our standpoint [2], in order to provide background for the reflections and decision-making processes along our research experience.

Soraia (she/her) has been a professor and researcher at the Federal University of Rondonópolis (UFR) for sixteen years. She has relied mostly on motivated undergraduate students as research collaborators. She has basic knowledge of Libras and LSM. Alfredo (he/him) has been a researcher in Human-Computer Interaction (HCI) for over twenty years, currently at the National Laboratory of Advanced Informatics. He has basic knowledge of LSM. Vanuza (she/her), is a schoolteacher, a Libras interpreter since 2006 and a volunteer at ASSUROO (D/deaf Association of Rondonópolis). She currently is preparing to apply to a master's program in the line of social inclusion of D/deaf persons. José Augusto (he/him) was born D/deaf and started learning Libras when he was seven years old. He obtained a computer science BSc degree and works at a transportation company as an administrative assistant. He is a professional soccer goalkeeper for ASSUROO.

3 RESEARCH RETROSPECTIVE

Five moments are key in this research retrospective: spark, exploration, engagement, outreach and maturity. Highlights from each of these moments are provided next.

3.1 **The spark**

Attending a sign language choir competition, in 2008, organized by religious groups in Rondonópolis was the starting point to awaken interest in D/deaf culture and one of its forms of communication. Many members of the local Sign language community are engaged in different types of religious affiliations and we realized we could meet them in that context.

Just a couple of weeks later, a student (she/her) had already accepted the challenge of designing an educational system for hearing persons to learn Libras. The system was designed to use a drill-and-practice strategy for exploring the state's flora and fauna [3]. During this two-year project, we did not involve the Sign language community, keeping studies and discussion internal to the group, and joined a sixty-hour beginners' course on Libras offered to UFR's staff. Also, we participated in the National Forum of Deaf Studies in the Information Technology Area (FESAI). This was an illuminating first experience: being one of a few hearing persons in an event where most of the participants were D/deaf persons who are sign language users. Those few days taught nuances of D/deaf culture that are hard to learn from books. It was also when Ronaldo, a D/deaf forum participant, created the *name sign* for the first author.

3.2 Exploration

During this stage, the first author, as part of her doctoral work, further investigated technology acceptance by D/deaf students from the perspective of inclusive education. Four key contributions resulted from this stage, in terms of thesis deliverables: *Wikitas* is a collaborative platform to collect information on assistive technology and on how teachers use them in schools [4]. Emotion-Libras is a self-report instrument of emotional user experience with Libras videos [5]. Sessai is a mobile application for real-time transcription of students, teacher and interpreter's speech in a classroom [6]. Finally, TAM4IE is a technology acceptance model for the specific context of inclusive education [7].

3.3 Engagement

In parallel, participated in a 100-hour Libras beginners' course with a group of schoolteachers, and observed D/deaf students during classes and specialized educational assistance hours in a regular public school during six months. Also, we participated in many social events promoted by the local D/deaf community (e.g., attended political demonstrations and a lecture by Karin Strobel, a D/deaf PhD graduate) and conducted various user studies. For five years, we grew strong ties with the community, including D/deaf persons and their families and teachers, and Libras interpreters. In many of these occasions, the authors from Rondonópolis collaborated in fixed roles as researcher, interpreter and study participant.

It was not until this stage, by conducting diverse types of studies working for and with D/deaf persons who are sign language users, when we stopped using or adapted some instruments. This was done in order to provide a better understanding and more independent ways of responding and interacting with the research team, so that an interpreter could only mediate when more complex explanations were required. For instance, we conducted a user study with the International Affective Picture System (IAPS) to compare the use of SAM (Self-Assessment Manikin) and our first version of Emotion-Libras [8]. We noticed a tendency to neutral emotional responses due to cultural differences between typical images for the United States (e.g., images of snow and pine trees landscapes, football, food) which are not in typical in our state in Brazil. After that, we decided to stop using IAPS rather than adapting it. Another example was a user study we conducted to evaluate the high-fidelity prototype of our Sessai application. In this case, we proposed an adaptation of a 3-point Likert-scale with static Libras images (representing bad, neutral and good for each emotion tag) and learned that it was insufficient, as a sign language requires representations of intensity levels for each emotion. This finding led us to change the Emotion-Libras instrument from images on paper format to videos on digital format, so that the intensity that is characteristic of emotions in sign language could be demonstrated.

3.4. Outreach

The research drove the first author into a 3-year representation (2013-2016) in the Municipal Council for the Rights of Persons with Disabilities of Rondonópolis. In this group, we had weekly contact with representatives from the local government and civil society organizations. For several months, the third author also joined the Municipal Council, becoming a closer collaborator. Involvement with social exclusion and inaccessibility issues outside the academic sphere was a great learning experience. Also, during this time, we were voting participants in the local, State and National Conferences on the Rights of Persons with Disabilities. The focus of discussions at these events was intersectionality of (dis)ability across age, gender and ethnicity in diverse social contexts foreseen in the Brazilian Inclusion Law [9].

During these same three years, opportunities to present conference papers in Chile and Argentina came across and important connections were initiated in terms of LATAM contact expansion and research collaboration, including the meeting between the first and the second authors. In 2018, the ACM SIGCHI across borders initiative met in Guatemala, the Latin American Conference on Human-Computer Interaction (CLIHC 2019) held in Panama, and the V Ibero-American Conference on Human-Computer Interaction held in Puebla, Mexico, in 2019. These events reunited researchers from LATAM strengthened existent connections (e.g., first and second authors) and motivated starting new ones. From 2015 on, two Brazilian financed projects were implemented, and a position in the ACM SIGCHI Latin American HCI Community (LAIHC) and a post-doctoral internship opportunity in another LATAM country were made possible.

A local private educational institution invited the first author to serve as advisor of two computer science undergraduate students who are D/deaf and sign language users during their capstone projects period, one in 2015 and another in 2017. The latter is the fourth author (he/him) of this paper, with whom we had a good synergy while working with the collaborative sign construction for terms in the software engineering area [10]. We had weekly meetings mediated by a Libras interpreter, we discussed the activities conducted each week and defined together the next steps, iteratively for the duration of the project. In both advising experiences, the cruel reality showed that the students were not fully literate in written language, they could read and write small and simple phrases, however, they could not read theoretical references or related papers which would substantiate their work, neither write their capstone project texts. Thus, the advisor and the interpreters (one for each student) would read a paper or write drafts every week, and the content was explained and discussed to reach a consensus during the meeting.

3.5. Maturity

From the advising experiences, between 2017 and 2019, we set as a goal to propose a framework to design and evaluate assistive technology and, as a case study for validating it, we ran the framework by designing a teaching-learning technology of written Portuguese to empower D/deaf persons who are sign language users with low literacy levels [11]. During three years, we included members of the Sign language community as codesigners, conducting workshops to build technology for, with and by them. The research team prepared (often adapted) instruments and planned the scripts to carry out all investigation activities. For instance, one artifact used for brainstorming problems, questions, ideas and solutions [12], which originally does not include potential stakeholders previously identified, was adapted to incorporate them into its presentation, to reduce the effort of having to look back and forth to two different artifacts during the workshop. At this time, we had an understanding of providing more daily-life autonomy for D/deaf persons through written language learning, in the sense that they would not need so much support from hearing relatives or interpreters to accomplish daily life activities, such as taking an admission exam to join university, getting married, obtaining a driver license, or traveling alone. However, many societal barriers showed us that other factors influence the low literacy problem within the Sign language community. Our experience led us to agree with Valério, who distinguishes between the autonomy we were looking for and the autonomy we should perceive, which "involves facing autonomy as an emancipation from hegemonic and hierarchical ideologies instead of reducing autonomy to independence" [13].

Next, during a one-year (2019-2020) post-doctoral research conducted in Mexico, a Socially Aware life-cycle design [12] of automatic sign language processing systems took into account cultural aspects [14][15], tracing comparisons between Mexican and Brazilian culture [16]. We aim to design universal design solutions, which can support communication between sign language users and non-users. Until February of 2020, the first and second authors carried out eleven interviews and four participatory workshops in two specialized schools for D/deaf students, however, after starting isolation due to the pandemic we focused the work on literature review, data analysis and research reports. A step further is being explored by co-advising a master's thesis project for researching the translation between LSM and Libras.

Currently, we are discussing the next steps for replicating a similar investigation in Brazil among this paper's authors. In this second round, we are designing instruments, artifacts and scripts, following recommendations of [1]. It has been a new learning experience for all, especially the adaptations we have to make for conducting virtual meetings, interviews and workshops with slow internet connections, poor video (webcam) equipment and the UFR's paid platform with scarce features for addressing the needs of a highly visual investigation.

4 FINAL CONSIDERATIONS

Prior to the beginning of this journey, members of the Sign language community had not participated as volunteers of research projects. The briefing that preceded actual work could be lengthy or would cause entire sessions to be rescheduled. There were only a few certified Libras interpreters in town, and they were unfamiliar with HCI vocabulary. As time passed, the scenario has changed. Members of the Sign language community already are familiar with our line of work, a larger number of certified Libras interpreters are available, and we have easier access to participant recruiting. Also, since 2016 we have obtained formal support from the Special Education Division in the city's government.

During the first years, only our campus facilities were used as our research setting. In Brazil, volunteers cannot be offered payments or any kind of benefits to participate in research (due to a regulation of the national ethics board in research with human beings [17]). So, for instance, we could not pay for taxi services to take study participants to our campus. As a result, many times participants did not show up as scheduled. Since participants tended to be late, we could not wait for them at the bus stop, so they got lost on the campus and could not call us to ask for help or instructions. Also,

interpreters could not stay much longer after the time slots agreed upon. Given these experiences, even though researchers have more control over equipment and physical spaces, we realized the best practice was to go wherever volunteers felt more comfortable for participating in individual or collective research activities.

This journey, far from being over, serves as an awakening of the senses, mind and community awareness for this universe we keep learning and being motivated every day.

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Blind review.

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