
Project: Mobile technology based supports for prenatal care among the Ngäbe in Panama



Figure 1. Interview with Ngäbe young women.

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Abstract

Panama is a country of contrasts. On one hand, there is Panama City, a developed metropolis with skyscrapers, and modern roads showing a wealthy society; and on the other hand, an extreme undeveloped world in the mountains where the Ngäbe people live. There is a huge gulf between them; a border that we as HCI for development practitioners have to try to decrease. We share our experience in the development of a mobile application that supports a better understanding between health care providers and Ngäbe pregnant women during the pregnancy control.

Author Keywords

HCI4D, mobile health, Ngäbe, rural areas, mobile phones

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Introduction

According to the last census Panama has a population of 3.4 million, whereas 12% of them are indigenous. As most Latin American countries, [2] in Panama there is an income and wealth inequity. Indigenous populations

are the poorest in the country. The Ngäbe are the largest indigenous ethnic in Panama (see figure 1) with a population of about 260 000, where 46% of the population are women in bearing age [1]. One third of the maternal death in Panama is Ngäbe women [2]. The main causes of the deaths are *the lack of health care providers in the community, large distance to the health care center, the intercultural difference, and the not early recognition symptoms.*

Because of the distance and the cultural difference, most of women give birth at home[2], and only when there are problem they go to the doctor to give birth, which it is usually late. One main cultural barrier is the language because almost no doctor speaks the Ngäbe dialect and almost no women speak Spanish. Medical doctors and nurses usually work one year obligatory in rural areas but after that most of them return to the main cities. Therefore the health care providers do not learn the language. In this paper we present a project where (1) mobile phones can support a better understanding between patient and health care providers during the pregnancy controls; and (2) to train the local volunteers in the community in recognize the early symptom of a problem during the pregnancy.

Description of the Problem

Ngäbe people are among the poorest population of Panama. They have the highest rate of poverty and illiterate in the country. Therefore, usually most of them are unable or have problem speaking Spanish. Especially women who are housewives or those who take part with their families in the coffee-grains collecting season are Spanish-illiterate.

When pregnant women visit the health care provider during their pregnancy control, they have to walk long distances to arrive to the nearest basic health-care center. Once they arrive there the language is the next barrier. Medical care providers do not speak Ngäbe dialect and the pregnant women do not speak Spanish.

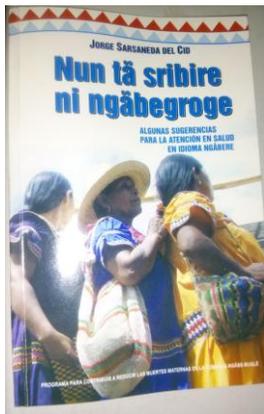


Figure 2: Cover page of the booklet “Algunas sugerencias para la Atención de Salud en Idioma Ngäbere” (Some health recommendations for Health Care in Ngäbe language)

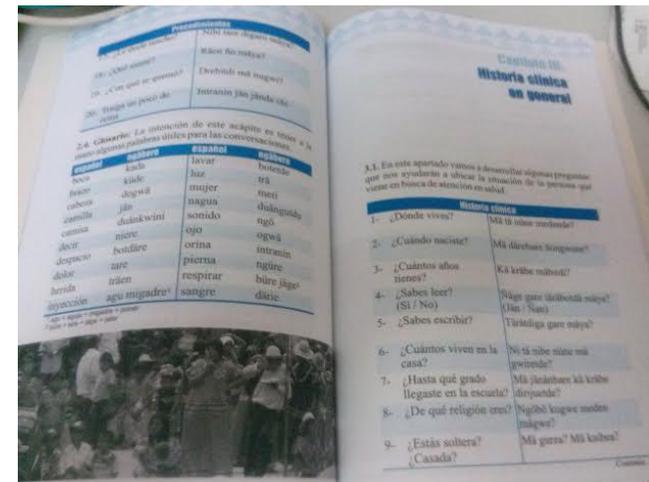


Figure 3: A page inside the booklet “Some health recommendations for Health Care in Ngäbe language”. In the left page a glossary Spanish-Ngäbe and in the right page expressions in both languages

Booklet Approach

In order to overcome the language problem, the UN-Panama, through the UNFPA developed a booklet to help in the communication between medical care providers and the women. Figure 2 and 3 shows the cover and inner page of the booklet. This booklet was divided in six chapters: *greetings expressions, the body, medical story; culture and health, sexual health*



Figure 4: Screenshots of the application. For a better interaction experience each button fits wide the screen. Main page of the application (above) and list of expressions of the chapter 3 (below)

and general recommendations. In addition includes an appendix with useful words. Each chapter presents written expressions in both languages Ngäbe and Spanish.

Although the booklet has some images, none was related to the expressions. So the booklet worked as a kind of written glossary. Through images and basic expressions, health care providers try to understand their patients and vice versa. The booklet has 58 pages and it was published on December 2012.

Proposed Application Approach

Due to the high access to mobile phones in the Comarca Ngäbe, the UNFPA staff asked the support to the Universidad Tecnológica de Panamá (UTP) in the development of an app based on the booklet. There was no funding for the development of this project; therefore students help in the development of the project. The UNFPA staff visit Inmaculada Rivera director of Social Service at UTP. She was who coordinate the work of her students and contact the HCI group of the Faculty on Computer Systems Engineering to assist her.

Methodology

In order to develop the application we tried to follow a user-centered design. Due to the finance constraint, we have to realize a collaborative research and delegate tasks. As first step we conducted a survey to 10 persons in two Ngäbe communities. The survey was realized in spring 2014. It was developed by the HCI researchers in the UTP in Panama City but conducted by a UTP security guard who is Ngäbe himself and

traveled to visit his family in the Comarca Ngäbe¹. The researchers explained deeply him the survey. The survey was short, and was focused to know the multimedia capabilities the phone they use and the usage pattern of the device. Two main findings from the survey were: (1) At least one person in each family has a mobile phone. Mainly the father and mother in the family have a phone. (2) Most mobile phones have browser, can display images and play audio, and have limited memory. (3) Half of the phones were smartphones Android.

Because we wanted that most of the women get benefit of the app, the application was developed including audio and images only. The programming development process was also influenced by our survey. Instead of a native android app, the app was built using HTML, CSS and JavaScript, which allow to be displayed in a standard web-browser.

The Ngäbe volunteers who collaborate and work with the UNFPA workers were who tried the prototypes and give feedback to us. The development of the application can be divided in four parts:

- *The recording of the Spanish audio and images.* This step was realized during two semesters by 30 students of the bachelor on software engineering. Each student was in charge to record one up to three phrases of the booklet in Spanish. Other students have to look for free images related to the phrase recorded.
- *The recording of the Ngäbe audio and evaluation of images.* With the help of the UNFPA staff, people in

¹ Territory where the Ngäbe people live in western Panama.



Figure 5: Screenshot of the application. Here the expression “I am going to put Anesthesia” written in Spanish first and then in Ngäbe, with its respective audio and a picture

special women from the Ngäbe communities record the phrases of the booklet in Ngäbe language. In addition Ngäbe local monitors and workers by UNFPA validate the images selected by the students.

- *The development of an application skeleton.* One student of the master on Computer Networks developed the application skeleton. After a crash day training, he teaches the bachelor students how and where in the code they have to fill out the content of the application.
- *The filling out with content to the skeleton application.* Students of the bachelor on software engineering also were in charge to fill out in the language programming code both audios and image for each phrase.

The first working version of the application was ready by December 2015. Currently the students are making some adjusts to the application. There is a plan to reproduce this model to other indigenous communities in Panama. Figures 4 and 5 show screenshots of the mobile app.

Discussion

The development of the application presented an enriched experience in many senses. First at all, both patients and care providers benefit of the audio and images that match each expression of the application. As many women are illiterate the images and the audio are much more helpful that the written words in order to describe better their symptoms. But the written expression is crucial for the health care providers as it easy for them to read loud the Ngäbe phrases from the booklet or application. The Ngäbe language is an oral dialect and has no original written alphabet. Although

the booklet has been very helpful, and it was published recently in 2012 it was surprising to us that it do not include it a CDs or other storage mean with the Ngäbe expressions as audio. Most of the basic Health Care centers usually have solar cells or own diesel electric plants or even some have electrical power.

Although we tried to follow the best practices in user-center design, some issues could not be done fully due to the lack of funds. For example with respect to the images, our advice was to draw own images considering the ethnic and environment of the Ngäbe people. However, the images were taking between a repository of images proportionated by the UNFP and free images from the Internet. As a drawback, not all the images reflect a real context and environment common to the Ngäbe users. However all the images were evaluate by Ngäbe people, and those set of images rejected were changed. This process was repeated until all the set of images were reviewed. Other example is the audio records. In ideal situations one or two persons (one female, one male) with clear voice and modulation should be in charge to record the audio in perfect silence environments. This was our advice; however the Spanish audio record was made by different students in different settings (home, classroom, etc.).

Another positive result is collaboration. Students participated in a project experienced the relation between computers and society. Most of the projects the students develop in their courses in the University are very abstract and they are never used after presenting to the professor. In this particular case the students found their work useful for the society. In addition, students self-learned programming language

skills that were out of the curricula for the first year of the bachelor in software engineering. Furthermore, they learned to work as a team, to organize, trust each other and divide tasks. Figure 7 shows a student present his part of the project.

Other benefit it was students get the importance of involves the final users in the development of the application. Finally they learn much more about the Ngäbe situation and way of living. Figure 6 shows students in their meeting with the UNFPA workers in the region limit to the Comarca Ngäbe in the province of Chiriqui



Figure 6. Students talking with the local UNFPA workers during their visit to the Basic Health Care Clinic in the rural area in Chiriqui, region limit to the Comarca Ngäbe.



Figure 7. Student present the project in the class of Software Engineering

Conclusion

Although it was not the ideal, this development approach presented here, leads two benefits: (1) the development of applications faster, especially those which have a large amount of information, which without the support of the students will take more time and/or money. (2) Students learn actively applying the service learning methodology [4], which implicates learning through the application of the knowledge given in class in benefit of the community.

We present a work that help to cross borders as decreasing a little bit the gap between developed Panama city and undeveloped Ngäbe communities, to help the students to apply their learning beyond the four wall of the classroom, and to help the students to see beyond the border of the skyscrapers of Panama city.

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