

FitoQuilombo - An App for the Cultural Maintenance of Medicinal Plants in *Quilombola* Communities

Gezivaldo Araujo Dias, José Valter Amaral de Freitas, Lucas Nunes Rodrigues, Sheyla Cristina de Castro, Walena de Almeida Marçal Magalhães

Federal Institute of Education, Science and Technology of Tocantins, Palmas, Brazil

E-mail: {gezivaldo, josewalteraf, lucasbob19, sheyla.cris}@gmail.com, walena@ifto.edu.br

Abstract—*Quilombolas* are Brazilian traditional people who are descendants of black slaves from Africa. The present article discusses how technological tools can be used to help in maintaining their use of medicinal plants, in a cultural vision, to keep alive the history and culture experienced in two *Quilombola* Communities in the Northern portion of Brazil. It also treats environmental values as part of the history and cultural heritage of these people and discusses the contributions that knowledge of telematics can provide towards turning a regional culture into a source for ubiquitous knowledge. In this context, the importance of preserving and valuing the knowledge of these communities becomes urgent in the context of safeguarding the cultural diversity existing in the world.

Keywords—*Telematics; Culture; Quilombolas; Medicinal Plants; Ubiquitous Knowledge.*

I. INTRODUCTION

Quilombola Communities are inserted in the concept of "Traditional People and Communities" - TPC - according to Quirino [1], and involve identity, historical, social and cultural peculiarities. In Brazil, since passing of the Law 6040/2017 [2] that deals with a National Policy for the Sustainable Development of People and Traditional Communities, conceptualization of the term TPC involves a legal framework. The third article of this Law defines traditional communities as culturally differentiated. Furthermore, it presents the forms of their social organization. In addition, *Quilombola* as a TPC use territories and natural resources as a means for cultural, social, religious, ancestral and economic perpetuation through practices produced and transmitted via tradition. This provides a guarantee of environmental conservation of their customs and institutions as fundamental rights defined by national and international legal systems. The legal instruments established in the country for the purpose of guaranteeing the cultural protection of *quilombola* communities also guarantee rights such as access to land,

productive inclusion, infrastructure, citizenship and quality of life.

According to Vieira and Monteiro [3] estimates from 2004 indicated that Brazil had around 3000 *Quilombola* Communities distributed throughout the entire Brazilian territory, with less than half being catalogued [4]. Officially, the Brazilian National Secretariat of Policies for the Promotion of Racial Equality states that, by 1 2013, the Palmares Cultural Foundation (PFC) had certified 2040 *quilombola* communities [5], present in the five regions of the country.

To be certified as a TPC it is necessary to request the beginning of a territory recognition process, which involves a Technical Report for Identification and Delimitation (RTID), analysis and rulings on appeals related to the RTID, recognition, decree and referral, removal of illegal occupants and titling. According to more recent data released for 2018 provided by PCF [6] Brazil has identified 3.051 remaining Communities of *Quilombos*, and has so far issued 2.547 certificates of recognition.

The state of Tocantins is one of the 27 federative units of Brazil, (NEDES) [7] located in the southeastern portion of the North region, occupying an area of 277,620 km². The state has 139 municipalities and its capital is the planned city of Palmas. The traditional communities are dispersed from north to south in the state of Tocantins. In Tocantins, 45 communities have been identified, of which 38 have a certificate of recognition as a TPC.

Initially, this research focuses on two of these Communities: Malhadinha *Quilombola* Community, located in the central region of the state, in the municipality of Brejinho de Nazaré, 90 kilometers from Palmas, the capital of the state; and São José *Quilombola* Community, in Chapada da Natividade, 210 kilometers from the capital.

The research intends to demonstrate how technology can help to maintain the culture of these communities, as a part of environmental knowledge.

This paper is organized into the following parts: After the Introduction, Section II presents relevant related works;

Section III presents the research proposal, showing the interdisciplinary relation between technology and cultural contents and materials and methods; and finally, Sections IV and V present the results, conclusions and suggestions for future work, highlighting how technology tools can help the communities in other areas, such as agricultural control.

II. RELATED WORK

Technology is ubiquitously used nowadays and can serve to turn local traditional knowledge into global knowledge, since it can provide solutions that offer information to the most diverse areas and problems. The use of mobile devices can be an example of that, playing a fundamental role in this dissemination process.

Pereira *et al.* [8] argue that technology can be complex to some people and that sometimes it is necessary to use easier tools, such as applications.

Magalhães *et al.* [9] also presented the use of a mobile App, created using an OpenSource tool, called AppSheet, that is an easier tool for use by people without specialized computing skills.

According to Santos *et al.* [10] mobile applications have already been used for environmental problems. They demonstrate the use of a mobile application for environmental preservation.

Regarding *Quilombola* Communities, Tesk [11] states that although globalization tries to bring cultural homogeneity, those *Quilombolas* resist through their culture, although they sometimes re-signify it.

Regarding TCP and healing practices, Auger *et al.* [12] say that it is important to have and provide access to traditional health care practices.

Thus, in order to continue pointing towards the use of mobile applications for social problem-solving in the path of mobility, this work presents a cultural catalog of medicinal plants, used as an alternative treatment for diseases, through the use of an App called FitoQuilombo.

III. PROPOSAL

The objective of this research is to solve a social problem in the environmental/cultural area, using technology as a support to aid in maintaining local tradition, by creating an application that can connect people and record *Quilombola* medicinal plants in a collaborative catalog. It presents two *Quilombola* Communities, both in the state of Tocantins, and the way they use medicinal plants, as an alternative method for treating diseases.

This research is based on two *Quilombola* Communities chosen by preliminary information and access provided by two researchers of this group who are themselves *Quilombolas*.

To solve the problem, the research group created an App that provides cultural information about use of medicinal plants by *Quilombolas*. The main challenges in doing this is

that the communities do not have the appropriate access to technology, besides the fact that most young people, who are probably better at dealing with new technology, leave the community at an early age to study.

To identify how the tradition of using medicinal plants for disease treatments is culturally passed on, the authors need to register some plants, their therapeutic purposes, the best form of use and how *Quilombolas* prescribe them through a prior data collection with the members of Malhadinha and São João communities.

Because of the growing number of people with interest in medicinal plants, the App will be available to all people, providing anyone from anywhere in the world access the cultural catalog, which can facilitate the interaction of the public interested in obtaining the necessary information on medicinal plants, and sharing this cultural legacy.

This shows that telematics tools can directly help to maintain cultural knowledge, providing an evolution in aiding human social relations, and helping part of this process.

A. Materials

As mentioned before, one of the products from this research is an App called FitoQuilombo, developed using AppSheet [13], a free platform. The tool includes a catalog with *Quilombola* information, photos, and videos of medicinal plants, demonstrating how those people traditionally prepare and use them, with a brief presentation of each community (Figure 1).

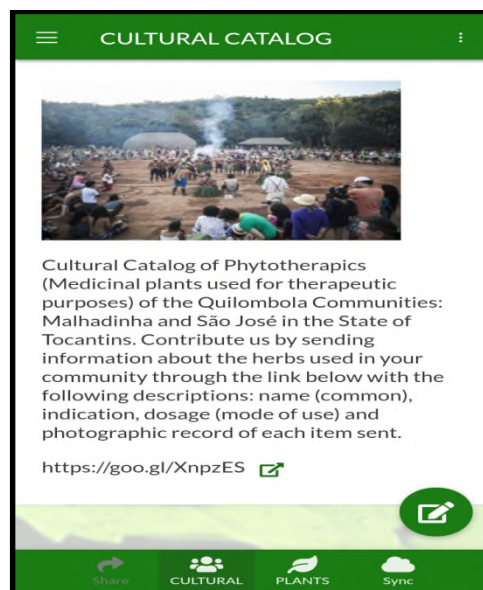


Figure 1. Presentation of communities.

The research was initially developed through meetings in the computer lab of the Federal Institute of Education, Science and Technology of Tocantins, Palmas Campus, using computers with Internet access, to carry out research

on the project with the support of a tutor, who shared configuration techniques for creating a file with the commands and procedures to transform a machine with the Linux operating system into an access point.

Other tools were used for interaction between the research group and the tutor, enabling support from instant messaging Apps such as WhatsApp [14], and platform tools such as Google Family [15]: Classroom [16], Gmail [17], Forms [18], Drive [19], Doc's [20], Presentations [21], YouTube [22], and Screencasting [23].

To explore the possibility of using the Linux [24] operating system tools, the authors used the command terminal to develop a container docker, thinking of information from the project that will be stored. Work was done to configure a container docker and to install tools that provide a solution for the work, which was defined by the group. Still using the resources of the Linux command terminal, a draft of the solution proposed for the problem presented in the classroom was implemented by the tutor; he executed commands to access the server, change the password and access one of the machines in the laboratory, creating a subnet docker and a container connected to this subnet by installing net-tools.

B. Methods

This is a work in progress, using Problem Based Learning – PBL – as an initial method, where a problem is given and solutions are sought.

During the bibliographical research of related work, it was possible to identify a range of solutions, which apply to the problem that was identified. In this way, an application was designed that contains a catalog of medicinal plants, with an indication of use of these plants, in a collaborative context with the two communities, to offer information on the most diverse medicinal plants and indications for treating diseases.

A preliminary survey was carried out in Malhadinha Quilombola Community, with 64 families and 476 people. The research identified that in this community it is possible to have access to Internet, via mobile data, with a stable signal and some specific points in the community receiving a more stable signal. The community people have 16 smartphones used by the *Quilombos*.

The researchers investigated the empirical knowledge of medicinal plants available in the community, to learn what medicinal plants are in fact used for therapeutic treatment. Of the 64 families in the community, 22 were interviewed to identify which medicinal plants are used; the researchers identified 46 medicinal plants: *Mastruz, Babosa, Quebra Pedra, Tipi, Gengibre, Açafrao, Arnica, Arruda, Alecrim, Boldo, Cagaita, Hortelã, Inhame, Urucu, Unha de Gato, Manjeriçao, Arnica, Capim de Cheiro, Erva Cidreira, Laranja da Terra, Mulatinha, Alfavaca, Vinagreira, Açoita-cavalo, Cajá, Jatobá do campo, Pequi, Mangabeira, Mangaba, Cansaçao, Fedegoso, Tamarindo, Inharé, São Caetano, Abacate, Negramina, Aroeira, Sucupira, Algodão,*

Assa Peixe, Amora, Cabelo de Milho, Jaborandi, Língua de Vaca, Noni and Quina.

The FitoQuilombo App was developed on the AppSheet platform, with the help of spreadsheets created in Google Docs, which are formatted according to their use on App screens. Within the platform itself, there is a support area, where documentation is found to aid in setting up and adjusting the application. This documentation is presented in the form of text and video tutorials.

In the process of structuring the application it has a catalog of plants and herbs, which helps the user to know which plants and their parts to use for treating diseases and to perform tests and surveys with potential users of the application.

In addition to the configuration and development part, we use research to support this applied methodology. These searches are primarily done in other sites, and within the AppSheet development program itself, which has a library with documentation help as well as tutorials that demonstrate the development of the proposed functionalities, enhancing the application so that it performs the functions as desired.

Research was also carried out, with the help of a form created in Google Forms, where questions related to the use and application of herbal medicines contained in the application were made. The objective of this research was to evaluate the design of the system and also the relevance of creating this type of application, which is to inform the end users about the importance of preserving both the culture and the plants used in the preparation of these herbal products. This will be part of the FitoQuilombo virtual catalog. Given the results obtained with the research done through this online questionnaire, it is already possible to establish the need to design software of this nature, as the respondents desire.

Through analysis of the data obtained with these surveys, the need to make the interface of the application as intuitive and straightforward as possible was verified, since the users who will enter data to compose the catalog of plants of the system may be individuals who do not have much familiarity with mobile network technologies (smartphones and tablets), and may experience some difficulty in adding more items to the system.

This impediment can easily be remedied through guidelines on how to use the system, along with users who are part of the communities that will supply the application library with the registration of therapeutically valuable plants found in the communities that are part of this analysis.

IV. RESULTS

This paper had the intention of providing contributions as to how technology can serve as a tool to maintain cultural identity in *Quilombola* Communities, focusing on

registering their cultural use of medicinal plants through an App called FitoQuilombo.

Its purpose was to help transmit, teach and preserve *Quilombola* culture on a daily basis, creating alternatives that optimize the process of maintaining the local culture. It may be possible to adapt it for use by other traditional peoples around the world.

The registration of medicinal plants in FitoQuilombo App is described only culturally. These partial results were collected by bibliographical researches, previous visits to the communities, interface usability test of the App, information and application navigation, which allowed for improvements in the organization of the application structure.

The researchers tested the FitoQuilombo App with pharmacists and natural product users, and applied a heuristic usability assessment, presenting some considerations about the usability of the App prototype, using heuristics as basis for the decision, generating an order of analysis of the 10 Nielsen heuristics [25], on interface design, information, and navigation. Together with the navigation designer, they then analyzed the visibility of the application system with the argument that the application does not have information on where the user is browsing, meaning what screen the user is on. In possession of these considerations, we realized that one must insert titles in each screen in order to identify the screen on which the user is; in this case, the project will make changes to their screens, including the titles.

In analyzing the application, specifically in heuristic 10 concerning the help and documentation presented by the application, it was reported that: "The application does not have a 7- help menu or tutorial on how to use, or how it should work for a collaborator to send or register an alert". Based on this analysis, we emphasize what the group was already trying to put into practice, which is the provision of a tutorial to assist in user navigation, explaining the main steps, how to register an herbal medicine and how to send opinions to the designers of the application.

Mobile devices have a fundamental role in this process of information dissemination, enabling interaction with the world. The goal of FitoQuilombo is to allow the user to have a satisfactory experience when opening the application. He or she should be able, when using his catalog of herbs and medicinal plants, to carry out research for indicating a treatment for a particular disease and to be sure that this operation was done with confidence and responsibility in the information. Also, that the application is made available on hosting platforms, for users to download, and that the application fulfills its role without presenting technical problems that should have been solved during its development.

The FitoQuilombo project, presents an interface design, menus with two levels of depth to make usability accessible and direct, in interaction with clear and objective

information in order to facilitate user navigation. A fault has been identified, which is the lack of title in each screen, as can be seen in the figure below:

The home screen of the application provides the menu of the home screen itself and the "medicinal plants" menu, allowing access to the catalog of medicinal plants. In the upper right-hand corner, there is the option of retrieving information contained within the application (Figure 2).

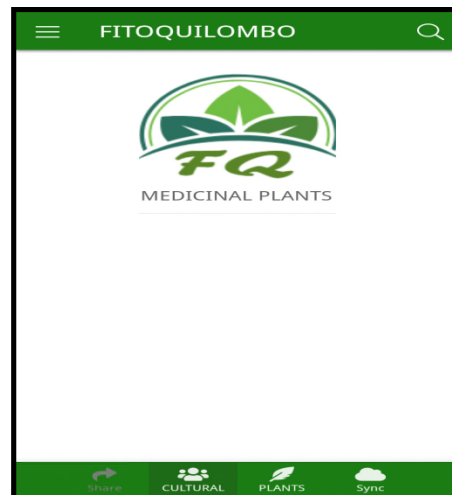


Figure 2. Application Home Screen.

The system contains submenus in which there is lateralized right-hand drop-down menu, with the following functions: "indication", "*Quilombola* Communities", "videos", "contact", "quilombola", "about" (Figure 3).

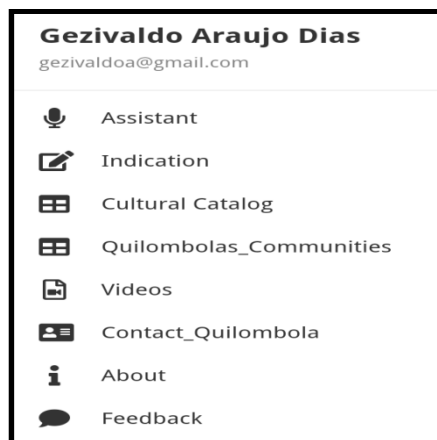


Figure 3. The layout of the menus.

The screen of the application provides images of the plants followed by their popular and scientific names; when accessing the image, it is possible to visualize and register the medicinal plants in the communities surveyed, providing information regarding indications, and mode of use by *Quilombos* (Figure 4).

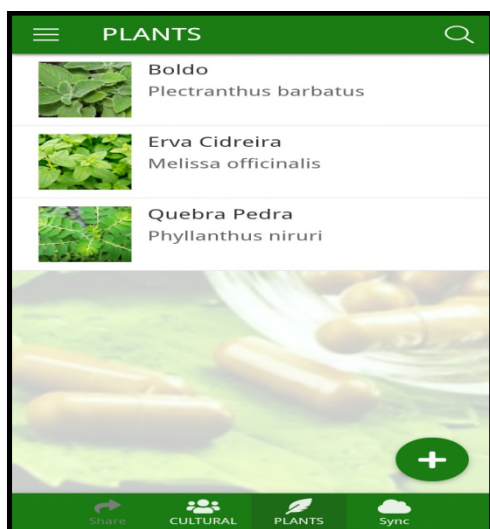


Figure 4. Catalog of medicinal plants.

The data obtained through the field research, for the development of the application, was used to produce a catalog of herbs and medicinal plants surveyed together with the Quilombola Communities; having this data, opens options for other works. Due to the unavailability of scientific research and the time needed to complete this project, scientific research of herbs and medicinal plants is recommended for future work, in search of validation of accessible knowledge, providing technical support to the communities involved.

V. CONCLUSION AND FUTURE WORK

Most activities for treating illness in the *Quilombola* Communities of Malhadinha and São José da Natividade in the state of Tocantins, can employ apps such as the one developed in this work as a viable alternative form of support for keeping the *Quilombola* culture alive in terms of its use of medicinal plants, along with technological growth among the people. A technology was sought to work collaboratively with the empirical knowledge of *Quilombos*, who are seeking alternative treatment for diseases.

At present, there is a growing number of people who seek herbal treatment, so an application has been designed that presents the recommendations, administration, and use of medicinal plants that are culturally used as an alternative treatment in the Communities. The conclusion is that technology is an excellent ally in disseminating information that contributes to society and that the empirical knowledge of *Quilombos* regarding medicinal plants can contribute to society.

Only some of the stated objectives we had proposed for this project were achieved. Due to the lack of communication via Internet it was not possible to test the

application in the Communities described in order for them to use and feed this instrument.

This work is very relevant to environmental and cultural research in relation to the globalization of cultures, which depends on the technology that is the means for connecting us even at long distances. This issue needs to be deepened, because it allows a better understanding of this unification process. The culture experienced in *Quilombola* Communities is a local culture with its own identities, and we have been enabled to better understand their use of medicinal plants and to develop research, selection, organization, and information communication skills obtained with each *Quilombola* community.

This phase of the research deals with the partial survey of the results obtained with the study carried out on the need to catalog and keep alive the *Quilombola* culture, with its knowledge of medicinal plants that is passed on between generations by the members of the community and the form in which the authors presented their proposal for cataloguing and disseminating these teachings.

Future work could be done by testing the results of the App use by the Quilombolas communities, and also with further investigation of technology that can help organic production, as well as with automation of the irrigation of medicinal herbal gardens, avoiding the excess and waste of human and natural resources.

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