

# Language Activism: Reinforcing the Presence of Guarani Language in Digital Contexts in Paraguay

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# Introduction

Paraguay is a unique country; it is perhaps the only country in the world in which the vast majority of the population speaks an native American language -Guarani- despite not being indigenous. In fact, the majority of Paraguayans are a mix of European descents and native Americans.

The language situation in Paraguay is complex. Spanish and Guarani are both official languages. However, Spanish predominates in formal settings -business, government, academia- while Guarani is used mostly in informal settings. Moreover, Guarani is at a disadvantage with Spanish in terms of written resources. There are lots of readings in Spanish, whereas it is hard to find readings in Guarani.

The goal of this project is to use design as a means for language activism, specifically, as a means to reinforce the presence of Guarani in digital contexts.

# Related Project

This topic was born out of the collaboration of Emeritus Professor of Informatics and Cognitive Science Michael Gasser, doctoral student in Computer Science and Computational Linguistics Alex Rudnick, and master's student in Human-Computer Interaction Design Alberto Samaniego, in an attempt to facilitate the translation of texts from Spanish into Guarani in Paraguay. In the long term, the goal is to create software that performs automatic translations of portions of texts to assist the human translators.

The role of Professor Gasser and Alex Rudnick is the application of computational linguistics and artificial intelligence techniques to the problem of the publication of more material in Guarani, in particular, through computer-assisted translation from Spanish.

The role of Alberto Samaniego in that project is to design the tool or tools that facilitate the publication of material in Guarani, including tools for computer-assisted translation.

Since the topic of this capstone project and the project with Professor Gasser are closely related, some of the insights and concepts generated in this project emerged as a result of the collaboration with Professor Gasser and Alex Rudnick. However, it is important to mention that all the interaction design work was made by Alberto Samaniego.

## Michael Gasser

Michael Gasser is Emeritus Associate Professor of Informatics and Cognitive Science at Indiana University. His work is focused on developing computational tools to help in the practical processing of several “under-resourced” languages (those languages that are not well represented in the digital world), including the Ethiopian languages Amharic, Tigrinya, and Oromo and the South American indigenous languages Quechua and Guarani. These languages are all very complex morphologically, and much of the ongoing work has been on software to analyze and generate complex words in these languages. The main long-term goal of this research is the application of computational linguistics to the problem of the publication of more material in such languages, in particular, through computer-assisted translation from other languages.

Currently Gasser is most actively involved in a project in Paraguay with the goal of facilitating the translation of texts from Spanish into Guarani, the indigenous language that is the first or second language of most Paraguayans. In the short term, we are building web-based tools to enable collaboration among translators in Paraguay. In the long term, we will enhance these tools with software that performs automatic translation of portions of texts to assist the human translators.

## Alex Rudnick

Alex Rudnick is a doctoral student in computer science and computational linguistics at Indiana University. His work focuses on automatic translation systems for disadvantaged languages, concretely on integrating machine learning techniques into rule-based machine translation systems. For the project involving Paraguay and Guarani, Alex is developing software that learns to produce better translations from collected data.

## Contents

Analysis		Synthesis			
Predispositions (page 5)	Research (page 10)  Literature  Observations  Collections	Insights (page 46)	Concepts & Concept Systems (page 57)	Prototypes (page 98)  Appearance	Strategies (page 104)
Predispositions are the things we believe to be true at the outset of a design process or explanation.	Research comes in three forms, namely (i) observations—or primary research, (ii) literature review—or secondary research, and (iii) collections—or knowledge about cultural forms.	Insights are the design issues that arise out of research.	Concepts and systems of concepts are the things, services, communications, or strategies that we envision in response to insights.	Prototypes come in three forms, namely (i) exploratory—or behavioral or low fidelity prototypes, (ii) appearance—or look and feel prototypes, and (iii) usability—or proof of concept or high fidelity prototypes.	Future directions of the project.

# Predispositions

The following predispositions are the result of living 26 years of my life in my country -Paraguay- and the beliefs about language rights and equality that drive my motivation of designing for the Guarani language.

## Predispositions

### Guarani as Part of Paraguayan Culture

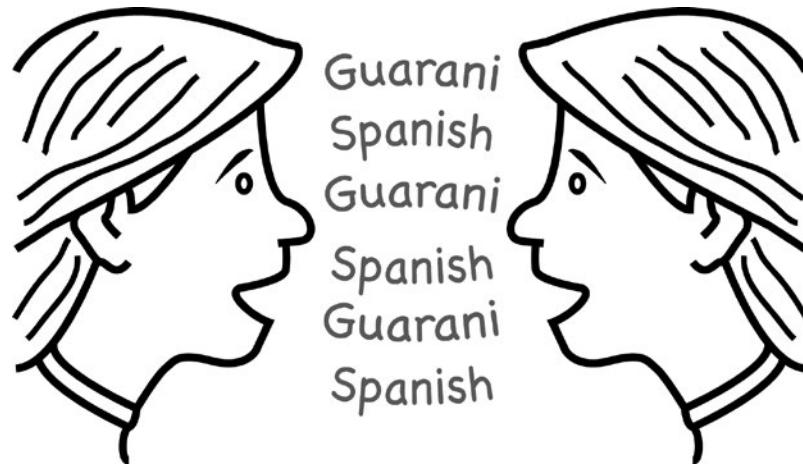
Guarani plays a fundamental role in Paraguayan culture and idiosyncrasy. It is spoken by the majority of Paraguayans.



## Predispositions

### Bilingualism in Paraguay

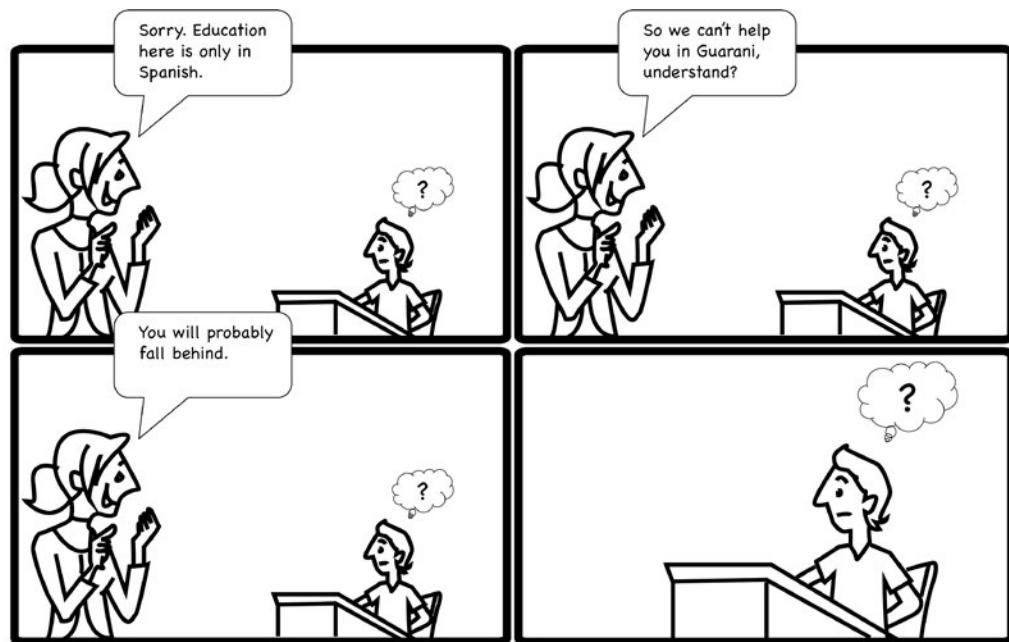
It is important to foster bilingualism in Paraguay as both Spanish and Guarani are official languages of the country and play key roles in Paraguayan's idiosyncrasy.



## Predispositions

### Mother Tongue-based Education

Basic education in mother tongue is a human right. Education in the proper language shapes educational outcomes.



Inspired by [\*]

## Predispositions

### Written and Digital Presence of Guarani

Guarani is mainly a spoken language. However, there is a Latin Script writing system for it. It is important to foster the presence of Guarani in digital contexts in order to raise it to the same standing as Spanish.



# Research

Research includes literature review (secondary research), observations (primary research) and collections.

For primary research, I traveled to Paraguay for a week in March of 2013 with Professor Michael Gasser and Alex Rudnick. There we met with Guarani activists to establish connections, performed participatory observations at higher education Guarani institutions, and observed classes at elementary and middle schools immersed in the One Laptop Per Child program in Caacupe city. I used quick ethnographic methods, including informal interviews and focus groups, observations, participatory observation and interventions. Primary research in Paraguay was key to establish collaboration with key stakeholders in the project.

## Research Literature

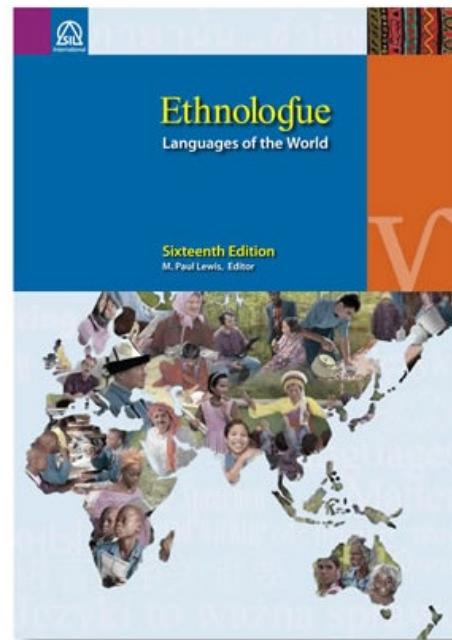
### Paraguayan Guaraní - Quick Facts [\*]

**Alternative names:** Avañe'ẽ

**Dialects:** Jopara. Jopara is the colloquial form mixed with Spanish loanwords.

**Language status:** Official language in Paraguay.

**Writing system:** Latin script.



[\*]

[\*] Lewis, M. Paul (ed.), 2009. Ethnologue: Languages of the World, Sixteenth edition. Dallas, Tex.: SIL International. Online version: <http://www.ethnologue.com/>

## Research Literature

### Situation of Guarani

Over half of Paraguay's population was bilingual by 2002 -out of a total of 5,163,198- according to the census conducted that year, encompassing a total of 51% of Paraguayans. [\*]

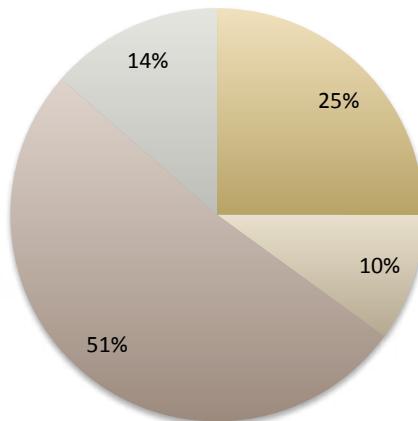
Guarani was spoken by 76% of the population (a total of 3,946,904 people) -being the most spoken language in the country, whereas Spanish was spoken by 61% of the population (a total of 3,170,812 people). [\*]

25% of the population was monolingual in Guarani, whereas only 10% was monolingual in Spanish. Most of the population that was monolingual in Guarani was located in rural areas, whereas most monolinguals in Spanish were located in urban areas. [\*]

Out of a total of 1,107,297 households, Guarani was spoken in 59% of them (653,600 households), while Spanish was spoken in 36% of them (396,802 households). [\*]

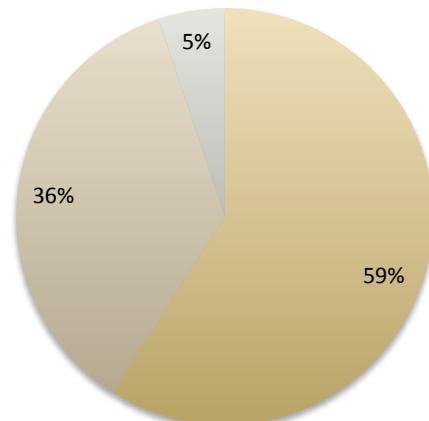
Note: last national census was conducted in 2012, but final results were not available by the time of this work. Preliminary results indicate that Guarani is still the most spoken language, encompassing around 77% of the population. The number of monolingual Guarani speakers would have reduced to 8%. [\*\*]

Languages Spoken in Paraguay by 2002



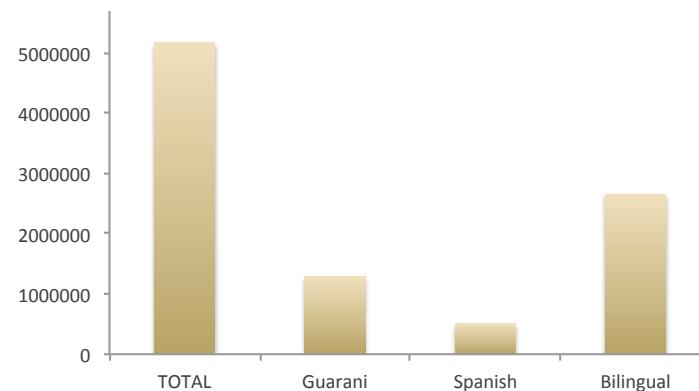
Total of 5,163,198 people

Languages Spoken in Paraguay Households by 2002



Total of 1,107,297 households

- Guarani
- Spanish
- Bilingual
- Other



[\*] Resultados Finales del Censo 2002. Dirección General de Estadística, Encuestas y Censos. <http://www.dgeec.gov.py/>

[\*\*] E'a. Periódico de Interpretación y Análisis. 12/2012. <http://ea.com.py/pese-al-estado-y-a-los-medios-el-guarani-sigue-como-el-idioma-mas-hablado-del-pais/>

## Research Literature

### The Language Profile of Paraguay

**Spanish, the official language de facto.** "Since 1992, the Republic of Paraguay has had two official languages: Spanish and Guaraní; however, Spanish is the de facto language of government and is the primary official language." [\*]

**Guarani, the official language de jure.** "Despite the official status of the language (the 1992 Constitution is actually published in Guaraní as well as in Spanish), Paraguayan Guaraní is not used as the main vehicle of written documentation of governmental proceedings, regulations, or proclamations and is therefore an official language in a limited sense, but has a significant nationalist function in Paraguay." [\*]

"Guaraní remains typologically distinct from Spanish, despite the centuries of contact that have exerted significant influence on the subordinate language. Guaraní maintains a system of 12 vowel phonemes, seven of which do not exist in Spanish, including a high central vowel and a full series of nasalized vowels." [\*]



[\*] Gynan, S. N. 2001. Language planning and policy in Paraguay. Current Issues in Language Planning.

## Research Literature

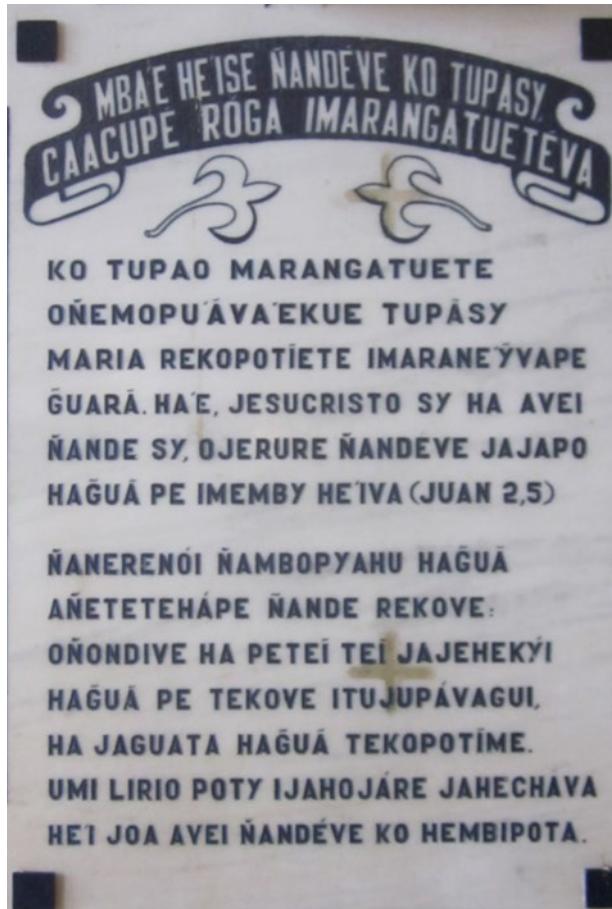
### Guarani Literacy

"Spanish is the major language of literacy in Paraguay. Most governmental documents are produced in Spanish." ... "The language has been, until relatively recently, the only medium of literacy education." [\*]

"While Spanish predominates in activities involving literacy in Paraguay, the status of written Guaraní has improved markedly over the last 20 years, undergoing an important revival." [\*]

"There are a few hundred books published in Guaraní. Most are short works: poetry, stories, and dramatic works." [\*]

The major media language is overwhelmingly Spanish.



A prayer in Guarani carved on a stone tablet at the Basilica of Caacupe. Caacupe city is considered the religious capital of Paraguay.

[\*] Gynan, S. N. 2001. Language planning and policy in Paraguay. Current Issues in Language Planning..

## Research Literature

### Guarani in Digital Contexts

“...there remains little to read in Guarani, at best perhaps 1000 books (Gynan, 2001), including very little on topics such as science, health, and technology. This lack is even more apparent on the internet, where most of what is available consists of news articles, political discussion, and a limited number of articles in the Guarani Wikipedia (gn.wikipedia.org). This dearth of reading material has two consequences. First, it gives people little reason to become literate in the language. Second, it inhibits the use of Guarani as a medium of instruction, especially in classes such as science and mathematics.” [\*]

The screenshot shows the main page of the Guarani Wikipedia. At the top, there is a search bar and a navigation menu with links for "Kuatahái", "Myangékó", and "Moñe". Below the menu, the title "Ape" is displayed, followed by the Guarani flag and the Spanish and Brazilian flags. A banner at the top right reads "Tapeéguahó poráite Vikipetá! Aváne'ë Wikipedia (2005 ary - 2013 ary) Puyyvénára - Ayuda - Help". The main content area features a grid of articles with titles like "Ñemohenda", "Mbyákuas", "Tetenguára", "Tembíssakue", and "Tembíkuasay". Each article entry includes a small thumbnail image and a brief description. At the bottom of the page, there is a section titled "Aváne'ë Vikipetá" with a note about the number of articles and links for editing help.

By February of 2013, the Guarani version of Wikipedia (gn.wikipedia.org) had only 2,202 articles, whereas the Spanish version had more than 940,000 articles, and the English version had more than 4,110,000 articles.

[\*] Gasser, Michael and Mansfeld María. 2010. Literacy, Translation, and Bilingual Education in Paraguay.

## **Research Literature**

### **Guarani in Education**

“Despite progress with programs of mother tongue literacy instruction in Guarani at the primary level, as well as the much-publicized doctorate program in Guarani at National University, Spanish is used almost exclusively in higher education.” [\*]

“For these children (the ones raised in Guarani monolingual households) literacy instruction in Spanish has amounted to de facto submersion with predictable results: high rates of absenteeism and early dropout.” [\*]

Nowadays, Guarani instruction is available in the great majority of public schools.

“...it is safe to say that the main effect (of bilingual education in Paraguay) has been a marked increase in Guarani literacy. However, subjects other than Guarani, except in the 10 bilingual modality schools, are still normally taught in Spanish, even in regions where all of the children have Guarani as a mother tongue.” [\*]

*“Medium of instruction is the most powerful means of maintaining and revitalizing a language and culture; it is the most important form of intergenerational transmission.” [\*\*]*

[\*] Gasser, Michael and Mansfeld María. 2010. Literacy, Translation, and Bilingual Education in Paraguay.

[\*\*] Tsui, A. B. M. and Tollefson, J. W. 2010. The centrality of medium-of-instruction policy in sociopolitical processes. In A. B. M. Tsui and J. W. Tollefson (eds.), Medium of instruction policies: which agenda? whose agenda? Mahwah, NJ, USA: Lawrence Erlbaum Associates.

## Research Observations

### A Sub-urban School in Paraguay

Public elementary and middle school “Héroes del Chaco” in J.A. Saldívar, a sub-urban town located around 25 miles away from Asunción, capital and main city of Paraguay.

Kids in this school are representative of kids public schools in sub-urban areas surrounding Asuncion. They go to classes either in the morning or the afternoon, but not both. Most kids were bilingual, fluent in Spanish and Guarani. It was common to hear them speak Guarani among each other. They had classes in both languages.

The school only had a small computer lab donated by the multinational telecommunications company Tigo. They lab consisted of around 10 personal computers with access to the Internet. However, the school did not take advantage of the lab as an educational resource (probably due to the lack of capacitation), and the lab ended up being used mostly as a cybercafe than for class work.



Above, a 6th grade classroom on the afternoon shift at the school “Heroes del Chaco” in J. A. Saldívar during a class in Guarani. Left, the only computer lab in the school, which consisted of around 10 personal computers.

## Research Observations

### Visit to Caacupe, Paraguay

Caacupe is a small city located 34 miles away from Asunción (main city and capital of Paraguay). It is considered the spiritual capital of Paraguay since it holds an enormous basilica in the center of the town, to where around 300,000 Catholic peregrinate every year.

Caacupe is the only city in Paraguay where all public schools are immersed in the One Laptop Per Child program. The main plaza of the city, located across the basilica is visited by hundreds of students every day after school hours. The place has free wi-fi access available to the public.

It was very common to hear people speaking in Guarani. Though, most school kids in the city used Spanish to communicate among each other. That situation changed drastically as we went to the borders and surroundings of the city.



Main plaza in Caacupe

## Research Observations

### OLPC Program in Paraguay

One Laptop Per Child (OLCP) is a world-wide endeavor that aims to “provide each child with a rugged, low-cost, low-power, connected laptop.”[\*] The **XO laptops** run a Linux based operating system and have wireless broadband that allows them to work as an ad-hoc network, creating a local area network even if there are no routers nearby. The philosophy of the project is that with this tool “children are engaged in their own education, and learn, share, and create together.” [\*]

In Paraguay, the project has been led by Paraguay Educa, a national NGO. Since 2008, they have included more than 9700 children and 350 teachers in the project.



[\*] One Laptop per Child. [www.laptop.org/about/mission](http://www.laptop.org/about/mission). Last accessed on 04/13/2013



## **Research Observations**

### **OLPC Program in Caacupe, Paraguay**

During our visit to Paraguay, we visited two public schools in Caacupe. The first one was school Daniel Ortellado, located in a rural area outside Caacupe city; the second one was school Santa Teresita, located in an urban area, in the Caacupe city.

Caacupe is the only district in Paraguay in which all public schools are part of the One Laptop per Child (OLPC) program, having more than 6000 kids from 1st to 6th grade using a XO laptop for daily class and extra-curricular activities. In the urban areas of Caacupe, kids speak Spanish as their first language; most of them also speak Guarani. In the more rural areas, the mother tongue of most kids is Guarani. In those areas, even though when a class is given in Spanish, the kids use Guarani to communicate among each other.



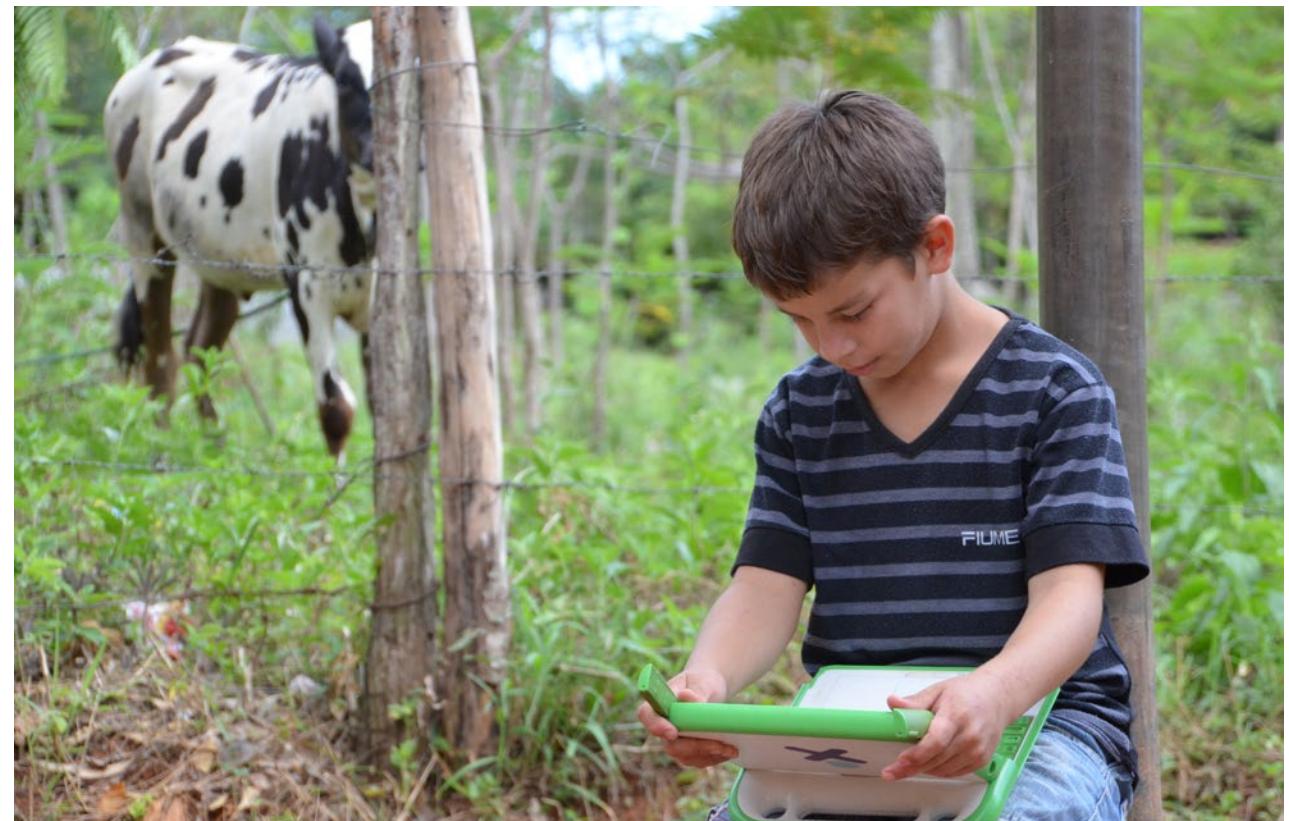
Class in school Daniel Ortellado, in a rural area of Caacupe district.

## **Research Observations**

### **Modalities of Teaching**

According to the teachers, schools have two modalities of teaching depending on which one is the mother tongue of the kids that go to that school. Normally, in urban areas classes are prepared for Spanish-speaking kids (having Guarani as a second language), whereas in the rural areas -where most kids speak Guarani as their first language- classes are supposed to be prepared for Guarani-speaking kids (having Spanish as a second language). However -always according to the teachers- this two modalities are not always implemented, and many times kids that speak Guarani have classes in Spanish, following the Spanish-speaking modality.

Nonetheless, kids in both types of school -urban and rural- are mostly bilingual, especially kids whose mother tongue is Guarani. Kids whose mother tongue is Guarani are more competent in Spanish than kids whose mother tongue is Spanish in Guarani.



A kid concentrated on his XO laptop during the break at school Daniel Ortellado in rural Caacupe.

## Research Observations

### Use of XO Laptops

The teachers explained that they handle most of the assignments to the kids through the XO network directly to their computers, and in that sense, that have replaced the use of chalkboards. They also described the limitations of the XO laptops with Guarani. None of the programs that kids run on their laptops support Guarani. For example, the application Speak ('Hablar con Sara' in Spanish) -a talking face for Sugar in which kids type words and the computer will say them out loud- is useful to learn to read and pronounce words in Spanish, but not Guarani. Another problem for the use of Guarani on the XOs is that the keyboard does not support special characters in Guarani like nasal vowels (e.g. ã) and the nasal g (ã).



The director and teachers at school Santa Teresita.



School "Daniel Ortellado" in rural Caacupe.



School "Santa Teresita" in urban Caacupe.

## Research Observations

### Guarani Institutes in Paraguay

Primary and secondary education in Paraguay include both languages Spanish and Guarani. Hence, there are several tertiary-level institutes in Paraguay that train people to become Guarani teachers and translators.

Among the most important institutes are the Ateneo de Lengua y Cultura Guarani -directed by Carlos Ferreira- and the Fundación Yvymarãe'ŷ -directed by Miguel Ángel Verón. Other important institutes are the Facultad de Lenguas Vivas (FALEVI), the Instituto de Lingüística Guaraní del Paraguay (IDELGUAP), the Universidad Nacional de Itapúa (UNI) and the Instituto Superior de Lenguas. During our visit to Paraguay, we visited the Ateneo de Lengua y Cultura Guarani and the Fundación Yvymarãe'ŷ.

The Ateneo de Lengua y Cultura Guarani has over a hundred branches over the world including Paraguay, Argentina, Brazil, US and Europe, totalizing more than a thousand students.

The Fundación Yvymarãe'ŷ has only one branch with around a hundred students.

The total length of the program to get a bachelor's degree in Guarani is four years. At the end of the fourth year, students have to present a final thesis work which might consists on the translation of a book from Spanish to Guarani or a research work on Guarani that results in a digital and printed publication in Guarani.



Main branch of the Ateneo de Lengua y Cultura Guarani.



Fundación Yvymarãe'ŷ.



A sign advertising Guarani Bachelor's degrees in bilingual education.

## Research Observations

### Guarani Classes - Size

At the institutes where people are trained to become Guarani teachers, classes are usually:

- **small-sized:** usually holding between 6 and 15 students in each course



A Guarani class with advanced students at the Fundación Yvymarãe'.

## Research Observations

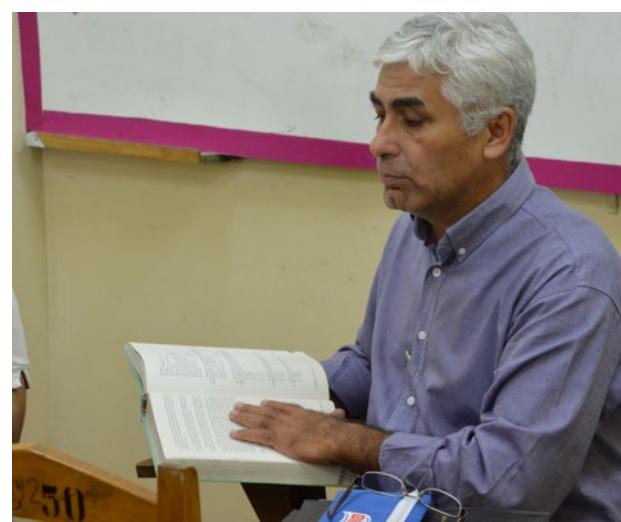
### Guarani Classes - Interactions

At the institutes where people are trained to become Guarani teachers, classes are usually:

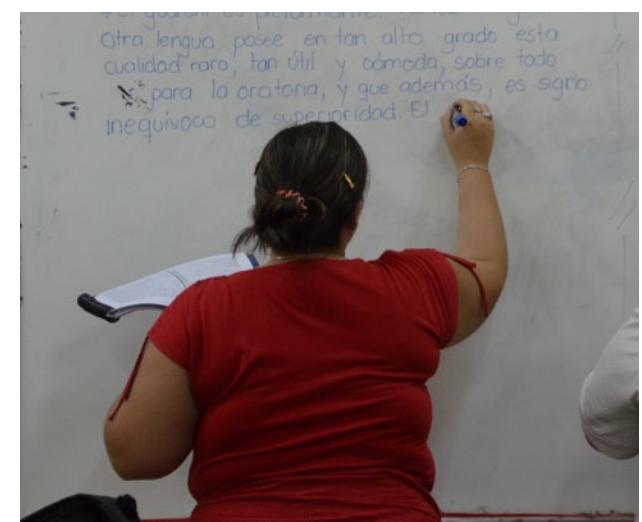
- **informal:** classes are very open to participation and discussion, especially in advanced courses the structure is closer to a seminar than a lecture



Classes at the Fundación Yvymarãe'ŷ.



Classes at the Ateneo de Lengua y Cultura Guarani.



## Research Observations

### Guarani Classes - Collaboration

At the institutes where people are trained to become Guarani teachers, classes are usually:

- **collaborative:** collaboration is essential especially in advanced courses; students usually collaborate to write and translate text in Spanish or Guarani

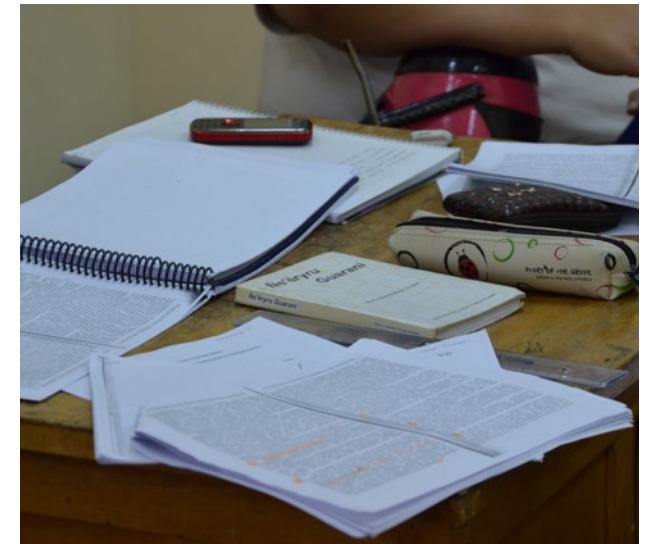
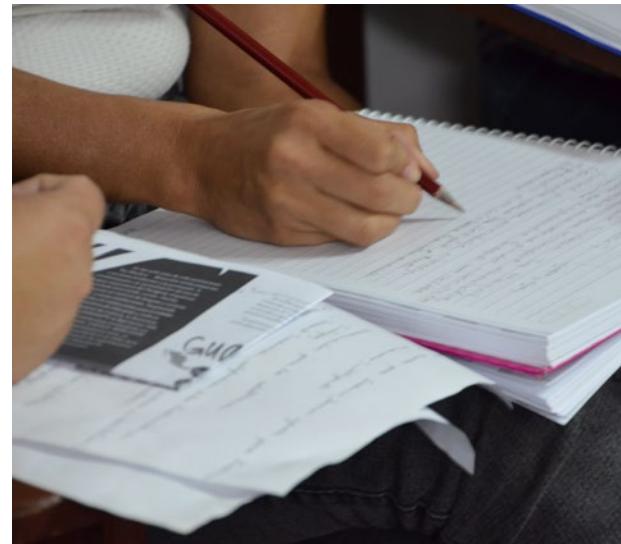


## Research Observations

### Guarani Classes - Technology

At the institutes where people are trained to become Guarani teachers, classes are usually:

- **low-tech:** the use of technology in class is not a norm; students do not bring laptops to class; however, in some classes the teachers use a projector and MS Word to collaboratively edit a document. Both institutes visited had wireless Internet access.



## **Research Observations**

### **Translating Spanish and Guarani**

Translating from Guarani to Spanish is easier than translating from Spanish to Guarani. Translating complex documents to Guarani, especially academic ones, many times require to come up with neologism that have not been standardized yet.

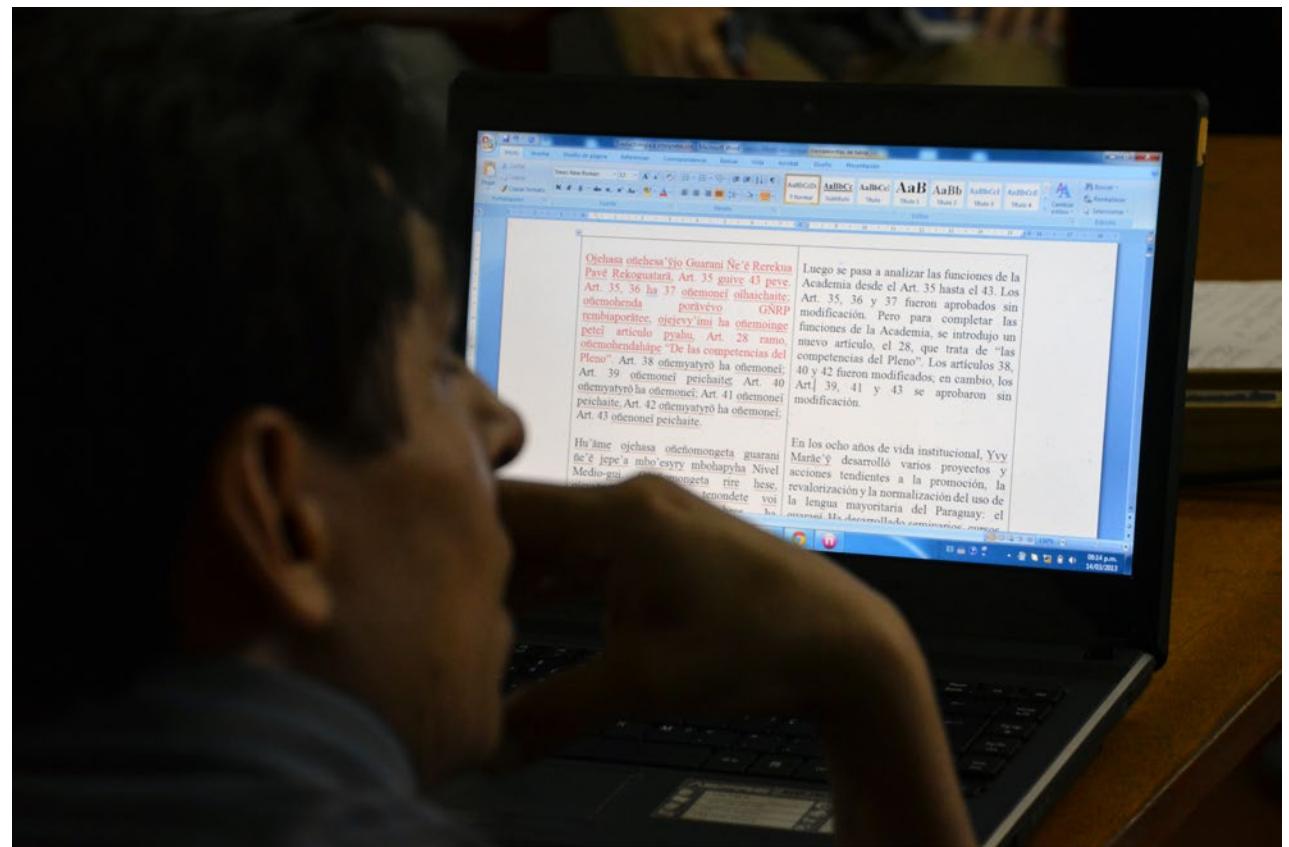


Guarani instructor and activist Carlos Ferreira clarifying doubts to students during a group translation assignment.

## Research Observations

### Standardization of Guarani

The Guarani vocabulary and grammar is yet to be standardized. This task is under the responsibility of the Academia de Guaraní (Guarani Academy), created in 2010 for this specific purpose.

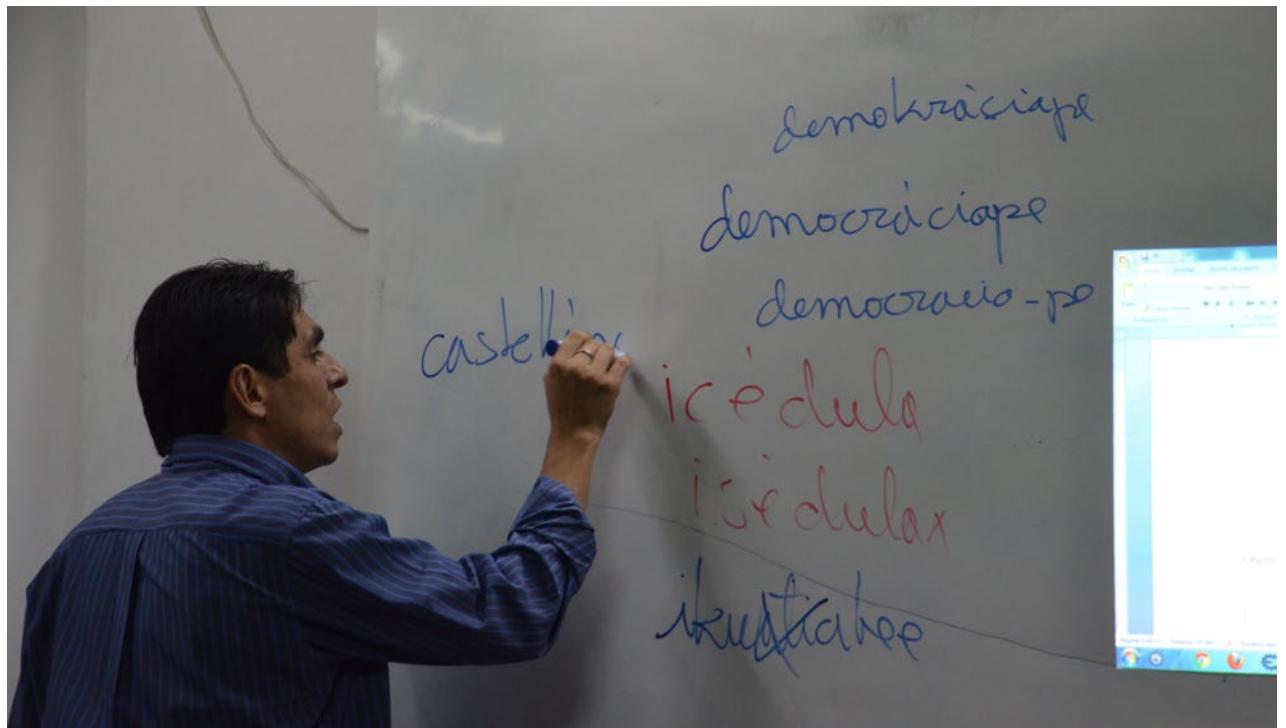


Guarani instructor and activist Miguel Veron using Microsoft Word for translating a document in class at Fundación Yvymaræ'ý.

## Research Observations

### Academic and Vernacular Guarani

The Guarani that is used in a day to day basis mostly for oral communication by Guarani speakers is not exactly the same Guarani that is taught in schools and institutes (Academic Guarani). Daily Guarani is less strict in borrowing words or even the structure from Spanish, whereas Academic Guarani has the least influence from Spanish as possible. The mix between Spanish and Guarani in daily oral communication is called Jopara.

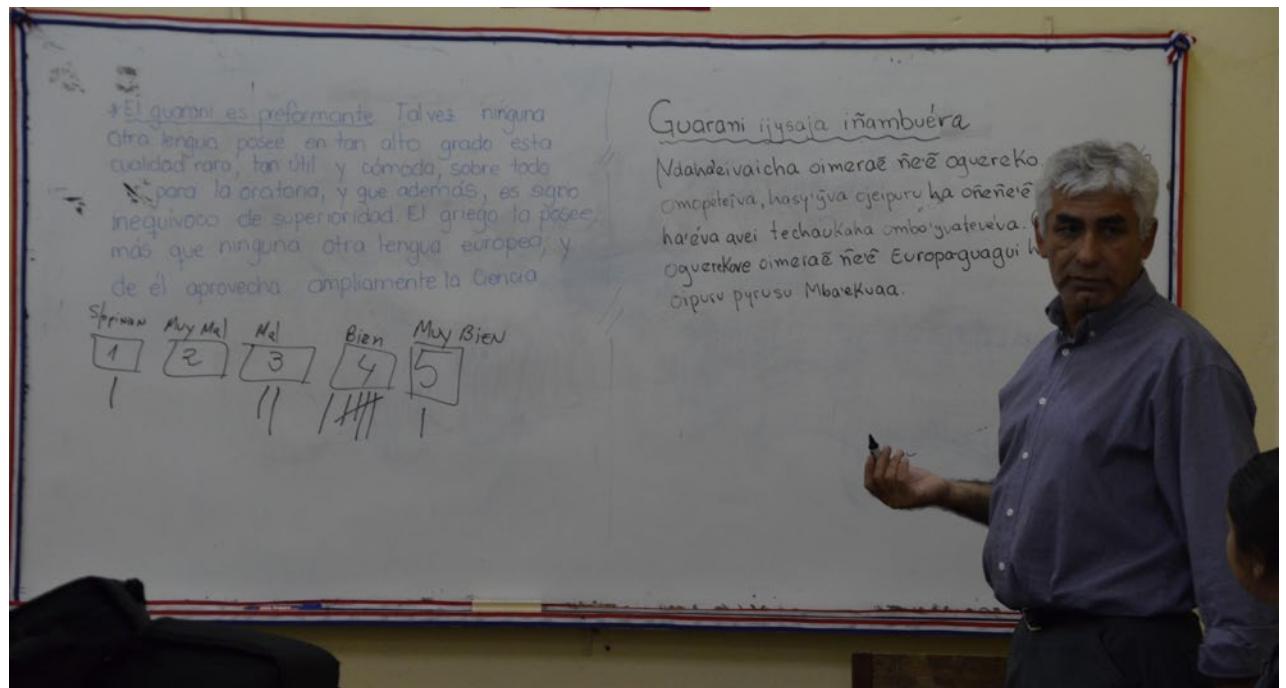


Miguel Veron showing different ways of writing the words for 'document id' and 'democracy' in Guarani.

## Research Observations

### Importance of the Context in Translation

Similarly to other languages, translation between Spanish and Guarani is highly dependent on the context.

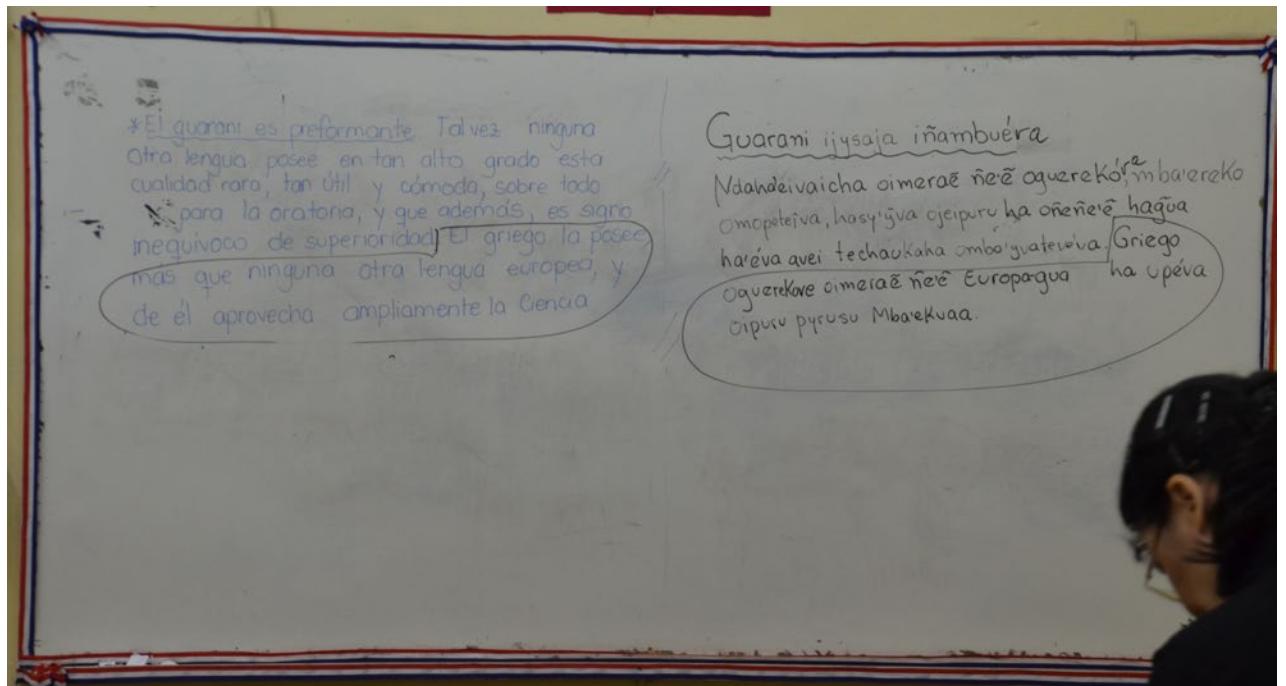


Carlos Ferreira clarifying the context of a paragraph students were supposed to translate.

## Research Observations

### Correspondence between Sentences in Translations

In order to be able to build a CAT tool, it is highly important to be able to know the match between translated sentences in a paragraph, i.e., it is crucial to know what sentences or sentences a specific translation corresponds to. However, the correspondent translation of a paragraph from one language to the other will no necessarily have the same number of sentences as the original one.



A paragraph in Spanish with its corresponding translation; 6 students came with different translations for the same sentence.

## Research Observations

### Guarani Activism

People that teach at Guarani institutions are usually activists for the language. Some of them are members of the Guarani Academy, which is the national institution, created in 2010, in charge of establishing the rules and standards for Guarani. Even though many of these people who teach and direct different institutions know each other, academic cooperation between institutes is scarce.

Institutes are willing to share documents and projects, and to collaborate to contribute to the presence of Guarani in daily life and the Internet. However, since in some way these institutes are competing among each other, they also want to have credit for the work they share.



Meeting Guarani activists and students.

## Research Observations

### Online Guarani Activism

The Internet is one of the main means of communication for Guarani activists. Two common groups for activists are the Facebook group Guarani Angirū and the Google group Guarani Ñe'ë.

Guarani Angirū ("Friends of Guarani") is a closed Facebook group containing more than 4,250 members (by April of 2013). Its purpose is to offer a space for reflection, opinion, learning and sharing who want to foster the use social of Guarani.

Google group Guarani Ñe'ë is also a private group, with 624 members (by April of 2013). Its goal is to promote the Guarani language and culture and spread it through the Internet. Guarani Ñe'ë members communicate mainly through email.

In both groups people share news and issues related to Guarani. However, in some occasions other topics such as politics and religion are also part of the conversation.



The screenshot shows the homepage of the 'GUARANI ANGIRÜ' Facebook group. At the top, there's a banner featuring several small profile pictures of users and a yellow sun emoji. Below the banner, the group name 'GUARANI ANGIRÜ' is displayed with a lock icon indicating it's a closed group. To the right of the name are buttons for 'About', 'Events', 'Photos', 'Files', 'Notifications' (with a checkmark), and a search icon. A message in Spanish reads: 'GUARANI ANGIRÜ ningó oiguyruse tape ñamombarete haüga guarani ñe'ë jeporu opa hendápe ha opa mba'erá, jehai ha ayvúpe, ... See More'. Below this, there are sections for 'Members by Name' and a search bar. The main content area displays ten user profiles, each with a thumbnail, name, status update, and a 'Add Friend' button. The users include Aaron Jimenez, Abayomi Guarani Kaiowá, Abby Luque, Abel Sanchiz, and Abelardo Ayala, among others. Each profile also includes their location and the date they joined the group.

Guarani Angirū group on Facebook.

## Research Observations

### Humor in Guarani and Jopara

Humor in Guarani is part of Paraguayan idiosyncrasy. It is common to hear and read jokes in Guarani and Jopara (mix of Guarani and Spanish) on private gatherings and also on the public media. The intonation of Guarani added to the context of use denotes a sense of informality that makes joke-telling in Guarani peculiar and different from Spanish.



A typical joke in Jopara (Spanish and Guarani). These kind comics are common on newspapers. [http://www.portalguarani.com/obras\\_autores\\_detalles.php?id\\_obra=8680](http://www.portalguarani.com/obras_autores_detalles.php?id_obra=8680)

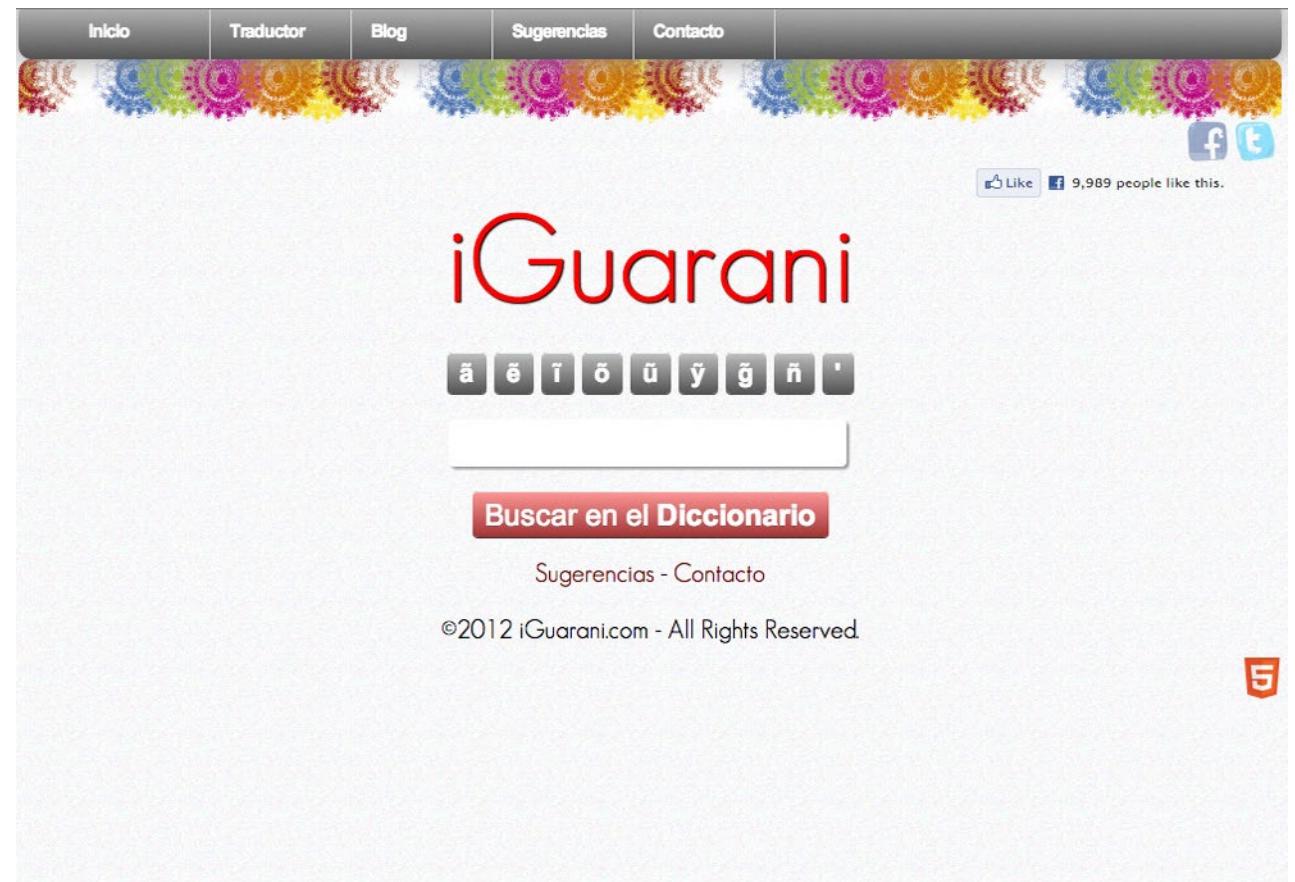
## Research Collections

### iGuarani

iGuarani [\*] is an online Spanish/Guarani dictionary created 17 year-old Paraguayan student Diego Gavilán. It contained nearly 40,000 terms by 2011 [\*\*] and is one of the most complete online Guarani dictionaries.

Like other online dictionaries for Guarani, iGuarani does not include morphological analysis on its searches. Hence, it is only suitable for looking up words in its raw form -no conjugated verbs or plurals for example. There is also an attempt (so far unsuccessful) to build a phrase translator for Spanish and Guarani on the same site.

Another online dictionary is Guarani Ñanduti Rogue [\*\*\*]. However, iGuarani was thought to be a better exemplar for its simplicity and completeness.



[\*] iGuarani. [www.iguarani.com](http://www.iguarani.com). Last accessed on 04/13/2013

[\*\*] "Con iguarani.com espero ayudar a las personas que quieran aprender". Article published on Diario La Nación. [www.lanacion.com.py/articulo.php?con-iguaranicom-espero-ayudar-a-las-personas-que-q&edicion=2&sec=7&art=7980](http://www.lanacion.com.py/articulo.php?con-iguaranicom-espero-ayudar-a-las-personas-que-q&edicion=2&sec=7&art=7980). 01/09/2011

[\*\*\*] Guarani Ñanduti Rogue. [www.staff.uni-mainz.de/lustig/guarani](http://www.staff.uni-mainz.de/lustig/guarani). Last accessed on 04/13/2013

## Research Collections

### A Basic Morphological Dictionary for Guarani

A very basic dictionary that includes morphological analysis was built by Professor Michael Gasser. The application was build with Python and runs on a command line interface. It can translate conjugated verbs in different tenses, negations and plural forms of nouns.

The limitation of the dictionary is vocabulary; it only includes a limited number of terms. However, a simple but more complete digital dictionary could be mined to increase the number of terms in this new dictionary. The problem is that it is difficult to have access to these simple dictionaries. Some authors of dictionaries in Paraguay denied Professor Gasser access to the digital form of their dictionaries, probably fearing that the digital versions would be illegally released to the public.



The screenshot shows a Python Shell window with the title "Python Shell". The code and its output are as follows:

```
>>> mO
Traduciendo con diccionario + morfología...
Dirección: gn->es [1] | es->gn [2] >> 2
Palabra o frase para traducir :: temés
--> rekyhyje

¿Traducir de nuevo? [1] | ¿Terminar? [2] >> 1
Palabra o frase para traducir :: no estoy hablando
--> nañe'ē'iaina

¿Traducir de nuevo? [1] | ¿Terminar? [2] >> 1
Palabra o frase para traducir :: no cambiamos
--> noromoambueiva'ekue
--> nañamoambueiva'ekue
--> noromoambueími
--> nañamoambueími
--> noromoambueíraka'e
--> nañamoambueíraka'e
--> noromoambuei'akue
--> nañamoambuei'akue
--> noromoambueikuri
--> nañamoambueikuri
--> nañamoambueí
--> noromoambueí

¿Traducir de nuevo? [1] | ¿Terminar? [2] >> 2
>>> mO
Traduciendo con diccionario + morfología...
Dirección: gn->es [1] | es->gn [2] >> 1
Palabra o frase para traducir :: kuña
--> mujer

¿Traducir de nuevo? [1] | ¿Terminar? [2] >> 1
Palabra o frase para traducir :: kuñanguéra
--> mujeres

¿Traducir de nuevo? [1] | ¿Terminar? [2] >> 2
>>>
```

Ln: 267 Col: 4

## Research Collections

### Google Translator Kit

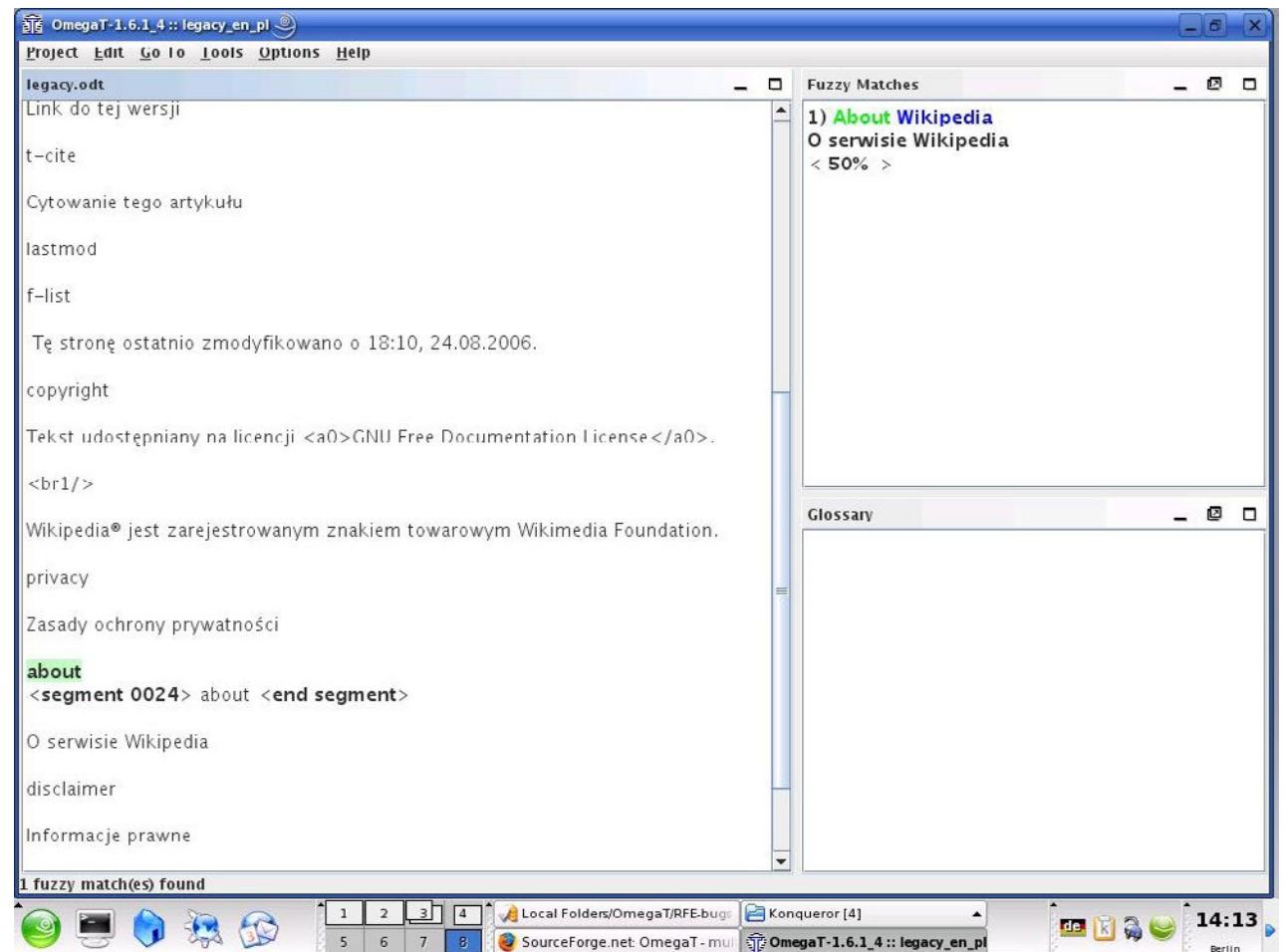
Google Translator Kit [\*] is an online assisted translator that uses the Google Translator engine to generate translation suggestions. Users can create and save their own translation memory and glossary. Additionally, users can share documents with others to collaboratively translate them.

The screenshot shows the Google Translator Kit interface. At the top, there's a menu bar with File, Edit, View, Help, and a toolbar with various icons. Below the menu is a section titled "Original text:" containing an English message about the Capstone class. To the right, under "Translation: English » Spanish", is the translated text in Spanish. A progress bar indicates "14% complete, 1810 words". Below the main text area, there are tabs for "Automatic Translation Search" and "Custom Translation Search". Under "Automatic Translation Search", it says "Translation Search Results" and "No previous translations available". On the right side, there are sections for "Machine translation", "Computer Translation", and "Glossary (0)". The "Machine translation" section shows a preview of the Spanish translation with some red highlights. The "Computer Translation" section contains a snippet of the Spanish text with a "Use suggestion" button. The "Glossary (0)" section says "No glossary matches available."

## Research Collections

### Computer Assisted Translation (CAT) - OmegaT

OmegaT[\*] is an open source Computer-Assisted Translator written in Java aimed for professional translators. OmegaT supports the upload of documents in different formats (pdf, docx, opt, etc.) for translation. It supports more than 20 languages, and has the flexibility to add new ones. Users can also create and/or import their own translation memories to the database.



## Research Collections

### Computer Assisted Translation (CAT) - MemoQ

MemoQ is one of the most used proprietary softwares for translation. It is a Computer Assisted Translation environment for translators and reviewers [\*]. MemoQ assists the translator in doing sentence by sentence translation in texts.

MemoQ also has a free version of the software available with a very basic translation memory and term base. The free version is not useful for large projects.

Line	Source	Target
1.	IN WHICH WE ARE INTRODUCED TO WINNIE-THE-POOH AND SOME BEES, AND THE STORIES BEGIN	Qui in capite nobis ostentatur Winnie de Pu atque apes nonnullae et incipiunt fabule.
2.	HERE is Edward Bear, coming downstairs now, bump, bump, bump, on the back of his head, behind Christopher Robin.	Ecco Edvardus Ursus scilicet nunc tump-tump-tump occipite gradus pulcherrime post Christopherum Robumin descendens.
3.	It is, as far as he knows, the (1) only way of coming downstairs, but sometimes he feels that there really is another way, if only he could stop bringing for a moment and think of it.	est quod sciat unus et solus modus (1) est quod sciat unus et solus modus gradibus descendendi, nonnullaque autem sentit, etiam aliter modus existere, dummodi pulcherrimus desinere et de eo modo mediante possit.
4.	Donde censet alias modos non esse. Es, max, ipse in insu est, vobis ostentari paratus.	Dende censet alias modos non esse.

Project Date: 2010-02-06 10:16:03

<http://kilgray.com/products/memoq/screenshots>

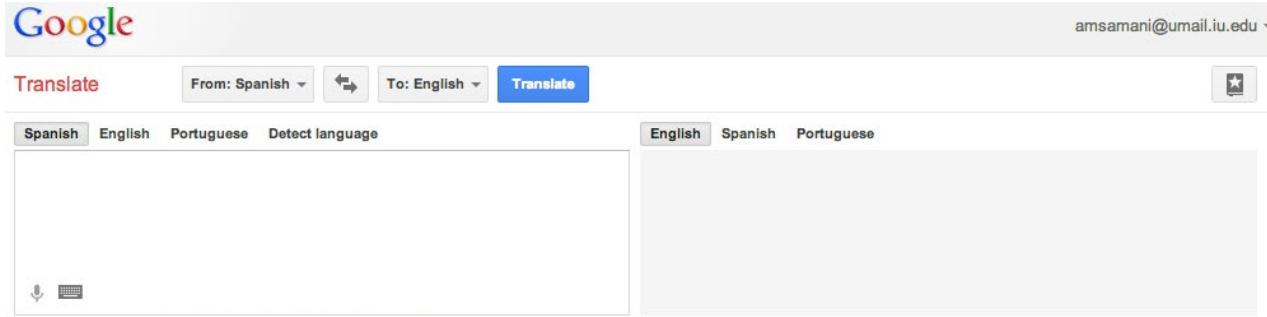
[\*] MemoQ Translator Pro. [kilgray.com/products/memoq](http://kilgray.com/products/memoq). Last accessed on 04/13/2013

## Research Collections

### Machine Translation (MT)

Machine Translation (MT) is different from Computer-Assisted Translation (CAT) since it implies automatic translation from one language to another. CATs can rely on MT to show translation suggestions but they leave the final translation decisions to the translator.

The most common exemplars of MT are the Google Translator[\*] and Microsoft Bing Translator [\*\*].



The screenshot shows the Google Translate interface. At the top, there's a navigation bar with the Google logo, user email (amsamani@umail.iu.edu), and a star icon. Below the bar, the word "Translate" is displayed in red. A toolbar includes dropdown menus for "From: Spanish" (set to English), "To: English" (set to English), and a "Translate" button. Below the toolbar are language selection buttons for Spanish, English, Portuguese, and Detect language. To the right of these buttons are tabs for English, Spanish, and Portuguese. The main area has two large text boxes: one for input (left) and one for output (right). Below the input box are microphone and keyboard icons. A placeholder text "Type text or a website address or translate a document." is visible. The output box is currently empty.


The screenshot shows the Microsoft Bing Translator interface. At the top, there's a navigation bar with the Bing logo, a "TRANSLATE" button, and a "HELP" link. Below the bar, there are dropdown menus for "Translate from: Auto-Detect" and "Translate to: English". To the right of these menus is a "Translate" button with a globe icon. The main area consists of two large text boxes for input and output. A placeholder text "Enter text or webpage URL" is visible at the bottom of the input box. The output box is currently empty.

[\*] Google Translator. [translate.google.com](http://translate.google.com). Last accessed on 04/13/2013

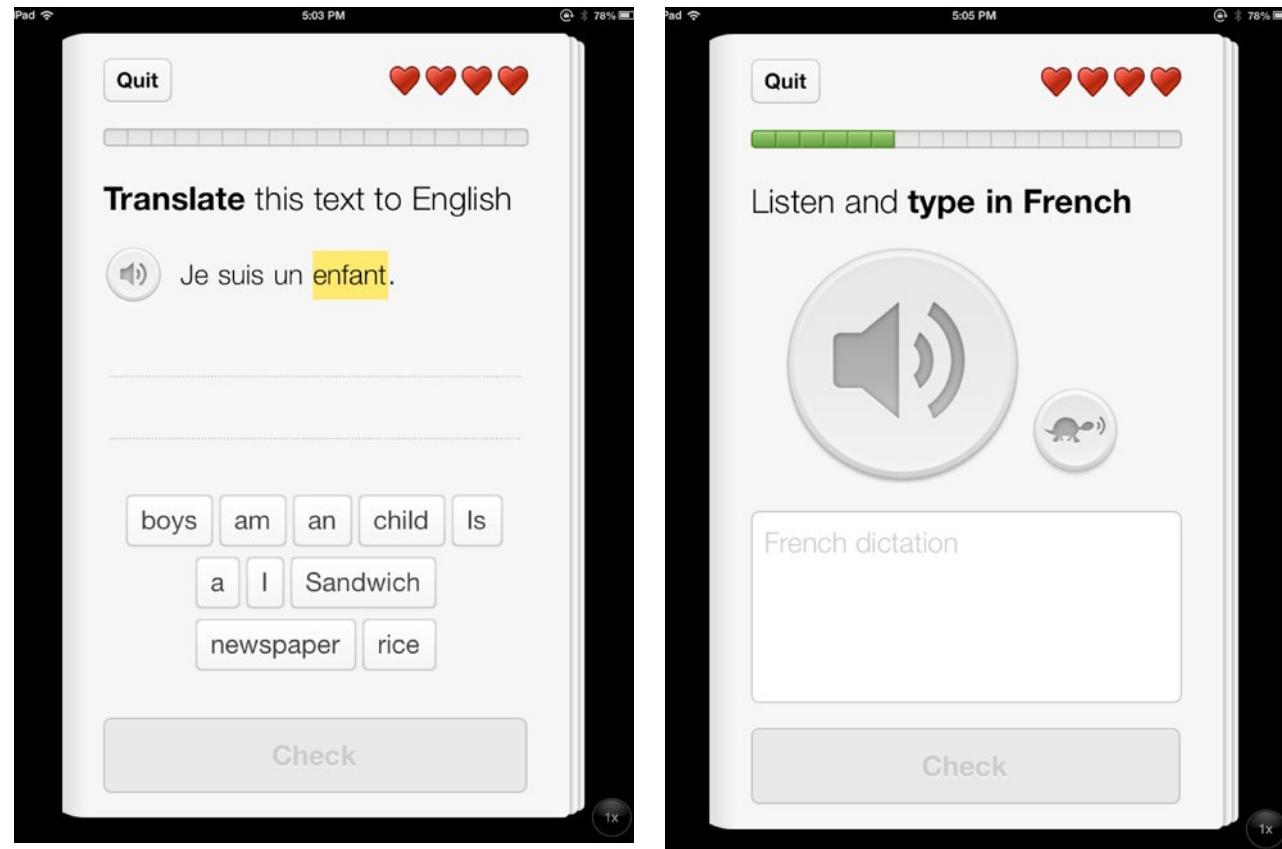
[\*\*] Microsoft Bing Translator. [bing.com/translator](http://bing.com/translator). Last accessed on 04/13/2013

## Research Collections

### Duolingo

Duolingo [\*] is a free service that helps users learn languages while simultaneously contributing to translate real-world content from the Web.

It is available directly through its website and also as a mobile app. Duolingo determines how knowledgeable the user is, and presents translation exercises accordingly. For advanced users in a specific language, Duolingo asks them to translate real sentences extracted from the Web (for example, Wikipedia) that have not been previously translated. It then uses statistical means to determine what is the best translation for the current sentence.



[\*] © 2013 Duolingo. [www.duolingo.com](http://www.duolingo.com). Last accessed on 04/13/2013

## Research Collections

### ProZ.com

ProZ[\*] is an online community of translators that allows people to post translation questions and translation jobs to amateur and professional language translators all over the world in more than 40 languages. It had 618,477 users and 2,998,356 translation questions asked by 02/05/2013.

English to Spanish translations [PRO]  
Computer: Software

English term or phrase: move only files  
Pattern for \*\*\*move only files\*\*\*:  
Pattern for temporary files:  
Pattern for done files:  
Number of temporary threads:  
No further context

Local time: 19:30  
(3 hrs behind you)  
Flag or filter this asker:

Summary of answers provided

5 +1	mover solamente archivos	Ulisses Pasmadjan
4	archivos "sólo para traducción"	Daltry Gárate
4	Sólo mover archivos	Ernesto Schintu

Discussion entries: 5

JoLuGo	How to move only the files in unix (no directories)	19:47
	opción 1: for file in *.* do test -f "\$file" && mv "\$file" "\$HOME"/ done  opción 2: find . -maxdepth 1 -type f -exec mv {} destination_path ;  <a href="http://superuser.com/questions/65635/how-to-move-only-the-fi...">http://superuser.com/questions/65635/how-to-move-only-the-fi...</a>	
Daltry Gárate Bolivia	Gracias Paola	17:39
Alicia Rodriguez	Archivos de movimiento	17:30

Send me notifications about this discussion  
Automatic update in 00:33  
[Post discussion entry](#) [Hide discussion](#)

## Research Collections

### Speak

Speak ('Hablar con Sara' in Spanish) [\*] is speech synthesizer for the XO laptop. It consists of a simple face that speaks out loud whatever the user types as an input. It supports several languages including English and Spanish; it does not support Guarani.



[\*] Speak. [wiki.laptop.org/go/Speak](http://wiki.laptop.org/go/Speak). Last accessed on 04/13/2013

# Insights

The following opportunities and design issues arose from the predispositions, and the primary and secondary research.

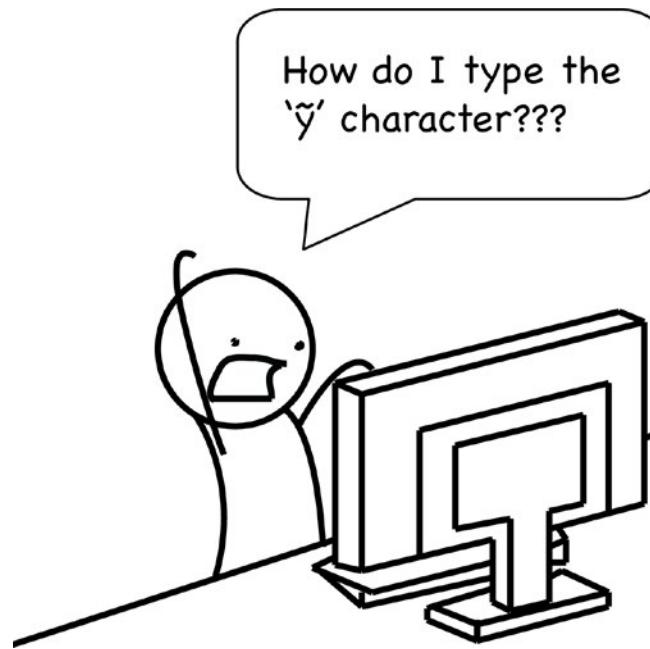
## Insights

### Written Guarani and Digital Technologies

Written Guarani needs to be supported by digital technologies. Even though Guarani orthography is much less complex than English or Spanish, people that do not know how to write in the language get easily discouraged, thinking that learning how to write in Guarani is an extremely difficult task.

This “fear” of writing in Guarani worsens when digital devices do not support neither ease writing. There is no easy way type special characters in Guarani such as nasal vowels (Ã, Ê, Ì, Õ, Ú, Ý, ã, õ, ì, ò, ù, ý) and the nasal g (Ã, ã).

Writing would be easier if people had an easy way of typing special characters. E.g. A standard keyboard distribution for Guarani would facilitate the writing of Guarani.



## Insights

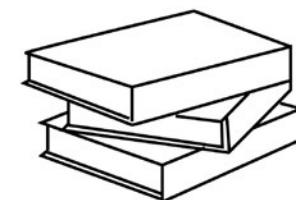
### Written Resources in Guarani

There is a need for mediums of instruction and written resources in Guarani. As we have seen in the research section, medium of instruction is essential to maintain and revitalize language and culture. It is crucial then to provide schools with the proper tools to instruct kids in their own mother tongue. Moreover, teaching Guarani in a compelling way will make kids whose mother tongue is not Guarani to be more prone to enjoy the process of learning the language.

Additionally, there is a general agreement among those fighting for Guarani that efforts to increase the volume of reading material in the language are crucial. Increasing the number of written material in Guarani is a big part in Guarani activism.



Spanish



Guarani

## Insights

### Guarani Support on XO Laptops

XO laptops will benefit kids more if they support and run applications in Guarani. Considering the previous insight and the research about the One Laptop per Child program in Paraguay, it is clear that Guarani needs to be supported by the XO platform.

There are current attempts to make translations of the interface to Guarani. However, so far most of the programs run in Spanish and none of the programs support writing in Guarani.

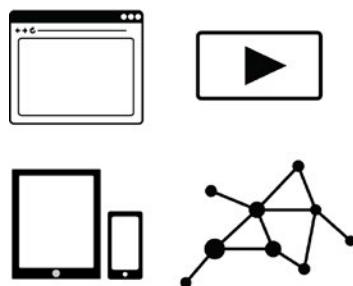


## Insights

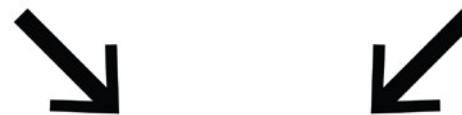
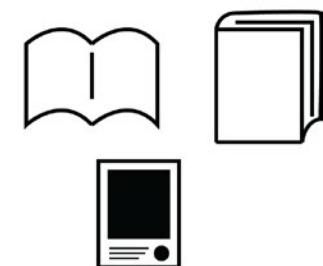
### Digital Technology to Support the Training of Guarani Teachers

Digital tools can be used in addition to non-digital tools to facilitate and support the training of Guarani teachers. Class dynamics could be more efficient if the instructors had a customized software tool that they could use to write and translate Guarani. Currently, instructors use MS Word, which is not the best tool for translating, writing in Guarani and sharing work.

## digital tools



## non-digital tools

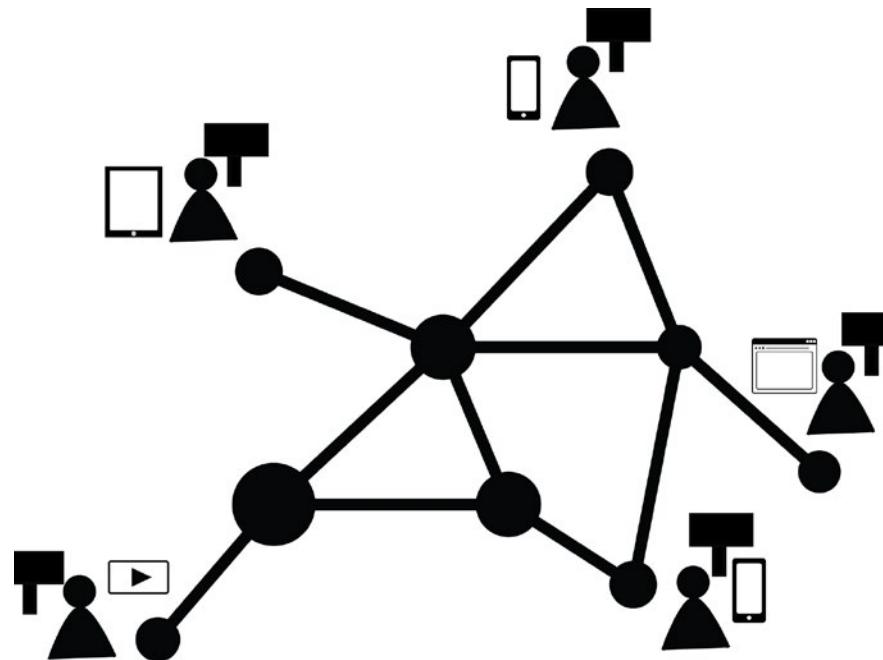


**learning Guarani**

## Insights

### Digital Technologies and Guarani Activism

Digital technologies and the Internet can be used as a means for Guarani activism. There is an opportunity to increase the presence of Guarani in public spaces and daily activities to reinforce cultural identity. In that regard, today's digital technologies can play a fundamental role. Smartphones and mobile computing devices are becoming more common and accessible to the population. Thus, it is a good idea to bring ubiquitous computing to mind when thinking about ways of doing activism for Guarani.

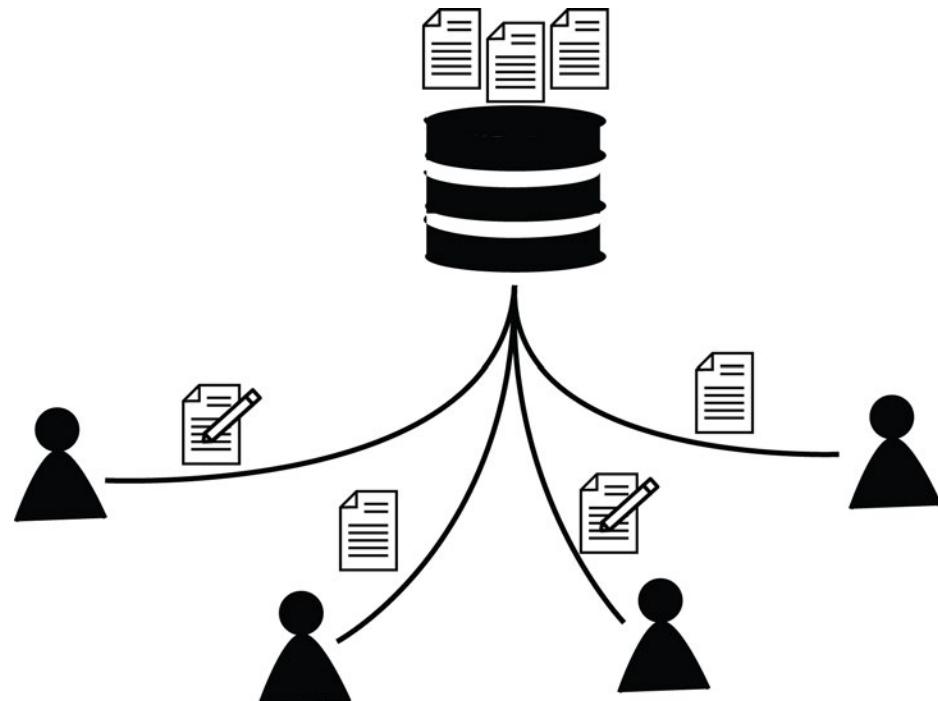


## Insights

### Sharing and Collaborating

If Guarani enthusiasts and activists had a common place to share resources and collaborate in tasks related to Guarani, they would use it. Currently, they use tools such as e-mail lists and Facebook groups. However, these tools are limited and are not customized to suit their needs. For example, it is difficult to find a document that was shared a year before through email or Facebook.

An online document repository for Guarani will help increase the presence of the language online. It might also help to put Guarani at the same level of Spanish by proving that it is possible to write complex ideas in Guarani. If that is not the case, it might at least fire up the discussion about the value and usefulness of Guarani in new contexts (such as academia).

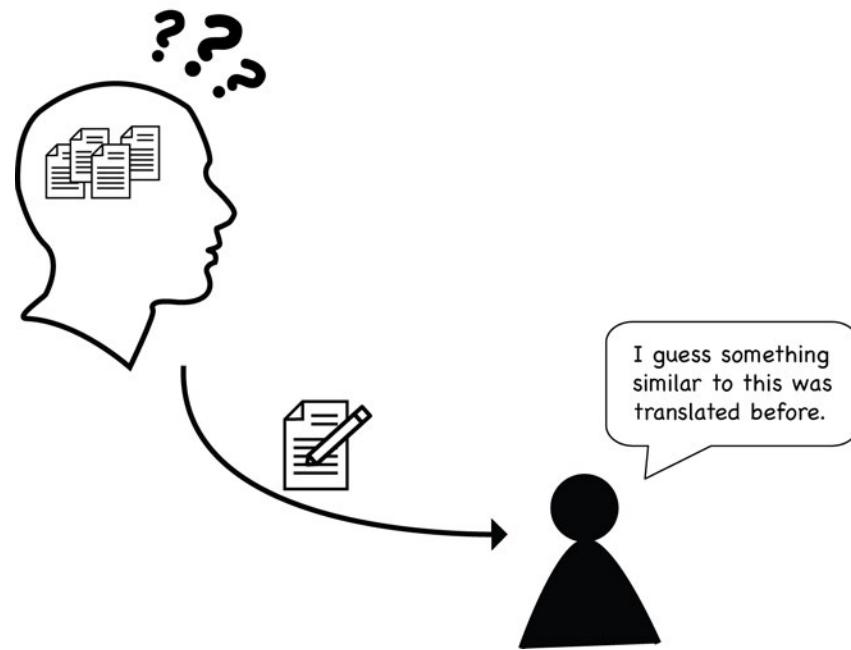


## Insights

### Translation Memories and Computer-Assisted Translation

A Computer-Assisted Translator (CAT) tool could increase the speed of translating a document –for example, in a group assignment–, still leaving the critical decisions to the translator.

A CAT tool cannot replace the translator, since all it does is display past translations of sentences that are similar to the current being translated. It is the responsibility of the translator to select the appropriate translation, if any, or to come up with a new one based on the suggestions.

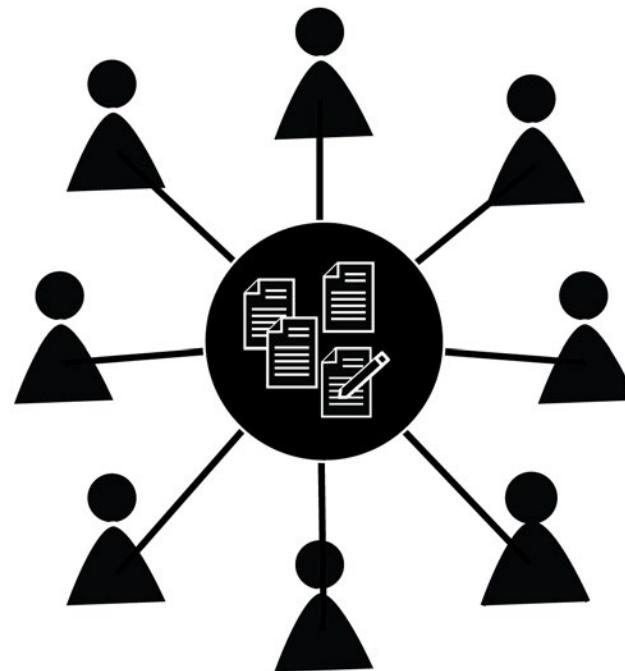


## Insights

### Crowdsourcing for Translating Guarani

Crowdsourcing and collaboration are already being used to translate other languages. A similar strategy could be applied for Guarani. Even though Guarani is not a major world-wide language and the total population that speaks and writes the language is small, the group of Guarani activists is very active and enthusiast about the language. Previous research showed that they are willing to collaborate and that it is crowdsourcing for translating Guarani is feasible.

Additionally, collaboration will be a means for quality assurance for translations, assuming that same translations from multiple people are likely to be more accurate than a single translation from one person.



## Insights

### Automatic Translation is Not Feasible in the Near Future

An automatic translator for Spanish and Guarani is not feasible in the short or even middle term. The main reason is that Guarani is an under-resourced language in terms of written material. In order to build an automatic translator it is necessary to have a huge translation memory -i.e. one containing thousands or millions of pairs of translations. It will take several years to build a translation memory big enough to make automatic translation in Guarani possible.

Additionally, it is necessary to first standardize Guarani in terms of neologisms, grammar and orthography.

Despite these current limitations, it is an optimistic forecast to say that automatic translation for Guarani will be available in the future.

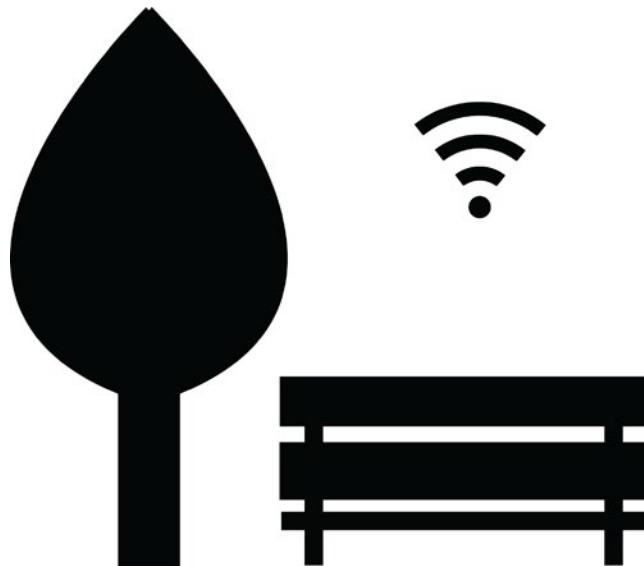


## Insights

### Digital Technology to Reinforce the Presence of Guarani

Digital technology can be used to reinforce the presence of Guarani in daily contexts of Paraguayan life in order to maintain and revitalize cultural identity.

Existing public spaces with access to wireless Internet are becoming increasingly common in Paraguay. This presents a new opportunity for strengthening Guarani as part of national identity.



# Concepts

Several concepts emerged from research and insights. Some concepts might seem trivial since they already exist for other languages (like a Spellchecker). However, it is important to mention them in order to establish a clear view of what needs to be done as part of a strategy in designing for the Guarani language.

## User groups

Four user groups emerged from research and insights Guarani activists, Guarani students, children at schools immersed in the One Laptop Per Child (OLPC) program, and general Paraguayan population.

**Guarani activists** are people involved in promoting the use of Guarani in different settings including social, academic, governmental and digital contexts. These people are normally members of activists groups, members of Guarani institutions like the Ateneo de Lengua y Cultura Guarani, or advanced Guarani students.

**Guarani students** are people being trained to become either Guarani translators, Guarani teachers or pursuing a diploma in Guarani language.

**Children immersed in the OLPC program** are the elementary and middle school -mainly in Caacupe- that use the XO laptop as part of their education program. This includes Guarani speakers, Spanish speakers and bilingual children.

**The general Paraguayan population** includes people identified with the Paraguayan culture living either in Paraguay or out of the country. These users might be Guarani speakers, Spanish speakers with basic understanding of Guarani or bilingual people. Normally they perform some Paraguayan activities like drinking terere (the national drink) or mate.



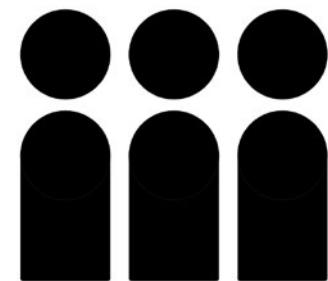
**Guarani Activists**



**Guarani Students**



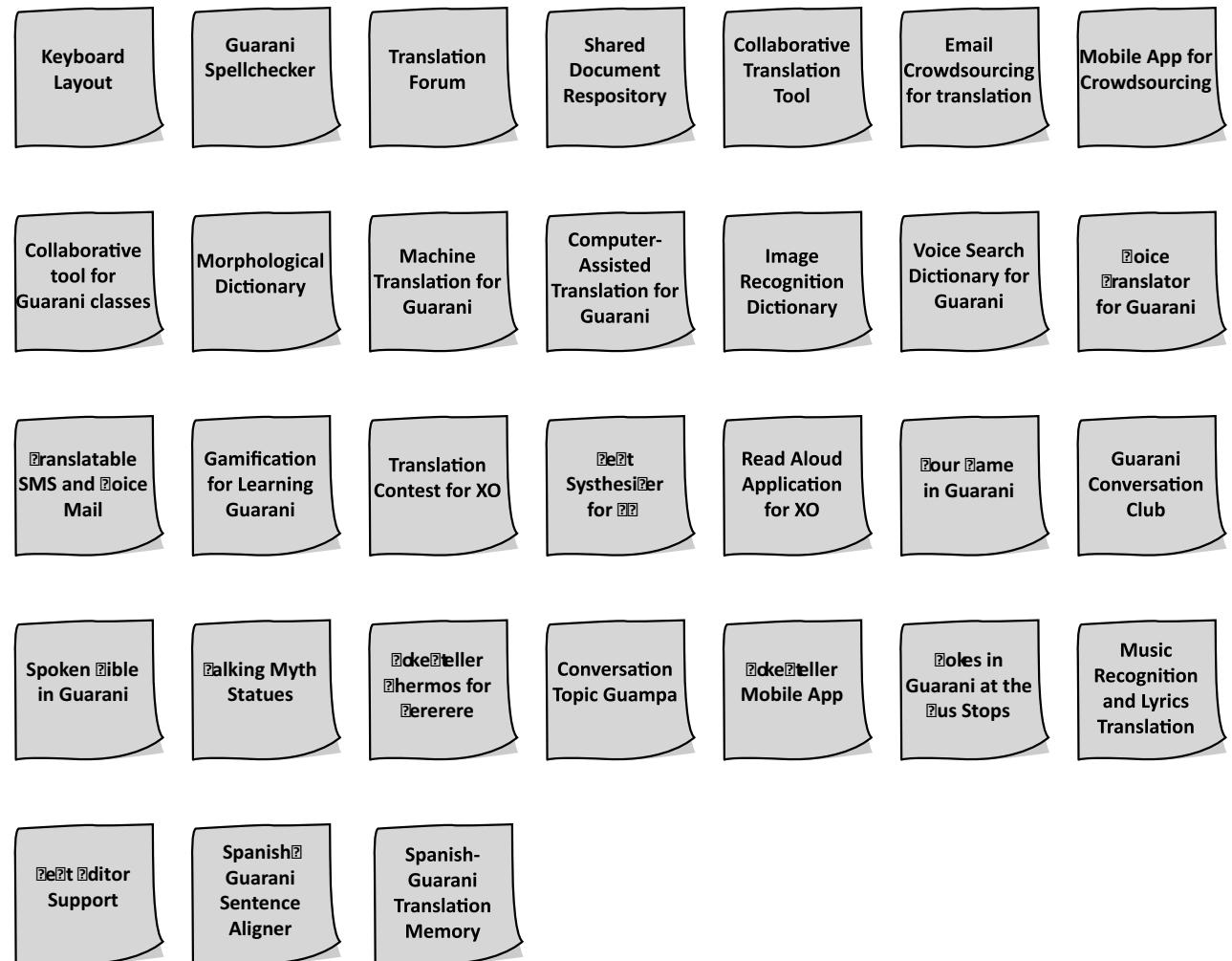
**Children in the  
OLPC Program**



**General Paraguayan  
Population**

## Concepts

Research and insights led to 31 concepts targeted to the four different user groups: Guarani activists, Guarani students, children immersed in the OLPC program, and general Paraguayan population.



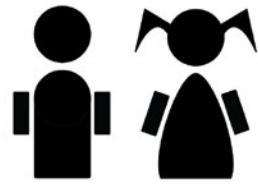


## Guarani Activists



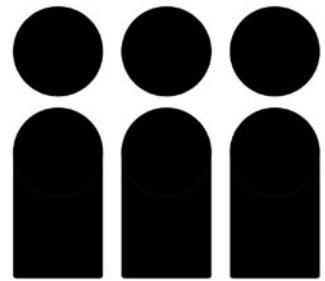
## Guarani Students





## Children in the XO Program



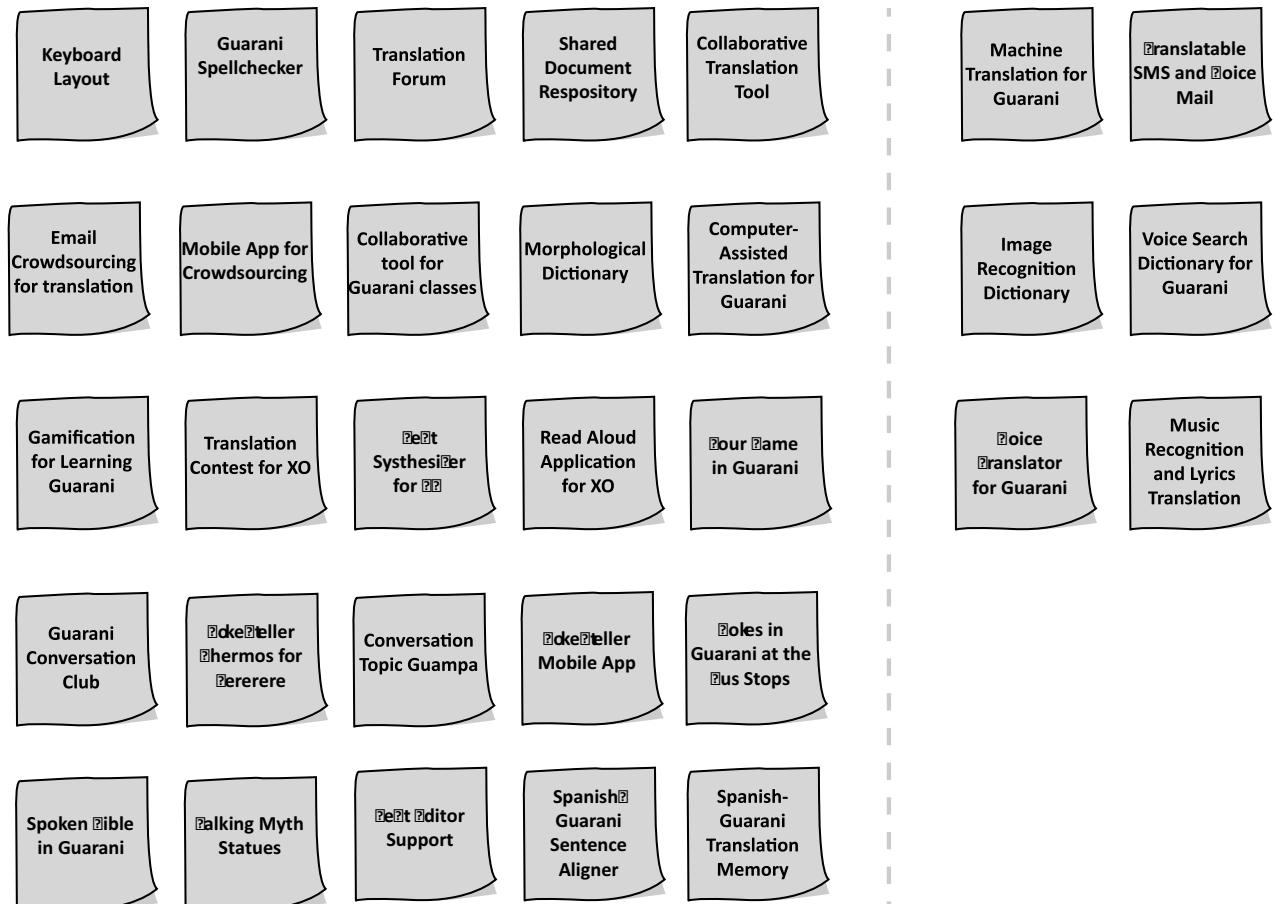


## General Paraguayan Population



## Concepts

Concepts can also be classified according to the estimated time needed for its feasibility.



**Short term**  
in less than 2 years

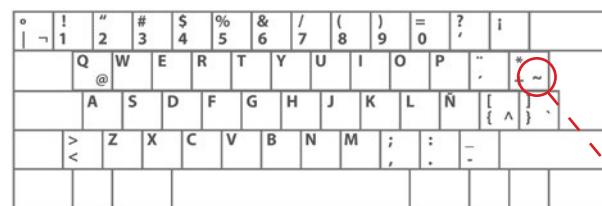
**Long term**  
in 2 years or more

## Concept

### A Keyboard Layout that Supports Guarani

A keyboard layout that facilitates writing special characters in Guarani without the need of adding extra keys. Special characters can be implemented by a combination of keys in sequential order. For example, the character 'g̃' can be introduced by typing '˜' followed by 'g'.

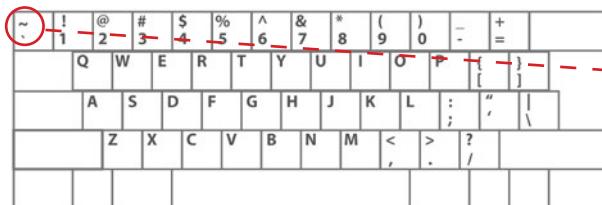
Nasal characters would be typed by first typing the key '˜' followed by the key corresponding to the character that wants to be typed. This will allow to type all special characters:  
 ˜ - ē - ī - õ - ū - ÿ - g̃ - ñ



Spanish (Latin America) layout



Spanish (Spanish variation) layout



U.S. - International layout

˜ + g = g˜

## Concept

### A Spellchecker for Guarani

A spellchecker for Guarani would use a morphological dictionary to check and correct misspellings in Guarani. It can be implemented in an open source text editor like Libre Office or Open Office, or Internet browsers such as Mozilla Firefox. Ideally, it would be also included in commonly used word processors such as Microsoft Office, but due to the limited population that speaks Guarani, it is unlikely that Guarani spellcheckers would be implemented by proprietary software companies.



## Concept

### A Text Editor for Guarani

A text editor that supports Guarani -i.e. supports special characters in Guarani and includes a spellchecker for Guarani-will be highly useful for producing orthographically and grammatically correct documents in Guarani. It is possible to add Guarani support to open source text editors. However, it is highly unlikely that Guarani will be ever supported by proprietary text editors such as Microsoft Office.



## Concept

### Collaborative Translation Forum

A social network in which people collaborate with each other to translate text and documents.

Members create a profile and join specific groups according to their interests, e.g. history, music, elections, etc. Each group contains a forum in which members can post text or documents to be translated collaboratively by the members. For a specific forum post, members can add new translations, comment and vote on already existing translations.

The translation data generated can also be used to create a 'translation memory', in order to build a CAT in the future.

The screenshot shows a group page titled "Paraguayan Music". It features a large image of a hand holding a bow and arrow. Below it, a box displays the group's name and a brief description: "In this group we will share and translate lyrics of music from Paraguay." A section titled "Forum topics" lists four posts:

- 13 Tujuti (2 replies)
- La Chuchi (1 reply)
- Che Pykesumi (5 replies)
- Aháma che China (4 replies)

A 'group' related to a specific topic, in which members post text to be translated.

The screenshot shows a post in the "Paraguayan Music" group. The post is titled "13 Tujuti" and contains lyrics in Guaraní: "Nahatupimî mano a la visera he tamborajâ che mbarekami Amongaréko Nanewa trinchera taropurehî 13 Tujuti". It includes a timestamp ("Posted on 2020-01-01 by User X") and a "Replies" section with two comments:

- Voy a alzar la mano... by User Y (6 votes)
- Voy a levantar la mano... by User Z (2 votes)

A specific post of the forum containing translation replies that are voted by other members.

The screenshot shows a user profile for "User X", described as a "Top translator". It includes a small user icon and the following details:  
Distinction: top translator  
Number of translations: 857  
Member since: 2012/08/21  
Groups: elections, history, science, Paraguayan music

A section titled "Last contributions" shows two recent posts:

- Voy a alzar la mano... Group: Paraguayan music (6 votes)
- Sepa dñose votar... Group: elections (2 votes)

The user profile shows how active the user is in the community and the latest contributions.

## Concept

### Shared Repository of Documents in Guarani

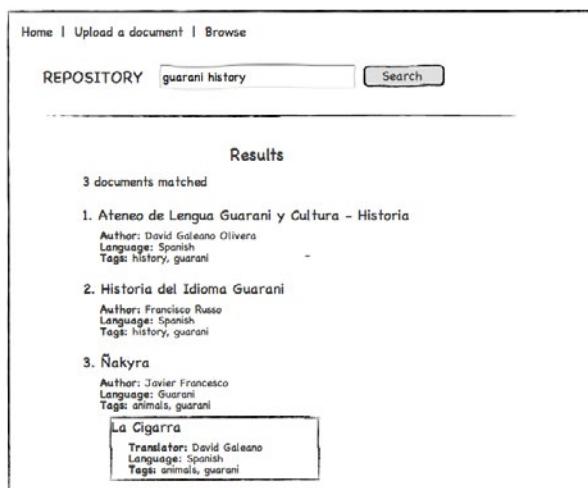
An online space where people can share documents written in Guarani with the possibility of uploading a corresponding translation.

Documents would be classified in categories (e.g. history, science, folklore, etc.). The goal of this concept is to create a huge compilation of documents, available to users through an easy-to-use search mechanism, increasing in this way the presence of Guarani on the Internet. Documents could be displayed either in PDF or HTML format.



The screenshot shows a search interface titled "Search document". At the top, there is a link to "Home | Upload a document | Browse". Below the title, it says "5,341 documents". There is a search input field with the placeholder "enter text...". Underneath the input field, there is a "Languages:" section with two checked checkboxes: "Guarani" and "Spanish". A large "Search" button is centered below these fields.

Simple interface -inspired on Google- to search documents



The screenshot shows search results for the query "guarani history". At the top, there is a link to "Home | Upload a document | Browse". Below the search bar, which contains "REPOSITORY" and the query "guarani history", is a "Search" button. The results section is titled "Results" and shows "3 documents matched". The results are listed as follows:

1. Ateneo de Lengua Guarani y Cultura – Historia  
Author: David Galeano Olivera  
Language: Spanish  
Tags: history, guarani
2. Historia del Idioma Guarani  
Author: Francisco Russo  
Language: Spanish  
Tags: history, guarani
3. Nakryra  
Author: Javier Francesco  
Language: Guarani  
Tags: animals, guarani

For the third result, "La Cigarra", there is a detailed view box showing:  
Translator: David Galeano  
Language: Spanish  
Tags: animals, guarani

Search results show information such as author, language and tags. Corresponding translations are grouped with the original document.

## Concept

### Online Tool for Collaborative Translation

A tool that helps to collaboratively translate a document by displaying suggestions and previous translations by other people sentence by sentence.

As the user types a translation, the tool highlights the current sentence being translated. The tool keeps track of the translation history, and saves all the translation to build a translation memory.

The screenshot shows a web-based application titled "Lets translate" for "Collaborative Translation". The main title is "Translating Document" from "Guarani -> Spanish". The document content is about "Pombero". A tooltip "Sentence currently being translated." points to the highlighted sentence in the main text area: "Se le pone en el horno yerba, miel, tabaco y caña, para hacerse querer por él." Below the main text, a "Translate sentence" dialog box is open, showing the same sentence. The "History" section lists previous translations: "Se le pone en el horno yerba, miel, tabaco y caña, para hacerse querer por él." (by Miguel Verón) and "Se le deja yerba, miel, tabaco y caña en el tatakuá para ser su amigo." (by Nidia Torales). At the bottom, there are "Cancel" and "Save" buttons. The footer shows "Collaborators": Miguel Verón (10 sentences), Nidia Torales (3 sentences), and Isabel Ruiz (2 sentences).

Lets translate

Collaborative Translation

## Translating Document

Guarani -> Spanish

### Pombero

Cuentan que Pombero es un hombre petisito de cuerpo peludo que sale por la noche a asustar a aquellos a quienes no los quiere y a cuidar a los que quiere. Se le pone en el horno yerba, miel, tabaco y caña, para hacerse querer por él.

Nañemoirū ramo ka  
ivaivéare, kuñataī  
opavave jaguerekóy  
ñande rape ha jagu  
ñeko'oi ha ñaña. Na  
opavavépe oñoañú  
heñojey ñandepype  
Pe tekokatupyry of  
oñeguahéporáve. A  
oikuapa ha ohechi  
jeipotápe, ñanderer  
tekokatupyry ha m

Translate sentence

Close

Se le pone en el horno yerba, miel, tabaco y caña, para hacerse querer por él.

History

1. Se le pone en el horno yerba, miel, tabaco y caña, para hacerse querer por él. (by Miguel Verón) x4
2. Se le deja yerba, miel, tabaco y caña en el tatakuá para ser su amigo. (by Nidia Torales) x2

Sentence currently being translated.

### Collaborators

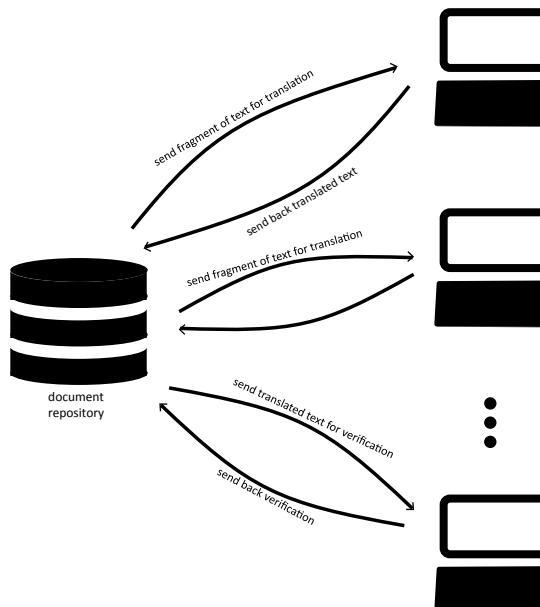
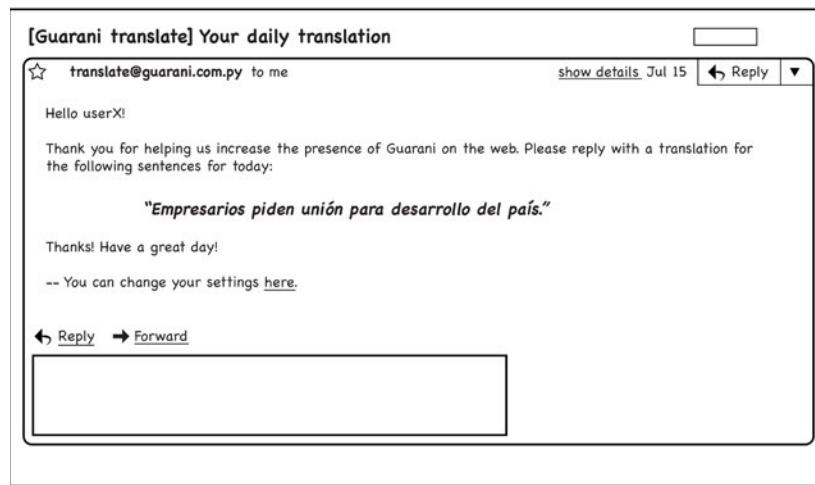
	Miguel Verón 10 sentences
	Nidia Torales 3 sentences
	Isabel Ruiz 2 sentences

## Concept

### Crowdsourcing Translations through Email

Crowdsourcing is a good means for translating documents. A sentence can be email each day to a list of users who agree to collaborate by translating short fragments of text.

Each user will receive one sentence to translate per day, with a short description of the context. Sending the same sentence to multiple users will add redundancy to increase translation quality. Additionally, translated sentences can be used to build a translation memory.

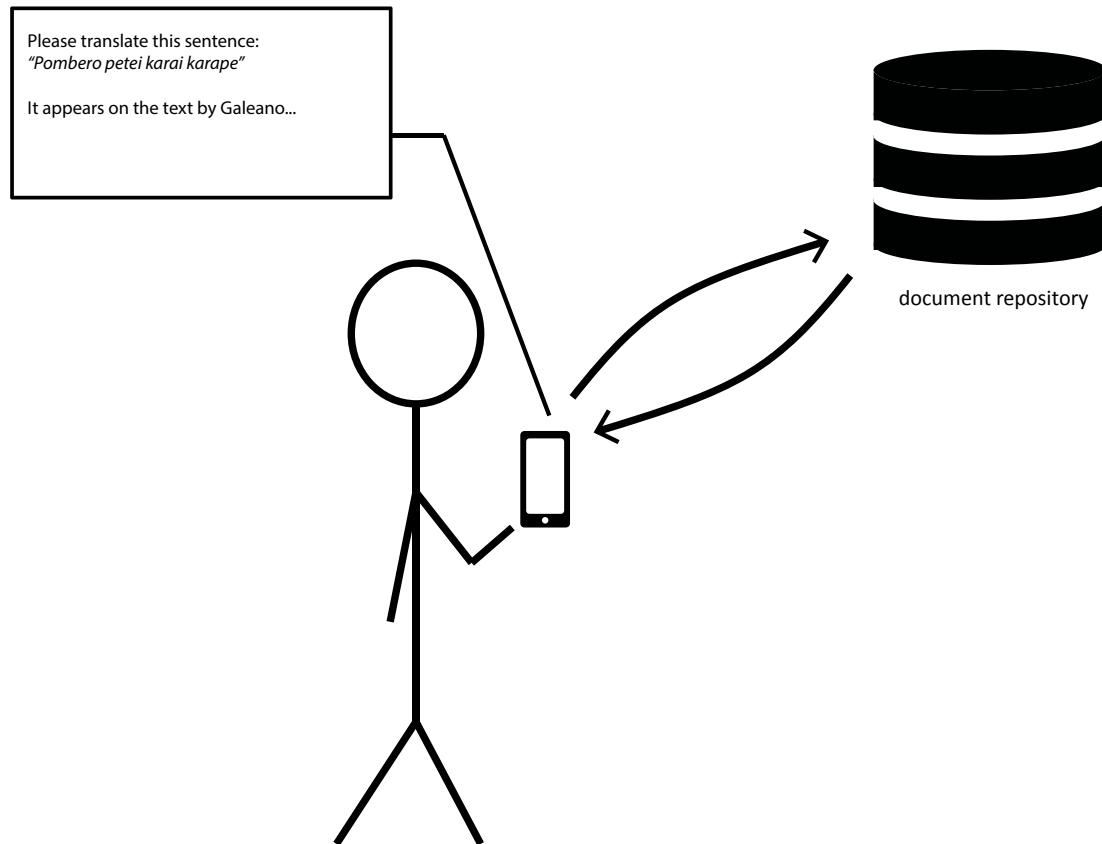


## Concept

### Crowdsourcing Translations through Mobile App

Similarly to the previous concept. An app can be used to translate fragments of text collaboratively.

Users who installed the app will be able to translate and verify translations of shorts fragments of text and submit them to the repository.

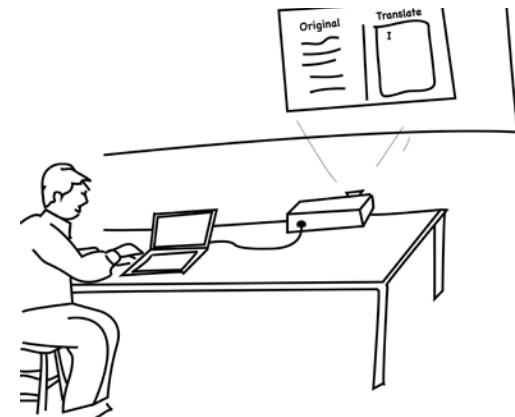


## Concept

### A Collaborative Tool for Guarani Classes

Using this web application, students will be able to work on assignments either individually in groups, and submit them to the class. The instructor will be able to pull up assignments from the system (or create new one) and review them collaboratively in class.

This tool goes beyond just a text editor (which is what currently is used in Guarani classes) that supports Guarani. The main idea behind this concept is to foster collaboration inside and outside class.



## Concept

### An Interface of a Morphological Dictionary

A Guarani dictionary that includes morphological analysis is currently being built by Professor Mike Gasser. In order for the dictionary to be effectively used by others, it needs to run on a graphical user interface (GUI) -preferably a web interface- rather than just a command line tool. The GUI for the morphological dictionary itself is not a concept. However, it is important to state the need for one in order to consider future strategies.

The screenshot shows a web-based interface for a morphological dictionary. At the top left is the word "DICTIONARY". To the right is a search bar containing the text "we did not change" and a "Search" button. Below the search results, the word "Results" is displayed in large, bold letters. Underneath "Results", the text "Results for: 'we did not change'" and "(8 forms of the phrase found)" is shown. A bulleted list of eight Guarani words follows:

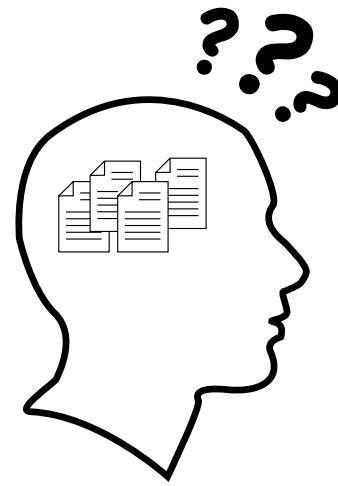
- noromoambueiva'ekue
- nañamoambueiva'ekue
- noroambuéimi
- nañambuéimi
- noroambuéiraka'e
- nañaambuéiraka'e
- noroambuéikuri
- nañaambuéikuri

## Concept

### A Guarani-Spanish Translation Memory

A translation memory is a database that stores pairs of translated sentences between two languages. A translation memory for Spanish-Guarani is necessary before implementing a Computer-Assisted Translator or automatic Machine Translation.

A translation memory for Guarani was an obvious step for Professor Gasser. He was already working on a translation memory for Spanish and Guarani. Nonetheless, it is worth mentioning the concept since it is part of a larger concept system for Guarani activism.



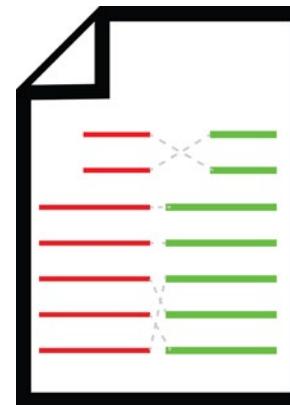
## Concept

### A Spanish-Guarani Sentence Aligner

Translated sentences of a document can be saved in a translation memory in order to be used by a Computer-Assisted Translator in the future. When the user wants to translate a new sentences, the translation memory can show him similar sentences translated in the past in order to give him a hint of how the current sentence should be translated.

A problem arises when we have a piece of text and its correspondent translation but we do not know which sentence is a translation of which. In a translation, sentences can appear in different orders, or sometimes the translation of a paragraph will have a different number of sentences. In those cases it is not trivial to figure out what pair of sentences should go into the translation memory. Artificial Intelligence techniques can be used to create an automatic sentence aligner that matches each sentences with its correspondent(s) translated sentence(s).

Again, this concept is an obvious one for computational linguistics experts, however it is worth mentioning it since it is part of a larger system of concepts.



## Concept

### CAT for Guarani

A Computer-Assisted Translator for Guarani would facilitate translation by showing suggestions of previous translations of similar text. It will let the translator choose among previous translations or create a new one. Current CATs present a complex interface and do not support Guarani. A CAT for Guarani should be simple and easy to use, and facilitate writing by supporting special characters.

This was the starting idea for Professor Gasser's project in Paraguay.

**Pombéro**

Pombéroje petéi karai karape heti hagueráva, pyhare oséva omondýi haguá ija'e'yvape ha ofiangareko haguá ohayhávare. **Oñemoi'je chupe tatakuápe ka'a, petý, eíra ha guaripóla jagehahuka haguá hese.**

Näñemoirü ramo karai pyharére, ikatúntema ñasë jaguata tape pytü ivaivévare, kuñatañ porã, ñande kichita róga rekávo. Arareñöi niko peteí pa u opavave jaguerekóva ñamboyahu haguá ñande rekove; ñamyatyrô haguá ñande rape ha jaguero ayva haguá teko. Upe árape tekotevê ñamboyke ñecko'õi ha ñañia. Ndaipóri mba'e iporávëva upe pyharépe jahechárô opavavépe oñioañuávo mbarete porã ha upe jave jahejávo Tupára'ýpe heñoljey ñandepype.

Pe tekokatupyry oñemoirü mborayhu ndive oñeguahé mombyryve ha oñeguahéporáve. Apyre'ý ojepysa afete rembe'ýre. Yyypóra ndaikatúi avei oikuapa ha oñechapa upécharupi. Pe mborayhu imbarete ñeme'ëme ha jeipotápe, ñandereraha hendive. Tekokatúpe jaikohagua ñaikotevë pe tekokatupyry ha mborayhúre.

**Pombero (translation)**

Cuentan que Pombero es un hombre peludo que sale por la noche a asustar a aquellos a quienes no los quiere y a cuidar a los que quiere. Se le pone...

Näñemoirü ramo karai pyharére, ikatúntema ñasë jaguata tape pytü ivaivévare, kuñatañ porã, ñande kichita róga rekávo. La Navidad representa una nueva oportunidad para renovar la vida, para corregir el camino, para celebrar la vida. Upe árape tekotevê ñamboyke ñecko'õi ha ñañia. Ndaipóri mba'e iporávëva upe pyharépe jahechárô opavavépe oñioañuávo mbarete porã ha upe jave jahejávo Tupára'ýpe heñoljey ñandepype.

Pe tekokatupyry oñemoirü mborayhu ndive oñeguahé mombyryve ha oñeguahéporáve. Apyre'ý ojepysa afete rembe'ýre. Yyypóra ndaikatúi avei oikuapa ha oñechapa upécharupi. Pe mborayhu imbarete ñeme'ëme ha jeipotápe, ñandereraha hendive. Tekokatúpe jaikohagua ñaikotevë pe tekokatupyry ha mborayhúre.

**Tools**

**Translation Memory**

95%  
Oñemoi'je chupe tatakuápe ka'a, petý, eíra ha caña jagehahuka haguá hese.  
Se le pone en el horno yerba, miel, tabaco y caña, para hacerse querer por él.

60%  
Oñemoi'je chupe tatacua pe yerba, petý, eíra ha

**Morphological Dictionary**

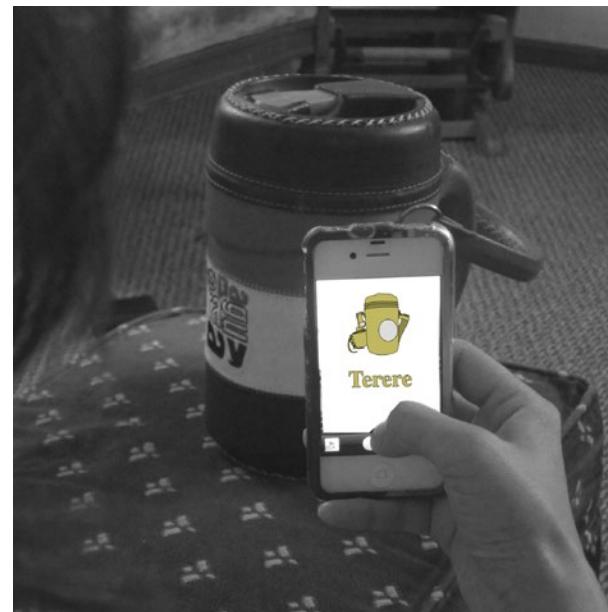
**Oñemoi'je:** o-ñemoi'-je

- **o-** prefix for third person
- **ñemoi:** v. to put
- **-je:** suffix, "to him"

## Concept

### An Image Recognition Spanish-Guarani Dictionary

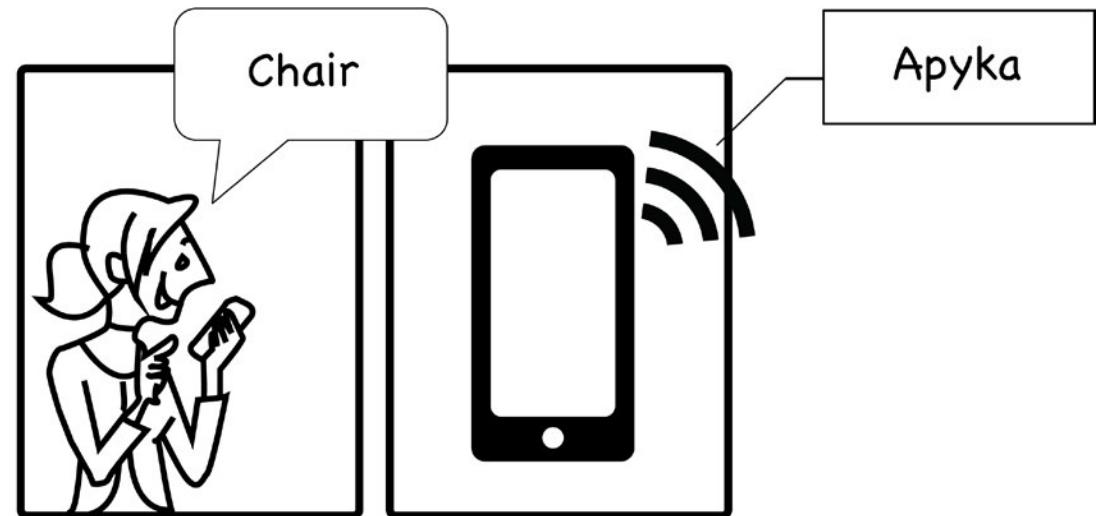
A mobile app that uses the camera of the device to take a picture. It uses Artificial Intelligence to recognize the current object being photographed, and displays the name and definition of it in both Spanish and Guarani.



## Concept

### Voice-operated Dictionary for Guarani

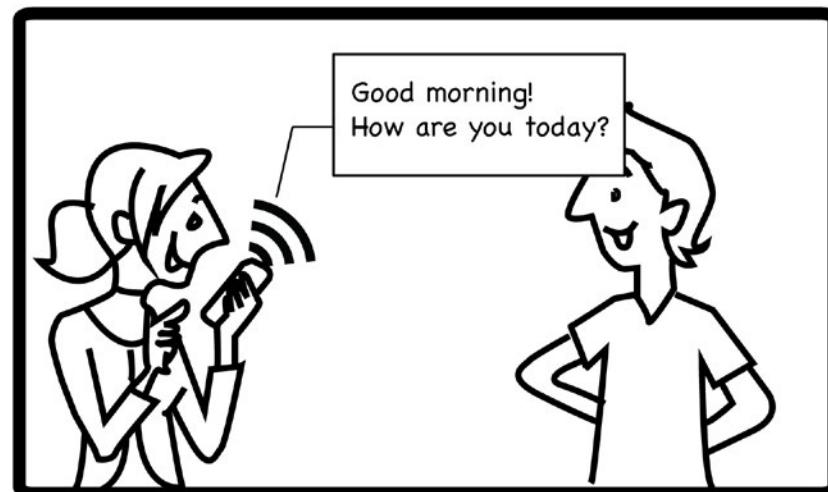
A Spanish-Guarani Guarani-Spanish dictionary app with speech recognition for both languages. The user would say out loud the word she wants to translate and the dictionary will speak the translated word.



## Concept

### Voice Translator for Guarani

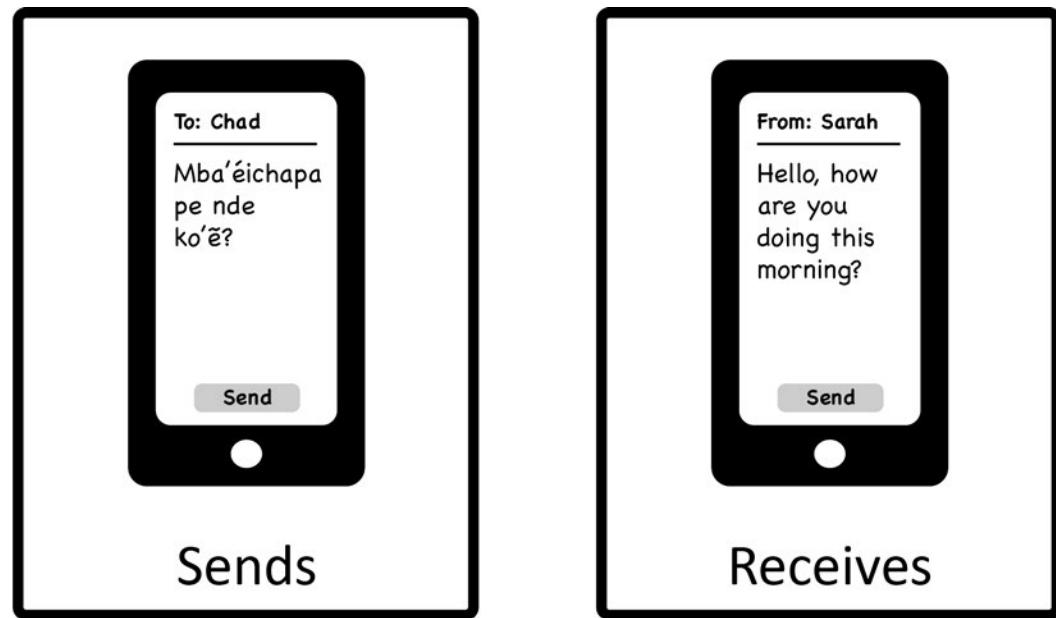
An app that uses natural language processing and machine translation to automatically translate spoken phrases in Guarani. This app would help Spanish and Guarani speakers to communicate between each other, avoiding common uncomfortable situations when one of the speakers does not speak the other's language.



## Concept

### Translatable SMSs and Voice Mail

This concept presents the possibility of sending a SMS or a voice message in one language and receiving it translated to the other one. This will facilitate communication between Spanish and Guarani speakers that are not fluent in both languages.



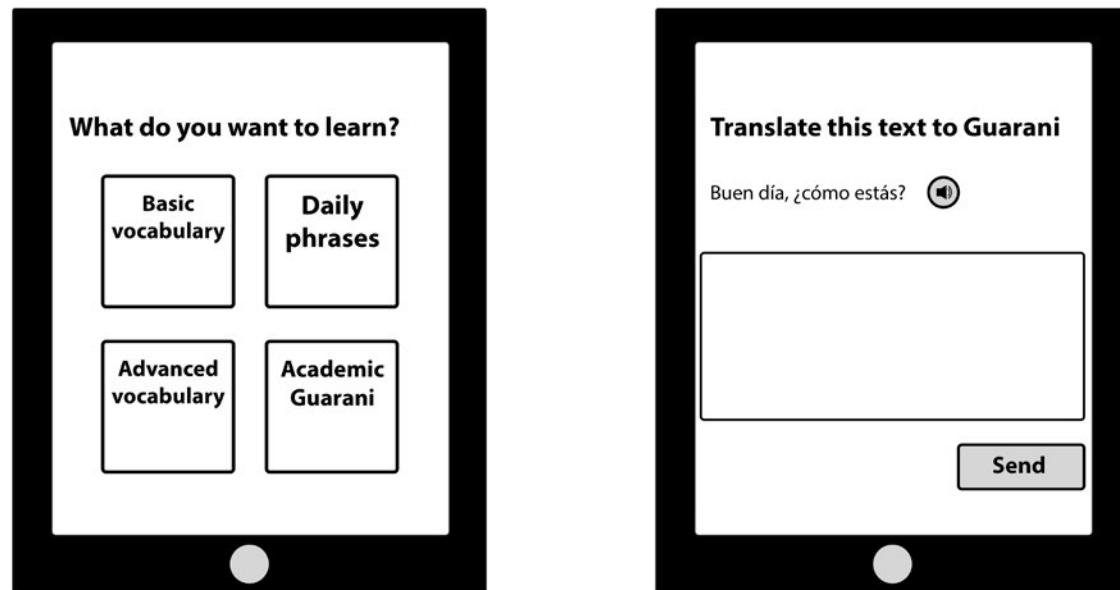
## Concept

### Gamification to Learn Guarani and Spanish

Gamification could be used to teach Spanish and Guarani to people who do not speak those languages. For example, Duolingo is a game that teaches other languages, like Spanish, to English speakers. The same idea can be used to teach Guarani from Spanish and Spanish from Guarani.

An noteworthy feature from Duolingo is that advanced students translate sentences extracted from Wikipedia articles. This way, students help translate the web while learning a language. The same idea can be used to translate documents from Guarani to Spanish and viceversa.

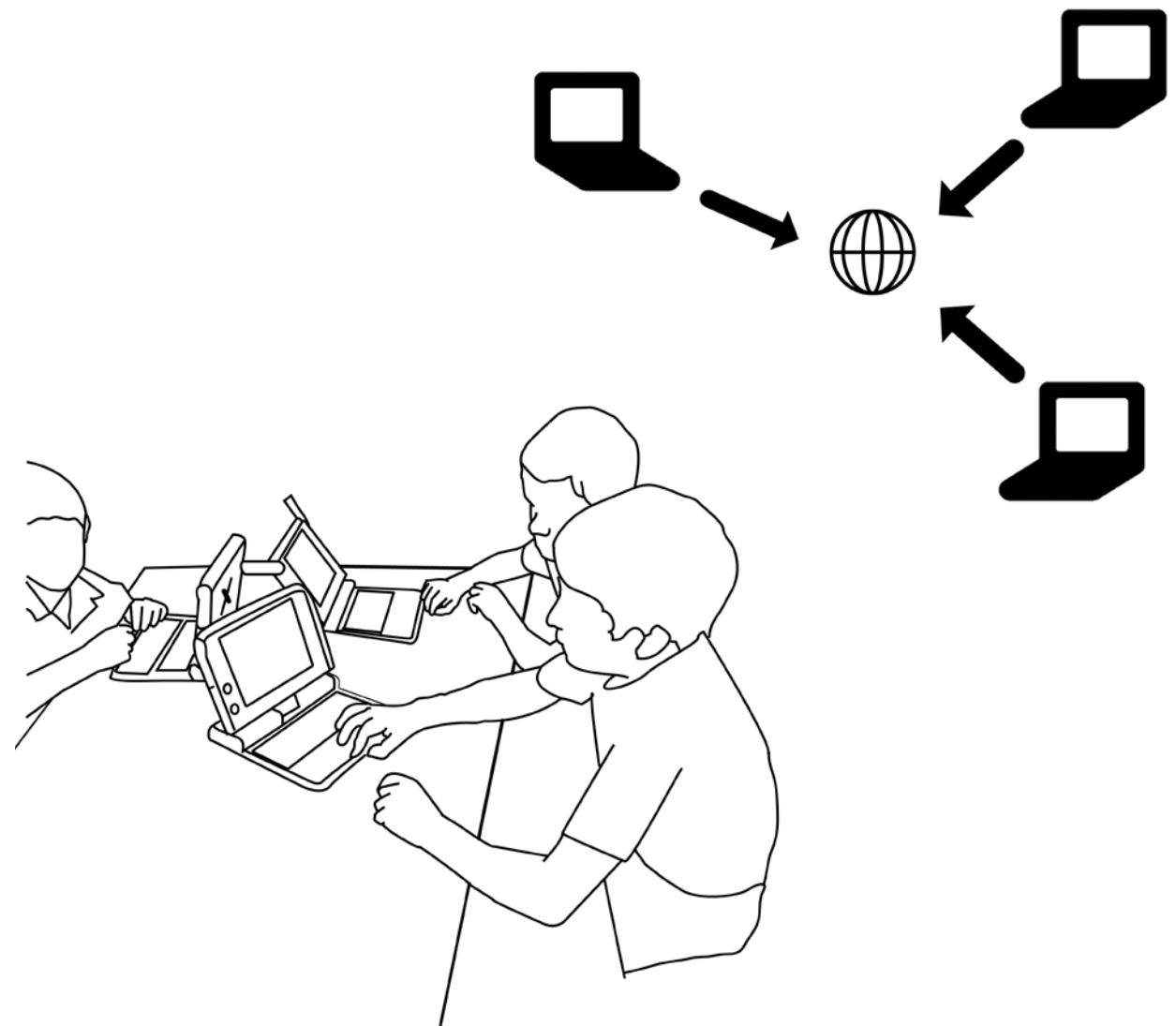
A game to learn Guarani and Spanish could include training for listening, speaking (pronunciation), writing (dictating) and translating.



## Concept

### Translation Contest using the XO's ad hoc Network

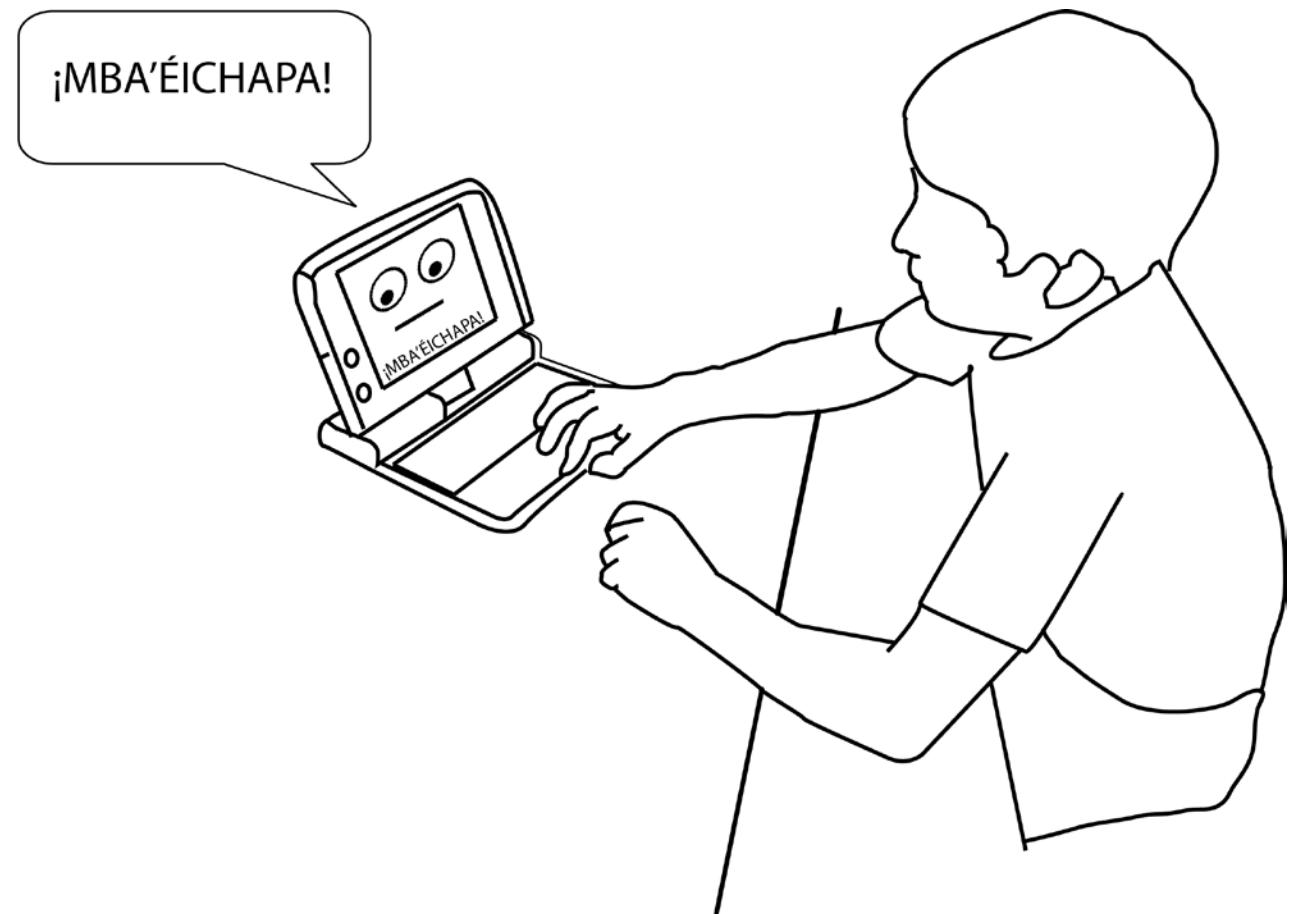
This application consists in a translation game contest. Each kid is presented a screen with an image and a sentence on his XO, and is asked to submit a translation (either by typing it or by selecting it from a multiple choice). Scores are assigned based on the timing and accuracy of the answer. Since the XOs have the ability to create their own mesh network on the fly, there is no need to have an Internet connection or a local area network to run the contest.



## Concept

### A Guarani Text Synthesizer for the XO Application Speak

The XO application Sara can read aloud text written in several languages, including Spanish and English. However, Guarani is not supported. Adding Guarani support will help Spanish-speaking kids learn the pronunciation. Additionally, it will help kids, both Spanish and Guarani speakers, to improve their reading and writing skills.



## Concept

### Reading aloud Recorder for XO's

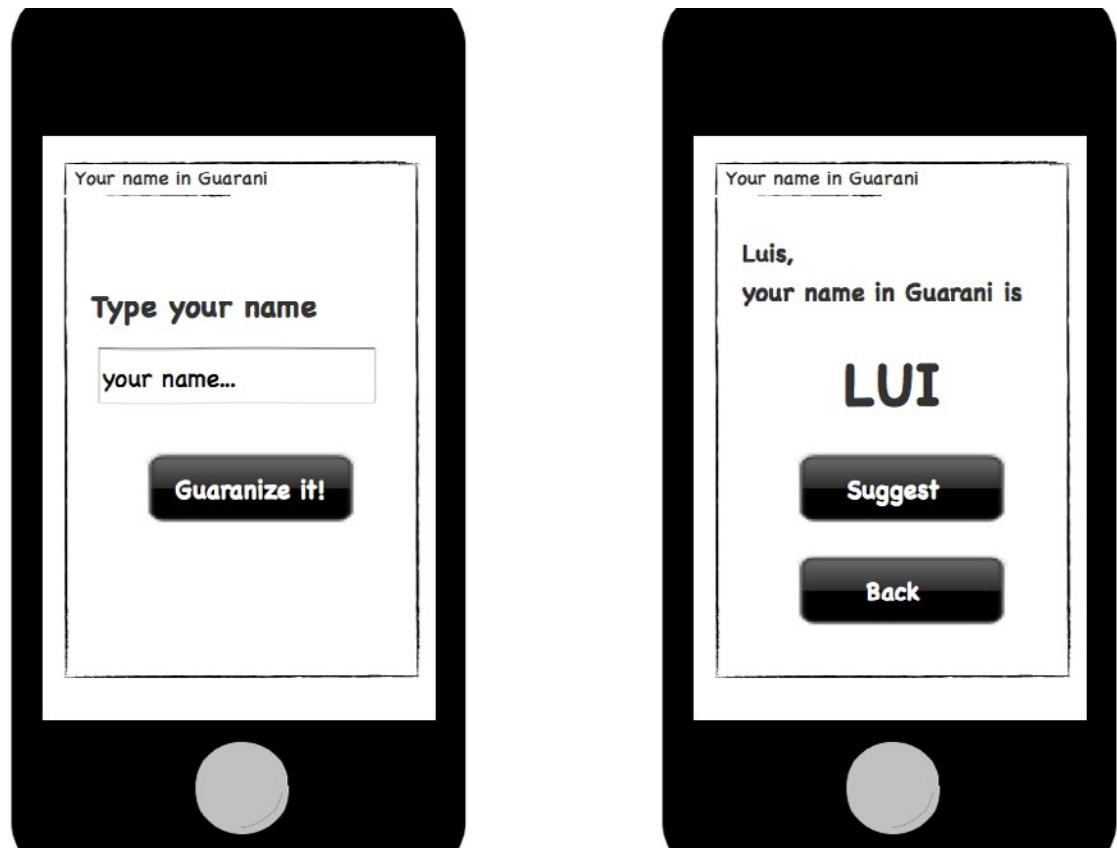
This XO application presents kids a text on the screen to be read aloud. Kids will press the 'record' button and start reading. Once they are done reading they can listen to their recording. They can repeat the process as many times as they want. Once they are comfortable with the recording they can submit their reading assignment to the instructor.



## Concept

### My name in Guarani Website

A leisure application that allows people to learn their names in Guarani. Some common names already have a known translation; for example, the translation for 'Carlos' is 'Kalo'. Other names can be translated by following certain rules, e.g. replacing the 'c' for a 'k' and removing the trailing 's'. Users can also submit their own translations so they can be shown as suggestions for other users with the same name. Integration with social networks like Facebook would allow to show the name in Guarani on the user's profile page.



## Concept

### Conversation Club.

A device that chooses a topic of conversation in Guarani. This device is placed in the center of a table to start a conversation. People that are sitting on the table have to talk about the topic suggested by the device for a certain period of time. The device has two buttons: 'extend time' to extend the time for the current conversation topic, and 'next topic' to change the conversation subject. The purpose of this device is to facilitate the practice of spoken Guarani to students.



## Concept

### Spoken Bible in Guarani

Paraguay is a country whose population is mostly Catholic. A few translations of the Bible to Guarani are available, but reading Guarani is not as common as speaking the language. Since Guarani is mostly oral, many people do not know how to read in the language. A Spoken Bible would allow Catholic Guarani speakers to have access to it in a way that would be easier for them to understand.

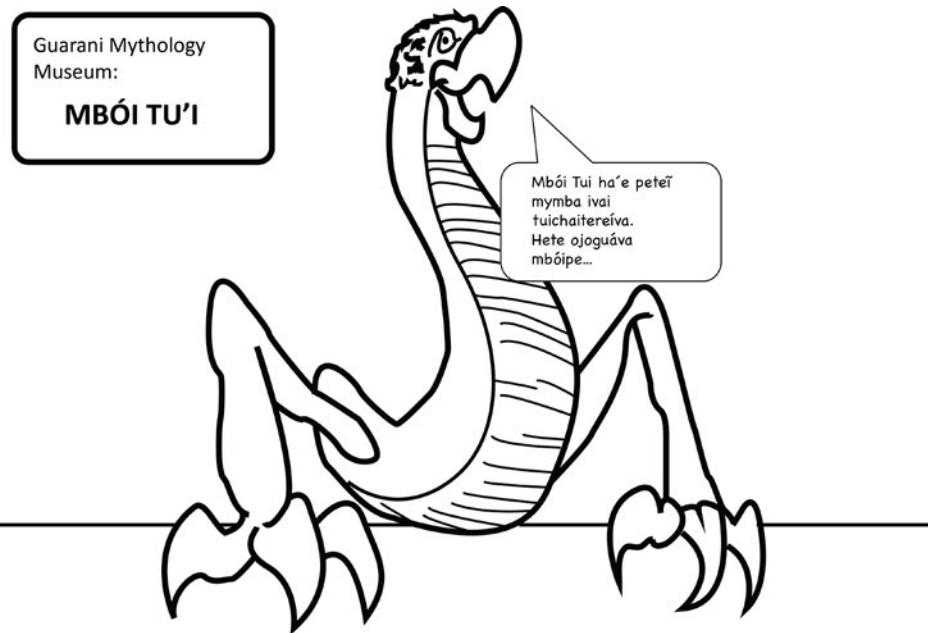


## Concept

### Talking Sculptures at the Guarani Mythology Museum

Guarani mythology is very popular in Paraguay. The majority of Paraguayans know about Guarani myths such as Pombero and Luison (some people even think they are real). There is currently one Guarani mythology museum in Paraguay that presents carved sculptures of Guarani mythical creatures.

Adding speech to these sculptures to make them interactive would enhance the experience of visitors and at the same time expose them to the Guarani language.



## Concept

### Joke-teller Thermos

As opposed to Spanish, which is used for more formal activities such as businesses or government, Guarani is a more vernacular and familiar language. Jokes in Guarani are common and could be considered part of the Paraguayan culture. Additionally, drinking terere -a kind of herbal tea that is shared in rounds- is a tradition followed by most Paraguayans. A talking thermos that tells jokes in Guarani in a round of terere would increase entertainment in an already common leisure activity.



## Concept

### Joke-teller App

Similar to the joke-telling thermos, this concept presents a simple app that tells jokes in Guarani in both text and audio formats. Paraguayans that are not fluent in Guarani, are usually able to catch jokes by understanding keywords or at least, they can understand Jopara (the mix of Spanish and Guarani). The goal of this app, besides entertainment, is to expose the listener to the language Guarani.



## Concept

### Conversation Guampa

Similar to the 'Conversation Club'. The same idea is merged with a local custom: rounds of mate and terere. Rounds of terere and mate are activities in which people drink an herbal tea in groups (mate or terere) as an excuse to relax and spend time with significant others. Different topic of conversations usually arise during this activity.

The idea of this concept is to suggest topics of conversations during each terere turns to make it alike to a game activity. For example, a person could have to tell a joke in Guarani during his turn, the next one could have to recite a short poem, and so on.



## Concept

### Jokes in Guarani at the Bus Stops

Waiting for the bus can be boring, especially when you do not know how long you will have to wait for the next bus to come (as happens in Paraguay). Reading jokes in Guarani at the bus stop could make waiting for the next bus less tedious and at the same time provide a short distraction that reliefs stress from someone returning home from work.



## Concept

### Music Recognition and Lyrics Translation App

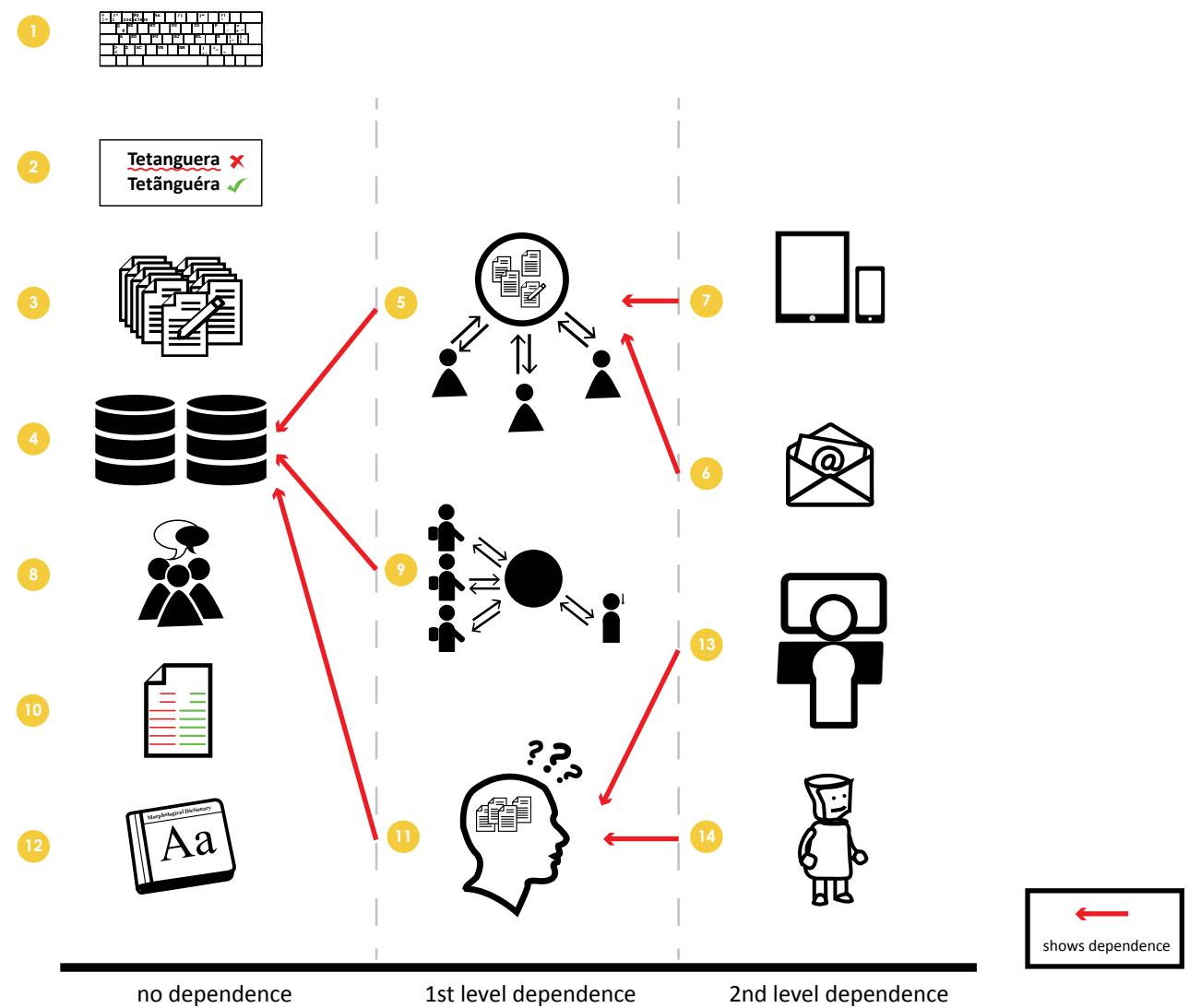
An app that recognizes songs, displays the lyrics accordingly, and also includes a translation on the results. This application will encourage the learning of Guarani by helping non-Guarani speakers understand the meaning of many of the Paraguayan songs they listen but are not able to understand.



## Concept System for Guarani Activism

Previously showed concepts for Guarani activism can work together as a holistic system aimed to reinforce the presence of Guarani online.

- (1) Keyboard Layout for Guarani
- (2) Spellchecker for Guarani
- (3) Word Processor for Guarani
- (4) Shared Bilingual Document Repository
- (5) Online Collaborative Translation Tool
- (6) Email for Crowdsourcing Translation
- (7) Mobile App for Crowdsourcing Translation
- (8) Translation Forum
- (9) Collaborative Tool for Guarani Classes
- (10) Spanish-Guarani Sentence Aligner
- (11) Guarani-Spanish Translation Memory
- (12) Morphological Dictionary
- (13) Computer-Assisted Translation (CAT) Tool
- (14) Machine Translation (MT)



## **Concept System for Guarani Activism**

The keyboard layout (1) and spellchecker for Guarani (2) can be used to facilitate the writing of documents in Guarani. They can be part of a desktop word processors (3), text editors for emails (6) and mobile applications (7).

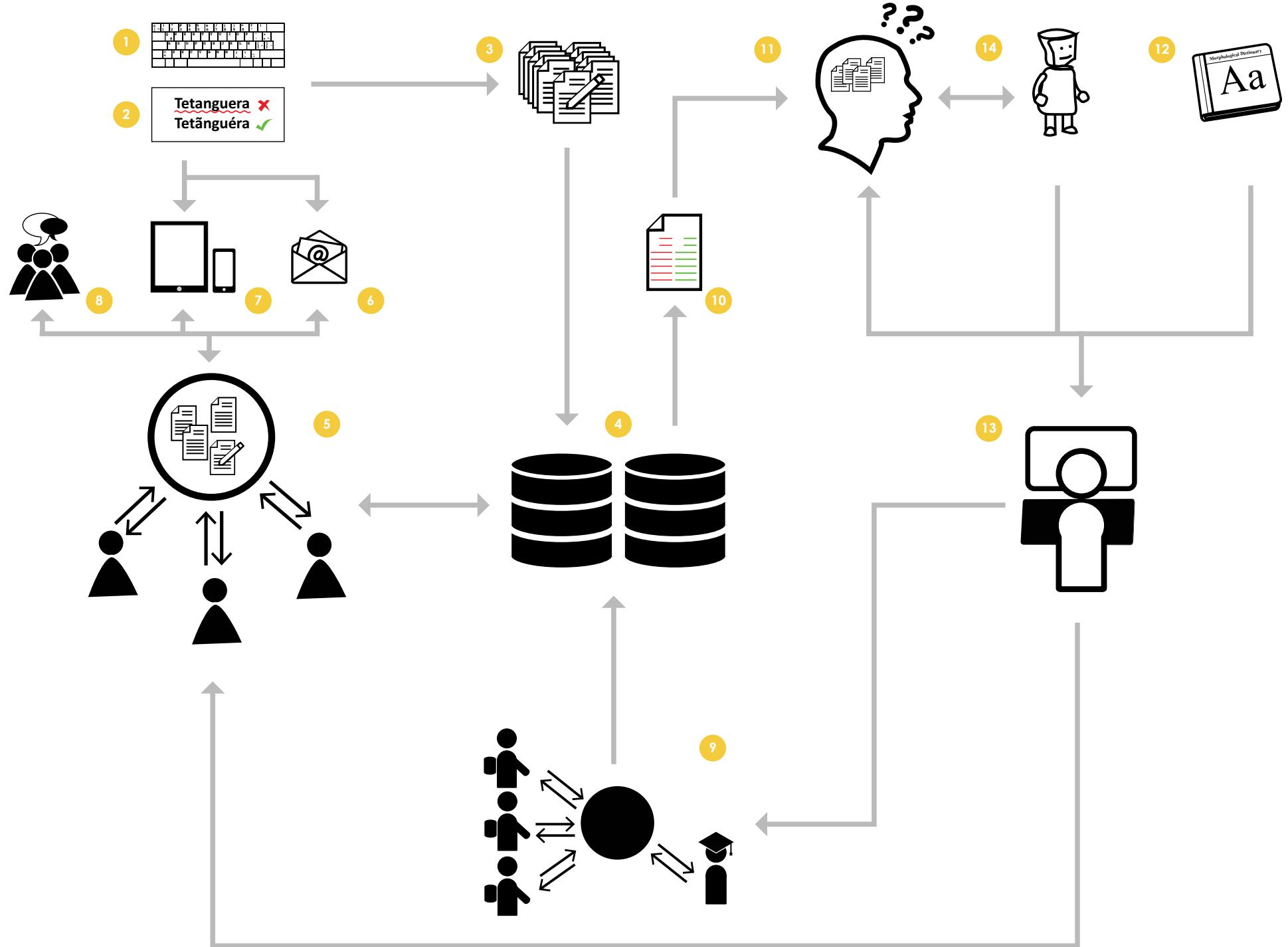
At the same time, these documents will be uploaded to a shared repository (4) where activists and students can share and translate them. Documents in the repository that are in only one language can be translated through an online collaborative translation tool (5). This tool can also send specific phrases for translation to Guarani experts through email (6) and a mobile app (7). Additionally, collaborators can ask questions about translation on a dedicated forum (8). Translated sentences will be sent back to the repository. Users will be able to see how much of a document has been translated (in percentage).

Translations from student translation projects at the Guarani institutes can also be shared in the repository through a customized collaborative tool for Guarani classes (9), after being reviewed by the course instructor.

In the case a user uploads a full translation of a document, a sentence aligner (10) will determine the correspondence between translated sentences. Pairs of translated sentences will be stored in a translation memory (11), that in the long term will enable the implementation of automatic machine translation (14).

A Computer-Assisted Translator (CAT) for Guarani (13) will use the translation memory (11), automatic translation (14) -if available- and a morphological dictionary (12) to aid students and translators in their translation tasks. In that regard, the CAT can be part of the online collaborative translation tool (5) and the collaborative tool for Guarani classes (9).

(see previous page for explanation)



# Prototypes

I decided to create an appearance prototype for a bilingual document sharing repository for Guarani and Spanish. This concept is key, and it is the first one that needs to be built in order to increase the presence of written Guarani online, and build a bigger translation memory. Bilingual documents could be mined in order to store pairs of translated sentences in the translation memory database.

The repository is intended to hold thousands of documents (there are already more than 500 thesis projects in Guarani that the Ateneo de Lengua y Cultura Guarani is willing to share online), hence it would be inconvenient to show an index of all documents. Consequently, I decided that the interface follows the simplicity of Google search as a first attempt. Future tests with users from Paraguay will most certainly iterate the appearance of the design.

The prototype is in Spanish since it is intended to be tested by Paraguayans. Future iterations might include a version in Guarani.

## Prototype

An Online Document Repository for Guarani

[Inicio](#) <sup>1</sup> [Subir un documento](#) <sup>2</sup> [Catálogo](#) | [Acerca de](#) <sup>3</sup> | [Contacto](#)

The main screen, as mentioned earlier, follows the simplicity of Google search. It allows the user to filter the search to documents only in Spanish, only in Guarani or both.

# TAHEKAMI

5.341 documentos ([ver Catálogo](#)) <sup>4</sup>

Escribe aquí las palabras clave del documento que deseas buscar 5

Buscar documentos en:  Castellano  Guaraní

Buscar 6

## Prototypes

An Online Document Repository for Guarani

Search results for the word “Ateneo”. Each matching result shows the name, author, institution that the author or translator belongs to (if she is a Guarani activist or student), language and additional tags. Bilingual documents show results in both languages (see result number 3).

Inicio <sup>1</sup> Subir un documento <sup>2</sup> Catálogo <sup>3</sup> Acerca de <sup>4</sup> Contacto

TAHEKAMI

Buscar documentos en:  Castellano  Guaraní

## Resultados

3 documentos encontrados

### 1. [Ateneo de Lengua Guaraní - Nuestra Institución](#) <sup>4</sup>

**Autor:** David Galeano Olivera  
**Instituto:** Ateneo de Lenguay y Cultura Guaraní<sup>5</sup>  
**Idioma:** Castellano  
**Etiquetas:** institutos, ateneo

### 2. [Sa'i jehuppty tekombo'e Guaraní Ñe'ẽ rehegua Mbo'ehao...](#) <sup>5</sup>

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**Idioma:** Guaraní<sup>6</sup>  
**Etiquetas:** tesis, educación

### 3. [Ñakyra](#) <sup>6</sup>

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**Idioma:** Guaraní  
**Etiquetas:** biología

[La Cigarra](#) (traducción) <sup>7</sup>

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**Idioma:** Castellano  
**Etiquetas:** biología

## Prototypes

### An Online Document Repository for Guarani

A screen for browsing a specific document. Possible formats for displaying the documents are pdf and html. The user can chose to see the translation of the document (if available) or translate it herself (the translation section is part of another concept that will integrate with this one in the future).

The screenshot shows a web interface for an online document repository. At the top, there is a navigation bar with links: 'Inicio' (1), 'Subir un documento' (2), 'Catálogo' (3), 'Acerca de' (4), and 'Contacto'. Below the navigation bar, the page title is 'TAHEKAMI' (5). There is a backlink 'Volver...' (6) and a small yellow square icon. The main content area has a title 'Ateneo de Lengua Guaraní - Nuestra Institución'. The text content discusses the ATENEZO DE LENGUA Y CULTURA GUARANI's mission and activities. To the right of the main content, there is a sidebar with the following information:

- Idioma:** Castellano
- Etiquetas:** institutos, ateneo
- Traducción (incompleta)**
  - [Ver traducción](#)
  - [Traducir](#)
- [Descargar](#)

At the bottom right of the main content area, there is a small yellow square icon labeled '4'.

**Content Text:**

El ATENEO DE LENGUA Y CULTURA GUARANI es una entidad jurídica, autónoma, civil, progresista, con carácter científico-cultural; fundada el 23 de setiembre de 1985; que nuclea a Licenciados en Lengua Guarani, a Estudiantes Universitarios del Área de la Licenciatura en Lengua Guarani del Instituto Superior de Lenguas; y a toda persona responsable que, libre y objetivamente, coopere en la común labor de la investigación, recuperación, promoción, difusión, valoración, protección y jerarquización constante, efectiva y sistemática de la Lengua y Cultura Guarani, y de la Cultura Folklórica Paraguaya; dentro de un marco democrático de respeto, igualdad, fraternidad y solidaridad; sin perseguir fines políticos-partidarios, religiosos, lucrativos ni sectarios de ninguna clase desde el punto de vista Institucional (Art. 1º de los Estatutos Sociales del ATENEO).

El trabajo fundamental del ATENEO DE LENGUA Y CULTURA GUARANI está centralizado en su intensa y perseverante CAMPAÑA NACIONAL DE CONCIENTIZACIÓN CÍVICA. EL ATENEO DE LENGUA Y CULTURA GUARANI descentralizó la promoción y difusión sistematizada de la Lengua Guarani, el Bilingüismo, y de la Cultura Popular; saliendo al interior del país a FUNDAR REGIONALES, y desarrollar CURSOS DE LENGUA GUARANI y encuentros culturales. El ATENEO procura -y lo está logrando- generar en favor del Guarani, una nueva conciencia ciudadana progresista y crítica, considerándola como CIENCIA que precisa de la INVESTIGACIÓN y la METODOLOGÍA para su comprensión, actualización y perfeccionamiento

Screen for uploading a new document. The user inputs the title, language(s), file(s), tags, author and institution.

TAHEKAMI

## Subir un documento

### Título

### Idioma

Castellano  Guarani  Castellano y Guarani

### Archivo(s)

Castellano:

Guarani:

### Etiquetas

identificadores separados por coma... <sup>4</sup>

### Autor:

### Instituto:

Permitir la descarga

An index page where user can choose to see all documents by a specific Author, Institute, or for specific tags.

## TAHEKAMI

### Categorías

#### Autores

##### A

Arturo Estigarribia

##### B

Benito Ortega

Bonifacion Núñez

##### D

David Galeano

Doroteo Taboada

Dionisio Borda

#### Institutos

Ateneo de Lengua y Cultura Guaraní

Fundación Yvy Marã'ëy

IDELGUAP

#### Etiquetas

##### A

Aviación

##### B

Biología

##### D

Diversión

# Strategies

This project was a first exploration on designing for the Guarani language. The aim of this project was to discover ways in which design could be used to reinforce the presence of Guarani in digital contexts in Paraguay.

Future directions include exploring in depth design opportunities for Guarani activism, designing for learning of Guarani, designing for Guarani in basic education and designing for maintaining and revitalizing Paraguayan culture through the Guarani language.

## **Strategies**

### **Guarani Activism**

Foster relations with Guarani activists and institutions - The first step that needs to be taken as part of a strategy for Guarani activism is to foster relations and collaboration with Guarani activists and institutions. Guarani activists have shown a great interest in collaborating and contributing to increase the presence of Guarani in digital contexts.

Establish collaboration with universities - Bringing these concepts and concept systems to reality will require coding work. In that regard, collaboration with universities, specifically with schools of computer science, could be key for a successful implementation phase.

Funding - Finding funding opportunities through grants, awards and NGOs is going to be important in order to cover expenses for research travelling and wages for part and full time professionals.

### **Learning Guarani**

Foster relations with Guarani institutions - People that belong to Guarani teaching institutions are usually Guarani activists. Similarly to the strategy for Guarani activism, the first step that needs to be taken as part of a strategy for Guarani activism is to foster relations and collaboration with Guarani institutions.

More primary research - A quick ethnographic work was done during a week in Paraguay in March of 2013. However, further ethnographic research needs to be done in order to discover

and learn the best ways of using design to facilitating the learning of Guarani. Participatory design should be considered to ensure that designed products meet real needs and are usable.

Funding and collaboration with universities - Finding funding and collaboration opportunities with universities and other interested entities will be fundamental to ensure the successful implementation of the designed products.

### **Education**

Foster collaboration with schools in the OLPC program - Teachers and directors from schools in Caacupe showed interest in supporting Guarani on the XO laptops for the children. They were eager about the possibility of having applications that allow children do school work not only in Spanish but also in Guarani.

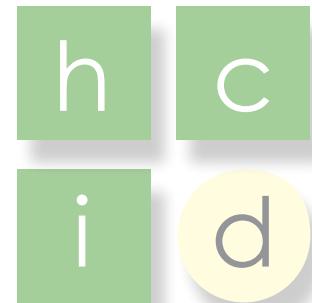
Establish collaboration with XO developers community - Initial contact was made with members of the group Juky. Juky is the Paraguayan community of developers for the XO platform, comprised mainly by volunteer free-software developers.

More primary research - Quick ethnographic methods should be used to perform further primary research in order to come up with appropriate design proposals. Schools in Caacupe immersed in the OLPC program are a the best opportunity for this kind of exploration.

**Collaboration with universities and NGOs** - Finally, establishing collaboration with universities and NGOs might be of great aid for carrying out an educational project for Guarani.

### **Maintaining and revitalizing Paraguayan culture**

Further research - Further research still needs to be done in order to identify the best ways of using technology and design as means for reinforcing Paraguayan cultural identity. Nonetheless, it is evident that tackling the previous points -Guarani activism, learning Guarani, and education- will definitely play a role in strengthening Guarani in Paraguayan culture.



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