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Intelligent Tutor System for the Learning of Otomí Language

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Abstract. *In this paper was raised as support to the rescue of the indigenous language called hñähñu (Otomí) existing in Mexico, in order to further develop the learning of this language in children's basic level, providing a teaching tool different from usual that children interact. The UNESCO marks that the countries should cultivate three languages: a native or local, in this case is hñähñu, or a national which is the Spanish, and the third is the implementation with another international language (English). The intelligent tutor system via web based on Joomla and PHP programming for learning the hñähñu or Otomí to the new generations and thus rescue the language from extinction. This research originates from an extensive and exhaustive collection of information from different bibliographic sources until the construction of intelligent tutoring system. The research work is designed to teach the basis of the Otomi language which is focused on the children of basic level in the region of the Mezquital Valley which is located in the State of Hidalgo, Mexico.*

KeyWords: Intelligent Tutor System, national languages.

1. Introduction

The language is a very important instrument for the human being for the communicative process, but it also is part of the culture and is a way to identify themselves as population; currently there is a wide variety of languages and dialects, some of these are at a serious risk of disappearing like the Otomi language of the indigenous peoples of Mexico. Until today consider the Otomi people of the Highlands of Mexico. Through history and archaeological studies indicated that they settled some years ago apparently B.C. The Otomi are divided into groups and have a name to call themselves according to the region where are radicand, as shown below:

Table 1 Otomi is naming according to the region.

Name	Region
Hñahñu	Valle del Mezquital
Ñatho	Toluca
Ñ'yuhu	Sierra Norte de Puebla
Ñañho	Mezquititlán

The Otomi term descended from Nahuatl and means "who walks with arrows" or "Archer of birds". (Marquez Lopez, Historia de México, 2015). Although the Intelligent Tutor System does not resolve the problematic of the disappearance of the language Otomí, it can be of great utility to them children of education basic is feel attracted by this language and them

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generate interest or continue learning. The Intelligent Tutor System is intended to design a teaching tool with basic information of the Otomí language as a resource for teaching and learning.

The cities where it inhabited the Otomi were: Teotihuacan, Tula, and Cuicuilco in Mexico. In these cities, they began to practice agriculture and the art of weaving, as well as the elaboration of garments decorated with embroidery that identifies the same group of Otomi.

Figure 1. Clothes decorated with embroidery that identifies the Otomi group.

In this paper, we propose an Intelligent Tutor System for the Learning of Otomí Language developed using Joomla and PHP programming. In the section 2 are the related works, in section 3 the Intelligent Tutor System, in section 4 are the experimentation and results, and finally are the conclusions.

2. Related Works

There are different works related to the use of systems tutors intelligent applied to the process of learning to teach. The most significant are:

Bacallao and Fernández (2015) mention that computing is a solution to the problem of learning and teaching. They carried out an educational software focused on pediatric based on surveys of residents and interviews with teachers. The software has updated information, gallery images, interactive exercises and bibliographies which complemented its software.

Valdovinos et al. (2011) describe that they were based on two stages to develop educational software, the first stage they focused on the design of the software and the second stage consisted of the research of the contents of its educational software which is focused to the learning of the theory of the crime, in the field of criminal law.

Ferreira (2012) mentions that an Intelligent Tutor System is applied to the teaching of different disciplines of which one is the foreign language and provided that these systems are

composed of three modules which are the expert, tutor and student module.

Marquez (2013) exposes an analysis of different intelligent systems and intelligent tutors and establishes that this tool is used nowadays since it is a way to enhance learning. Barron (2014) exposes an Intelligent Tutor System designed and focused on children from 3rd grade to the teaching and learning of the natural numbers, this in order to draw the attention of the students. Barron et al. (2014) expose the description and the process of the development of an intelligent Tutor system that also measures the emotional state of the student during the process of learning through an artificial neural network. This tutor was implemented in a school for the learning of mathematics.

Ferreira et al. (2015) mentioned the development and implementation of an intelligent Tutor system to be applied to the teaching of the foreign language with the CALL model, which is supported from a major study on the sighting of the improvement in the computer-assisted learning of foreign language.

There are sites with content of the Otomi language as Yaak-Online (2016) and Otomimoderno (Mejía, 2014). The users of this systems can enter any word that wish to translate and others already contain a listing of Otomi words with their meaning in Spanish.

The date of the review of the State of the art not found any research that develops or propose an Intelligent Tutor System for the teaching of the Otomi language.

3. Intelligent Tutor System for the Learning of Otomí Language

To develop the tool we investigated about the grammar of the Otomi language and found that this Language also has its own alphabet; the letters are the same as in the alphabet in Spanish but are now accompanied by some signs to give them different and same tone a different to the original utility, forming compound letters; below is a table with the alphabet.

a	**ą**	**ä**	**b**	**'b**	**bb**	**ch**	**ch'**	**d**	**dd**
dz	**e**	**ë**	**ê**	**f**	**g**	**h**	**hm**	**hn**	**i**
î	**j**	**k**	**k'**	**l**	**m**	**'m**	**n**	**'n**	**ng**
ñ	**'ñ**	**o**	**ö**	**p**	**r**	**'r**	**s**	**t**	**t'**
th	**ts**	**ts'**	**u**	**u(w)**	**'u('w)**	**û**	**ü**	**w**	**x**
y	**'y**	**yy**	**z**	**'**					

The symbol " ' " is known or referred to as idiom and is where you can see that it is accompanying the letters but only at the beginning: b, m, n, n, r, u, and; After that go ahead of the letters and are: ch, k, t and ts, these are called consonants deaf. As an otomanguean

language, is considered a tonal language which is: high, low, ascending, in the language, there are words that sound different shades to pronounce them.
The Intelligent Tutor System consists of 4 sections:

1. Oral vowels. In this section of teaching the rules of the vocal oral for the teaching of the language Otomi. The table shows that at the top it says previous, central and rear this refers to the location of where the letter is and left side in the first column says high, medium and low, this is the tone that will receive to pronounce it, according to the location it is the tone of the pronunciation that is owed to.

	PREVIOUS	CENTRAL	REAR
HIGH	I	u̱ [ɨ]	u
MEDIUM	E	o̱ [ʌ]	o
LOW	e[æ]	A	

2. Nasal vowels. The vocal nasal receive this name since to the to pronounce them is must close the step of the air by the nose for so to get the effect right of the pronunciation and them vocal with which it has that do this are the following.

	PREVIOUS	NOT PREVIOUS
HIGH	ï [ĩ]	ü [ũ]
NOT HIGH	ë [ẽ]	ä [ã]

3. Musical tones or Pronunciation. There is tone ascending tone (ă) and high (a), under (a, unmarked) tone. The ascending tone has more duration at the end of a sentence, and is the reason why some specialists have written two vowels to represent him.
4. Musical tones- The adjective. In the Otomí language the adjectives are accompanied of a substantive, almost all are under certain condition by having estate verbal, usually are compounds of them substantive but is has that change the vocal by “a” to “o of another way eliminating it, this rule is performed with all them estate verbal that form the first element of the prayer.
5. Comparison. This section explains comparisons between phrases or words of the Otomi and its rules to make comparisons.
6. In the Otomí language, there are adverbs, as in any other language, which if few are those that exist, apart from the places and time.

Below are some images in Spanish of the Intelligent Tutor System for the learning of the Otomí Language. As first part we find the title of the Tutor system and a brief introduction, the structure is on the left side all the chapters of the System. There is a

phrase in the language Hñähñu-Otomi, as it has an image of birds with a short description of the image and contains the name of the developers of the website as well as those who contributed in the development.

Fig. 2. Intelligent Tutor System.

Chapter 1 has 4 sections which are: about the alphabet in the Otomi language, numbers, colours and a little exercise to qualify what they learned of the aforementioned sections.

Fig. 3. Intelligent Tutor System-Chapter 1.

Within the chapter 2 has 3 sections of pronouns, family and kinship, animals with two test to evaluate this chapter as shown below.

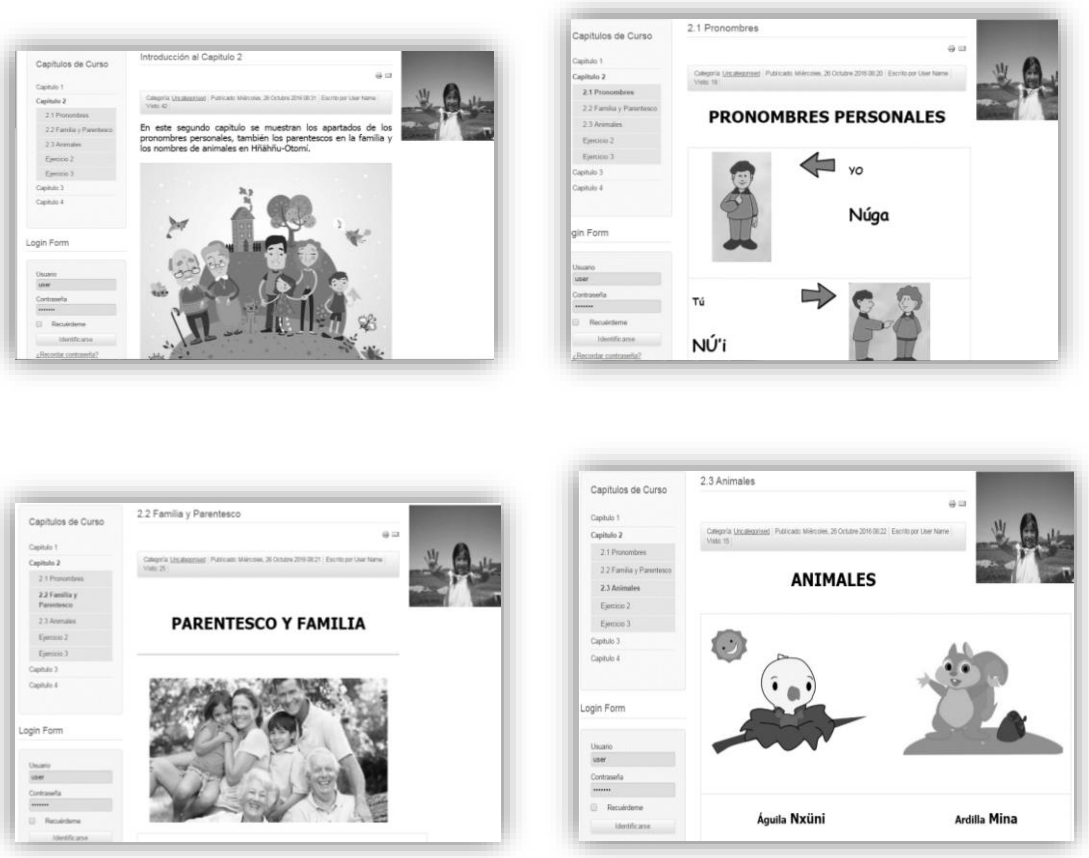
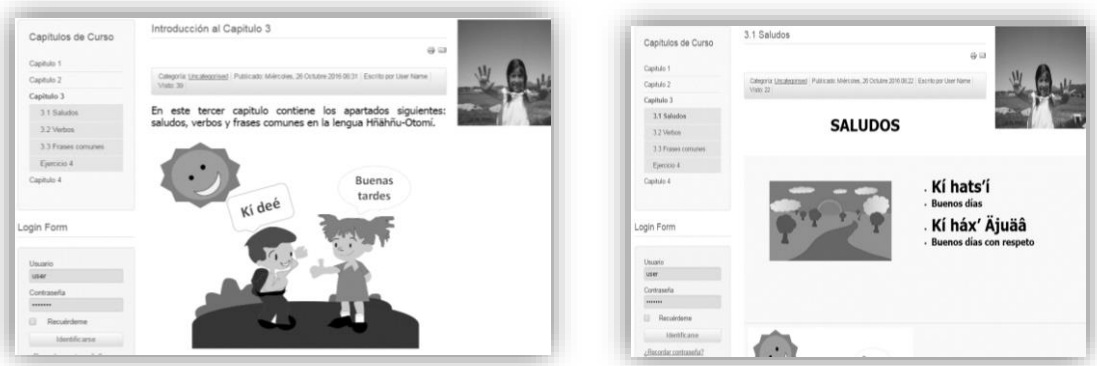


Fig. 4. Intelligent Tutor System-Chapter 2.

For Chapter 3 is composed of 4 sections which are: Greetings, verbs, common phrases and an evaluation exercise.



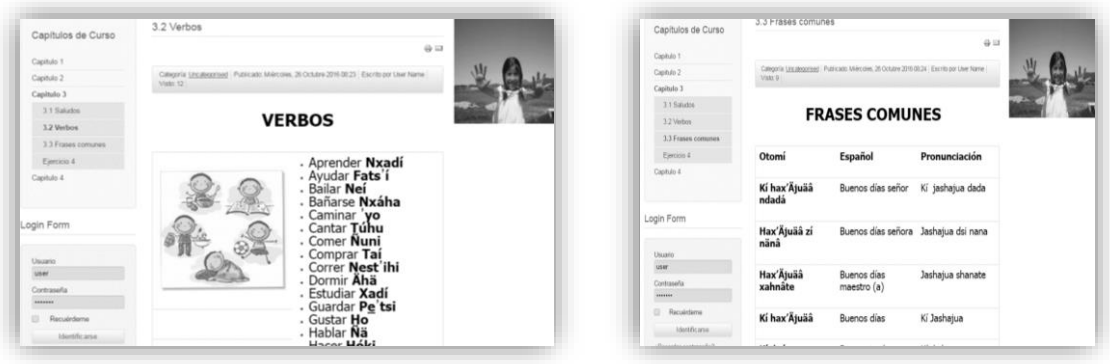


Fig. 5. Intelligent Tutor System-Chapter 3.

4. Experimentation and Results

A practical, dynamic method has been implemented to attract the attention of children in basic school level; with the purpose that the Hñähñu-Otomi language is learned by new generations which are children and thus ethnic fence not to die. The Intelligent Tutor System was made using the Joomla software. Joomla is a system that enables the creation of dynamic websites in a professional manner (CMS, hereinafter stands for Content Management System).

The research work is designed to teach the basis of the Otomi language which is focused on the children of basic level in the region of the Mezquital Valley which is located in the State of Hidalgo, Mexico.

The intelligent tutor system was shown in 5 schools in the State of Hidalgo Mexico, specific to the 4 years of the basic level (approximately 30 students per group, Group A and B).

Obtaining the following results:

Table 2 Results of the Quiz of Otomi.

Topics	10	9	8	7	6
Common Phrases	20	12	23	2	5
Animal	20	18	1	4	10
Pronouns	7	11	24	16	4
Colors	18	6	11	21	3

5. Conclusions

According to a study of Unesco, in the last 10 years disappeared more than 100 languages, others 400 languages are in a situation critical, and other 51 are spoken by a single person. Lost the knowledge of written and spoken of peoples, legends, songs and stories.

According to the results of the study of the project Intelligent Tutoring System for the learning about the Otomí Language Via Web, a set of tools were established so that the learning of this dialect is more optimal, concluding that teach Otomí through the use of technology is very likely since this is done more dynamically and can capture the interest of children more because that will be done interactively through the internet. That will attempt to avoid another language more disappears.

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