

Usability of an educational software tool developed for the teaching and learning of words in the Mayan language of Yucatán

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Abstract

A computer program developed to support the process of teaching and learning can be called educational software and can be used in three different ways, or working strands, these are: computers as learners, computers as tutors and computers as tools. The educational software named Memorama Maya, presented here, belongs in the third category being a tool for learning Mayan words aimed at children and teens for use not just in schools, but also at home. In this study we present an analysis of usability, which is a measure of how easy to use the product is and to what extent satisfaction is felt by the user. This study is divided into two concepts; usability seen as a product (the efficiency, effectiveness and satisfaction of the software, and usability seen as a process (evaluating whether it is understandable, attractive, easy to learn and operational).

Keywords: *Usability, Educational Software, Mayan Culture, Technology.*

1. Introduction

A computer program developed to support the process of teaching and learning can be called educational software [1] and is often used in educational contexts to support teachers during the teaching and learning process.

Educational software was born in the 1960s but it had its biggest impact in the 1980s. The first breakthroughs in educational software in terms of teaching were made with the Logo language developed by MIT and used in schools and universities [2].

Educational software is characterized by its interactivity [3], in that it incorporates multimedia and/or animations which allow children and teenagers to review what they have learned in class through exercises and games.

Thanks to educational software many centers of learning have improved their processes by facilitating both teaching and learning as well as attracting new students with the prospect of using these tools. However, as time goes by the

appeal of the software tends to decrease, leading to lack of interest or motivation. Considering this, technological advancements have led to the modifying, redesigning, perfecting and developing of new software in order to attract new communities of learners.

But how can we know if the educational software we use is really useful and interesting? This is something that can be tested in different ways. The study we will use is for usability.

Usability is the ease of use of a system, the quality and satisfaction of the users [4], the measurement of the level of ease of use associated with a product and the type of satisfaction that this produces in the user [5], it also refers to how much the software is used for the purpose for which it was created.

At the Multidisciplinary Unit in Tizimín, part of the Autonomous University of Yucatan, a software tool called Memorama Maya was developed in which users learn words from the Mayan language using educational methods. This software was developed in response to changes in technology which have drastically changed the world around us, not only changing how we behave, but also leading us to gradually forget features of our ancestral culture in the process of adapting to a new lifestyle. In the case of our immediate environment this could mean the loss of the Mayan language, be it in written or spoken form. In Yucatan, the unstoppable march of technology is causing the gradual loss of Mayan cultural traits most notably the everyday use of the Mayan language which has historically been an important marker of regional identity. Consequently, we designed a software tool in the Mayan language for children and teenagers in Yucatan to learn or reinforce their knowledge in this language while having fun in the process.

Currently there are several computer programs that deal with the teaching and learning of the Mayan language,

each with a different approach to capturing the interest of children and teenagers both from Yucatan and elsewhere.

Aprende Maya – Mayan dictionary and course [7], is a software tool aimed at users who have no prior knowledge of the Mayan language. It has a course for step by step learning of Maya and a dictionary so that users can understand words with which they are not familiar. This software can be found on the Yucatan state Secretary of Education website. It was developed with the aim of bringing the public into contact with the Mayan language and facilitating learning, and the software is divided into different sections such as games and stories, among others.

Aprendiendo Maya Jugando [8], is a software tool designed to aid the learning of basic written and spoken Maya with a focus on pronunciation, writing and word meanings. It has 7 categories: fruit, numbers, animals, colors, body parts, family and common phrases.

In academic literature we can find the article: Usability of educational software as an instructional medium for the teaching-learning process of a subject [9] which describes how usability is a useful metric for rating software for the teaching-learning of a subject and for knowing how well it facilitates the gaining of knowledge within the classroom. The author mentions that during recent decades the range of multimedia products in the marketplace has become very wide, however, the quality of these products depends of the characteristics that are required for teaching. The article also mentions that education faces many day-to-day problems and examines how technology has played a part in solving these problems through the use of educational software in educational institutions which has been evaluated through usability studies.

Memorama Maya a software tool designed to aid the teaching-learning process for students of the Mayan language. Teachers are able to use it during sessions and likewise independent users who are interested in learning Mayan vocabulary and writing can also use it. It was designed for use in the region's schools visited during the social outreach projects undertaken by the UMT.

2. Educational Software and Usability

Educational Software can be used in three distinct ways known as work lines [2]:

- Computers as tutors. This refers to assisted teaching via computers which use simulations of the real world.
- Computers as learners. These are aimed at programming, as in the case of the Logo language, in

which only instructions are given for the completion of a task.

- Computers as tools. These help organize, store, process and broadcast data or information to aid learning, via the use of communication applications, databases, and educational software among others.

The educational software presented in this study belongs in the third category, being a learning tool for children and teens to use in the computer rooms of their schools.

Does this educational software tool achieve its objective as expected? To answer this, we must analyze the software through a usability study.

Usability is the ease of use of a system, the quality and satisfaction of the users [4], the measurement of the level of ease of use associated with a product, the type of satisfaction that this produces in the user [5], and also whether it meets the expectations of the user [10]. This is examined from several standpoints so that the desired objective may be met.

Usability can be seen to have two aspects, processes and product.

- Usability as process is defined as a measure of how efficient, effective and satisfying the software is in meeting the specific aims of the users.
- Usability as product is the capacity of the software to be understood, and to be appealing, easy to use and easy to learn, under specific criteria.

It is important that the developed software be attractive, understandable, operational and easy to learn [4] as the usability of processes and product will make it more appealing to children and teens and consequently more likely to be used.

Usability seen in terms of processes contains three criteria for the evaluation of the software [4], and each has its own metrics. The criteria are as follows:

- Effectiveness- this refers to the percentage of objectives achieved and the number of users who completed their tasks, as well as the accuracy of the completed tasks
- Efficiency- this evaluates the time in which the tasks were completed.
- Satisfaction. Defined as how agreeable the software was to the user, how many complaints were received and number of times it was used.

The evaluation of the software from a product usability perspective has four quantifiable criteria each with its own metrics.

- Understandable - The functions are understandable and the manual is easy to interpret.
- Attractive - the user is attracted to the software from the start
- Learnable - the functioning of the software is easy to learn
- Usable and operational - messages are clear, functions can be understood, interface is well designed.

The above can make the software simple, not in terms of design, but in terms of the understanding of its functions and practical use. Usability also seeks to describe the satisfactory completion of a user's objectives within a working context [11].

The objective of this study is to analyze the use of the Memorama Maya software from the point of view of both the aforementioned aspects of usability to understand how effective it might be as a tool for teaching and learning both in schools and the wider community.

3. Mayan Culture and Technology

According to the National Institute of Geography and Statistics (INEGI) [12] the Mayan language is one the most widely spoken languages in Mexico after Spanish, despite this however it is also an endangered language given that the number of speakers is in decline.

This decline is understood to be caused by the fact that community elders are no longer succeeding in transmitting the linguistic knowledge of their mother tongue to the younger generations and therefore there are ever fewer speakers in the community [13].

“When a language is lost, when a word is forgotten, so we lose an important part of the culture” [3]. This quote, from Gabriela Tec Chan, implies that as time goes by, in the absence of the practice and transmission of this language to Yucatecan children and teenagers, numbers of Maya speakers will continue falling.

However, thanks to the technological revolution we now have access to systems, applications and virtual courses that attempt to combat this gradual erosion of Mayan culture and language, applications such as Apremiendo Maya Jugando [8] and Aprende Maya – Mayan Course and Dictionary [7] as well as the software considered here-Memorama Maya- whose objective is to aid in the learning of the Mayan language.

It is true that technology has had a constant influence of the daily lives of the population, accordingly the

development of educational software that has the potential to resonate with the local culture is of great use.

4. Analysis of Memorama Maya Software

Memorama Maya is a software tool developed to aid the process of teaching-learning Mayan vocabulary to children and teenagers in the region with a focus on fun. This software has three difficulty levels (easy, medium and expert) and three categories (fruit and vegetables, animals and body parts). The objective is to find matching pairs of cards where one set is in Spanish with an accompanying image and the other is only in Maya. See figure 1.

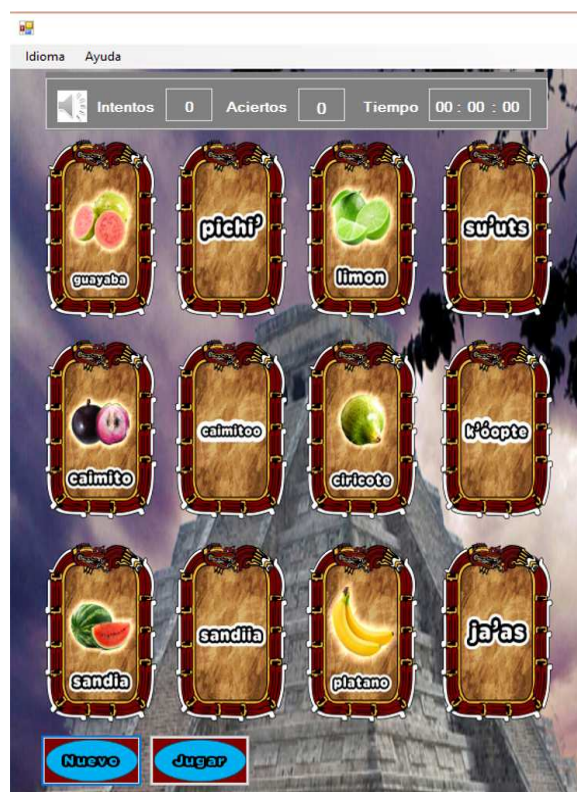


Fig. 1. Memorama Maya.

In this study we present the evaluation of the software in order to gauge its usability in the process of teaching and learning in schools. To do so we evaluated the software in the context of four educational institutions in the following communities around Tizimín, Yucatan; Chan San Antonio Secondary, Tixcacalcupul Secondary, Tizimín Telesecundaria and Tekom Telebachillerato. The software was evaluation by a total of 24 users, of which 12 were male and 12 were female, with an age range of 12 - 16 years.

The evaluation process we followed is described below: Before the users interacted with the Memorama Maya software, they took a test to ascertain any prior language knowledge they may have relative to the vocabulary topics contained in the software. Afterwards, the users interacted with the software and upon finishing they were asked to take the same test again so any increase in knowledge of the Mayan vocabulary could be detected. The results of the tests are presented in figures 2 and 3.

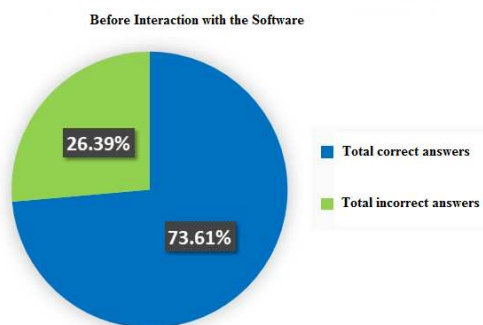


Fig. 2 Results of the test administered before interaction with the software

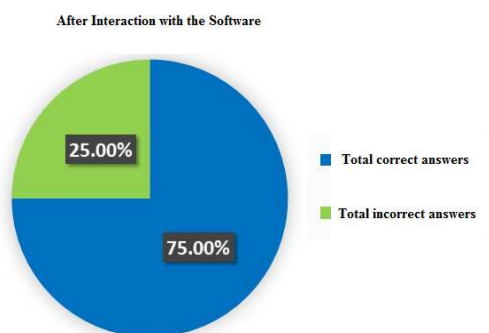


Fig. 3 Results of the test administered after interaction with the software

It can be seen from these results that there was a slight increase of 1.39% in the correct answers chosen by the users in the second application of the test, it is worth bearing in mind that the users interacted with the software only once, and due to time constraints were only able to complete one of the following topic/level combinations:

- Animals-Easy
- Fruit-Easy
- Body Parts-Easy
- Animals-Medium
- Fruit-Medium
- Body Parts -Medium

- Animals-Expert
- Fruit-Expert
- Body Parts –Expert

The evaluation of the software for usability of process produced the following results from a survey accompanied by observations by the interviewer.

- Effectiveness - Memorama Maya is a piece of software that meets the required objective, namely to increase the learning potential for user attempting to gain Mayan vocabulary knowledge, and it is hoped that with further use even better results would be seen. Users were able to complete the activities easily and quickly. This was noted through observations and a survey in which users were required to match words in Maya with words in Spanish.
- Efficiency - There were no time limits in place however all users completed the activities included in the software in a timely fashion, likewise the software responded adequately to the users' commands. Users gave feedback by choosing descriptions such as "I could progress easily and quickly through the game", among other descriptions included in the survey.
- Satisfaction - The software was agreeable to users and they mentioned that they liked the interface and its functionality because they learned while having fun. These findings came from comments that users left during the survey, using descriptions such as "the whole game was entertaining and pleasant", among others.

The general results in terms of usability seen as a process are presented in figure 4.

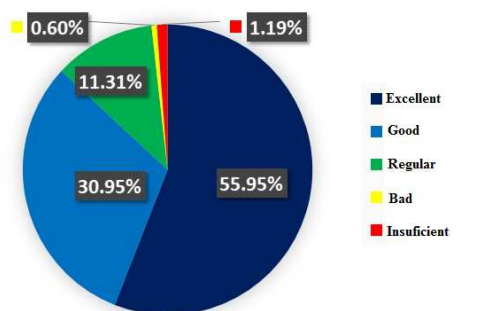


Fig. 4. Results for usability seen as a process.

In each of the indicators of product usability, the following results were obtained through surveys and observations.

- Understandable - Memorama Maya was understood by users and they felt at ease with the use of the buttons which were deemed clear and adequate. In some cases minor doubts were resolved during use, following which the users wished to continue participating. These results were obtained through observations by the interviewer who was looking at the receptiveness to instructions of the users and the inclination to express doubts, among other factors that all gave positive results.
- Attractive – According to results from the survey into both the presentation of the software interfaces as well as its attractiveness to users, it was concluded that Memorama Maya is a very enjoyable software tool with a pleasant virtual environment. Users showed curiosity to learn more about the topics and progress through the levels, and a majority of users rated as excellent the design of the cards. The audio was adequate to the context of the software environment.
- Learnable – Users learned to use the software at the first attempt. It was observed that users had a good command of the software after one interaction. This feedback was obtained through surveys and observations determining how easy the software was to master as well as the clarity of the accompanying instructions.
- Usable and operational – The messages that the software displayed to users were deemed adequate and practical, this was expressed through positive user ratings in terms of general appearance. Users responded positively to the part of the survey which asked about the clarity of messages displayed by the software.

General results for product usability are presented in figure 5.

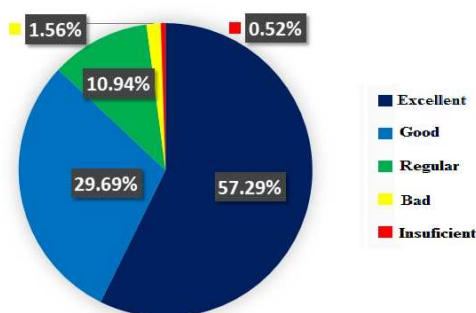


Fig. 5. Results for product usability

Based on the surveys conducted to collect the results explained above, we can judge that the software can help a community to learn Mayan words and in doing so, contribute to its conservation. The users of the software considered that it would be of great use not only in classrooms but also in the sider community. Implementing its use in schools would be helpful to the process of teaching – learning, some students from the Tekom telebachillerato high school mentioned that schools were Maya is taught could exploit this software to make classes more dynamic.

Users also mentioned that they are very interested in technology, although less interested in traditional Maya classes, combining the Mayan language with technology would grab their attention to a greater extent.

We agree with users about the implementation of educational software in the teaching of the Mayan language both for teaching and learning processes, in addition we are in favor of the implementation of these technologies in both educational institutions and general social initiatives so that this important language may be preserved in the region.

5. Conclusions and Future Work

In the surveys conducted before interaction with the software, we observed that users from the rural communities of Chan San Antonio, Tekom and Tixcacalcupul had a greater knowledge of the Mayan language with results of 61.11%, 100% and 97.22% respectively, in comparison with those users from urban communities like Tizimín who had results of 36.11%.

The study of software in terms of usability as a process generated the following results: with regard to effectiveness, users successfully completed the activities in Memorama Maya at the different levels; with regard to efficiency, the activities were completed on time and finally in terms of satisfaction; Memorama Maya gave good results inasmuch as the users were satisfied with the software.

The study of usability seen in terms of the product produced the following results: in the area of understanding, Memorama Maya was understood through both on-screen and verbal instructions before the beginning use of the software. In terms of attractiveness, users rated the software's design positively and commented that they would use it for their learning. With regard to learning, from the first interaction most users were able to master use of the software without assistance.

Finally, in the area of use and operation, users found the structure of the software to be pleasing, they liked the design and they understood the on-screen messages.

With the information gathered from the surveys and observations we learned that the Memorama Maya software can be used successfully as both a teaching tool and a learning tool in educational institutions where Maya is taught. It can also be used in institutions where Maya is not taught, to aid in the general orientation and cultural education of the students as part of the effort to conserve the Mayan language.

Memorama Maya is a software tool that has the potential to attract users from pre-school and primary, as well as secondary and high school ages. It is well structured and designed with an eye-catching interface and appropriate sounds for the context. This information was obtained from comments and answers that users gave during the surveys.

In terms of future work; we intend to add more categories to the software, for example colors and numbers, to create a software tool with greater variety of vocabulary themes. Additionally, we intend to add English to the software in order to further develop the potential of the tool by facilitating not only the teaching – learning of Maya but also English, a language which is already taught in most secondary schools in the region.

In response to the comments and observations left in relation to the software, another difficulty level will be added as well as a time limit for each level, forcing users to conclude activities faster. It is hoped that these changes will make the software even more appealing to users.

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