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Educational Software Developed to Support the Teaching and Learning Processes

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Abstract: *This paper presents three educational software developed to help the teaching-learning process in primary and secondary education. Due to ICT taking a fundamental role in education, among other daily-life areas, in the Bachelor of Computer Science of the Multidisciplinary Unit Tizimin several educational software were developed in order to contribute with the use of technology in teaching and to facilitate the learning of students in the region, amongst which the software will be distributed.*

Keywords: *Information and Communication Technologies, Educational Software, Education, Music World, MJL Speak, Solar System.*

I.   Introduction

There is no doubt that the Information Society has brought the massive incorporation of the Information and Communication Technologies (ICT) to all sectors of society, from the economic, to the cultural, and of course among them would not going to fall behind the educational [1]. Nowadays educational scenarios have changed as radically as they had not done so in previous years [3].

ICT offer great possibilities to the world of education, since they can facilitate the learning of concepts and materials, help to solve problems and contribute to the development of cognitive skills [2]. Our duty as educators should include leveraging technology to create new teaching and learning situations.

Resources and tools have come to constitute or at least to be proposed as a substantial element in educational tasks to support teaching in classroom activities. In this sense becomes relevant to teach in its proper use, putting information technology at the service of an innovative, creative and quality teaching [2].

Therefore, educational software has become of great importance in the teaching process, being tools that provide both the teacher and student dynamic spaces for learning, since, according to [3], an educational software is a computer program created to facilitate the processes of teaching and learning. The use of technology in education responds to a new concept of education as a non-linear process, and the integration of text, images and sounds, under the control of a computer [3].

In view of the above, in the Multidisciplinary Unit Tizimin (UMT) of the Autonomous University of Yucatan (UADY), during the Theory of Programming Languages course, students are encouraged to develop a software with an educational focus, on the one hand because as mentioned it is important to bring technology to students and on the other hand to facilitate the work of teachers and the learning of students. It was considered appropriate to develop software that contributes for students to build their own knowledge in a way different, attractive and according with the demands of today's world in the field of technology. This is desirable in our environment as we have carried out visits to primary, secondary and high schools, interviewing teachers and principals of the same and observed the lack of technological tools to help them in their labor and at the same time offer children new learning scenarios. This paper presents the description of three educational software.

A. ICT and Educational Software

ICT implicitly involve the definition of several concepts. On the one hand the concept of technology, defined as the science that studies the technical means and the processes used in different branches of industry and business. The technology of information, also called informatics, is the science that studies the techniques and automated processes that act on data and information. The word "informatics" comes from the fusion of the terms "information" and "automatic", and originally meant the realization of tasks of production or management through machines. Communication technologies, or more precisely, telecomunication technologies, study the techniques and processes that allow the sending and receiving of information remotely. Communication theory explains "communication" as the way of transmision of information, the bringing into contact among peers, i.e. the process by which a message is transmited by a canal, between a transmiter and a receiver, within a context and using a code known to both [4].

ICTs are present at all levels of our current society, from the largest multinational corporations, to the SMEs, governments, administrations, universities, educational centers, socioeconomic organizations and associations, professionals and individuals.

Many technologies such as computers, cell phones, GPS, internet, among others have become essential to many individuals, schools and businesses.

It is important to mention that ICTs have offered to educational systems a number of resources that have allowed them to venture into new land to develop teaching strategies and models for promoting actions that strengthen the teaching and learning process. To mention just a few, think of the possibilities that digital environments such as email and forums offer to foster greater interaction in time synchronous and asynchronous between the actors of the educational process; the use of platforms, the creation of learning objects, digital repositories and educational software, among others, that have allowed to develop different strategies of teaching and learning [5].

In this context we could define the term Educational Software as computer programs for education, however, we can also highlight the following definitions:

- Pérez Marqués (1996), they are computer programs created for the specific purpose of being used as a teaching medium, i.e. to facilitate the teaching-learning process. [6].
- Begoña Gros (1997), any product made with an educational purpose [7].
- Ceja Mena (2000), those programs created for the specific purpose of being used as a means of teaching; to facilitate the processes of teaching and learning both in direct contact and in the distance and flexible mode [2].

These definitions include all the computer programs that have been made with educational purposes, from traditional programs based on behavioral teaching models, to even those which use techniques of Expert Systems and Artificial Intelligence, pretending to imitate the labor of teachers using models of knowledge representation consistent with the cognitive processes that students perform [2,8].

II.   Description of the Developed Software

This section describes three educational software. The first one, called "Music World", is oriented to children of basic education to help them in the learning of the basic notes of the recorder (a kind of flute). The second one, called "MJL Speak", is suitable to public at any educational level and its main purpose is to introduce the student in learning Japanese. Finally, the software "Solar System", aimed at children of primary and secondary education, has the objective of learning data and images of our solar system. The three were developed taking into account that it should not be necessary a big knowledge in the use of computers, so it was decided to make it in an easy-to-navigate and intuitive environment in which just to click on images were enough, so it was decided to make a graphical and friendly interface.

A. *Music World*

Music World is an educational software in the modality of Hypertext/Multimedia, oriented to primary school children, which aims to help children to learn to play the basic notes of the recorder (a kind of flute) through various options.

By learning to play notes, a child acquires certain skills that will serve him throughout his life. The software has colors and visual enhancements so it results attractive for children, it also includes a section in which the correct posture of the body to play the notes can be visualized, further options are added to listen, see, play and learn notes. The child will have the opportunity to interact with the computer while learning autonomously.

The software has among its features to be attractive, entertaining, interactive, dynamic, fun and easy to use, according to comments received from the users who tried it. In Figure 1 we can see the main screen of the software.

Figure 1 Graphical environment of "Music World".
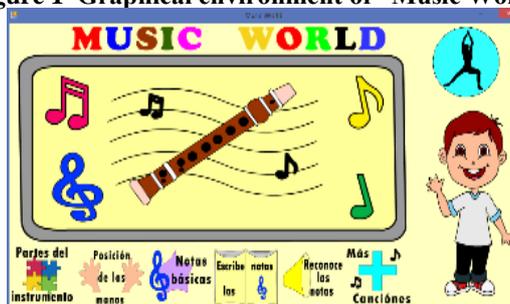
The software includes in its interface, images made with Flash, real sounds of the recorder and voices of the authors, all joined together using the Visual Basic 6.0 programming language. Its available options are: Parts of the Instrument, Position of the Hands, Basic Notes, Recognize the Notes, and More Songs. Figure 2 shows the Position of the Hands option.

**Figure 2 Position of the Hands option.**
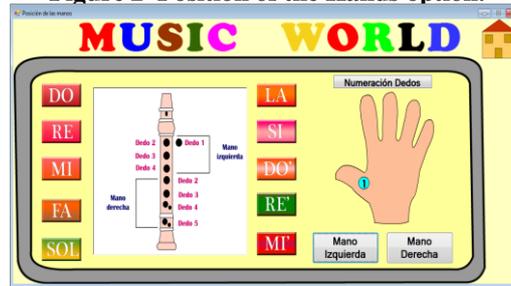
B. MJL Speak

The purpose of MJL Speak is to help a user of any educational level in the endeavor of learning Japanese. The game strengthen the user's memory through the classic memory game called Memorama, in which the user should find pairs of tiles by remembering its content and position. MJL Speak has a nice user interface with sounds, images, and a speech recognition capability provided by Microsoft Speech API.

The software also counts with several options of Memorama, such as the Classic, Interactive, and Learning, among others, each one with various complexity levels. Image 3 shows the graphical environment of the software.

Figure 3 Graphical environment of MJL Speak.
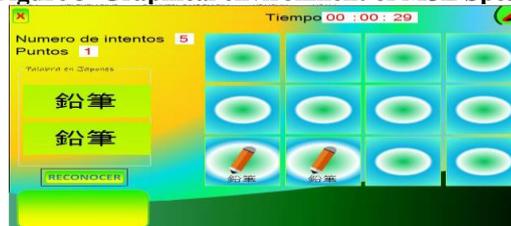
The software also counts with a section of phonetic pronunciation focused on images used in the game. In Figure 4 we can see an example of this option.

Figure 4 Phonetic Pronunciation option.

C. Solar System

The objective of the Solar System software is to bring information and basic data of the solar system to school students mainly from the primary and secondary level in order to learn about the planets and the sun.

Figure 5 shows the main screen of the software and an example of the information that provides about each planet.

Figure 5 Main screen of the Solar System software and information generated about the planet Jupiter.
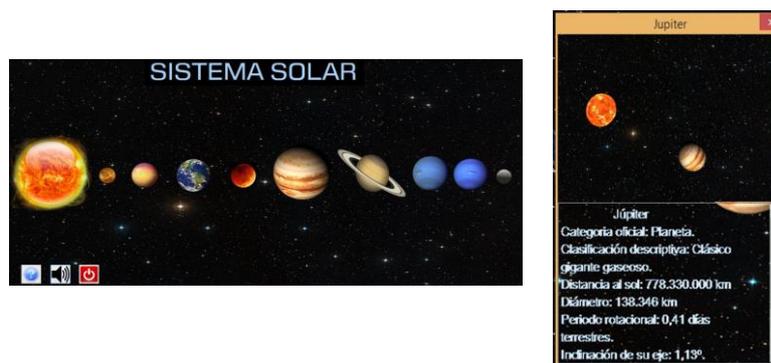
III. Conclusions and Future Work

As professors we should always be in a constant search of new materials and teaching resources for our students as well as to include increasingly more ICT resources that make a class session more attractive, interactive and dynamic. The resources presented in this paper have this purpose: to be a support instrument in the learning process, since the traditional education concept does not longer work in the world we live in. Therefore we, the professors of the course Theory of Programming Language of the Bachelor of Computer Sciences of the Multidisciplinary Unit Tizimin, proposed for students to develop an educational software that can serve as support to teachers in basic and secondary education.

Three examples of the resources that have been developing were presented in this paper. In addition some software testing has been carried out in a controlled environment, children were asked to interact with the software and give their opinion; in all cases they have made positive comments about them. The next step will be to spread more the resources and evaluate the functionality of the same.

As was expressed at the beginning, the objective of the educational software developed so far is that they provide help and support to children and young people to learn various topics in a dynamic and attractive way. On the other hand teachers who impart these levels will be able to rely on a novel resource that serves them as a complement in the proposed topics.

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