



Interactive Animations to Present Academic Subjects to Elementary School Children

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***Abstract:** Nowadays, technology has become a crucial factor for many of our daily activities, we are increasingly using new technological devices as a way to improve our lives. Several areas have been influenced by technology, education is one of them. With this in mind a project called "A Day of Science and Technology in your School", from which this article addresses specifically the use of software-based animations as a means to teach academic subjects to children who attend elementary school. It is presented an analysis of the current context of technology in elementary schools in the eastern part of Yucatan, as well as the opinions collected from the participating group of teachers of those schools, and some comments made by the project staff. Finally, the results obtained during those visits are presented and the usefulness and potential impact of interactive animations in the process of teaching and learning for elementary school children is analyzed.*

***Keywords:** Elementary school, primary school, education, animation, software, children.*

I. Introduction

In recent years, the educational system at international level has been updated once again in order to be consistent with the digital revolution, computer systems has been implemented to benefit the learning of students, and many educators are advocating the use of laptops, desktops and mobile devices, among others. The impact and the incorporation of technologies of information and communication technology (ICT) in society and especially in the education sector, has led to that the information is a valuable resource that can be used in different ways, allowing teachers to develop innovative ways in which technology is used to create more effective learning environments and thus being able to generate knowledge [1].

In Mexico, there has been progress in the incorporation of ICT in the education system, both in public and private institutions. For example, the Telmex (telephones of Mexico) Foundation has implemented the Program of Digital Education and Culture for the elementary schools level, seeking to develop mathematical and computational skills based on educational axes, such as science, technology and universal values [2].

However, despite all the efforts made, we often hear talk of the term called "digital divide" of which there are different approaches and perspectives; some refer to it simply as the access of people to ICT; but more precisely, the Organization for Economic Co-operation and Development (OECD) says that it "refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to their opportunities to access information and communication technologies (ICTs) and their use of the Internet" [3]. In summary we can say that it is the gap between those with and those without access to ICT.

As a result, the digital divides lead to an increase in inequalities and are cause of a social and cultural exclusion. However, there are several alternatives to counteract this, such is the case of the Program of Digital Education and Culture, mentioned above, and of the educational program micompu.mx which belongs to the Secretariat of Public Education (SEP) of Mexico, which in its first phase will provide of a laptop to all children in fifth and sixth grades of elementary schools in the States of Colima, Sonora and Tabasco, having as main objective: "contribute, through the use and exploitation of personal computers, to the improvement of study conditions in children, the updating in teaching methods, the strengthening of collectives of teachers, the revaluation of the public school and the reduction of the digital divide" [4].

A. Information and Communication Technologies in Education

ICTs are in almost everything around us and not simply help us in communication, but that also in our daily life benefiting us beyond what we commonly do, such as facilitating trade, science, entertainment, education and countless other activities of modern life [5].

The World Bank has defined the countries access to ICT as one of the four pillars to measure their degree of advancement in the context of the knowledge economy (World Bank Institute, 2008) [5]. Many scenarios of the reality in which we live would be extremely different if ICT had not burst exponentially the way we live in the 20th century and beginning of the 21st.

Some countries like Nigeria make use of ICT in other contexts such as jurisdiction. In this regard, the use of ICT as a predictor of lawyers' productivity, is discussed in [6] with a focus on the legal system of Nigeria. The work of justice professionals involves a high level of documentation and information, processing, storage and retrieval. The capacity of the tools and technologies to accelerate the documentation, management and processing of information are not only important for a lawyer, but professionally necessary [6].

Albania implements the use of ICT in the different scenarios that may exist, as example we can see that [7] presents a research that focuses on crucial aspects of ICT in tourism, taking advantage of the fact that the Internet is a perfect platform to bring tourism products to the direct client.

Therefore, it can be observed that ICT facilitate life in different contexts, and in education occurs something similar since there technologies are also present. In Latin America, teachers of primary and secondary education have a positive perception about the usefulness of technology in the teaching-learning process, since they think that learning to use it does not require too much effort and helps them to achieve their goals. It is worth mentioning that as well as they have a positive perception, they also have knowledge of the risks involved in the improper use of technology in education.

In 2010 the Cisneros Foundation and the program for Update of Education Teachers (AME), based in Venezuela, offered for the second time a five month course to the teachers of elementary school in Latin America called "Appropriation of the Technology in the Basic School", in order to promote the use of the Information and Communication Technologies (ICT) in the practices of teaching at school [8]. In the objectives of the course is intended to develop skills for selection and effective use of tools and resources available on the Internet, promote the use of information technology in teaching and learning, in the professional development of teachers, in the exchange of expertise and collaboration with other teachers in Latin America, develop positive attitudes towards the use of computer in education and promote reflection on the relevance of the information technologies for the innovation of the school systems in Latin America.

The Latin American countries which have the most advanced level of ICT integration (access to technological resources in schools, teacher professional development, and the integration of ICT in the curriculum and in the learning process) are Chile, Uruguay, Argentina, Mexico, Brazil, Costa Rica and Colombia [8].

B. Animations

The concept of animation is even older than movies or television. Animations are sequential images that appear in a fixed framework, a succession at the speed of 24 frames per second produces the illusion of fluid motion. Long ago, people wanted to express movement in images, so taking several of these and passing them quickly can be done to simulate a specific movement. In addition to entertainment, animations are also used as a successful and efficient tool for learning in the field of education, since it improves different kinds of skills and knowledge, sometimes even better than the traditional way of teaching. For example we can mention that some authors emphasize that animations in literature classes improves the intellectual, emotional, and social experience of the student.

Currently, television and the Internet are two of the main media of animations, today's children spend more time watching television or doing some activity on the computer, therefore, digital is important for all aspects of their life since they use digital as a second language [9]. Children can find the use of visual and audio resources to share information, knowledge and ideas, which is an opportunity to express themselves and improve their knowledge and skills in the learning process.

The research described in [10] states that the computer-assisted learning has positive effects on student achievement, increasing the performance of students at different levels of education and subjects

II. Use of ICT and Animations in Elementary Schools

In Mexico, the authors of this work are part of the Multidisciplinary Unit Tizimín (UMT) of the Autonomous University of Yucatan (UADY), where takes place the project called "A day of Science and Technology in your School", which consists of visits to different elementary schools of the eastern part of the State of Yucatan. The overall objective of the project is to promote and encourage interest in science and technology among students through the exhibition of academic subjects related to the six grades of primary education in Mexico, using scientific and technological material; to date 12 schools have been visited mainly from the municipalities Tizimin, Panaba, Sucila and Calotmul.

The project consists of 6 stands or booths covering different areas: animations, mathematical challenges, robotics, electronics, paper folding and video; each stand consists of 2 or 3 students of different grades enrolled in the Bachelor of Computer Science in the UMT, who direct the activity supported by their professors advising them. In Fig. 1 is shown one of the activities carried out in the stand called "Animations", to which this paper focuses.

In the stand of animations, some educational applications and some videos with cartoons are used to teach children topics of some courses of their scholar grade. To mention one example, in Spanish are practiced spelling and vocabulary; in math are practiced basic operations as sum and product, the multiplication of fractions and the use of the scale; in the exploration of nature and society are addressed topics such as: the food pyramid, and states and capital cities of the Mexican Republic, among others.

On the other hand, some animated videos are used to promote environmental responsibility, encouraging the use of materials and products that do not harm the environment. A video is also used to compare a person who consumes too much packaged and instant products and another that is more aware of the importance of eating healthy. Some other videos also promote care of electrical energy and water saving.

Figure 1. Animation stand of the project “A Day of Science and Technology in your School”.



Besides, supporting the issues discussed is projected a video that illustrates the current technology in which we are engaged and which is to come in the not-too-distant future. For example: a way of working from home, to watch a movie and even cooking, always supported with the use of technology. It is worth mentioning that this projection aroused a great interest in the children due to the novelty and surprising that it results for them.

Finally, to teach the children a new view and use of the computer, besides to use their imagination and creativity, the basic steps to design and create a 3D animation are shown, using a software called Blender, specifically the version 2.69. During the exhibition, basic shapes are created such as spheres, cones, cubes, rectangular prisms, pyramids, etc. Animals, objects such as chairs, tables, and floors of different kinds of material as grass, concrete and wood, are designed. Later it is made a small animation with the designed objects. In Fig. 2 is illustrated the design environment of Blender.

Figure 2. Design in 3D with Blender v2.69.



Using animation software to create a short 3D animation in the classroom, children experience a new way of seeing everything that is behind the animated films, this situation allowed to compare the animated drawings of some years ago with current films. Projection of educational software useful for academic subjects, arouses in children and teachers the interest of using the available technological resources to enhance their experience during the process of teaching and learning.

During the project, the planning of the animation stand was divided in 2 stages, below each one of them and the reasons that led to their creation are described, as a strategy to improve results.

A. First Stage

Initially, prior to the exposure of materials to children, it was applied a diagnostic questionnaire to a sample consisting of 30% of the children in each group, approximately. Subsequent to the event, another similar questionnaire was applied. The questions included in each of the surveys were directly related to the activities carried out during the event, i.e., the issues related to the questions asked to the participating children before and after the event were covered during the same. This methodology was intended to compare the immediate observable impact on the participating children.

In addition, a brief opinion survey was applied to the group of participating teachers, in order to obtain their own perception of the activities as well as suggestions and comments in general to improve the event.

B. Second Stage

Due to the limited time to work with children (30 minutes per group) and the time that took the applications of initial and final questionnaires, it was decided to modify the strategy. Thus, the performance of children are registered through the observations made by the contributors to the project, who at the end of each visit recorded their appreciation in polls answered during the feedback session, which was complemented with the opinion of the elementary school teachers, who responded to a slightly more extensive survey.

III. Results

This paper describes in more detail the second stage of the project, so following are presented the results obtained and the observations made by the collaborators of the animation stand during this second stage.

The opinion survey was applied to teachers of the elementary schools visited and of the various grades. In total 45 teachers participated, who were surveyed in order to estimate the impact of the preformed activities, specifically here is described the animation stand. Table 1 shows information regarding the years of teaching experience of the participating group of teachers. As can be seen, most of them have less than 20 years of experience, allowing

to catalog them as young teachers, which means that, although they are not native to the technology, they have had early contact with it.

Table I. Years of the teaching experience.

| Years of experience | Percentage of teachers |
|---------------------|------------------------|
| 0-9 | 33% |
| 10-19 | 33% |
| 20-29 | 18% |
| 30-39 | 11% |
| No answer | 5% |

A. Opinion of the Visited Teachers

In general, the event had a good acceptance among directors, professors and students from all the visited schools, as shown in table 2. At asking the group teachers their general opinion about the event, 36 of them (80%) indicated that it was "excellent", 5 of them (11%) did not provide an answer, and 4 more (9%) teachers categorized it as "good". Their opinions expressed indicated that students were very motivated, participative and interested, due to the innovative and interactive topics presented in each stand. In addition, children had fun learning topics of their interest but above all they were motivated and making use of the tools that will serve them in the classroom to keep learning. It is worth mentioning that topics were obtained from their curricula.

Table II. Evaluation of the project.

| The event seemed to him | Total of teachers |
|-------------------------|-------------------|
| Excelent | 36 |
| Good | 4 |
| Regular | 0 |
| Bad | 0 |
| Worst | 0 |
| No answer | 5 |

B. Suggestions from the Visited Teachers

Among the suggestions to improve the event, teachers expressed that it was very important to give more time to stands, since originally it was 25 minutes per stand, period in which the planned topics had to be covered, along with their corresponding activities. Subsequently the time extended 5 minutes more. The majority of the surveyed ones did not find some other negative element in the different stands, including the one of animation. It is worth mentioning that in the first stage all grades were included (1 to 6), i.e., with the 6 or 12 groups of each school. At that time, the presenters of the stands indicated that to work with groups of almost 80 children (in some cases) was very difficult, so instead of working with all the grades, it was decided to include only half of them, thus electing the more advanced groups. That means that, if the school had 2 groups of each grade, it was decided to work only the 3 more advanced degrees (4°A, 4°B, 5°A, 5°B, 6°A and 6° B). In the case that the school has 3 groups by grade, we only worked with the 2 more advanced degrees. In the last edition of the event, it was decided to also cover children from third grade since the number of children permitted it. Of the seven schools visited in the second stage, only one of them is private: College Teresa of Avila, as shown in table 3.

Table III. Schools visited and number of participating children.

| School | Participating grade | # of children |
|----------------------------|---------------------|---------------|
| 1. Justo Sierra Méndez | 4° a 6° | 366 |
| 2. Abelardo Conde Ruz | 4° a 6° | 193 |
| 3. Otilia López | 5° a 6° | 160 |
| 4. Gabino Barreda | 4° a 6° | 205 |
| 5. Colegio Teresa de Ávila | 1° a 6° | 120 |
| 6. Sebastián Molas | 4° a 6° | 181 |
| 7. Luis Álvarez Barret | 3° a 6° | 226 |
| Total | 44 groups | 1,451 |

C. Technologic context of the elementary schools visited

The group of collaborators in the project noted that the majority of schools does not have the technological resources needed to implement the activities to perform during the event (most of them are public), which basically consist of computers and projectors in the majority of cases, although in some stands are used sheets of colors, wood sticks, printed boards and robots (Robotics stand). In this regard, 49% of the surveyed teachers said that there are very few technological resources at his or her school, 35% said that they do not have the necessary technological resources and 7% said that they have enough technology, although most of such equipment are in poor condition. The remaining 9% did not provide any opinion (see Fig. 3).

With regard to the level of ICT proficiency that the teachers themselves feel they possess, 56% considers to be in an intermediate level, 18% indicates an advanced level and 22% considers himself a beginner. 4 percent of teachers could not answer at which level they are, i.e. they do not selected an answer. (See Fig. 4).

As regards the possibility of training in the use of ICTs, it is interesting that most of the teachers (62%) said that they receive training in the use of ICT, 33% said that on rare occasions they are summoned to a meeting for the

purpose of training and 5% said that there is definitely no such support. Therefore we can say that more than half of those surveyed have or may have the necessary knowledge for the management of ICT. (See Fig. 5)

Figure 3. Opinions of teachers about the availability of technological resources at their schools.

At your school, Do you have the necessary technological resources?

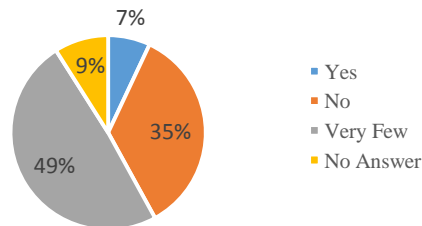


Figure 4. Levels of ICT proficiency

Which is your level of ICT proficiency?

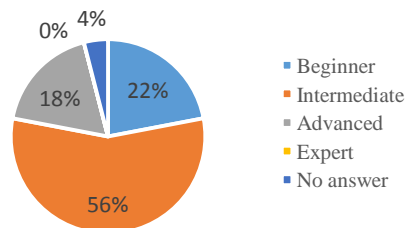
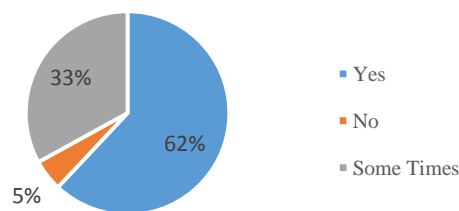


Figure 5. Training in ICT

Does the education system, to which you belong, provides you with training in the use of ICT?



IV. Conclusions

This work has presented the activities carried out at the stand of "Animations" and the results obtained so far, as part of the project named "A day of science and technology in your school". In particular, the animations stand provides to teachers a set of options for using ICT in the classroom.

During the visits to elementary schools, it has been perceived a very good acceptance of the project by the visited teachers and students, who orally and in writing, have externalized a great amount of positive reviews. For example, teachers mention that the animations and programs used in the activities are new and innovative, teachers also comment that the animated videos help to motivate children but specially to make them aware of the issues addressed. Thus, they claim that they would be willing to use them in their class sessions and that the video about future technology seemed significant and interesting as it shows to the children a window to the world to come, awakening their interest and motivation to learn more on the subject.

Besides, during those visits it has been observed that most of the schools are equipped with a projector and computer equipment in some salons, however the lack of maintenance has made them unusable. Precisely one of the problems mentioned insistently by the teachers on the opinion surveys is the lack of computer equipment in their own schools, which prevents the children to interact on a daily basis with computers. However, despite the fact that schools do not have adequate technological resources, with this project it has been fomented the interest of teachers about having tools or materials to use in the classroom, as can be seen in the graphs presented.

VI. References

- [1] Orozco, E., et al. "El m-Learning como soporte para la construcción de conocimiento en la enseñanza de las Ciencias," Conferencia Conjunta Iberoamericana sobre Tecnologías y Aprendizaje. Cancún, Quintana Roo, México 2013.
- [2] Programa de Educación y Cultura Digital, telmex educacion, México. 2014 http://www.telmexeducacion.com/el-programa/Paginas/default.aspx?IDT=que_es/ Fecha de última consulta 17 de Febrero de 2014.
- [3] Sandoval, A. "Explorando la brecha digital en México: Diagnóstico del proyecto e-México en el estado de México," Espacios Públicos, 2006, vol. 9, núm. 17. México.
- [4] micompu.mx Dotación de equipos de cómputo portátiles. Documentos Base, SEP. México, D.F. 2013 <http://basica.sep.gob.mx/> Fecha de última consulta 26 de Enero de 2014.
- [5] Romani, J. (2009). "El concepto de tecnologías de la información. Benchmarking sobre las definiciones de las TIC en la sociedad del conocimiento," (Spanish). Zer: Revista De Estudios De Comunicación, 14(27), 295-318.
- [6] Owoeye, J. (2011). "Information Communication Techonology (ICT) Use as a Predictor of Lawyers' Productivity," Library Philosophy & Practice, 122-134.
- [7] Kromidha, J., & Muca, B. (2011). "Adoption of Information and Comunication Technology in Albanian Tourism Industry in Global Setting: Challenges and Benefits," Journal Of Information Technology & Economic Development, 2(1), 64-73.
- [8] García-Urrea, S., & Chikhani, A. (2012). "PERCEPCIONES QUE TIENEN LOS DOCENTES DE AMÉRICA LATINA SOBRE LAS TECNOLOGÍAS DE LA INFORMACIÓN Y LA COMUNICACIÓN," (Spanish). Revista Q, 6(12), 1-32.
- [9] Ausekle, D., & Šteinberga, L. (2011). "ANIMATION AND EDUCATION: USING ANIMATION IN LITERATURE LESSONS," Pedagogy Studies / Pedagogika, (104), 109-114.
- [10] AKTAŞ, M., BULUT, M., & YÜKSEL, T. (2011). "THE EFFECT OF USING COMPUTER ANIMATIONS AND ACTIVITIES ABOUT TEACHING PATTERNS IN PRIMARY MATHEMATICS," Turkish Online Journal Of Educational Technology, 10(3), 273-277.