El zoológico: Un recurso tecnológico-educativo para Preescolar

The Zooo: A technological- educational resource for Preeschool

Zoo: Um recurso tecnológico-educacional para prè-escolar

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Resumen

El presente artículo describe el desarrollo y la implementación de un recurso tecnológico-educativo denominado e*l zoológico*, empleado en niños de preescolar para apoyar el desarrollo de algunas de sus habilidades en inglés, como son escuchar y poder expresar palabras en ese idioma relacionadas con los animales y los colores. Dicho recurso forma parte de otros desarrollados para un proyecto llevado a cabo en la Escuela Superior de Cómputo del Instituto Politécnico Nacional (ESCOM-IPN). El objetivo es mostrar las diferentes etapas de la elaboración del recurso el zoológico mediante una metodología de ingeniería de software dividida en tres etapas: pre-producción, que incluye el análisis y parte del diseño del recurso; producción, donde se hizo el diseño gráfico y se programó el recurso, y post-producción, que aborda lo referente a las pruebas de funcionalidad, las cuales se llevaron a cabo en uno de los Centros de Desarrollo Infantil del IPN (CENDI) en la Ciudad de México, con una muestra de 10 niños de los tres grados de preescolar y la maestra de inglés.

La metodología empleada fue mixta porque se establecieron categorías analizadas cualitativamente una vez que se obtuvieron los datos numéricos. El recurso también formó parte de un estudio piloto que se llevó a cabo en los CENDI y que consistió en dar un taller a las educadoras y posteriormente acompañarlas en su trabajo en el aula. En este piloto, se empleó como instrumento metodológico el cuestionario. Se aplicaron cuestionarios a los niños

para medir el grado de satisfacción, eficiencia y efectividad que tuvo el programa, hallándose que 80 % no tardó en aprenderlo a jugar y 70 % lo consideró fácil de jugar. Para el restante 30 % le fue difícil porque no está acostumbrado a jugar memorama; sin embargo, en general tuvo una alta aceptación. Se concluye que el uso de las tecnologías de la información, comunicación y conocimiento en el nivel preescolar mejoró.

Palabras clave: inglés, recurso, tecnología educativa.

Abstract

In this paper it is described the development and implementation of a technological-educational resource called *el zoológico*, which was used by preschool children to support the development of some English skills, such as listening and to be able to express words in English, which were related to animals and colors. This resource was part of a set of resources that were developed as part of a project that was carried out at the Escuela Supeior de Cómputo del Instituto Politécnico Nacional (ESCOM-IPN). The objective of this work is to show the different stages through which the elaboration of one of the resources (el zoológico) happened, for it was used a methodology of software engineering divided in 3 stages: pre-production, that includes the analysis and part of the design of the resource; Production, where the graphic design was done, and the resource was programmed and the post-production stage, which addresses the functionality tests, which were carried out in one of the Centro de Desarrollo Infantil of the IPN (CENDI), in Mexico City, using a sample of 10 children and the English teacher.

The methodology used in the research was mixed, since categories were established, which were analyzed qualitatively once the numerical data were available. The resource was also part of a pilot study that was carried out in the CENDI and which consisted in giving a workshop to the educators and later accompanying them in their work in the classroom. In this pilot, the questionnaire was used as a methodological tool. Questionnaires were applied to children to measure the degree of satisfaction, efficiency and effectiveness of the program. It was found that 80% of the children soon learned to play, and 70% considered it easy to play. The remaining 30% was difficult because he is not used to playing memory game. In general

it had a high acceptance. With the information obtained, it was concluded that there was an improvement in the use of information, communication and knowledge technologies at the pre-school level.

Resumo

Neste artigo o desenvolvimento e implementação de um recurso tecnológico-educativo chamado "e*l zoológico*", que foi usado por crianças pré-escolares, para apoiar o desenvolvimento de algumas habilidades em inglês descritos, tais como ouvir e expressar palavras em inglês, que foram relacionadas com animais e cores. Este recurso faz parte de um conjunto de recursos que foram desenvolvidos como parte de um projeto realizado na Escuela Superior de Cómputo del Instituto Politécnico Nacional (ESCOM-IPN). O objetivo deste artigo é mostrar as diferentes fases do desenvolvimento de um recurso (el zoológico) a esta engenharia de software metodologia dividida em 3 fases foi utilizado: pré-produção, incluindo a análise e projeto de peças recursos; produção, onde fez o design gráfico eo recurso, a etapa de pós-produção, que trata sobre testes de funcionalidade, as quais foram realizadas em um dos Centro de Desarrollo Infantil del IPN (CENDI), cidade do México, usando uma amostra de 10 crianças a partir dos três graus de pré-escolar e professor de Inglês. A metodologia utilizada na pesquisa foi mista, como categorias foram estabelecidas, as quais foram analisadas qualitativamente, uma vez estavam disponíveis os dados numéricos. O apelo também foi parte de um estudo piloto foi realizado em CENDI e foi para dar uma oficina para educadores e depois acompanhá-los em seu trabalho na sala de aula. Neste piloto, ele foi usado como uma ferramenta metodológica ao questionário. crianças questionários foram utilizados para medir o grau de satisfação, eficiência e eficácia que teve o programa, descobrindo que 80% das crianças rapidamente aprender a tocar, e 70% consideraram fácil de jogar. Os restantes 30% era difícil porque não está acostumado a jogar Memorama. Geral I uma grande aceitação. Com as informações obtidas conclui-se que houve uma melhora no uso da tecnologia da informação, comunicação e conhecimento na pré-escola.

Introduction

Chávez (2011) mentions that research in education has shown that educational resources at home (desk, books, computers) are one of the factors that have a significant impact on students' learning achievement. Therefore, the school must compensate for deficiencies in the home that impede the improvement of learning in children.

The information and communication technologies (ICT) are a resource of indispensable incorporation in the educational system. ICT, and especially access to both computers and mobile devices and internet connection, are innovative and necessary resources to develop in the postmodern and globalized world.

In this regard, Mendoza (2011) comments that the challenge of bringing ICT to the classroom not only concerns the infrastructure or technological resources, but also the way the teacher works with them, the moment they use them, for what and what learning hopes to achieve in the students. Therefore, this article describes a technological-educational resource created along with 18 other resources, used to support preschool students in the development of their skills.

The creation of these resources arose from the research project Development of Digital Educational Resources and Paradigm of the Environment of Learning Supported in ICT for the Cendi of IPN (ESCOM-IPN, 2015). The stages used in a software engineering methodology (Gómez and Jiménez, 2016) are:

A. Pre-production (analysis and instructional design).

B. Pre-production (design and functionality).

C. Production (graphic design).

D. Production (development, programming).

E. Post-production.

In the post-production phase, tests were carried out to check the functioning of each element of the technological-educational resource, so the resource was created the zoo, named after animals in a zoo and designed to support the child preschooler in their process of developing some English language skills, such as listening and expressing words in that language.

The task of integrating the teaching of English into a technological-educational resource is possible, because it is not confined to a simple symptom of globalization, but to that which is part of the academic training that children need. Implementing technology in education can be seen as a support tool, since it aims to help the student to have more visual and auditory elements that enrich their teaching-learning process (Cacheiro, 2011).

Because the teaching of English in the Child Development Center (CENDI of IPN, COCENDI, 2010ª and 2010b) is based on the use of flashy drawings, colors, letters, textures and audios, it was decided that this was part of the educational resource the zoo, created to have a better user experience. This motivates and improves your listening skills and speaks English. The creation of the zoo was based on aspects of Papert's educational construction theory and, after being developed, on a mobile device with tactile surface for its implementation.

"Papertian constructionism as a theory of contemporary learning is the answer to Piaget's constructivist theory ... emphasizing the value of ICTs as powerful tools of mental construction, useful for developing complex thinking in students" (Papert, 1991, p. 38).

The ideas of Papert (1993) have had a great influence in the field of child-computer interaction. This is particularly clear when the child participates in the use of technology for building resources, rather than experiencing worlds and situations that are prepared in advance. To a large extent, Papert's interest stems from the great variety and complexity of the entities that children can build with the use of computers. Papert (1993) also viewed

computers as a way to help children connect their interests with various issues, which presented without them fail to capture their attention.

The objective of this research was to develop a technological-educational resource that allows the preschool child to develop their listening skills and speaks some words in English.

The following research questions guided the study:

- What are the characteristics that the technological-educational resource of the zoo should have in order to develop some skills in preschool children, for example, memory, listen carefully, pronounce words in English fluently, ability to discover and to make a story

- How to measure the resource so that it is efficient, effective and with a high degree of satisfaction for the child?

This resource sought to support the cross-cutting themes of the National Preschool Education Program (SEP, 2011ª, 2011b, 2011c).

Materials, methods and / or tools that describe the work developed

The development of the technological-educational resource of the zoo went through several phases, starting with a mixed qualitative methodology that helped to determine the categories that answered the questions. The methodological tool used was the questionnaire.

The developed resource was part of a system made up of modules: registration module for both teacher and students, database and statistical module, which allowed children to register, access the resource, play and be evaluated. Teachers were also able to register, access and review statistics on the results obtained in children.

Figure 1 shows the dynamics followed in the laboratory for the operation of the three nodes: production, management and testing in the development of the technological-educational resource of the zoo.

Figure 1. Desarrollo del recurso educativo del zoológico a través de los tres nodos del Laboratorio.

Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

Pre-production (analysis and instructional design)

As part of the analysis, it was considered fundamental to review the Preschool Education Program, finding that the goal of teaching English in preschool children is "Develop skills in a second language to learn it all the time naturally through attractive activities; in order to have the capacity to create their own ideas in a comfortable and attractive environment "(SEP, 2011a, p.7). This gave the guideline to start the working meetings with the English teachers of the CENDI and to describe the characteristics that would have the resource.
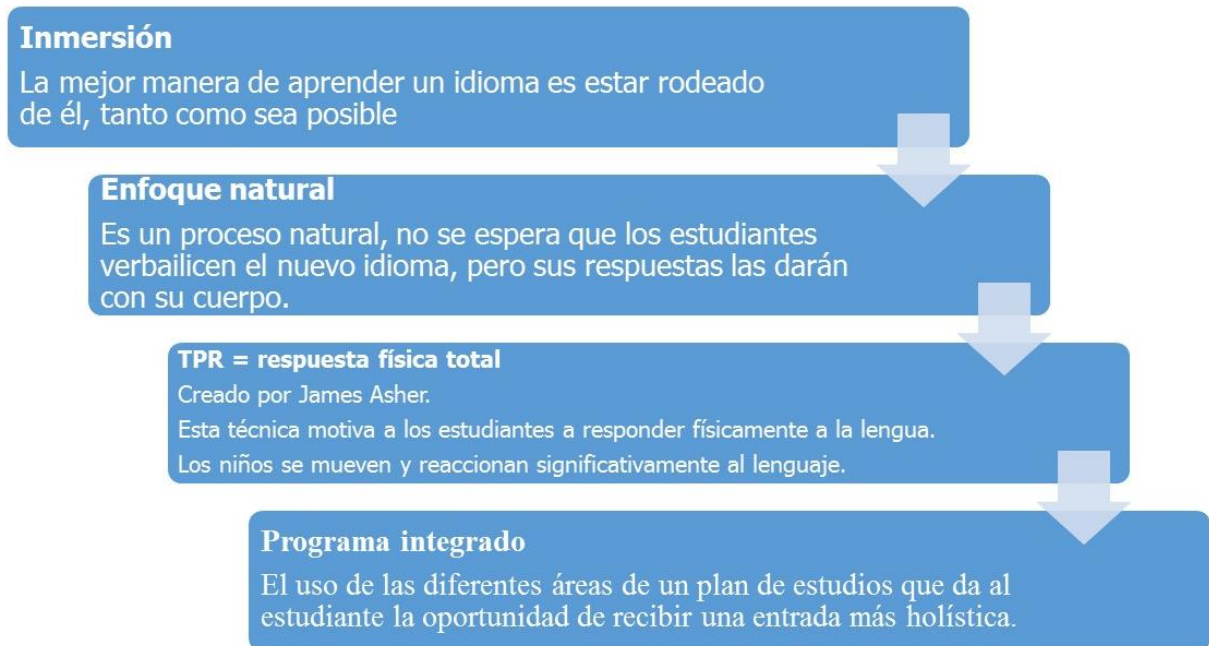
In relation to the methodology currently used in the CENDI of the IPN for the teaching of English, it is based on the Multiple Intelligences Theory of Howard Gardner, who proposed that human life requires the development of various types of intelligence. Thus, Gardner's

(2014) posture does not contradict the scientific definition of intelligence: "The ability to solve problems or to produce valuable goods" (p.24).

Figure 2 shows the strategy currently used by English teachers in CENDI. This strategy is based on the use of the textbooks of the series called Balloons and Pockets, by Herrera and Hojel (1998). The authors' proposal consists of making an introduction to the topic, followed by a presentation of the contents of interest, and the practice of concepts or revised content. In addition, it sets the learning assessment parameters and fun ways to expand classroom and home-based activities.

The organization of the activities in the design of the zoo was divided into three stages, which are sequenced: beginning or presentation, practice and evaluation. At the presentation stage the student becomes familiar with the elements to learn, which are the animals that are in a zoo and their respective names in English. Here the boy touches the different figures of the animals and hears his name in English. In the practice stage, the student performs an activity to practice and reinforce knowledge with the help of the teacher, that is, the game of memorama. And in the third stage, which is evaluation, the child uses the language in its context.

Figure 2. Estrategias para la enseñanza del inglés

Inmersión
La mejor manera de aprender un idioma es estar rodeado de él, tanto como sea posible

Enfoque natural
Es un proceso natural, no se espera que los estudiantes verbailicen el nuevo idioma, pero sus respuestas las darán con su cuerpo.

TPR = respuesta física total
Creado por James Asher.
Esta técnica motiva a los estudiantes a responder físicamente a la lengua.
Los niños se mueven y reaccionan significativamente al lenguaje.

Programa integrado
El uso de las diferentes áreas de un plan de estudios que da al estudiante la oportunidad de recibir una entrada más holística.

Source: Creación propia apoyada en Herrera y Hojel (1998)

Pre-production (design and functionality)

At this stage the design of the zoo resource was defined, using diagrams based on the Unified Modeling Language (UML).

Within the classroom the following functions have been designed for the actors: Student and Teacher. (See Table 1).

Table 1. Actores del sistema

Profesor	Alumno
● Iniciar Sesión con un login con su correo electrónico y password, el último será asignado automáticamente en la página de monitoreo y gestión.	● Iniciar sesión de una manera un poco distinta a lo convencional, a partir de un avatar (imagen) proporcionada por el sistema.
● Recuperar los grupos de los que él está a cargo.	● Seleccionar el recurso el zoológico.
● Seleccionar el grupo del cual se quieren conocer las estadísticas.	● El alumno experimentará la presentación del tema.
●Seleccionar un alumno en específico y conocer su rendimiento.	●El alumno tendrá su juego de reforzamiento.
	● El alumno tendrá su evaluación.

Administrador
● Inicia sesión de manera convencional con un email y un password generado automáticamente.
● El Administrador podrá conectarse a través de internet y acceder a su cuenta.
● El administrador tiene poco o casi nulo contacto con las tabletas.
Registra a profesores y los grupos junto con sus alumnos que se encuentran inscritos en el programa de estudios del CENDI.

Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

The technological-educational resource the zoo, was part of a system which had its web portal and had three actors, student, teacher and administrator.

Figure 4 shows the case of general use, the elements that compose the system considering the technological-educational resources (Cruz, 2007), which in this case is the zoo, the web portal and the adjacent components.

**Figure 4.** Diagrama de Casos de Uso general del Sistema
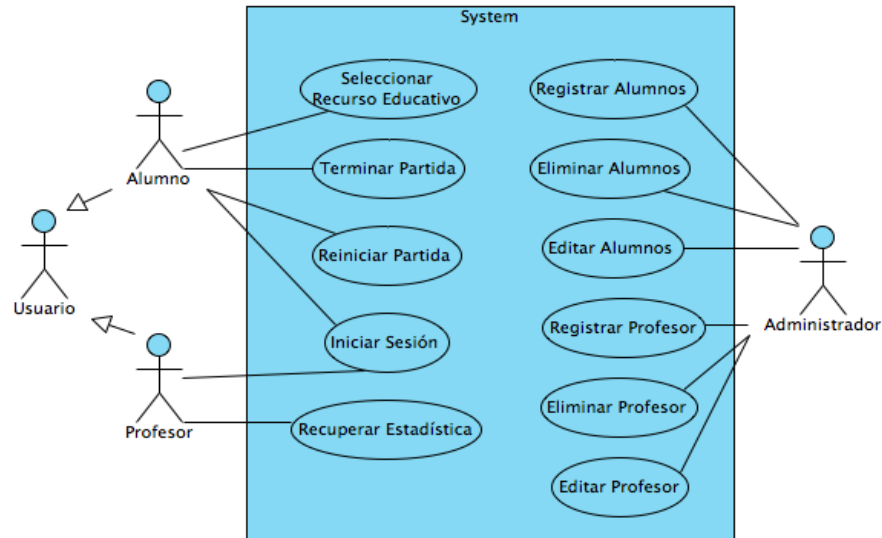
Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-
IPN, 2015)

The use cases describe the functionality of the system taking into account the steps followed
and the interaction with the different users (Schwaber & Beedle, 2001), it was considered
convenient to divide the system into the following modules (Figure 5):

➢ The zoo
➢ User Management
➢ Authentication
➢ Statistics Recovery
➢ Digital Educational Resources
➢ Web API
➢ Databases

Figure 5. Arquitectura.
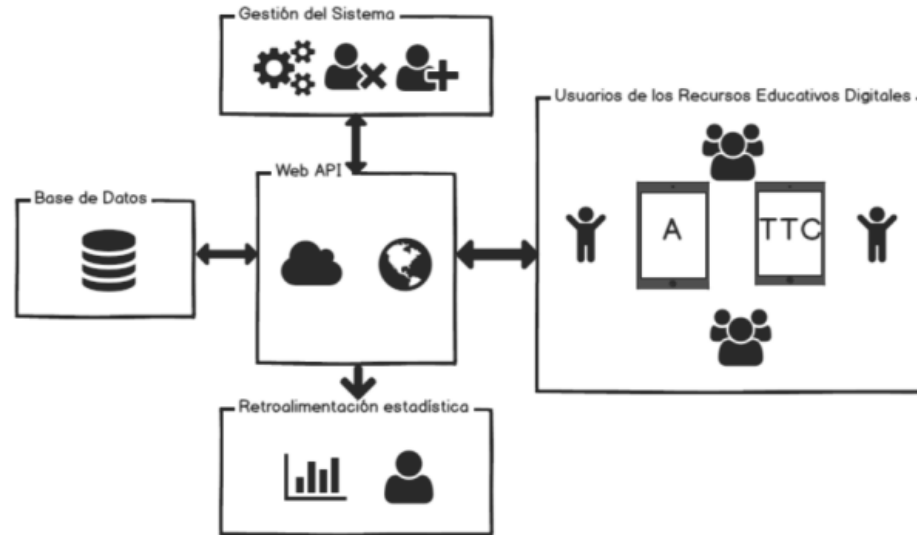
Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

Production (graphic design)

In this phase the infographics and multimedia design that required the resource was made.

The design of the images was done by a designer who elaborated the ones that would be used in the resources developed for the pre-school level (the copyright document of the IPN is available).

Production (Development and Programming)

In this stage, the characteristics and functions of each of the technologies used are described, both for the educational resource of the zoo, as well as for the administrative and statistics web system and the developed Web APIs (Wiley, 2000).

We used HTML5, CSS and JavaScript (Sánchez, Sicilia and Rodríguez, 2012), because these tools are cross-platform; this means that no matter the operating system that counts the mobile device, iOS, Android or Windows 10, the resource the zoo can run correctly.

Intel XDK was used as the development environment, which provides enough tools for the development of mobile applications. The target operating systems are stable and are backed by large companies such as Apple, Google and Microsoft, respectively.

It uses a Web API created by the Laboratory development team and located on node 3, which allowed it to have a better interaction with the database. The functions that are in the Web API allow the registration and consultation of data. Access to the Web API has its respective security to maintain the integrity of the data.

For the exchange of data was handled the format JSON (JavaScript Object Notation), which unlike XML, in its implementation is simpler for any technology, also has a better data structure. For the development of the Web API we used Grails which is based on the Groovy programming language.

In the development of the monitoring and management system was made use of Laravel, a framework based on the PHP programming language. This framework is mainly used for the agile development of web systems and in conjunction with the Web API developed in Grails the proposed controller view model was respected.

For the creation of the database, MongoDB was used, which is a document-oriented NoSQL database system. Unlike relational databases, data is stored in JSON document data structures, which facilitates integration.

The construction of the website was supported by the PHP Laravel framework, since in addition to having a fairly extensive documentation and user forum, it works very well in conjunction with the API that was previously designed, in addition to the web tools inherent in any project web, such as HTML 5, JavaScript and CSS.

The organization of the activities of the zoo is divided into three stages:

Home or presentation

In the beginning stage the child is shown a zoo with the different animals in it, such as: bears, giraffes, flamingos, tigers, hippos, so that when the child touches the different figures, the name is heard in English of the corresponding animal. You can practice as many times as you want. Figure 6 shows the interface that contains the image of the zoo.

Figure 6. Vista del *zoológico*.
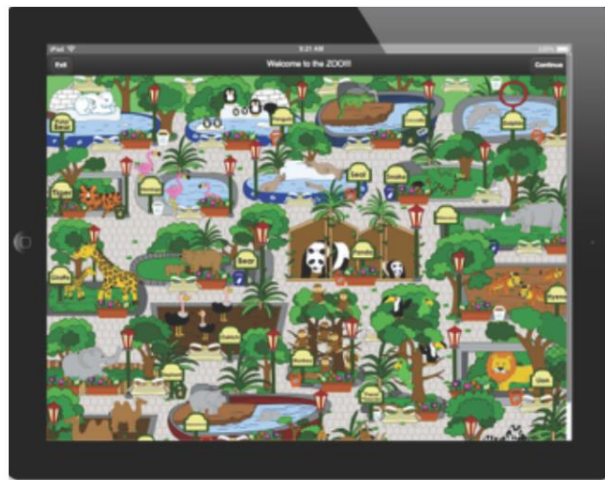
Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

The purpose of this first phase is to show the student a variety of animals and their different pronunciation in the English language to familiarize themselves with the subject. The child can work with the resource in the classroom as at home. This resource is installed on a tablet.

Practice

After the child has been listening several times to the names of the animals in English (5 touches in the image of each animal), a message appears on the screen (and also with voice), if you want to continue playing or if you want to play to another activity. If you want to change, enter the second phase, called practice, where you play as if it were a memo. On the screen there is a letter with the figure of one of the animals of the zoo and when you hear the horn hears his name in English; the child must turn the cards to the left of the figure, which

are of different colors, so that each time he touches a letter hears the name of his color; when the letter turns, you hear the name in English of one of the animals of the zoo. When he hears the one of the animal that is equal to the one of the initial letter, the boy must gather both letters. This is repeated several times with different letters of animals that the child must find. (Figure 7).

Figure 7. Fase de prueba.
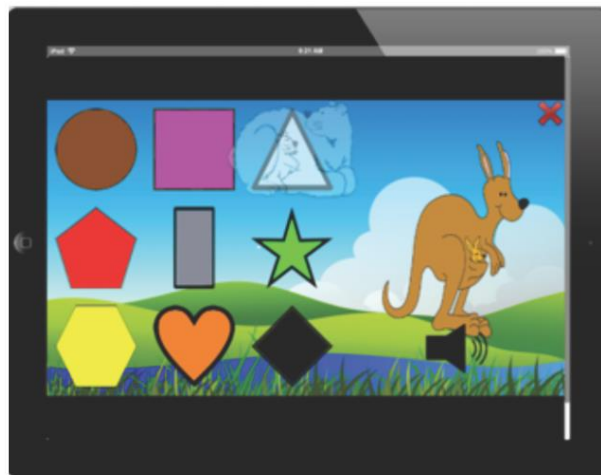
Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

Evaluation

In the evaluation phase, the children should relate the three figures of animals with their respective names in English, which he listens to when he honks. Both hits and errors are recorded and this information is sent to the database so that it can be consulted by the teacher in charge of the group.

Testing and Results

In this section we show the functionality tests performed with a sample of 10 children who studied 1st, 2nd and 3rd. of preschool (children from 3 to 6 years). Tests were also conducted with CENDI's English teacher "Margarita Salazar de Erro". The tests were part of the so-called post-production stage.

The study responds to a mixed methodology because the categories that were established to be measured and with that reach the objective and the research question are:

- Memory.
- Listen carefully.
- Pronounce words in English fluently.
- Discovery capability.
- Ability to make a story.

According to Sampieri and Fernández (2008), qualitative research allows documenting and analyzing the processes followed during the duration of the study.

Post-production (testing)

Figure 8 shows the student's actions to work with the zoo's resource.

Figure 8. Diagrama de Actividades del recurso tecnológico-educativo "*El Zoológico*"
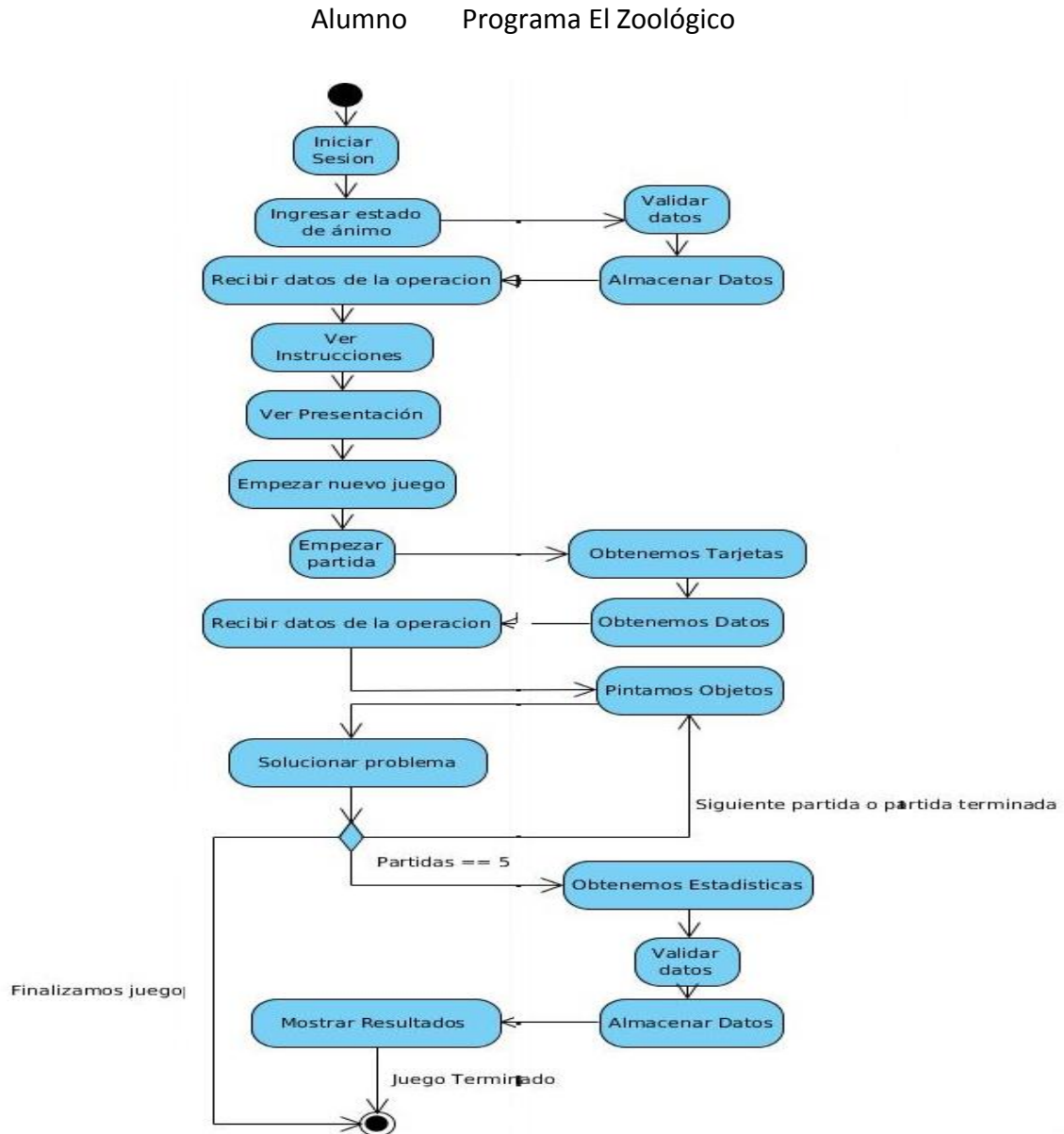
Alumno   Programa El Zoológico

Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

Figure 9 shows the interface of the home screen of the website, which was called RED CENDI (Digital Educational Resources of the Child Development Center).

The start view has the welcome details to go to the information screens (green box) and to the login screen (red box).

When a user, who can be administrator or teacher, wants to enter the system, he can do it by clicking on the button that was shown in figure 9. This will redirect them to the login screen. Here you have to enter the email of your registration and the password provided by the system.

Figure 9. Pantalla de inicio del sistema.

Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

Once you have entered your data correctly, you will be redirected to the corresponding view based on your status (if you are a teacher or administrator). As a statistics portal for the teacher to control the use of technological-educational resources within their groups. It is notorious that the system has a fundamental role in this section, since it is in charge of taking control of the users, this means that it is the one in charge of registering and / or discharging teachers, students, schools and groups, in addition to being able to make changes. This was intended to provide better quality information and more security in the system. (Figure 10).

Figure 10. Pantalla de registro

Source: Creación propia apoyada en el Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

Before starting work with the children, a questionnaire was designed and applied focused on the use of technology by them. Responses indicated that 40% of children have used a tablet as an academic support.

Although 60% of the children had not worked with tablets, when they played with the resource of the zoo it was observed that although it was new for the majority, they showed facility to play with him.

The children touched the tablet screen in different images of the animals and listened to their names in English, which allowed them to establish relationships. Later the children dragged on the screen the figure of the animal that corresponded to the name they had heard. The teacher asked the children to repeat the names of the animals that appeared on the tablet. The children worked on this resource as a visit to the zoo through which there was a stage of recognition, both of the animals that are in a zoo and their respective names in another language. At the zoo's practice stage, when the child has to choose the card containing the animal shown, it was found that of the 10 children in the sample, 10% erred at the first opportunity of choice, and no child in the second opportunity.

This shows that the child's attention to playing was good and it was clear what he had to do when playing.

In the third part that corresponds to the evaluation of the 10 children, 20% was wrong in the first choice of animal given in the figure and none in the second election.

To assess listening skills and ability to pronounce words in English, CENDI was approached on a different day they had been practicing with the resource and the English teacher was asked to review these and give their evaluation.

The teacher showed the figures of the animals and asked for their names in English. Children of 1st. preschoolers had some difficulties in pronunciation, but children in 2nd. and 3o. correctly pronounced their names. The teacher asked all the children if they wanted to play with the resource again. The same system evaluated the recognition of the English names of the animals. (See Figure 11).

Figure 11. Trabajo con los niños.

Source: Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

To evaluate the usability of the technological-educational resource of the zoo, we designed the same questionnaires that were applied to the children (Pérez, García, and Hernández 2015).

For Faulkner (1998) the usability evaluates if the operation of the software applications fits the purpose of the design.

Effectiveness

It relates to the accuracy and completeness with which users use the application to perform their tasks. The quality of the solution and the error rate are some indicators of effectiveness.

Efficiency

It is the relationship between effectiveness and the effort or resources used to achieve it. Some indicators are the time to perform a task and learning time. The less resources and effort, the greater efficiency.

Satisfaction

It is the degree to which the user is satisfied when using the application to complete some task. Satisfaction is a subjective attribute, which can be measured by attitude rating scales.

Several questions were asked of CENDI children to review these three aspects.

Questions

Table 2 presents a set of questions asked to the 10 children of the sample of the CENDI of the IPN, who, because of their young age, still do not know how to read (except for children in 3rd grade). questions were asked through audio.

Of the 8 questions, two review the efficiency (3 and 5), three to effectiveness (2, 6 and 7) and four to satisfaction (1, 4, 7 and 8).

Table 2. Cuestionario de evaluación para revisar las categorías de usabilidad

Preguntas	Opciones de respuesta	Qué evalúa	% de respuestas
1.- ¿Te gustó el juego?	Mucho Poco Nada	Satisfacción	Les gustó mucho el juego al 100%
2.- ¿Te fue fácil jugar?	Muy fácil Más o menos fácil Difícil	Efectividad	Al 70 % le fue fácil jugar y al 30% un poco difícil.
3.- ¿Tardaste tiempo en aprender a jugar?	Mucho Poco Nada	Eficiencia	el 80% no tardó en aprenderlo y el 20% tardó un poco
4.- ¿Qué aprendiste en el juego?	Palabras en inglés Colores en inglés Conocer los animales del zoológico	Satisfacción	Aprendió palabras en inglés el 100% Colores el 80% Los animales del zoológico el 100%
5.- ¿Volverías a usar el juego?	Sí NO	Eficiencia	Si el 100%
6.- ¿Te equivocaste al tocar los botones?	Mucho Poco Nada	Efectividad	El 20% se equivocó poco al jugar El 80% no se equivocó al jugar.
7.- ¿Terminabas cada actividad o en algún momento la abandonaste porque te aburrión?	Terminaba la actividad No la terminaba y abandonaba el juego	Satisfacción y Efectividad	El 90% terminaba la actividad El 10% no concluía y lo abandonaba
8.- ¿Qué te parecieron los colores del juego?	Bonitos Feos Me gustaron Me desagradaron	Satisfacción	Al 100% de los niños les gustaron los colores y les parecieron agradables.

Source: Creación propia apoyada en Pérez, García, y Hernández 2015.

According to what was obtained in the fourth column of Table 2, it was observed that 100% of the children showed a high degree of satisfaction when playing with the zoo's resource since they mentioned that it was to their liking and that they learned words in English , which was the purpose of the creation of the resource. In addition 90% of the children managed to finish the activities. In relation to the efficiency of the resource, it is shown that it also has a

high degree of efficiency since 80% did not take a long time to learn to play it, and only 20% took a little. This 30% corresponds to the children of 1º and 2º. preschool.

The rate of errors in the use of the zoo's resource was very small so the resource shows a high effectiveness in its use, also 80% of the children completed the activities proposed in the resource.

With these answers we can say that the zoo's resource has a high degree of satisfaction among children from 3 to 6 years of age and it was useful to identify the English names of the different animals in a zoo as well as the names of the colors.

Analyzing the development of the tests and the obtained results, the following was concluded:

- After the children began to use the technological-educational resource, some began to repeat the words in English spontaneously and imitating the same intonation.
- Preschoolers 2 and 3 understood the functionality of the resource faster.
- Some children learned new vocabulary.
- Children in Preschool 3 were able to explore the resource on their own.
- Children were able to identify images and relate them to their environment.
- Children in Preschool 3 identified what each star represented (hit or miss), while Preschool 1 and 2 did not pay attention to that.

One of the bad points was:

- The internet connection was very slow, so it was decided to use a cellular network.

**In relation to the pilot study**

This zoo resource was part of the pilot study conducted with the educators of the CNEDI. There were 280 children and 150 educators. They were given a workshop that lasted a week. They were shown the technological-educational resources, explaining the use of each, as well as being taught to program in scrath. After the workshop, they were accompanied to their classrooms to support them in the work they would develop with their students. Finally a meeting was held where the computer teacher of each of the 5 CENDI were in charge of gathering the evidences worked. In this way they presented samples of the work done with the

children. Figure 12 shows the photographs of two of the computer teachers, who explained how they used the different resources, through class video and photographs.

Evaluation questionnaires

The questions of the educators' questionnaires focused on reviewing which technological-educational resources they had used, the topics in which they had used them, and the strategies on which they had been supported. It was also interesting to know the learning environment that involved the situations presented. Difficulties encountered, children's moods and how collaborative work was favored with the use of digital educational resources. He was interested in reviewing children's ability to pronounce English words, listening ability, children's ability to discover, and the ability to make a story.

Figure 12. Presentación de los trabajos realizados por las educadoras.
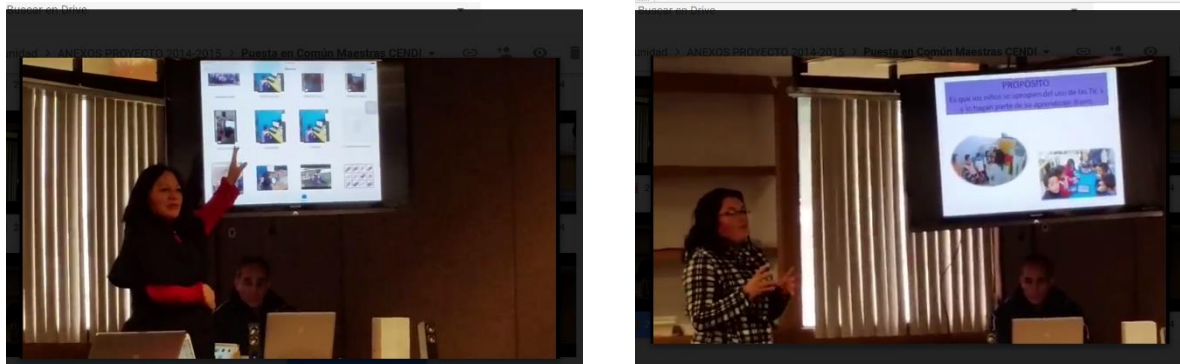
Source: Reporte del Proyecto multidisciplinario (ESCOM-IPN, 2015)

Teachers commented that before the use of technology, she told a story in which she involved words in English, the children listened and repeated their sound. Now the children elaborated a story in which they use the words of English that they learned with the technological-educational resource. It rescues the ingenuity and creativity of children. In the language and communication competition, the narrative is highlighted with its own words, the identification of sequences of events. In the competence of mathematical thinking the development of systemic thinking is supported

Regarding the children, the questionnaire applied to them sought to review what they had learned, how and by what resource.

Conclusions

It is important to build resources that use technology that is intuitive for the child as are the tablets, as their size allows them to interact with the different figures that appear on the screen, in addition they are portable, which contributes to the child can work in the classroom or outside.

For the construction of the technological resource of the Zoo was a multidisciplinary team, pedagogues, programmers, digital designers and educators, which allowed it to be built according to the preschool education program, as well as related to the interests of the child and also striking by the colors and figures used.

It is worth mentioning that we had the advice of a person skilled in the subject of English teaching for preschool, in this case, one of the teachers who works at CENDI "Margarita Salazar de Erro" because it provided the methodology used for teaching and instructional design of the technological-educational resource was attached to this methodology (Herrera & Hojel, 1998).

The learning environment that enveloped classrooms in the classroom described the educators who was cordial, respectful, very interested in children, motivation, ease of communication, curiosity, exploration and discovery, which coincides with Papert's (1993)).

With this project it was possible to develop a technological-educational resource that can be used in any mobile device.

The development and implementation of the technological-educational resource whose theme was "the zoo" for the CENDI classrooms of the IPN (COCENDI, 2010b), aimed to guide the development of children's learning, skills and abilities in English which was covered, according to the results obtained in the evaluation stage, as well as to what was indicated by the educators and the English teacher.

Responding to the research question, The Zoo allowed the child to navigate and discover the world of animals, developed his memory by finding the letter of the animal that is the same

as presented, relating his image to the sound of his name in English. It also allowed the child to invent a story in which it involved the animals that are in a zoo.

The characteristics that allowed the development of different competences are: Taking the methodology of English learning pointed out by the English teacher who in turn relies on (Herrera & Hojel, 1998). To take into consideration what has been pointed out by researchers like Papert about the importance that the child uses an application so that he can create new knowledge, in this case the story he developed starting from the Zoo. Also presenting a part of the application as a game (memorama).

For their part, the parents expressed through the questionnaire that they were applied, that they saw their children more enthusiastic when carrying out the school activities and the house, with more interest, with pleasure in performing tasks at home, they liked to sing songs , they said fluently the parts of his body, explained how they brushed his teeth. They told stories and stories that had worked in class and programmed in scratch. They recognized the sounds of different zoo animals and their names in English.

In order for the educational and technological resources with which the IPN already counts and those that are added can be fully exploited, it will be necessary for CENDI to have sufficient mobile devices and a fast and secure Internet connection. In addition to this, it will be necessary to continue promoting a cyberculture in these schools.

Finally, it is considered that by releasing the use of the technological-educational resources that have been worked in the Institute will make a great contribution for the improvement of the educational setting of Polytechnic children.

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