



**Universitat de les
Illes Balears**

Education Faculty

End of grade work memory

Learning English through technology: Infant school education

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Degree in early childhood education

Academic year 2017-18

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	Yes	Yes

Key words:

ICT, educational robotics, activities, experiences, infant school education

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1. Introduction

The topic chosen to develop the Final Degree Project is English in the Pre-school Classroom, focusing on learning the English language by using the new technologies at our disposal.

New technologies offer different programs through which children can acquire knowledge of the English language in a motivating and fun way as they play, by learning either individually or in groups. As new technologies we find educational robotics, the interactive digital whiteboard and the computer, each of them with their respective programs or softwares.

To carry out the end-of-degree project I will use different sources such as: books, web portals, teacher blogs and Internet platforms. I will use the knowledge acquired in the course "Media and technological resources in the learning process during the early childhood" where I have acquired basic concepts of technology, examples of experiences in other educational centers and how to take good advantage of these technologies to learn English in preschool classrooms. In this subject, I have been enriched and I have been able to obtain new learning strategies through the use of technology. I have also experienced the learning phases through the use of technologies, especially with the use of educational robots such as the Bee Bot.

1.1 Justification of the chosen topic

As we already know, new technologies are increasingly present in our lives. From a very young age children already have electronical devices at hand that they use habitually such as phones, tablets and computers among others, to watch series, videos and search for songs or play.

In today's society people use these technologies increasingly; however, we must not forget to make good use of them and learn how to take advantage of them responsibly. We must use these technologies in order to innovate in education, so that teachers can

create new learning systems through which children can learn in a fun, motivating and simple way. There is also an increase in the incorporation of new technologies in classrooms, which justifies the need to review the different technological devices available, the different activities that can be carried out with technology and the experiences lived in schools.

1.2 Objectives

Next I will mention the objectives that I want to achieve with the knowledge of ICT in the classroom of young children.

- To present the different technologies that teachers can use in the pre-school classrooms.
- To initiate and to encourage the use of ICT in infant education.
- To create new ways of learning.
- To learn about the use of ICT in children's classrooms.
- To provide innovative activities through the use of ICT.

2. Theoretical framework

The theoretical framework is divided into 4 sections: 1) augmented reality (RA); 2) educational robotics; 3) interactive whiteboard and 4) computers.

2.1 Different types of technology or robots.

Next I will explain the four technologies that we can find in a class.

2.1.1 Augmented reality (RA)

Augmented reality is a technology that superimposes a real image obtained through screen images, 3D models or other type of information generated by computer. This

technology is classified into four levels of augmented reality (RA), then each of them is explained.

Level 0: Hyperlinks to the physical world. The activators in this level are the QR codes that link us to websites. If you have a QR code reader installed on your mobile device, scanning the next QR will take you to the home page of the website.



Level 1: Based on markers. At this level the activators are markers, figures that when we scan them we usually obtain a 3D model that is superimposed on the real image.



Level 2: Without markers. The triggers are images, objects or GPS locations.



Level 3: Based on the augmented vision. The augmented reality incorporated in glasses (google glass) or in bionic lenses.



With augmented reality (AR) the learning is more fun, more interactive and more visual according to Rousseau, who follows the argument of G.R. Amthor (2004: 3-4) "people retain (...) 75% of what they see, hear and do".

Reinoso (2012: 197-198) identifies 6 significant applications of augmented reality (AR) in education:

1. Learning based on discovery.
2. Eduactive games with RA.
3. Modeling of 3D objects. Reinoso (2012) defines it as "using tools for modeling objects and applications of augmented reality (AR), the student can create and visualize 3D models and manipulate them: zoom them, move them away, rotate them, place them in specific places or explore their physical properties "
4. Books with augmented reality (AR)
5. Teaching materials such as Catedu.

We can find different augmented reality applications such as Aurasma, Google Skymap, Fetch, 4D Anatomy, Ciberchase 3D Builder, Quiver 3D Coloring, etc.

2.1.2 Educational Robotics

Educational robotics are tools that facilitate the acquisition of knowledge in a playful way, based on the principles of interactivity, social interrelations, collaborative work, creativity, constructivist and constructionist learning and the student-centered didactic approach, acquiring digital skills and the development of logical and computational thinking. In this case, Pequebot is a robot that is formed by a programming set that is composed of cards, an application for mobile devices and a web page.

The knowledge acquired thanks to this robot is based on Papert's constructionist philosophy, incorporating knowledge of science, technology, engineering, mathematics and art (STEAM)

We can talk about two types of interaction with the robot:

1. Physical interaction: children manipulate, play and observe the robot.
2. Logical interaction: the child has to perform a sequence that leads the robot to perform a task.

Educational robotics are a way of learning based on the theories suggested by Froebel (2014) through which children are able to understand abstract concepts and different interaction patterns by manipulating and interacting with robots.

The theory of constructivism created by Piaget (1971) and the constructionism created by S. Papert (1980) are based on explaining how knowledge is acquired and developed in individuals.

The constructionist philosophy of Papert emerges from the constructivism of J. Piaget adding that the student acquires new knowledge when they are engaged in the elaboration of a tangible object with some significant representation for these.

According to CIVE (2017) knowledge and skills that are acquired through the use of the robotic tools are:

- Social learning that leads to the process of collaborative learning and which in turn allows the development of interpersonal skills and civic competences.
- Active learning, by solving problems according to their interests and needs, encouraging the development of critical, analytical and creative thinking.
- Development of oral communication skills.
- Acquisition of knowledge, mathematical and logical skills by learning the principles of programming.

- Development of kinesthetic intelligence is, according to Gardner's theory of multiple intelligences, defined as the ability to use one's own body to perform activities or solve problems whether by touching, moving or processing information through corporal

sensations, impacting the spatial and sensory development, and the motor coordination of students.- Learning based on constructionism and constructivism.

- Application of various pedagogical teaching methodologies such as project-based learning, problem solving, learning by doing and learning based on the game.

Educational robotics kits

Below is a short description which includes some characteristics about the robots that can be acquired today for preschool children. The most used ones at preschool centers are the Bee Bot and the Blue Bot.

1. Kibo Robot

It is a robot that counts with sound, light and distance sensors as well as a barcode reader through which all the programming instructions are entered.

It is composed of a series of wooden blocks, where different programming instructions are represented by images and colors.



2. Bee Bot

This robot is currently the most used one in children's classrooms for the initiation of students in the concepts of robotics. Competencies are acquired in the areas of knowledge such as reading, writing, mathematics, art, etc.

The Bee Bot is a robot that is controlled through the commands of its shell. The main commands are: back, forward, turn to the right and left, pause and a button to execute the sequences of steps that have been entered by using the previous buttons and another button to start the device to enter a new script.



3. Blue-Bot

Blue Bot is a Bee Bot with transparent case and bluetooth connection. The wireless connection allows you to connect to a mobile or tablet to use your application that is available for iOS or Android. It allows classic programming but also a series of games or challenges to complete. It also allows turns of 45°.



One can design activities in which the development of all intelligences proposed by Howard Gardner in his theory of Multiple Intelligences is enhanced.

A. Logical-Mathematical Intelligence

The use of the robot involves the use of skills such as counting, geometric figures, sequences, spatial concepts (front, back, left and right) and other concepts such as large, small, long, short, etc.

B. Linguistic intelligence
The activities performed in teams or couples imply a dialogue.

C. Visual-spatial intelligence

Children have to program the robot to guide it along a path, which entails the development and use of spatial vision.

D. Musical intelligence

The robot can include sounds and videos.

4. Roamer

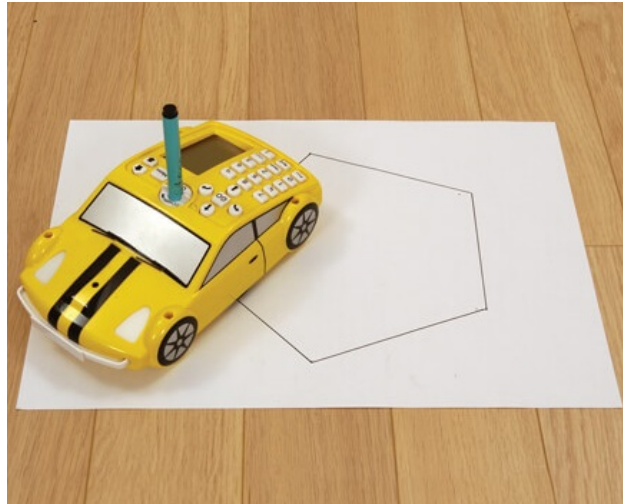
This is an educational robot capable of adapting to different ages and levels of skills and knowledge by changing the keyboard module on top of the device. Children can handle patterns of speed, distance and angle of rotation with the possibility of repetition.



5. Pro Bot

It is a more complex robot. It has light, sound and contact sensors and can be operated through the buttons on its shell or through a USB connection to a computer and PROBOTX software.

One has to enter the distance to travel which can vary from 1m to 5 m, forward or backward, whose angles can vary from 1° to 500°.

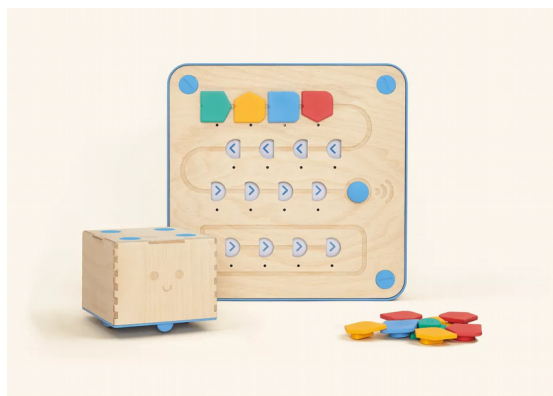


6. Cubetto

It is a robot in which the sequence of commands that make up the programming is through blocks in different slots of a board that represents the interface with the robot.

The blocks have different shapes and colors, each one represents a specific action: forward, left or right turn and function.

The board is divided into two parts; an upper part with slots that guide the sequence and where the children has to place the blocks of instructions and a lower part with slots, in which the children can enter a sequence of programming by using different blocks, once the pieces are introduced, the program is sent via Bluetooth to the robot represented by a wooden box built with Arduino.



7. Code a Pillar

This is a robot in which one can introduce the programming concepts for pre-school children in order to promote computational thinking skills and problem solving is formed or contains 8 segments that are connected to each other through a USB port, each of them representing a certain command such as: forward, right and left turn.



8. Tangibot

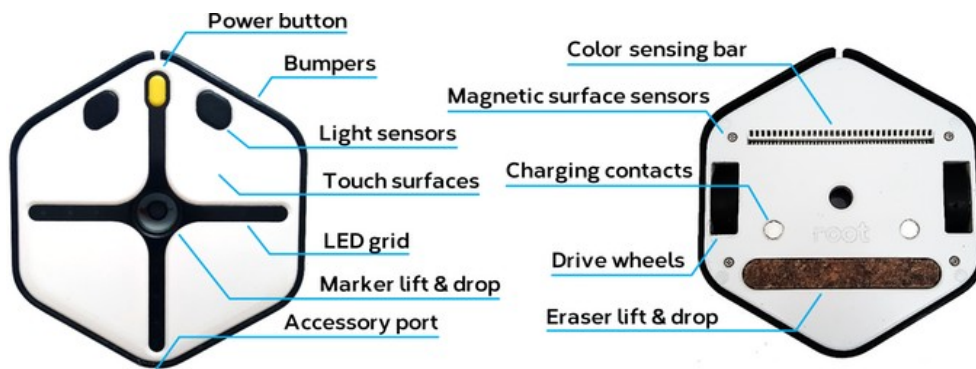
This is a robot that helps develop the logical thinking and social skills of children between 3 and 5 years old.

It incorporates an RFID reader that allows children to interact with the robot, handling it with playful objects, such as EVA rubber pencils, balls, plastic animal figures, etc. These toys also incorporate RFID tags, all encoded so that the robot responds with different types of behavior.



9. Root and Square

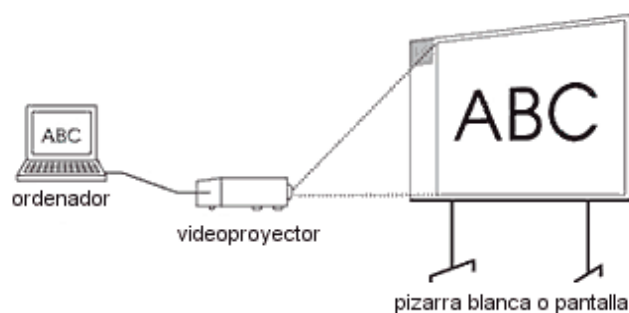
It is a robot that reacts to factors in the environment and whose interaction works through a code. It can be programmed to move, rotate, draw, erase, scan colors, play music, illuminate, feel touch, feel shock, detect magnetic surfaces, perceive light and respond to the sensors of one's phone or tablet.



2.1.3 Interactive whiteboard

The interactive digital whiteboard is a technological system, composed of a computer, a video projector and a pointer control device, which allows to project on an interactive surface digital contents in an ideal format for group viewing. It can interact directly onto the projection surface.

Its added value in front of the digital board is that it allows interaction directly on the projection surface by means of a pencil-pointer (or with the fingers if it is a tactile digital interactive board). It consists of a computer, a whiteboard and a video projector.



The benefits of using a digital board are:

- To renew the classroom methodology and awaken a new interest in the teacher towards new technologies.
- To bring the students closer, from the Early Childhood Education stage to the new technologies.
- To promote a great interest and motivation in the students.
- To respond to the diversity of the group mix.
- To promote autonomous, cooperative and playful learning, in which students are the ones who carry out their own acquisition of knowledge, and their peers who interact and verify the knowledge acquired, always through an essential tool, the game.
- To create a warm and relaxing atmosphere in the classroom.
- To enhance the creativity of students.
- To awaken the interest of children towards new technologies.

2.1.4 Computer

The use of computers and educational software is a research, manipulation and expression tool that motivates students and captures their attention.

This resource may favor:

- Stimulation of creativity.
- Experimentation and manipulation.
- Respect for the learning pace of students.
- Work in groups favoring socialization.
- Curiosity and research spirit.

Computers can have various programs such as Power Point, Youtube, camera, sound programs or sound recorders that serve as a tool for the work of oral language and reading texts.

2.2 Experiences on the use of TIC in preschool classrooms

In this section I will explain experiences lived with the four technologies explained above.

2.2.1 Augmented reality (AR)

The first experience was carried out in Domingo Santabárbara with first-year preschool students at the C.E.I.P Valdespartera de Zaragoza and it was called Valdesparteras is Culture. The project focused on sculpture through augmented reality (AR) with a sculpture representative of the neighborhood where the school is located.

The students worked and saw the different perspectives of the work from different angles and positions. This experiential activity does not limit the work of sculpture in photographs, but in a 3D object which students can handle and manipulate.

Another experience is that of two sisters who present a project called 'Villalba in your Hand'. On this project the students observe the flora and fauna of the area, make a geolocated route and listen to the anthem after identifying the municipal coat of arms.

The following experience is called *London through Augmented Reality* (AR) with Aurasma, in which children explain the places of interest in London, after focusing on a map of the city.

Another experience is from a teacher who experimented with augmented reality (AR) for the project on the human body. The project is called *Our Augmented Body*. The students play with the senses thanks to Aumentaty, draw augmented faces with Colar Mix and see what the inside of their bodies look like thanks to Anatomy 4D.

2.2.2 Educational robotics

In Diego Lainez de Almazán school the Bee Bots were introduced in the classrooms. In the first phase they learned what the robot consisted of; buttons, color, if it has wheels, arrows, etc.

In a second phase they manipulated the robot to discover how it works. It is very intuitive and they all worked it out together. In a final phase they had to program the movements of the robot to make certain routes through a board with different images or numbers.

It was concluded that it was very motivating for the children and they learned a lot. Thanks to the Bee Bot they have begun to take their first steps in educational robotics.

Some activities that have been carried out are:

1. They built a simple circuit with the construction items available in the classroom for Bee Bot and decided where the start and the finish line were.



2. They searched with Bee Bot for the initials of their names.



3. Bee Bot must start from a number (graph) and get to the card with as many points as the starting number.



This experience with the Bee Bot started at the beginning of the course at the C.R.A Orba school, with the robot the children have learned a lot of things from a practical and motivating perspective. It has also helped them to develop their spatial organization, to reinforce concepts they are learning, to learn in a meaningful way, in addition to approaching the world of robotics and programming. Bee-bot is very fun! Said the 4 and 5 year-old children.



The following experience is from a school located in the town of Grisén. They have carried out different activities with the Blue Bot. The first was to ask questions and find the footprint of the animal that had been named by programming the robot.



While playing they realized that Blue Bot could also spin. At first they did a test, programming on their heads ... but they realized that it was not as simple as it seemed. So they decided that they would write it down on a piece of paper and then they would put the code for Blue Bot to perform the action and achieve the goal.

The students were willing to share their experience with others so they went to their classmates and invited them to play. Together they played with the game they had created about emotions. But the most beautiful experience was when their families came to play.



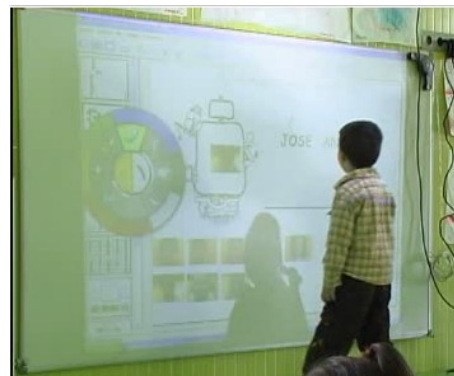
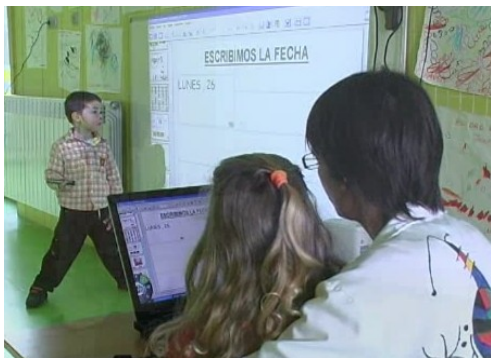
2.2.3 Interactive whiteboard

This experience has been carried out in the center C.R.A Valle del Bullaque el Robledo (Ciudad Real) at first it was only focused on the use of interactive whiteboard and its components; pencil, software, some educational links, etc. Now the teacher is trained to create the activities herself.

For her the blackboard is a resource not a methodology. The interacting child picks up the pencil, places his project of the day, etc. It becomes more visual and they even get to take home all the activities they have carried out on a CD.

Before the teacher had to prepare activities on paper cards, now she just needs to store them on a computer and can retrieve them whenever she wants.

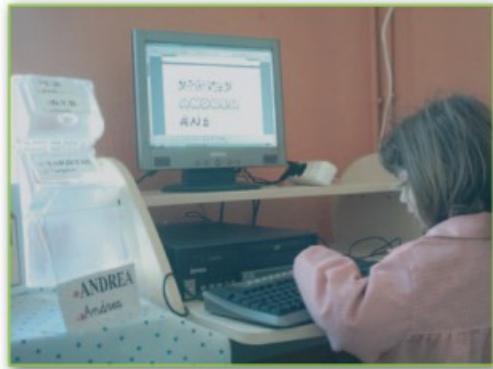
The use of this resource has caused the teacher to innovate in the way of teaching and transmitting concepts for children. It is a new fun way of learning by being more involved in a more visual and interactive way.



2.2.4 Computer

The next experience took place in a center with 3-year-old students. They did activities in a large group, such as writing their name in different types of creative letters.

3.Proposal of activities to carry out in the classroom for children.



They also carried out activities in small groups. In this game they associated number with quantity. They are also participants in the assembly, the person in charge is responsible for passing the list and taking attendance.



The computer is a resource usually available in educational centers, since it does not imply a cost as high as robotics and interactive whiteboards.

3. Proposals of activities with the different resources of the Tic.

Next I will describe different activities that can be carried out in preschool classrooms with the technologies or devices that we have seen in the theoretical section.

3.1 Activities with augmented reality (AR)

To carry out activities with augmented reality (AR) we will need a mobile device or a tablet with the application that can read the different levels of augmented reality (AR).

We have two options:

- A. Online search for educational materials that are available.
- B. Use of the different applications to create the activities that we want to carry out.

We can work on a wide variety of topics such as numbers, colors, animals, geometric figures, places in the world, countries, etc. We can also find songs, stories, books, 3D object models, various didactic materials, etc.

Thanks to the augmented reality (AR) the characters and the scenes of the books come to life, this leads the students to interact with them and they get to live the stories they tell in a more profound way.

3.2 Activities with educational robotics

The most used robots in preschool classrooms are the Bee-bot and the Blue Bot. These aspects must be taken into account:

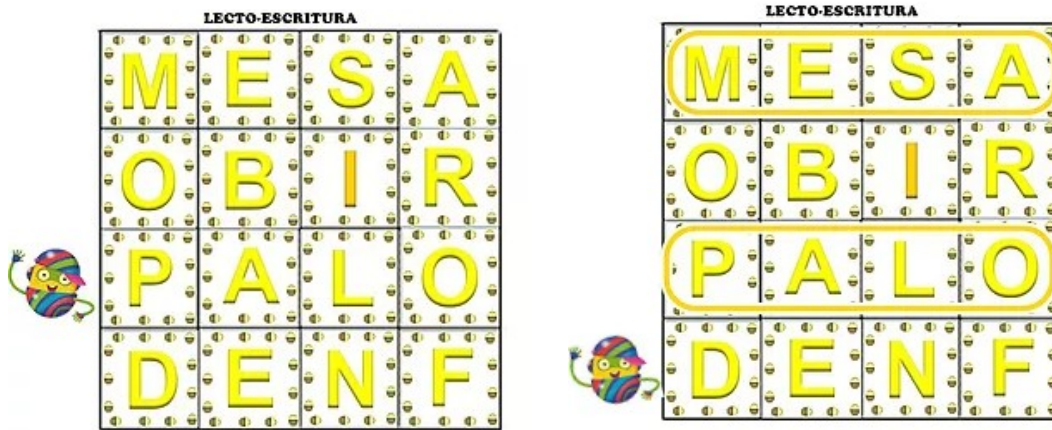
- The robot advances 15cm with each command
- The squares measure 15x15cm
- The mat has 8 squares, with a size of 60x60.

Before starting any activity, children should become familiar with this resource and its operation. They have to learn the commands so they can make cards with the different movements that the robot can make.

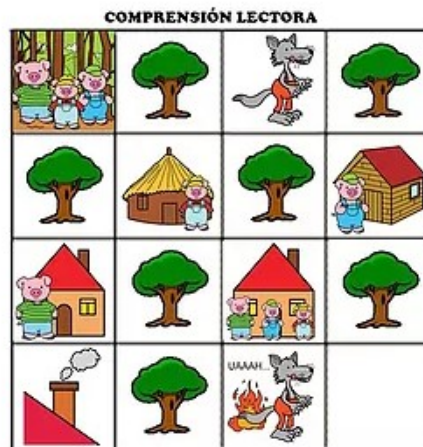


Activities to work on reading and writing

We can create activities where children recognize and visually discriminate the letters of the alphabet, create words or alphabet soups.



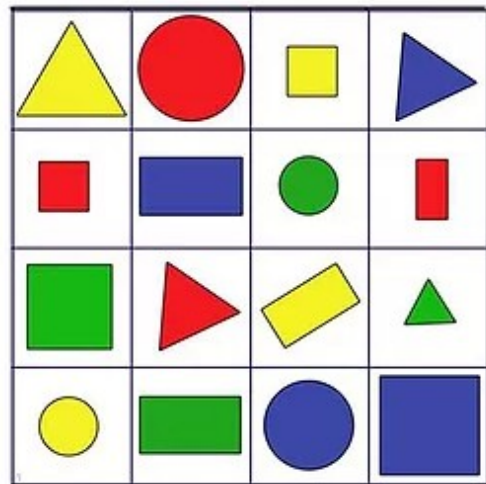
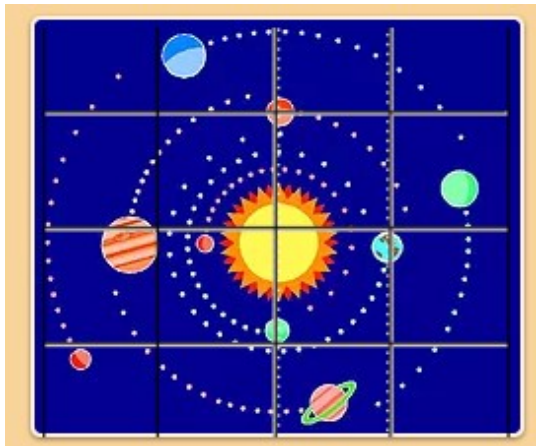
We can also do comprehensive reading: children will have to program the robot to go through the scenes of the story.



Logical-mathematical activities

The child works on mathematical concepts such as numbers, quantity, small sums, mathematical problems, spatial organization (directionality and laterality), geometric figures, etc.

Example of mathematical problem



Activities of identity and personal autonomy

We can build mats to work hygiene habits, emotions, etc.



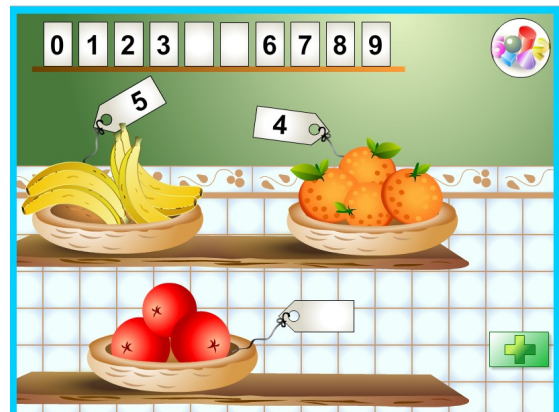
3.3 Activities with interactive whiteboards

The interactive digital board is often a resource that many schools have at their disposal, with it activities can be created by teachers with any format they choose. There are various activities that can be created and adapted to different levels according to the age of each child.

We also find interactive programs that contain a great diversity of activities, more often the publishers provide programs through which one can enhance the different concepts that are worked on in each teaching unit.

Being a resource with a large screen and good sound quality allows us to use it as a support for projecting a movie. On important dates such as Peace Day, Easter, etc., activities can be prepared for students, and we can also involve families.

Another way to use the digital board is in an introductory way for games or activities that children will then perform individually in the computer area. It is also ideal for students to approach written language dynamically and with innovative activities.



3.4 Activities with the computer

The computer is a resource used in the classroom to carry out various activities such as searching for information, listening to songs and activities programmed by the teacher to work with educational content. We can find software where educational contents are worked on. Nowadays we can find many educational programs.

The activities can be individual, in large groups, in small groups or in pairs. We always have to establish the rules of use and the time that is going to be dedicated to them. Normally the computer area is called the corner of the computer, where we can carry out the following activities:

Class group activities: they would be basic explanations to clarify how to act and to introduce the rules, how to make good use of the computer and the dangers involved. In this presentation there will be a selection of concepts; as an example one can do tours, make drawings by choosing figures (moving a triangle, square, ...), vocabulary games (four figures appear on the screen, the computer says their names and the children have to match them with their names).

In small group activities children can do series, find the missing pieces, complete tracks, solve mazes, etc. The individual activities will be adapted to the level of each child. Some will learn to use the mouse and others will have some skills reinforced, depending on the previous knowledge they have.

4. Conclusions

As it is well known, technology is now available to everyone, we use it more and more frequently and it is part of our day to day life. Therefore, it is essential in the field of education to take good advantage of this technology and learn how to use resources such as educational robots, laptops, interactive whiteboards, computers, etc.

It is a tool that allows teachers to create a wide variety of activities which include 3D models, videos, augmented reality, images, Power Point presentations, etc.

It is important for teachers to be in touch with this technology, to know how it is used, how to get the best results out of it and to have a clear idea about the objectives that need to be achieved.

Students in the early childhood education cycle acquire knowledge in an innovative, fun, more motivating, more visual and more interactive way. It is a different way of learning, it is not as traditional as the old learning methods and children feel much more involved and therefore they are more fulfilled and content.

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