Roamer Robot in Portugal

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Abstract

For a long time, many schools in Portugal have begun using Roamer Robot in their classroom activities.

Roamer is an autonomous robot that can be used by a group of children in their activities. Using this ICT tool, it is possible to develop many of the essential skills presented in the scholar curriculum. Mathematics is the subject that this ICT can help the most, but skills from all curriculum areas can be put together in the same activity. For all this, Roamer Robot is a flexible tool and can cross all curriculum areas.

In Portugal, this is the only ICT used in classrooms having specific characteristics; the other ICT's always depend on having a computer where they can be played.

As well as CNOTINFOR represents the Roamer Robot, its team has been training and supporting projects that involve the use of this robot in schools in a very innovative way.

In this paper, we intend to show examples of what has been done with Roamer Robot in Portugal and what people from the educational community think about it.

Keywords

Logo, Roamer Robot, Basic skills, Teachers' training, ICT, Early education, Robotics,

1. Introduction

Life is not about "knowing the right answer" – or at least it should not be – it is about getting things to work! (Papert, 1999)

Learning with a Roamer robot is similar to this idea, we have to understand and program it to do things as we want them to be. To achieve this, we will have to program over and over, starting many times from the beginning, but every time we will learn something new!

Roamer is a very friendly robot made to be used in the classroom in early education. This robot is programmed with Logo Language basic concepts like forward, back, right and left. *With the robot, the children can, in a playful way, turn abstract concepts into reality. Examples include measuring, comparing lengths, moving in a specific space; drawing a path diagram; expressing these concepts in words.* (Cruz, et al. 2003b).

In Portugal, there are some projects and places where Roamer robot has been used for some time. At the present moment, many schools are receiving a Roamer through a governmental project, where the Ministry of Education has recognised it as an important tool to be used in the classroom. So forth, the use of Roamer is increasing in Portuguese schools and the need of training is also growing.

In this paper, we will explain how the use of Roamer is being made in Portugal by showing important projects that are taking place. We will also show some work done in the training workshops that have taken place in CNOTINFOR Training Centre.

2. Using Roamer in Portugal

The first appearance of Roamer robot in Portugal has occurred in the early 90s, when a governmental project was developed: the Minerva Project. This project wanted to make new technologies available in all schools and most of the software used was Logo based.

Many teachers that have participated in this project remember the black screen with a triangle (the Logo turtle) in the middle. They remember the curiosity of the children that have never seen a computer in their life, and the joy when they saw they could interact with a machine, play games, draw and write.

At that time, many Roamers were introduced by the Ministry of Education in some schools and teachers were trained to use them. Many teachers remember the work accomplished with joy, because it was something very important for the learning process of the children.

But as the years went by, the teachers, which had this training, left their schools and the new teachers did not know how to use Roamer. So in some places, these robots are still locked in rooms or lockers.

However in other schools the Roamer is used regularly. There are some projects well documented. We will present three of these. The first two have finished as a project but the Roamers are still being used. The last one has just started.

2.1. Computers in Early Childhood Contexts

It was developed as a subproject of Trás-os-Montes Digital Project, by Trás-os-Montes e Alto Douro University and was named *Computers in Early Childhood Contexts*. The aim was to promote the use of ICT in playful educational ways and integrate them in the regular activities. The Roamer was one of the several available ICT tools.

The activities developed with the children using this new tool were similar to the ones already done before. So, stories like Little Red Riding Hood were funnier and children were able to learn to express themselves at the same time they learned concepts of space orientation by programming Roamer to do the path though the forest like the characters of the story. Other stories were worked, songs were composed, games were played and many other things.[9]

With this project, many teachers had the opportunity to see and experience to learning by doing and the results with children. Who worked in this project had the proof that Roamer is a powerful tool that introduces mathematical concepts to children in early stages in a very easy way. (Cruz, et al. 2003a; Cruz, et al. 2003b)

2.2. Roamer Microworld

The second project was implemented by a team of researchers of Paula Frassinetti Educational Training School in Porto named *Linha de Investigação*.[10]

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[9] To know more about this project, look for Cruz, Monteiro, Morgado & Morgado (2003a). A Robot in Kindergaten in *Proceddings Eurologo2003: be creative… re-inventing technology on education*. pp 382-387. Porto: CNOTINFOR; or Cruz, Monteiro, Morgado & Morgado (2003b). A Robot in Kindergaten in http://home.utad.pt/~leonelm/papers/RobotinKindergarten/RobotinKindergarten.html.

[10] To know more about this Project, look for Correia, Secundino; et al (2004). *Micromundos AIA*. pp 134 – 156. Porto: ESE Paula Frassinetti or in http://www.esefrassinetti.pt/~aia/.

The researchers involved knew Roamer and their results in children's learning process. For so, they have drawn a project that intended to introduce Roamer in the classroom by giving guidelines to teachers and building a collaborative community to exchange experiences, results and suggestions.

This project was implemented with groups of children aged six to eight years-old. Three schools in Porto, five teachers and six students of the Training School were involved.

Using a web platform, it was possible to give guidelines to the teachers and to encourage them to exchange experiences. After some time, it was possible to see suggestions of the use of the Roamer made by the teachers.

Figure 1.   Work done by one of the children.

Figure 2.   Scenario of a city built by one of the classes.

Figure 3.   Children discussing how they could achieve the aim of their work.

The results of the use of Roamer were very good. All children and teachers have enjoyed working with it and learned a lot. The evaluation made by all the people involved has shown that this project was very important to learning and that Roamer robot was a very powerful tool.

After the end of the project, it was important to verify that one of the schools continued to explore Roamer autonomously.

2.3. Pyramid Project

In Abrantes, a Portuguese city, the *Pyramid Project* has begun, whose partners were the Superior School of Technologies (*ESTA – Escola Superior de Tecnologias de Abrantes*) and the City Hall of Abrantes.

The aim of this project was to create a technology room available to every child of Abrantes to see and use it.

This is a room in the Pyramid Building, a building refurbished by the City Hall, to be a place where everyone can attain to every technology available.
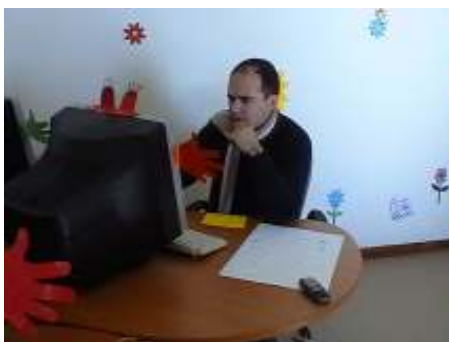

Figure 4.   Computers in the Pyramid room.

Figure 5.   Space in the Pyramid room to play

with Roamer.

The project has begun with a training workshop for teachers about technologies. They had made a big assignment about driving prevention during this period. It was taken to an exhibition of technologies that occurred in Abrantes in November of 2004. The 3rd prize was given to this project, and it was very important because it was the only education technology expose.

Figure 6. Outdoor presenting the project in the exhibition.

Figure 7. Project presented in the technologies exhibition

This prize gave to Pyramid Project a big importance in the city of Abrantes and showed how Roamer could be used. Some teachers have asked for further information about it.

Today the project is growing: groups of children from Abrantes' schools are arriving to the room in the Pyramid Building to work with technologies. But the Pyramid Project team is also reaching to schools to help teachers working with the available technologies. Roamer is one of the technologies available and the one that gave this project the impact needed for it to begin.

3. Training teachers to use Roamer

Since the early 90's, CNOTINFOR team has trained many teachers and other professionals in the use of Roamer in their daily activities in schools or in therapy.

Today this training is more frequently and the assignments fulfilled during the training workshops are excellent.

We will show some interesting assignments developed during Roamer training workshops.

3.1. The Tortoise and the Hare fairy tale

This was a training that CNOTINFOR has organised in 2003 for the team of the project *Computers in Early Childhood Contexts* mentioned.

Figure 8. Sequence of the activity

The group began to draw what they wanted to do: they decided to perform the Tortoise and the Hare story using the Roamer. They started with the making up of the Roamer: one hare and one tortoise. After this, they built the scenario: they draw a path on the floor and put some trees and other nature things in it. At the end they programmed the Roamer. The performance has begun with an "Action" order, like in the real movies! The narrator explained what was happening and sometimes had to interact with the Roamers. At the end, one of the turns of the turtle went to the wrong side, so one element of the team picked on of the Roamers up before they crash with each other!

The aim of this project was to work a story inside an early childhood classroom. Many skills could be developed with this activity: expression, art, space orientation, directions and sequences.

3.2. The illusionist man

This was a workshop training that took place in Abrantes. Some were involved in the Pyramid project. In this assignment the Roamer had sensors, motors and lights.

Figure 9.   The illusionist man activity

This was an activity developed to introduce the addition process with children of key stage 1. Roamer was an illusionist man that responds to a number of hand claps. The idea was simple: a child takes a number from an envelop and the teacher claps his hands that number of times. The illusionist "counts" the claps and lifts his arm that number of times and goes forward the same number of steps. All the children have to say which is the number in the floor where the Roamer will stop. When arriving at the end of the path, the illusionist man turns back and returns to the starting point.

This Roamer program was a bit difficult. The Roamer uses a sound sensor. When the hands are clapped, the Roamer begins a sensor proceeding. At the end of each sensor proceeding, the Roamer is ordered to do another sensor proceeding when another sound will be heard. The result of this Roamer program was incredible; nobody was able to guess how the group could do this. But this information was in the guiding material given to the trainees!

An activity like this could be very motivating to children in the learning of addition process.

3.3. Cnoti ET came to Coimbra

This was a training workshop with a group of people that work with autistic children in Coimbra. They have drawn activities to be developed in their daily work.

Figure 10.   Cnoti ET activity

For this activity, three Roamers were needed: Cnoti ET, a Coimbra student and a car. A scenario of a city was built. The story was that Cnoti ET had arrived to Coimbra and wanted directions to go to a specific place. He found a student, but the directions he gave him were not enough. He went to a restaurant nearby and they told him all the directions. But he did not know how to walk in the streets. He tried to go to the other side of the street but a car was passing by, and it had to sound the horn for the ET to go back. He had to wait for the signal to be green to walk.

This activity is important for a group of autistic children, as they see themselves as ET's: different from everyone else. So they identify themselves with the character. This is also a way to work the traffic and social rules.

4. Opinions about Roamer

All people that had participated in a training workshop about Roamer enjoyed this tool and recognised the importance of its use in education. They gave importance to the improvement and development of some skills by using Roamer like: space orientation, logical sequence, moving in a specific space, measuring, comparing lengths, express concepts in words and art.

All these skills can be developed in a classroom, museum, library or in a space where children can learn by playing.

Roamer is characterised as a tool that can introduce mathematical concepts to children in early stages. Some of those can be very abstract, but with the help of the Roamer, children can see these concepts as something tangible and easy.

However Roamer is not a perfect tool. There are some limitations pointed to this robot:

1. It is complex to program: it is needed to press many buttons to do something;

2. It cannot do two or more things simultaneously;

3. It cannot memorize programs after it has been turned off;

4. The memory has low capacity;

5. It is expensive and so it is almost impossible to have one in every school;

6. The sound is low, so if we try to work with a Roamer in a classroom, we probably cannot hear it.

These were the major problems detected by the people who participated in a training workshop about the Roamer robot. For some of them, Roamer World software was able improve the robot in some of its limitations. Roamer World is a software that simulates a Roamer. Paths, music and all things like a real Roamer can be programmed and the results of the program can be seen in the screen. After this the program can be sent to the robot. Another possibility is to import the program in the Roamer to the computer and save it there.

This software improves the use of Roamer robot. For some teachers it is even better than the Roamer itself, when used with specific children, like autistic ones. Autistic children do not like things that do not work like they want, they need routines. With Roamer they do not achieve routines, they have to try many times to do something and they do not like it. With Roamer World, they can modify what is wrong on the program and save it in the disk to see it as many times as they want.

But this is the opinion of those who work with this specific group of children. Because of this opinion, they have not tried to use the Roamer with the children. So we are not certain about this effect on autistic children.

5. Final Words

In Portugal, Roamer robot has a long past with positive results that are like seeds. The seeds of the present are appearing, but the future depends on the conditions.

Portugal is known for the low literacy level that has been reported in many international studies. This is something that Portuguese government wants to change. One of the ways is to put ICT in schools and promote training among the teachers. This is something that is happening right now.

Logo language and its methodology of learning are present in some of the software and also in Roamer Robot. Some projects using those ICT tools had been taken place and the satisfaction of the people involved is quite high. Everyone has realised that the learning made by children during the activities with Roamer has improved theirs skills more easily than in traditional classes. The acquired knowledge with these activities is the basic skills that they need to understand other concepts afterwards in life.

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