

# **ADVANCES IN TECHNOLOGY-BASED EDUCATION: TOWARDS A KNOWLEDGE BASED SOCIETY**

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# Communication and information technology in pre-primary school

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## Abstract

During the past decade, the world is becoming more and more an information driven society. Information and communication technologies represent a large fraction of the economy and are being used almost everywhere. Sometimes there is a tendency for thinking that technology can cause harm to kids when used and abused from very early ages. However, if properly used, technology can help children to learn concepts in a more natural (and more fun) way, something that Seymour Papert has called *home-style learning*.

Our investigation explores preliminary experiments to be conducted with pre-primary kids with ages ranging from three to five years old. We give special attention to the Logo software invented by Seymour Papert. Logo provides an environment which is suitable for exploring new worlds. Influenced by his work with Jean Piaget, Papert designed Logo with children in mind and with the philosophy that people (and children in particular) learn best when they can experiment and learn from their own mistakes.

There has been some studies on the utilization of information technologies by primary school children, but there has been very few with pre-primary children. Our study addresses a number of questions: (1) Can very young children learn to give directions to the Logo turtle? (2) What type of drawings do they try to implement? (3) Do they draw abstract worlds or try to represent the real world? (4) Can they apprehend simple arithmetic concepts more easily with Logo, and (5) Do they have fun using Logo?

## 1 Introduction

Information and communication technologies are becoming more and more important in our society. Therefore, it is necessary to prepare our children to use these technologies in a natural way. In our opinion, this preparation must start soon, during pre-school, because as Papert says [2, 3], children seem to have a special affinity with technological equipment. The reason for that is simple. As opposed to what happens with many adults, children are not afraid of exploring technology. A child explores technological equipment without fears, just like he/she explores remaining portion of the world that surround him/her. By doing so, children learn to work with technology in a natural way.

Seymour Papert argues in his books [2, 3] that children have an incredible potential. As adults, we seem to be always surprised with what children are able to do. And this happens even with adults that spend their lifetime studying children behavior.

A child explores the world and detects when he/she makes something wrong. When that happens, he/she tries to undo the error [2]. This process is a very natural way of learning.

The following sections describe the main idea of our project as well as the main research questions that we want to investigate. We also present the methodology that we will be using in a small pre-primary school in a small village in the southwest of Portugal.

## 2 Research questions

The idea of this project started as a conversation between the authors of this paper. During the conversation, one of the authors remembered the experience that he had (as student) with Logo in primary school. His contact with this programming environment started through the MINERVA [4] project, a national initiative that started in 1985 and that had as objectives (1) provide technological equipment to schools, (2) introduce information and communication technologies to both teachers and students.

The authors knew of a pre-school in a village in the southwest of Portugal, that is relatively distant from urban centers, and thought about using the children from that school as a case study. Other studies have already been done in Portugal in this area, but those studies have used mainly programming environments such as ToonTalk [1]. In our case, we wanted to analyze how very young children behave with the Logo language itself.

Our study addresses the following questions:

1. Can very young children learn to give directions to the Logo turtle?
2. What type of drawings do they try to implement?
3. Do they draw abstracts worlds or try to represent the real world?
4. Can they apprehend simple arithmetic concepts more easily with Logo?
5. Do they have fun using Logo?

These questions may seem strange to some readers because one might ask how is it that a child that is not able to read, capable of using a version of the Logo software such as MicroWorlds, MSWLogo, or other. Why not using a software environment specifically targeted to pre-school children, something like ToonTalk?

People who make these questions are possibly right in some sense, but as we already mentioned previously, children have an incredible potential which is often largely underestimated by adults. Therefore, we would like to investigate if children are capable of using a standard version of Logo. Of course, we will not expect that children start writing Logo commands to give orders to the the turtle. Instead, we will be using a methodology which is described in the next section.

## 3 Methodology

We associate each command to a nickname, programmed by some procedures. Each nickname consists of a single letter that stands for the first letter of the Portuguese command. A short example can be seen in table 1.

In addition to developing their mathematical skills, this methodology will allow children to learn the letters of the alphabet in a fun way, and also to develop their sense of orientation by learning the distinction between left and right.

Children will be working in groups with the aid of a teacher. However, we do not want that teachers force children to work with the computer. Instead, we want to promote a free environment where children use the computer and Logo only if they want to. Indeed, one interesting variable of our study is to discover the degree of interest that children demonstrate to use the technology.

Table 1: Short example with Logo commands abbreviated.

Command	Nickname	Portuguese	Figure
forward	f	frente	
right	d	direita	
left	e	esquerda	
back	t	para trás	
pu	c	caneta em cima	
pd	b	caneta em baixo	
...	...	...	...

## 4 Summary and Conclusions

This paper argued that information and communication technologies can be beneficial for very young children. We have outlined several ideas involving the use of the Logo programming language that can be used with pre-school children. Some of the experiments are currently being conducted and we hope to report the result of our investigations in the near future.

## References

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