

Computer Programming in Kindergarten Education Research Using ToonTalk

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Abstract

Kindergarten education, in a very generic way, aims to help kids learn skills and create a personal sense of the world around them, making learning easier and more natural.

However, computer use in kindergartens deals more with a new medium to do drill-based activities or creative activities not directly associated with computing, i.e., painting, drawing, etc.

Can kids this young be introduced to the single most powerful feature of computers – their ability to be suited to the users’ needs? This can be achieved by choice of different programs; customisation of existing ones; combination of distinct elements (i.e., seeking the right free Java applet for use on a personal page) or even full-fledged computer programming.

If this is possible, then: -

- What issues must be addressed in order to do such an introduction?
- What are the skills that must be mastered?
- What loopholes or conceptual traps may kids fall into?

Since January 2000 we have been conducting research that aims to find some answers to these questions, or at least shed some light on them.

Preliminary bibliographical research yielded a single reference on computer programming with kindergarten children, dated from 1974. This paper described a “card-machine” and a “button-machine”, which kids could use to produce some simple programs, manipulating this hardware.

Currently, several children-programming software packages exist that are less dependent (or even, for simple programs, completely independent) on reading and writing skills, which raises the possibility of using them to introduce programming concepts in kindergarten.

We have made some considerations regarding the suitability of three distinct packages: Stagecast Creator (AKA Cocoa), ToonTalk and Imagine (LOGO version, with a fully graphical programming interface, marketed in Portugal as *Floresta Mágica* – Magical Forest).

Having chosen ToonTalk as the focus for our research, initial experiments were conducted with 7 children, aged 4 and 5, on three different kindergartens, during May-June 2000. During these experiments kids programmed robots that swap trees and flowers, trucks and bombs and even a generic robot that swaps any two images; a robot that vacuums up nests from boxes; a robot that vacuums bombs from boxes; and even a pair of robots that use birds to pass a ball among them.

This motivated us to conduct more extensive research, which took place between February-June 2001, with 21 kids aged 3-5, from 2 different kindergartens, in two different situations: kids aged 4-5 were given “ToonTalk sessions” in groups of 6, two kids per computer; kids aged 3 participated in sessions only two at a time, at the same computer.

This paper will present our experience using Portuguese ToonTalk with these children, including both the 2000 and 2001 sessions.

The analysis of the 2001 sessions is still underway, but the free form that the sessions took allowed us to gather examples of specific programming skills that must be addressed: purpose of a program (“What is this robot going to do?”), requirements (“What must you give to the robot in order to teach him that?”), correctness of a program (“Will this robot do what you taught him?”), intent of a program (“Now, do you want to see your robot working?” Kid: “What for? I just taught him.”), among others.

ToonTalk-related, computer-related and other issues were also detected.

The most encouraging results, including the kids' enthusiasm and the robots they managed to program, will be presented, along with some of the hurdles that require longer, broader research.

Among the issues still under analysis, whose status at the time will be presented, is the presentation to kids of different sequences of themes, activities and skills, and the distinct results regarding the kids autonomy using ToonTalk and enjoyment doing so.