Microworlds

Computers are widely used in schools, but most educational programs are merely electronic textbooks. Logo is different — it uses a computer to provide a new kind of 'learning environment'

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Walking Turtle
The turtle was designed as a device to think with — particularly in the course of learning about geometry and spatial relationships. When children are unsure how to instruct the turtle to perform a particular manoeuvre, they tend to act out the role of the turtle by walking around the floor and obeying the LOGO instructions. This makes learning a far more 'real' experience

Since the micro first appeared in 1977, far-sighted educators have been quick to identify its potential as a teaching aid in schools. Most schools now have at least one machine, and many offer computer studies as part of the curriculum. Nevertheless, the micro has made few inroads into traditional teaching methods.

The strongest evidence for this lies in the range of educational programs currently available for home computers, which in the main exhibit a remarkable lack of imagination. The majority can be described as 'electronic textbooks', in which the computer presents the pupil with a series of 'frames' on the screen (equivalent to pages in a textbook) and then tests how well the information has been absorbed by means of a series of multiple-choice questions, which the computer marks automatically without the need of a teacher.

Such packages are easy to write on a home computer and offer the benefits of colourful — perhaps even animated — graphics as an accompaniment to the text. This is, however, merely automating the existing process rather than applying the power of the microcomputer in new ways.

LOGO is different. Primarily the work of Professor Seymour Papert, of the Massachusetts Institute of Technology, LOGO is defined as being 'a philosophy of education, and a family of computer programming languages designed to help implement that philosophy'.

Many people have mistakenly viewed LOGO purely as a programming language and compared its commands and facilities with those of BASIC, concluding that LOGO is a far better language for beginners. This misses the point. Papert never intended his system to be a method of teaching children to learn programming. He conceived it as an environment in which children could learn diverse subjects — one in which they could, in fact, learn how to learn.

Much of this philosophy derives from the eminent Swiss educational philosopher Jean Piaget, who argued that, given the right environment, children can learn any subject for themselves in the way that they learn to walk and talk. Piaget's work, however, was entirely theoretical, and Papert set out to produce a practical environment for Piagetian learning.

That traditional education methods don't achieve this is evident from the fact that the majority of adults are afraid of learning and do not enjoy the idea of having to acquire new skills or areas of knowledge. The most common symptom of this, argues Papert in his book *Mindstorms — Children, Computers, and Powerful Ideas,* is the widespread fear of mathematics — or 'mathophobia', as he calls it.

One of the reasons for this is that most subjects are taught in the same way, whereas their applications are completely different. Children are taught, for example, to multiply in the same way they are taught the capital cities of the world — by rote learning. The learning process has been divorced from what is being learned, when it should be inseparable.

Papert himself views learning a new skill, whether it's flying, cooking or a foreign language, as a hobby. He attributes this attitude to his childhood, when he discovered how gearwheels work at an early age and applied this concept whenever he came across a new problem. Albert Einstein, too, used to say that when he encountered something he didn't understand, he would break it down into concepts that he had grasped before the age of five.

These powerful notions were incorporated into LOGO, as can be seen in our example of LOGO in action. The first important feature of LOGO is the turtle, which was designed as 'a device to think with' in the same way that Papert used gears as a child. For young children, the turtle takes the form of a specially designed floor robot (see page 176), which is linked to a micro and can be moved around the floor by typing in commands in LOGO. The turtle usually carries a pen for marking shapes on the floor, and it can also feature a small loudspeaker and collision detectors that guide it through an obstacle course.

Children usually graduate from using floor turtles to screen turtles — shapes that can be moved around the computer's screen. The turtle is