EDUCATION

EDUCATION; INTERVIEW: SEYMOUR PAPERT ON COMPUTERS

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SEYMOUR PAPERT, a professor of mathematics and education at the Massachusetts Institute of Technology, is a major pioneer in the use of computers in elementary and secondary schools. Mr. Papert, a student of the late Swiss educator and psychologist Jean Piaget, is the creator of LOGO, the computer language most widely used with young children. His writings, including his book ''Mindstorms,'' published by Basic Books, have had considerable influence among educators in this country. Mr. Papert recently discussed his views on computers and education in an interview. Following are excerpts from that discussion:

Q. What is your impression about the way computers are being used in most elementary schools today?

They're not being used very much. Across the country, there's about one computer for 70 children, and you can't do very much with that. Imagine that writing had just been invented, and somebody said, ''Let's take it easy. We'll start by putting one pencil in each classroom.'' The idea of one computer in each classroom is about as absurd as one pencil in each classroom. Q. How do you describe LOGO? LOGO is a program, which is to say it's a way of making the computer do what you want it to do. LOGO gives a child the possibility of exploring the power of the computer and mastery over it. You frequently see children work for many weeks on a complex programming project. This involves planning, making different parts of the project, putting them together. That is quite unusual, since our schools do not normally give elementary schoolchildren the opportunity to work for a long time on a complex project. Programming does.

Q. Can you give a very specific example?

Make your simulation of the space shuttle. You have to design the shape, make it move, make the rockets fire. It gets up to the sky, takes off in an orbit and eventually lands. In the course of doing that you have to worry about how to describe the movement of the shuttle and the stars in the background. All of this has a lot of content and a lot of challenge. If you ask the child ''What are you doing?'' the answer you will get is, ''I'm drawing something beautiful'' or ''I'm making a space shuttle.'' You won't get the answer ''I'm doing mathematics,'' but that's what's happening. And this is where it's fundamentally different from a traditional curriculum. There isn't the Balkanization of knowledge which makes mathematics one little compartment, art another, music another, science another and so forth.

Q. How about these other academic areas?

The mechanics of writing is a terrible chore, so young children don't do much. The word processor makes it easy to play with language, to correct, to experiment with a different form, to see your product neatly typed out in the form you can be proud of instead of it being a mess. Or take social studies. The computer makes it possible for very young children to manipulate data about society and get a grasp on the way social movements were formed. You can also use the computer to simulate the economy or the geography of the planet. It allows children to take control and to manipulate kinds of knowledge that have been totally bookish in the past. And then, of course, there are the sciences. Q. Explain. What's most important in physics is the laws of motion - how they affect the stars, atoms, gravity - but it's almost impossible to study this even in high school because the mathematics is just too complicated. Or was until the computer. With the computer it's now possible for elementary schoolchildren to manipulate motion in quite a formal way. Moving objects on the screen can be related, say, to throwing balls, so that what is fundamental in science can be brought into relationship with what is most natural to children - moving about.

Q. What about the cost of all this? Pencils were a lot cheaper.

Computers cost more than pencils, but they cost a lot less than the wasted time of teachers or the consequences of children who are turned off by schools, drop out and end up with drugs. In New York it costs about $40,000 of taxpayer money to educate each child for the whole area. You can go to the stores and buy a pretty powerful computer for less than a thousand dollars.

Q. What will it take to get from the single-pencil approach to a computer-intensive environment?

I'm trying to create a couple of high-density schools where children can learn in an environment of free access to technology. That's one side of it. The other side of it is to rethink the subject matters we are dealing with. We need to bring real physicists, real artists, real writers into the process of redesigning the activities of children.

Q. Didn't we go through that right after Sputnik? The new math and the various science curriculums of the time did not turn out to be a very happy experience.

True, but then we had one half of it because they went in absolutely the opposite direction. The emphasis there was on making mathematics a very pure - a very logical - subject. So mathematics, which was already an alienated subject, became even more alienated. The computer enables us to go in the opposite direction, making it much more concrete and personal. We're getting a second chance.

Q. Boys tend to be more interested in computers than girls. Is that something that troubles you?

It does trouble me, and it's a reflection of the general phenomenon. It's not the computer as such that's more attractive to the boys than to girls. It's the fact that the computer comes out of a male technological, technocratic, white-dominated culture. The computer as we know it was made by engineers who like to think in a very systematic, organized, top-down, highly planned way.

Not everybody likes to think like that, but science and mathematics instruction in our schools is powerfully biased against people with a more artist-like style of thinking. They react against a culture that has no room for intuition, no empathy, no communication about what you're doing. They react against a culture where the emphasis is on linear thinking, on individual work and on making a product that works rather than a product that you can talk about with other people.

The computer, though, allows you to approach technical subjects, and mathematical ones too, more like the artist who creates by a negotiation of the object you're trying to create. There's no incompatibility between that intuitive kind of thinking and being able to do mathematics in a very creative way. We're making pockets of computer culture where learning is very personalized, where you can build up from the bottom and still structure it from the top. You can make something and change it. You can let it grow the way a painting on the canvas grows in a kind of negotiation between you and the product.

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