

school) and “mathematics” (which has been called the Queen of the Sciences) are the same thing. Teachers try to make math interesting but it is really boring for them, too, because most of them don’t have any personal interests that connect with what they teach in school math. So they pretend it’s just there to teach you to be logical. The big difference computers can make is that they allow pieces of mathematics that children and teachers can learn to be connected with topics that interest different people—music, graphics, movie-making, robotics, and science.

Question from the audience: People are better able to do tasks when those tasks are connected with everyday reality. If you express problems in terms of everyday experiences, people understand them better. I wonder whether the panelists have any comments on framing their ideas in people’s everyday realities.

Papert: Yes and no. You learn things better when they are connected with things you are passionate about. Connecting math to things that you don’t care about doesn’t help even if they belong to everyday life. For example, nobody is duped when school textbooks try to make seven times six “relevant” by making it seven eggs at six cents each. What counts to you is your mental world of interests, dreams, and fantasies, which are often very far removed from everyday life. The key educational task is to make connections between powerful ideas and passionate interests: for example, when someone who loves games uses mathematics to program breathtaking action.

Minsky: The most important thing in learning is copying how other people think. I don’t think learning by doing really gets one to emulate how other people think. The way to learn something hard is by getting new ideas. How do you do something in your head? ... We need a cultural situation where every child has an adult friend who they can emulate. And communicate their ways of thinking to the child. Do something that gets each child to spend a few hours a month with someone worth copying. What we do now is to take a six year old and send him in a room full of six year olds. The result is that every person grows up with the cognitive capability of a five year old.

Kay: I completely agree. I go to a music camp in the summer. What you see there are people with different abilities playing in the presence of master play-

ers. The camp doesn’t accept coaches that won’t play in the concert. Imagine a fifth-grade teacher assigning a composition and actually writing one herself. Shocking! What teachers do is broadcast in every way possible that “I’m not interested in this at all because I don’t do it.” I think it’s unthinkable to teach six year olds to be six year olds. You need to have these models. It’s like grad school. You go there to find professors that are more like you’d like to be and try to understand the way they think.

Kestenbaum: Are there countries in the world that are doing better? Is anybody doing better at getting these big ideas into schools?

Papert: In many countries I have visited, or learned about, little schools with only one or two teachers. It’s the best model we have, where the teachers, the parents, and the students are tightly connected in the community. We can do better with smaller settings. And with the technology the disadvantages of being small go away: even the smallest school has access to the worldwide library and can do real scientific investigations. We should learn from them and change our concept of school.

Question from the audience: The Internet isn’t what everyone expected. What do you see in the future of developing technologies for children?

Kay: I’d like to see things much less cluttered so that we could work on them better. ... The best way to use current technologies is to try to put your results out for free as open source. Education is an area where when someone does something good for children and puts it out for free on the Internet it is great. Climbing one more stair to get up the tower of this cathedral. If kids can get it for free it can have a tremendous influence. ... The Internet gives people the opportunity of putting things out, and people are doing it. I realized that the way to do something about this is to put out alternative content. The trick is getting to the place where people can see alternatives, and that’s the best thing people can do.

Kestenbaum: Lessons from the past. Something that didn’t quite pan out. Something interesting. What do you think the answer to that is now?

Kay: Most of the stuff we did was a failure. We got a little better at it when we tried to at least have good failures. Where you have some idea of why, rather than just negative results. That took a while.