

Sam and the Microcomputer

Computers can offer fun games, but they need to nurture thoughtful learning as well.

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Something that charmed me at first, then disturbed me, happened in the exhibition area of an education conference in Toronto last year. I had set out to spend a couple of hours there, looking at computer software. I wanted to do it alone and thoughtfully, but as usual in such exhibition areas, whenever my feet stopped moving, the nearest sales representative moved in to grab my ear.

Then I got lucky. In the booth of one of the larger publishers, all of the sales reps were engaged away from a program that was running. It was the chance I had been waiting for, so I headed right for the keyboard.

On the top half of the screen the action was a blend of "Space Invaders" and "Asteroids." On the bottom half, a mathematical exercise appeared—something like "change 96% to a decimal." As I fumbled with the keys to get some control over the screen, a boy about ten years old walked up and eagerly offered to show me how it worked. It was a charming gesture that called to mind all the stories from researchers and teachers about fifth- and sixth-graders around the country who, by dint of their hunger for computer contact, know more about the machines than most of their teachers.

No sooner had I agreed to become Sam's tutee than he began to fly through a sequence of keystrokes: "This one makes the ship go up, this one makes it go down, this one lets you fire its gun."

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As he flew along, he had to return periodically to deal with the exercises at the bottom of the screen. Correct answers apparently allowed him to continue playing the game above, though I must confess Sam was moving so fast that I missed a few connectives. It seemed, however, that one correct answer might allow him to refuel his ship, the next allowed a change to a different interplanetary setting, and so on.

The exercises were all of the same fabric:

"Change 96% to a decimal."

"Change 83% to a decimal."

"Change 18% to a decimal."

"Change 5% to a decimal."

A countdown clock in the upper right corner of the screen kept track of Sam's speed in doing these exercises, and he ran through about ten of them very quickly and without a mistake.

All the while, however, I grew more and more uneasy. For one thing, throughout his enthusiastic chatter Sam never acknowledged the mathematical exercises. Everything he said was directed to the top of the screen. It is possible that he assumed I needed no tutoring on the mathematical part and so kept his comments pointed to the spaceship maneuvers. On the other hand, I suspect that not very much of his mind was open to that practice or would have been open to it if I had not been there as his tutee. He was racing a clock, he was dodging aliens, and he had little attention to devote to percents and decimals.

The rationale for repetitive practice is based on sound educational and psychological research. Repetition can reinforce learning at the skill level, especially when it is tied to an appealing reward. When the reward competes for attention with the learning, however, as it seemed to in this case, I have to wonder how much reinforcement is really taking place.

Furthermore, as impressive as the educational potential of the computer is, we will only see the fulfillment of that potential if educational software complements and even invites human interaction—between learners and learners and between learners and teachers. In those few minutes with Sam, I looked for openings for interaction that I might use if I were his teacher. Since he was so reticent about the mathematics, there were few open-

ings. Even when I did see one—he changed 5 percent to .05 and I was curious how he knew when to bring a zero into play—I would not have dared to interrupt the flow of his spaceship maneuvers.

Of course, if I were really Sam's teacher I could have waited until he was through with the machine to invite him to talk about the learnings involved. In fact, it would be downright inappropriate not to wait when a student is flowing along like Sam was. Let's not ignore, however, the critical underlying issue here for teachers: the more sophisticated educational software becomes, the easier it will be for teachers to see themselves as *competing* with the microcomputer, rather than perceiving it as an ally. Helping teachers to explore options for developing this sense of alliance and complement with computers must become one of the central issues for mathematics teacher trainers.

The other thing that disturbed me was Sam's frenetic pace. It brought to mind the controversy surrounding *Sesame Street*, with some child psychologists favoring it and others very wary about the expectations built up in its young viewers for quick changes in stimuli. The psychologists in this latter group point to *Mister Rogers' Neighborhood* as an exemplar of what they maintain is a wiser approach to the learning of young children. Rogers' pace is almost always slow, his pauses carefully woven in to allow children to absorb what they are seeing and hearing. Mister Rogers has been known to take 15 minutes to peel an orange, all the while carefully examining its shape, color, texture, smell, and taste.

Anyone who has played "Pac-Man" or "Space Invaders," or who has watched someone play, knows the kind of frenzy I saw in Sam. It may not be that harmful in the long run. Indeed, like *Sesame Street*, it may prove quite useful. We need to be watchful, however, not to mistake "dross with gloss" for quality. While many educational programs do not inspire frenzy, I have not yet seen the software counterpart of Mister Rogers. Granted the microcomputer is unprecedented as a teaching tool in its speed and power, and granted 15 minutes of peeling an orange may not translate into interesting software. If the microcomputer is to succeed, however, we must find ways to use it to induce thoughtful learning and contemplation as well as the kind of learning I watched in Sam. □

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