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Technology Can Help:
Children comment on computers

Abstract

Although there are several studies which have documented how computers are used in schools, there has been relatively little research which has considered children's perceptions of computers. This paper presents results from interviews with elementary grade students to find out what they thought about computers and learning, what uses they saw for them inside and outside school, and what difficulties they had with them. Their comments are grouped into three areas: computer as tool, collaborative learning, and dealing with difficulties. Implications of their perceptions in these areas are discussed.

Although there has been a tremendous influx of computers into schools there has been relatively little research which has considered children's attitudes towards using computers. Logan and Padro (1986), in their research on the impact of computers in the classroom, stated that "children's perceptions of educational technology has only received the most cursory attention to date" (p. 13).

One researcher who did examine children's perceptions and use of computers was Trumbull (1986). She observed grade 5 students, using mainly drill and practice programs, in a computer lab. She interviewed twenty-one of these students to find out what they thought about computers. She found that while the children thought that computers were important, most of them saw the computer, both in and out of school, as a machine for playing games. Few of them seemed to know much about how computers could or would be used in the future.

Turkle (cited in Rhodes, 1986), in a recent interview in *Educational Technology*, presented a different perspective on children's use of computers. She stated that in many schools, children are using computers as "productivity tools" to help them get their work done and as "vehicles for fantasy" which enabled them to create texts or drawings to express their fears and fantasies.

Trumbull and Turkle provide rather different perspectives on children's perceptions and uses of computers in schools. The purpose of this paper is to provide addtional insights into how elementary children perceive and use computers. Students in a suburban Montreal elementary school were interviewed to find out what they thought about computers. (A research team had been in the school as part of a larger study on educational uses of computers. As a result, the children were used to talking with them about computers.)

All the children in the school (about 550 students), from kindergarten to grade six, used computers on a regular basis. Teachers ensured that their classes had computer time each week. For the past few years, each class had been time-tabled for at least one thirty-minute session per week in a resource room which had fourteen computers. During their computer sessions, kindergarten students used computers mainly for math and language games; students from grades one to six used them regularly for either LOGO or word processing. Besides these scheduled sessions, the resource room was also open to all students at noon-time and after school. These open times were very popular with the students who used the computers for both school and personal projects.

To ensure that in the interviews there was a cross-section of students which included novice and expert users, classroom teachers were asked to recommend five or six students from their class whom they felt represented a range of computer knowledge from most to least proficient. A random selection of 26 boys and 23 girls from these lists (approximately 10% of the school population) were interviewed. Each student was interviewed individually; all interviews were tape recorded and then transcribed.

The interviews were open-ended. Students were asked what they thought of computers and learning, how they used computers in school, and what difficulties they had with them. In considering their comments, three general areas of concern emerged: computer as tool, collaborative learning, and dealing with difficulties.

Computer as Tool

The children thought that computers were versatile and valuable tools that could be used for a variety of different purposes, such as writing

stories, doing experiments, learning numbers, managing things at work, keeping track of information, helping people find out things, drawing pictures, paying bills, and figuring out accounts.

Students frequently mentioned that the computer helped them do their work more efficiently. "It takes a long time to write things out by hand and it's just better to type it up and let the printer type it out." Others mentioned that they liked the computer because it produced an attractive looking product. "It's fast and it's easier than writing because if your writing isn't that great, the computer is neater."

They also recognized the time and labour saving features of computers which enabled the user to produce a clean copy without frequent recopying. "It's an easier way of writing. You don't have to erase it all. Like a rough copy, you can save it on the screen and then go back and correct your mistakes and print it out." Another student commented that he liked to use the word processor for writing because "you can put the text the way you want."

In addition to being an efficient tool which helped them finish their work more quickly, produce an attractive copy, and organize and review information quickly, many students felt that the computer also helped them in math. A girl in grade 1 commented, "LOGO shows us how to make pictures and designs of things and then we can make them that way in math time." Children in the upper elementary grades mentioned that working with LOGO helped them estimate angles and distances. "Like with angles, you know them better. Like if you say a 45 degree angle you'll know just about where it is.... It makes you faster in math. You can get the answer right away." A sixth grader commented, "It must have helped us a lot because this year we have no problems with our angles and all that." It appears from these comments that these children saw the computer as a tool which helped them get their work done. In Turkle's terms, the computer served as a productivity tool for them.

However, in addition to acknowledging how computers helped them in school, the children also recognized the useful role that computers play outside school in areas such as banking ("you know everything about everyone"), hospitals ("to keep track of births"), architecture ("to design buildings"), business ("to keep accounts"), education ("put report cards and information of the school like students' names, phone numbers, and where they live"), and investing ("my Dad put stocks and everything on it"). Computers were seen as especially useful in the space industry. "Instead of... men lifting the shuttle up, you have computers to control things.... Everything gets done a little faster. That's why men invented them."

Very few students saw themselves directly involved in computers in future years. Only two students thought they would get a job in the computer industry. One of them thought that she would like to "make up programs for little children to play." The other one stated that he wanted to become a computer expert because he liked experimenting with new programs.

Most of the children, however, imagined that they would use computers in the future. One student suggested that computers could be used to build robots which he could then teach to do things he wanted done, such as making his bed and driving his car. A boy in grade 6 suggested that it could be used for social purposes, "Well, to upgrade life a little bit. Like, some poeple don't have homes. We could use the computer to fix it up."

For many children the computer was not only a functional tool which helped them and others do their work, it was also something that encouraged them to explore and play with ideas and concepts. A sixth grader explained that on the computer he gets "more out of myself.... They're good for guys like me. They're fun to program, learn stuff about them, inquire your mind.... It's fascinating." Another student felt that word processing made him more creative. "It's great for the imagination, well the computer doesn't really have anything to do with that, but you put your imagination to the story.... When you work with the computer your mind opens but when you're writing, you're sort of dull, you know what I mean." These comments mirror Turkle's (cited in Rhodes, 1986) statements about the computer as a "vehicle for fantasy" and provide some insights into the kinds of excitement that computers generate among these children.

Most of the children enjoyed using the computer. As one grade six student explained: "You want to do it, instead of like, you have to do it." Another student agreed: "You can have fun as well as doing work." With these comments and others where they talked about how much they enjoyed using the computer to play video games, it appeared that the computer is often seen as a toy or games machine. However, rather than limiting the students to a passive role which many of the drill and practice programs do, the computer as toy seemed to provide them with opportunities to create, to discover, and explore in playful and personal ways.

It appears that although children were aware of a variety of ways that the computer could be used inside and outside the school, they were not overwhelmed by them. From their own experiences, they realized that they controlled the computer. A grade 3 student put it most succinctly: "It's us who give the commands." Other students also mentioned this issue of control. "You've got to tell it everything, you know. When you turn it off, it doesn't remember anything"; and, "If you want to draw pictures and you're

not that good an artist, then you can get the computer to do it for you. But you have to tell it what to do. It doesn't do it by itself."

It appears from these comments that students saw computers in school and in society performing a variety of jobs, ranging from simple record keeping to more profound social changes, such as helping people have better homes and jobs. Yet although they were cognizant of the multi-faceted role of computers, they realized that they were in control; they told the computer what to do. In this sense, the computer was a tool which they made work for them to fulfill a variety of creative and functional purposes.

Collaborative Learning

Sheingold, Hawkins, and Char (1984) argued that the presence of computers can alter the framework for the social organization of teaching and learning in classrooms in interesting ways. One way computers can do this is by facilitating collaborative interaction among children. Another way is by increasing opportunities for children to act as resources for other children. Because neither of these forms of interaction appears very often in most traditional classrooms, we were interested in talking with the children to see whether they saw interactions among children and between children and teachers changing as a result of using computers.The questions in this study focused on preferred style of working, alone or with a partner, and the exchange of information among users.

The children interviewed preferred working with others because they could share information, help each other, and also manage to have fun. One student explained: "I like it better with a partner because if I get tired typing he could type. It's easier with two people because he also has ideas for writing." Another student agreed that working with someone else was helpful. "You can talk. You can learn a lot of things. What he knows, I don't know. Everyone knows a little."

Several students had developed strategies for working together. A grade 5 student explained that he and his partner "usually discuss what kinds of programs we should make, why we should not do that program. If we agree on something we do it. If not, we flip a coin." A grade 3 student described a somewhat different collaborative arrangement. "I get all the thinking and she gets all the printing." This division of tasks is similar to an example cited by Sheingold *et al.* (1984) where a student, describing the relationship with her partner, stated: "I'm the thinkist, you're the typist."

Coming to terms with each other as partners was not always an easy process. One problem that children working together often faced was the issue of resolving conflict. A grade 2 student indicated that he preferred to

work alone because "they always scream at me . . . this one and that one and this one. When I am alone I can figure out all the words by myself." A grade 6 student also mentioned the issue of conflict. "It's faster if you don't have to listen to the other kid or argue what you're gonna write."

Several children stated that they learned more on their own. One student said that she liked to work alone "because you learn more, instead of someone knowing more and you know less." Another student also preferred working alone because "it keeps my concentration to myself."

Whether they worked alone or in pairs, however, children frequently mentioned that they shared information with the teacher. One boy commented, "Our teacher doesn't know really that much. He comes in to see how we're doing and he asks us questions about it, so he's learning kinda on the job." Another student noted: "My regular teacher, she knows just a little about computers . . . . She watches the kids and me. By watching them work . . . she can learn from that."

It is important for children to see themselves as knowledgeable, with expertise they can share with others. Although they frequently called on each other for help, the fact that some children knew more than others about computers occasionally created problems. One student complained, "The experts on computers can do more things faster. I still don't know how to print, and my friends do, and that gets me a little behind, and a little lost in pride."

Because of the novelty of computers in schools, teachers have often been unable to keep abreast in this field as much as they would like. This often means that children can find themselves in the role of knowing as much, if not more, than their teachers. This is by no means a bad thing. On the contrary, this shift in roles allows children to share their expertise with teachers and with other students. One teacher commented that she often relied on the students to help her when she did not know how to run a program. She felt that computers were "a great leveller" between students and teachers. However, in order for the "leveller" to work, there must be active encouragement of information sharing and collaboration between and among students and teachers.

Dealing with Difficulties

Several researchers have argued that working through problems on a computer enables the user to develop good problem-solving skills. We were interested in finding out what kinds of problems children experienced with computers and the kinds of strategies they used to solve these problems.

One of the most frequently mentioned difficulties was keyboarding. Comments included statements such as, "Well, sometimes I get a bit frustrated 'cuz if I'm typing something . . . I have to think where the 'h' is and everything"; and "It's confusing where the letters are. You have to wait two seconds to find each one." Students dealt with their keyboarding problems in different ways. Most of the children felt that with practice they would gradually become more familiar with the keyboard. A few children found typing tutor programs useful. However, not everyone wanted to use them. A grade 6 student pointed out that he didn't need to use these programs as he could go fast as he needed with two fingers.

The second main complaint that students had was the lack of time to finish work. A grade 2 student made the following comment about his LOGO sessions: "We never have enough time! Well, once I did, but I couldn't put the smoke on the chimney." Another student complained: "I don't like making houses because it takes a long time and when everybody is doing it, we're still trying to do it and then when we figure out how to do it, we have to go."

A third complaint related to difficulties with the process. Students were aware that problems sometimes arose in the creation of the product. They suggested a variety of techniques for dealing with "process" difficulties. Several stressed the need to take good notes as a way of being able to review the process. A grade 3 student noted, "The teacher explains something on the blackboard, but the computer doesn't do it like the blackboard says. Sometimes you have to go back to the class and review." A grade 5 boy provided another alternative, "If I have a problem I would ask the friend on my side and if he doesn't know I would ask the teacher. He would say 'find it for yourself.' So I would. He encourages me like this, so I found it."

The children interviewed did not appear to be discouraged by their problems with computers. Most felt that many of their difficulties were due to lack of expertise and, with practice, they would become more proficient and more self-reliant in solving their problems.

Conclusion

What became very clear from interviews was that, for the most part, these elementary grade students were comfortable with computers. They had assimilated a great deal of computer terminology and knowledge. They were aware of the power of computers, but at the same time were not overwhelmed by them. As one grade four student commented, "Everyone could live without computers, you know. The computer isn't the most precious thing in the world."

Most of the children interviewed clearly distinguished between what the teacher could do and what the computer could do. A boy in grade 6 stated that "computers are not smarter than teachers because a human made it and put his own information inside it." However, there were advantages to working with computers. In the words of a grade 3 student: "We can't command our teacher, but we can command the turtle."

The children frequently mentioned that computers could help students and teachers do their job. However, very few of them saw computers replacing teachers. Students felt that teachers were more flexible in that they could explain things in a variety of different ways, whereas the computer was really quite rigid in its approach. Nevertheless, students thought that it was important for teachers to learn how to use computers. One boy suggested that "teachers just have to go into the computer room after class and learn."

It appears that using computers helped many of the children become more resourceful learners. Several children mentioned that they enjoyed trying to figure out ways to solve their problems. Most of the children had developed particular strategies such as note-taking, reviewing information when things do not work out, and referring to other children for help. These problem-solving strategies would also be useful to them in other learning contexts.

Sheingold *et al.* (1984) stated that new kinds of learning interactions such as collaborative learning, power sharing, or restructuring of expertise may arise when children work with computers. They suggest that these new learning interactions must be valued and supported by the overall learning environment for change to take place. Teachers who are aware of the difficulties that children have in working with a partner can help their students develop effective strategies for collaborating. Several researachers (Ryba & Chapman, 1984; Starshine & Fortson, 1984) have suggested that working together on computers can help children develop collaboration skills. Comments from the children in these interviews suggest that in order for children to work effectively together, they may need help in learning how to develop a good working relationship.

Teachers also need to be aware that limited access to computers may cause problems for students. It is important to organize frequent and flexible access to computers so that students are able to finish assignments. Students may become frustrated and develop negative attitudes towards computers if they do not have the opportunity to finish projects during regularly scheduled sessions.

Not all of the children felt that they would use computers in the future. However, they did foresee a variety of different roles for computers as a tool for functional and creative tasks both inside and outside school. They seemed to enjoy the computer and were willing and interested in sharing their knowledge with other students and teachers. They appeared confident in using computers and seemed to enjoy discovering what computer technology could do for them.

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