Teaching and Learning: Whose Computer Is It?

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Editor's Message

When we invite young people to use new technologies, they often take them in directions we never anticipated. This uncertainty is what makes new tools and media fascinating and frightening. In the United States, groups as diverse as Computer Professionals for Social Responsibility, the Motley Fool investment advisory, and the Church of Scientology recognize this in their use of the phrase, "the good, the bad, and the Internet."

One consequence of uncertainty is that people become cautious. We see this in the tendency to use new technologies first in ways that replicate old practices. Thus, early television sets looked the way radios looked, and our computer desktops look like the desktops they purportedly replace. Another consequence is that we seek to retain control—to ensure that we decide whether, where, when, and how the new technology is employed.

In the classroom, these tendencies can mean that teachers often see the computer as a tool to help them do their work, and they are uneasy about what students might do with it. As a result, students are limited in the range of things they can do with new technologies. There is nothing wrong with taking advantage of the ways that technology can aid teaching, but a focus on teaching per se can limit what learning can occur. This month, Yong Zhao, Sophia Hueyshan Tan, and Punyashloke Mishra of Michigan State University tell us about an innovative program that opens up possibilities for young people as the primary users of the computer.

Going Beyond the Teacher's Machine

We are problem solvers. Every day we face many problems: some trivial, some significant, some familiar, some novel. For solutions to them we look to ourselves, other people, and new technologies. When presented with a new technology, we immediately ask what problem it might solve or whether the technology might become a problem itself. Teachers and students have different lives and different problems, although they spend a significant portion of their lives together in the same place. As a result they have different reactions to new technologies. They conjure up different images of what problems technology might help them solve and what problems it might cause.

Consequently, teachers and students have different attitudes toward computers. They put them to different uses. Teachers see, and are often advised to see, the computer as a tool to help them teach better—to make their presentation more attractive and effective, to manage their students more efficiently, and to communicate with parents more easily. Computers are believed to have the potential to alleviate teacher headaches such as outdated curriculum materials, hard-to-explain concepts, students' uneven intellectual and social development, lack of time for professional interactions with colleagues and experts, and uninterested students.

Students, on the other hand, see the computer as a solution to a different set of problems: making and keeping friends, managing boredom, and dealing with school and family. Thus kids use computers to play games, chat with old friends and make new ones, design websites, build robots, discover the latest cool songs, and send pictures to their grandparents (Cole, 1996; Nardi & O'Day, 1999; Resnick & Rusk, 1996).

Educational technology has often been about solving teachers' problems with technology. Although the ultimate goal is to enhance student learning, which is paradoxically the teacher's problem, technology has always been viewed as a tool to help teachers teach better. Students have had little say over where computers are placed, how and when they are used, or what should be on them. Concerns over students' needs are only indirectly and peripherally related to decisions about computers in schools. Regularly computers are found in secure labs, in the classroom corner, or on the teacher's desk. The teacher strictly manages

student access to them. The teacher decides when, where, and how they are used. Computers in some sense have been consecrated as only the teacher's machine.

The view of the computer as the teacher's machine has resulted in some undesirable practices—practices that move us away from our intended goals, which fueled the generous investment in school technologies. First, drill-and-practice programs are still by far the most common in classrooms. Applications (e.g, Powerpoint) that help them do presentations are the most popular among teachers. Further, we routinely find teachers having students compose and revise their writings with paper and pencil instead of a word processor. Only when the writing is complete are students allowed to type and print it. The idea is to improve appearance rather than use the computer to assist writing, in the way it is used in the real world. The same is true with teachers' practice of scanning students' drawings and printing them out so that students can take them home to show their parents.

The last example is perhaps most troubling. Schools have spent lots of money and energy getting wired to the Internet so that everyone can enjoy the benefits of this wonderful information and communications technology. Then, right after school staff get the Internet connected, they start spending money and energy trying to restrict access to it. They build firewalls. They install filter software such as CyberSitter (http://www.cybersitter.com) and SurfWatch (http://www1.surfwatch.com). They develop elaborate Internet user policies. They require students and parents to sign Internet access agreements akin to the ones signed prior to a major surgery. After all this, few teachers actually engage students in any Internet-based communication activities such as chat or e-mail (Becker, 1999). Most schools do not give students individual e-mail access. Online chat is strictly prohibited. FTP and Web publishing are generally not allowed on school servers. Many websites are blocked, and in essence the Internet is reduced to a reference book for the teacher.

The teacher-centered configurations and practices of technology teach students to be serious about the computer too. It ceases to be an object of fascination and imagination. It is reduced to a tool—the teacher's tool. It is something students have to learn to improve their grades, something they have to put up with to please their teacher. Much of what students do with the computer is well structured and supervised, such as very low-level keyboarding or simple restricted Web

searches. It is not too far a stretch to say that many students may have a richer experience with computers in a local electronics store than in school.

Alternatively we could view the computer as the student's machine—one that students can use to solve their problems and that can help them do things better—a machine each student can play with (Garner, Zhao, & Gillingham, 2000). For the past three years we have been developing a program that attempts to realize this view. In the following sections we describe the program and report what happened when technology was seen as the children's machine.

The Program: KLICK!

In the spring of 1998, a group of educational technology researchers and middle school teachers and administrators in the United States got together at Michigan State University in East Lansing to work on a grant proposal that would eventually lead to funding for an after-school program in 10 middle schools in Michigan. The program, later to be called Kids Learning In Computer Klubhouses (http://www.klick.org), or KLICK!, was designed as an after-school program to serve mostly middle school students. These clubhouses would be operated by and within local schools with support from the College of Education at Michigan State University. These clubhouses would follow a common set of principles and offer a series of common activities. While operated by local schools, these clubhouses would work together as a consortium. Students within the clubhouses would be involved in voluntary, authentic, and engaging activities. These activities, supported by computational media, would provide participating students personally meaningful experiences and result in authentic products useful to them or the community at large (Zhao, Mishra, & Girod, 2000).

Although the spirit of what makes a clubhouse is hard to define or outline, we identified three key factors for making a clubhouse a clubhouse. The first and perhaps most important of these is the freedom to choose what to do and when and how to do it. Bruner (1996) has argued for

> building school culture that operates as mutual communities of learners.... Let these schools be a place for the praxis (rather than the proclamation) of cultural mutuality—which means an increase in the awareness that children have of what they are doing, how they are doing it, and why. (pp. 81–82)

Schools, as we know them, are far from Bruner's conceptualization. But we want KLICK!, an after-school program, *not* to just be an extension of the traditional school day. Students in KLICK! should be free to decide how and when they want to use whatever technological tool(s) they need to achieve their goals.

Adults in KLICK! are not there to determine the nature and scope of the students' activities. Instead they are there to offer support, point out possibilities, and maintain a free and safe environment for all participants. To ensure true choices in learning opportunities, we emphasized the importance of networking and community beyond the immediate physical boundaries. We wanted KLICK! participants to be able to engage in activities requiring resources and expertise that may not be available within a local site or school. This is significant given that many of our sites are either in rural or inner-city areas—locations where resources and expertise may not be easily available. Moreover, our goal was to develop a KLICK! community wider than the local site (or local community) and to use the capabilities of current networking technologies to help us achieve this.

A second important property of a KLICK! clubhouse is that it produce "works" or *oeuvres*, as the French cultural psychologist Ignace Meyerson called them. As Bruner explained it, *oeuvres* can be grand, such as arts and sciences of a culture, as well as minor, such as a school team's winning a soccer game. "Oeuvres are often touchingly local, modest, yet equally identity-bestowing" (Bruner, 1996, p. 22). KLICK! encourages students to produce both personally meaningful works as well as products that are useful for their community. Through a consortium arrangement, we hope that KLICK! participants can develop a better sense of "localness" and identity in their works because they now belong to a larger community with more potential collaborators, competitors, and audiences.

The third and final important property of a clubhouse is collaboration. In a learning community, especially one that encourages personalized learning activities, collaboration is especially important. It not only provides the necessary venues for participants to access one another's skills to complete their works, but also introduces the opportunity for students to recognize and respect others as valuable sources of knowledge.

What Happens When Computers Are Made the Children's Machine?

> We have all known for years that if you treat people, young kids included, as responsible, contributing parties to the group, as having a job to do, they will grow into it—some better than others, obviously, but all benefit. (Bruner, 1996, p. 77)

Bruner was right. In the two years since KLICK! opened in January 1999, KLICK! kids, or KLICKers as they call themselves, have used their "own machine" to do some wonderful things for themselves, for their teachers, for their schools, and for their community. Their "mucking around" at the computer has resulted in dramatic changes in attitudes toward the school, impressive gains in technology proficiency, and amazingly meaningful and practical works.

Looking at what KLICKers did helped us better understand what problems kids care about and what kind of things they want the computer to help them with. It also revealed (a) how difficult it is to truly make the computer the children's machine in the current school setting and (b) the tension between the two views of how computers should be used in schools.

Living online: Exploring identities. The most popular activity at all KLICK! sites is online communication, IRC, Instant Messenger, the Palace (http://www.thepalace.com), and e-mail. KLICK! provides each participant with an e-mail account, access to a set of KLICK! text-based chat rooms as well as a graphical chat environment (the Palace). Every day hundreds of students come to the 10 clubhouses to participate in some kind of online communication activities. They "talk" with their friends from the same school, other KLICK! schools, KLICK! central office staff, and whomever they find interesting. Of particular interest is the KLICK! Reporter project (Garner, Tan, & Zhao, 2000).

The KLICK! Reporter project was created with the online project-based workshop model in mind. The original goal was to help improve students' writing by engaging them in authentic projects. Two or three students from each of the KLICK! sites were asked to serve as reporters who would contribute to the weekly Password Express, an electronic newsletter of KLICK! A graduate research assistant served as the project coordinator. Each week the reporters were to meet online and discuss what they might write. The coordinator hosted these meetings and provided guidance.

By standards of prescribed goals, the project has failed miserably. Students did not do what the adults wanted them to do, which was to write, design, and publish. However most reporters continued to show up for the chat meetings and

to have frequent e-mail communications with the coordinator and one another. Site coordinators have regularly praised this activity because the students like it. Many reporters have also expressed great appreciation for this activity and the coordinator. Further, a closer look at what the reporters did during and after the online meetings shows that the kids were learning something very important: living online.

This project revealed an interesting tension between the two perspectives. The project is assessed to be a failure by the "teachers' machine" standards because the reporters are not writing in the traditional sense. However, from the "children's machine" perspective, they are learning quite a lot: complex graphical user interfaces, multiple and fluid identities, social consequences in virtual communities, and multimedia and multimodal communication tools. Moreover they enjoy being a part of this community. Here are some more examples of what students enjoyed doing in KLICK!

Webbing for the community: Playing with design and multimedia. Developing websites in local communities is another major KLICK! activity. KLICK! students have developed more than 50 websites for local businesses, community service organizations, and schools. For example, a student in Baldwin (a small rural community in western Michigan) developed and maintains the website for the local emergency service and his parents' dry-cleaning business. A group of students in the same school developed and maintain the website for the local chamber of commerce. A student in Armada (a rural community in eastern Michigan) developed websites for the local hardware store. Students in the clubhouse in De Tour Village (a small rural community in Michigan's Upper Peninsula) developed a website for the community's centennial celebration.

Being helpful to others: Offering services to the community. Works are not only tangible products, they also include externalized experiences and activities. In Brethren Middle School, KLICK! students have participated in the "Adopt-a-Teacher" program, which offers teachers technical and research assistance by KLICK! members. In Cass City, KLICK! participants served as assistants to community members who came to use the computers. In Detroit, students have been trouble-shooting computers and the network in the school. For that purpose, the students have developed a database of information they collected about all the school computers. In Baldwin, students have been offering computer instruction to senior citizens.

Who I am and what I like: Expressing yourself. KLICKers have spent lots of time finding ways to express themselves. Melinda (pseudonyms are used for all students) developed a photo essay on the Web about a nearby cement factory that attracted her curiosity every time she and her mother passed it. Sarah has been writing and publishing a novel about the Dragonites on the KLICK! website. Browsing through KLICKers' personal homepages you can find elaborate creative sites about Pokémon, the National Hockey League, medieval weapons, pet care, and other things in which kids are interested. KLICKers also have developed antismoking digital videos, antidrug animation movies, and interesting three-dimensional animations of things they care about.

Closing Comments

Technology, particularly the computer and the Internet, not only provides solutions to existing problems, it changes the problems we have to solve every day. It also creates more problems that demand new solutions. In other words, technology innovations not only improve the means but also change the ends. The definition of *literacy*, for example, has already gone through many changes due to technological changes, and we expect more in the future (Labbo, 1999). The computer not only makes it easier to transmit text and mix different media, but it also requires us to be able to read and write hypertext and multimedia documents. The Internet has already made virtual communities common places where millions of people interact with one another every day. The ability to participate in these communities is much more than just being able to type and read. It also includes being able to manage multiple identities and deal with multiple information sources.

Children, through active use of technology to solve problems, are in a sense practicing and learning the new literacy brought upon them by new technologies. Their mucking around with new technologies is actually a way to participate in the future. Unfortunately, due to the prevalent view of the computer as the teacher's machine, any computer use that does not directly lead to improved learning of the traditional subject matters is considered irrelevant. As a result, adults often ignore or trivialize children's interaction with computers, viewing it as mindless or fruitless mucking around. Worse yet, some adults see kids playing with computers as a dangerous criminal act that must be prohibited. We hope that KLICK! and other similar projects, such as the Fifth Dimension and the MIT Media

Lab Computer Clubhouses (Resnick & Rusk, 1996), provide a counter argument—playing with computers is necessary and can lead to good things. (The Table illustrates some differences between the two uses of the computer.)

The Teacher's Machine vs. the Student's Machine

	The Teacher's Machine	The Student's Machine
Tasks	Used to create drill-and-practice tasks Used to present content	Used to create artifacts (including word documents, graphics, animation, music, art)
Software	Mainly presentation software	A variety of software (including games, simulations, applications, digital videos, communication-related software) Even presentation software is not necessarily used as presentation software (e.g., Powerpoint used to simulate animation)
Purpose	Used mainly for the product (e.g., write and edit on paper then type final draft on computer) Students work for teachers	Used for both process and product (e.g., type, edit, create, communicate, collaborate, and publish on computer) Students work for themselves, their peers, and their communities
Display	Products are displayed on paper (e.g., show parents print-outs)	Products are displayed in different media (e.g., show parents on paper, on computer, and on the Web)
Internet	Restrict access to Internet Internet is used as a reference book	Explore various facets of Internet Internet is used as the Internet, as a medium for communication, inquiry, construction, and expression
Terms	Used on teachers' terms (teachers decide when, where, and how)	Used on students' terms (students decide)

How You Can Participate

The current KLICK! sites are funded through a grant from the U.S. Department of Education. Recently we received funding to expand KLICK! to a total of 20 schools in Michigan. KLICK! has started to accept new schools from around the United States, and schools can apply for grants from the Department of Education's 21st Century Community Learning Centers program or use its existing facilities to establish KLICK! sites. Please visit the KLICK! website for more information.

Website of the Month

The KLICK! page (http://www.klick.org) has information about the KLICK! consortium, sample activities, and students' products.

Other Sites of Interest

The Computer Clubhouse Network (http://computerclubhouse.org) provides information about an effort similar to KLICK! Originally developed by the Computer Museum in collaboration with the Massachusetts Institute of Technology Media Lab (http://www.media.mit.edu), it is another after-school program for youth. Unlike KLICK! the Computer Clubhouse is located in nonschool community-based agencies.

The afterschool.gov website (http://afterschool.gov) is a site developed and maintained by several U.S. federal agencies to provide information about after-school programs. The 21st Century Community Learning Centers site (http://www.ed.gov/21stcclc), maintained by the U.S. Department of Education, provides information about this grant program.

Glossary

File Transfer Protocol (FTP): the most widely used way of moving files from one computer to another over a network. There is a set of commands in FTP for making and changing directories, and for transferring, copying, moving, and deleting files. Formerly, all FTP connections were text based, but graphical applications are now available that make FTP commands as easy as dragging and dropping. Numerous FTP clients exist for a number of platforms. Common FTP clients include Fetch (Macintosh) and ws_ftp (Windows).

Internet Relay Chat (IRC): a system of clients and servers allowing people all over the world to communicate via typed messages. IRC allows multiple users to converse in real time on different "channels." Channels vary in traffic and content. IRC clients are available for nearly all platforms.

Instant Messenger: a type of software that enables instant messaging, a type of communications service that lets one user create a private chat room with another individual. Typically, the instant messaging system alerts the user whenever somebody on his or her private list is online. The user can then initiate a chat session with that person. AOL Instant Messenger (AIM) was the first instant messaging system to become popular on the Internet.

continued

> **Glossary (cont.)**
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> **Oeuvre:** The French cultural psychologist Ignace Meyerson used the plural *oeuvres* to refer to artifacts, activities, and events of a culture that bear its identity. In *The Culture of Education*, Bruner (1996) applied the term in an educational context to refer to authentic products and events of schools.

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