Technology Column:
Interface: Computers in the Classroom

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An interface is a connection, or a boundary, between two different systems enabling them to link their singular operations; for example, printers need an interface with a computer in order to link the operations of the two devices. Similarly, humans need an interface with the computer in order to merge the thinking functions of the human being with the calculating functions of the computer. The familiar folders and document icons in popular operating systems are part of an operating system interface that facilitates communication between computer and computer user (a person). While many think of cyberspace as a world of humans connected through an electronic network, that exists digitally but not in any physical place, this article suggests that cyberspace relies on a physical infrastructure of servers, cables and wireless access points, keyboards, laptops, and so on. More important, this article explores what that infrastructure means for teachers concerned with literacy in this century.

While discussions of technology in education often center on the configuration of a processor, the resolution of a monitor, or the downstream speed of a broadband connection, teachers and policy-makers at the district level must also consider the implications of where the computers are located in the school building and how and when students use the technology. Technologies transmit values (Hughes, 2004; de Botton, 2006), but often the values conveyed are implicit and hidden. In the United Kingdom, a well-meaning attempt, called The Grid, to make the World Wide Web accessible and safe for students eventually limited the resource, rendering it a simple reiteration of traditional transmission pedagogies. That is, it delivered content to students, reinforced drills and practice, but did little to encourage students to analyze the data or sources of the data they

encountered while actively discouraging communication (Lankshear & Knobel, 2003). A 1998 survey of 4000 teachers of grades 4 through 12 (Becker, 2001) found that teachers of lower-ability courses used computers for skills games across the disciplines while teachers of higher-ability students tended to use computers for such tasks as email, presentations, and access to the Web. Just as telling, the survey found that teachers who use computers in class tend to employ them for getting information or ideas, self-expression through writing, and mastering skills (51%, 44%, 37%, respectively) reinforcing a rather teacher-centered and one-dimensional view of the purposes technology in the classroom might serve. By contrast, three least cited objectives for technology are learning to work independently, presenting information to an audience, and communicating electronically (23%, 18%, and 9%, respectively).

As computers became increasingly common features in schools over the last three decades, a traditional model for deploying these tools within the school was employed--the computer lab. Computer labs seemed to make sense in the same way that a science lab makes sense; if the school keeps the tools in a central location, they are easier to maintain, inventory, and control. Simply bring the students to the tool set (beakers, Bunsen burners, and so on) in a lab rather than the other way around, and for a science lab, the price is right. Students are already in the classroom with a lab nearby, perhaps even in the same room, so a science laboratory is efficient. However, when the same model is applied to a set of ICT interfaces (computers, network connections, printers, and so forth), the best uses of the tools are immediately defeated (Zandvliet, 2006). Before we explore why that might be so, a review of what new literacies are is in order.

New Literacies

The term “new literacies” is increasingly familiar to teachers as students learn to create web pages, evaluate the quality of a website in relation to an academic task, or communicate via a growing set of a tools such as instant messaging, email, or threaded discussions to construct new understanding. Three important features of new literacies relevant to the discussion here are the notions that learning is frequently a socially constructed phenomenon (Vygotsky, 1978), literacy in the twenty-first century requires new strategic applications of cognitive skills for specific and individual purposes (Leu, Kinzer, Coiro, & Cammack, 2004; Wenger, 2003; Stewart, 1999), and that traditional structures in education may not fit within the new literacies model.

In the Becker study described above, many respondents placed value on technology as a means of acquiring information and demonstrating competence. It could be argued that using technology as a means of self-expression is a form of new literacies in action, yet some studies show that while students are writing more as a result of word-processing technology, they may not be any more engaged with the task as a result of access to the technology (Bangert-Drowns, 1993). The point is not that the technology makes the difference; really, it doesn’t. There are many instances of tools sitting unused in a corner of a classroom or isolated on the desk of the teacher where students are not permitted to be. In these cases, expensive innovations in technology are a waste. Similarly, when technology is used to do what can be done just as easily with paper and pencil; technology makes it possible to be more efficient. Grading programs save countless hours spent adding up and weighting scores for instance. However, a good question for teachers to ask is whether the technology makes a connection or learning possible that was not possible (or probable) before (Leu, Leu, & Coiro, 2004) What does

matter is what teachers and students do with the technology. In the Becker study, students and teachers rely on the Internet as kind of huge encyclopedia or information source. Certainly, the Internet coupled with useful search engines has the potential to provide vast amounts of information virtually on demand, but this is neither its strength nor the real pedagogical potential.

In a 1984 book describing schooling in America, John Goodlad described the primary characteristics of classrooms as places where the teacher was the center of attention and related to students as a whole class rather than as individuals, students learned in isolation from other students in spite of being in a classroom full of other students, there is a paucity of "praise and correction" (p. 124), and students were passive occupants of the physical space of the classroom rather than actors therein. These characteristics are worth noting in our discussion of how technology might be used in service of learning, how it can transform that learning, as well as where and when students have access to technology.

Key to understanding how new literacies positively impact the learning environment is the potential such technologies have of reducing the isolation that Goodlad noted (1984, pp. 186 – 188) among teachers and the isolation to which students are subjected even in the face of philosophical stances that suggest that learning occurs best in environments where they are able to work with others to construct an understanding that is serviceable and academically valid. Leu, Karchmer, and Leu (1999) portray the Internet as a tool capable of far more than delivering information rapidly. In their view, the Internet is a tool students and teachers can use to communicate with each other, to transform technologies in new ways, and to share understandings with

like-minded others beyond the bounds of the classroom walls. Similarly, in the last issue of *The California Reader*, we explored how ICTs can help students connect with like-minded classmates in ways that transcend the time constraints of the school bell, as well (Wolsey & Grisham, 2007). If we can agree that new technologies embrace new ways of thinking about how we teach our students, that students must work together to construct new understandings, and that students must also learn as independent and socially responsible thinkers (International Society for Technology and Education, 2000-2005), then we are well on our way to asking ourselves an important question. Where should an interface with technology be located?

An answer

In answering the question, I have resorted to a kind of shorthand that must be explained. Note that the question does not ask where the computers are located in a school system; frankly, the physical location of the computers may not make much of a difference. It is possible for student interfaces to include a memory stick, a personal digital assistant (PDA), a thin-client terminal that accesses a physically distant server, classroom laptops, an MP3 player, an actual computer located near a student's desk, or some combination of these tools. Accessibility to the interface is the critical pedagogical component. Students must have a USB port where a memory stick can be plugged in, a wireless access point for a PDA or laptop, or a thin-client terminal without waiting a long time for a "turn" to use it in the classroom.

A useful distinction illustrates the importance of access to the interface. Earlier, I pointed out that locating computers as interfaces in a lab setting defeats the purpose ICTs might serve learners. If students are to work together to solve problems and

simultaneously become active participants in the educational enterprise, the interface with the ICT becomes very important. Consider this scenario. The author's students, reading a book set on the Pacific coast of Canada, did not have a mental reference for the Royal Canadian Mounted Police—Mounties. Because the small group reading the book had immediate access to the Internet in the classroom, they were able to call up the official site (http://www.rcmp-grc.gc.ca/) and see what the Mounties look like in present times and historically, thus they noted the need for background knowledge they lacked and taking action to create that knowledge when they needed it. Imagine students wondering about the Mounties and then having to schedule a computer lab session, waiting days or weeks, traveling to the lab across campus, looking up the information, then returning to class. Such a scenario is impractical and counter-productive to goals for learning. In this instance, the implications are quite clear. Students need an interface that is located where they do most of their work and that is not so limited that they must wait for a long time for a "turn" at the interface. Technology belongs in and near classrooms, not in a distant lab.

Students who work together to create new learning can do so beyond the bounds of the school day or the walls of the classroom. Threaded discussions illustrate the importance of access to ICTs when students need them and in locations that are immediately accessible. In threaded discussion, students take advantage of the immediacy of the Internet, the interaction of discussion with knowledgeable others, and time to think about what to write to those knowledgeable others (Wolsey, 2004; Grisham & Wolsey, 2006, 2007). What a student posted yesterday can prompt reflection on the part of peers who might think about a response which won't be posted until today in

threaded discussion. However, such productive interactions cannot occur if students are treated as a whole class, taken all at once to a computer lab, and asked to post responses to each other in real time. The time to think about a peer's post disappears and with it the co-constructed learning that might have taken place.

What teachers can do

Teachers increasingly use technology to support the learning in their classrooms; it is not any longer the sole job of the computer teacher. Rather, regular classroom teachers are employing ICTs to enhance their curriculum and teach students effective strategies for using those ICTs. The California Department of Education regularly collects information about technology use in the schools. For 2004-05, approximately 42% of all credentialed teachers in the state responded to the survey question about student computer use in their classes. The results are encouraging (see table 1) with the majority of teachers requiring students to use technology for instructional purposes at least once a month with many of those teachers doing so weekly or daily. Forty percent of teachers have access to and use ICTs in the classroom (see table 2). While these teachers may also make use of computer labs, the promise of having access to the tools to use in the classroom when instructional needs and students' learning purposes call for them is similarly encouraging news. First and most important, teachers can use the technology they have available to them in service of learning the content and processes for which they are responsible.

Table 1: Use of technology tools in the classroom

Of the technology tools to which you have access, how often do your classroom assignments require students to use them?

	Daily	2-4	Between	Less	Available	No	Total

		days a week	once a week and monthly	than monthly	but I never use it	access	responses
Computers and peripherals (scanners, printers, etc.)	20,498 16%	22,665 17%	35,990 28%	22,592 17%	18,236 14%	10,205 8%	130,186 100%
Internet	11.956 9%	15,181 12%	31,717 24%	27,250 21%	29,257 22%	14,789 11%	130,150 100%

Source: California Department of Education. (2006). EdTech Profile, 2004-05. Retrieved December 30, 2006 from http://data1.cde.ca.gov/dataquest/dataquest.asp

Table 2: Where students use ICTs in school.

Where do your students use technology tools (computers, video, Internet, and hand-held devices) for your classroom assignments? Select all that apply.

Library Media Center	Computer lab	Classroom or other instructional areas	Total Responses
56,243 24%	80,821 35%	92,634 40%	229,698* 100%**

* Teachers may use technology tools in more than one location.

** Rounded total.

Source: California Department of Education. (2006). EdTech Profile, 2004-05. Retrieved December 30, 2006 from http://data1.cde.ca.gov/dataquest/dataquest.asp

Second, teachers should be aware of the ICTs that are available to them and what learning these technologies might promote. The EdTech report (California Department of Education, 2006) showed that 53 percent of teachers felt their computer skills, in general, were at least at the intermediate level with only 20 percent reporting that they felt their skills were at the beginning level. Even as teachers are increasingly comfortable

with technology and can integrate it in sophisticated ways, it is not important that teachers feel that they are more proficient than their students are. While it is true that students are often undiscerning consumers of technology (Grisham, 2001), they can often take the instructional concepts with which they must work and apply technological solutions to them that would not have occurred to the teacher. When teachers are aware of possibilities, they may encourage students to also explore the trio of attributes Leu, Karchmer, and Leu (1999) term "envisionment:" imagine new possibilities, transform technologies to construct a vision, and share the work with others.

Third, teachers must be advocates for meaningful change. As Fullan notes, meaningful change is complex and cannot be promoted by putting a few "changed individuals into unchanged environments (2001, p. 79)." Teachers that want their students to make the best use of the tools the twenty-first century has to offer them must confront the need to create interfaces where students are physically located: in the classroom and in the home. While teachers have little control over what students can do at home with technology, they can make significant and positive differences for their students by insisting that computer interfaces be located in and near the classroom, that architects and educational facilities planners create the infrastructure that such technology requires (wiring, wireless access points, space and furniture to permit students to move freely about without being crowded by the technology and each other (Martin, 2002)), that sufficient technical support be provided in a timely manner, and that opportunities to integrate technology take their rightful place alongside the more traditional literacies school value (Watts Pailliotet, 2000).

Fourth and finally, teachers, no matter their level of proficiency with the technological tools and integrating those in the classroom, should be explorers. They might ask themselves what the technology that exists in or near their classrooms can do that genuinely promotes learning in ways older technologies like pens and paper cannot, that connects students to other humans in the classroom, in the community, on the planet. They might ask themselves how the technology promotes thinking about important questions students raise and encourages them to navigate complex networks in search of information and connections, evaluate information, synthesize new understandings, and communicate with others (Leu, Leu, & Coiro, 2004). Table 3 describes some instructional activities that students can try right in the classroom equipped with appropriate interfaces between students and technology. No need to go to the computer lab for these; try these with a whole class or a small group of interested students, with one classroom computer or with a dozen laptops. These serve as a beginning for those just dipping their technological oars in the water, but these activities also might spur teachers experienced with technology applications in the classroom to try something new.

Table 3: Instructional Activities for Students with a Classroom Interface

Activity	Description	Advantages	Resources
Internet Workshop (Leu, Leu, & Coiro, 2004)	Teacher identifies content from the Internet and develops an activity which students then complete. Students share what they have learned.	Advantages: Limits content to sites approved by the teacher. Limits time commitment for the workshop. The author's students completed some workshops after finishing mandated computer testing in just a few minutes.	Blue Web'N: http://www.kn.pacbell.com/wired/bluewebn/index.cfm
WebQuest	A cooperative task (Dodge, 2001) that requires students to interact with each	Advantages: WebQuests are frequently posted for colleagues to share. For each WebQuest a teacher	The WebQuest page at San Diego State University: http://www.webquest.org/

	other and with Internet resources.	creates, there are thousands more, created by other teachers, that can be located and used to promote inquiry learning.	Best WebQuests: http://bestwebquests.com/
Threaded Discussion	In threaded discussion, students interact with each other at different points in time (asynchronous communication): One student posts today and another responds tomorrow, promoting time to think and thus, thoughtful discourse.	Advantages: Students can interact at lunch, at home, during class, or in a computer lab. A small group of students may elect to create a discussion group about a current event in social studies, a science innovation, or a work of fiction.	Nicenet: http://www.nicenet.org About Threaded Discussion: http://readingonline.org/articles/art_index.asp?HREF=wolsey/index.html
Google Writer	This tool permits more than one student to write collaboratively from two different locations on the same document.	Advantages: Students from one class can collaborate with students in a different class to create one final document.	Google Docs and Spreadsheets: http://www.google.com/google-d-s/tour1.html
Group PowerPoint	Using presentation software, students can create virtual museums, synthesize findings from a group inquiry, or present a jigsaw (Kagan, 1994).	Advantages: Students work together to share responsibility for a presentation's content. They can present PowerPoints to an entire class, of course. But students might also send a presentation to another group for review, or post it to a class website.	Microsoft PowerPoint® Software: http://office.microsoft.com/en-us/powerpoint/ Adobe Captivate: http://www.adobe.com/products/captivate/?sdid=HCRC KidPix: http://www.learningcompany.com/ then select the link for KidPix.

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