

Cite as: Bruce, Bertram C. (1994). Computers and school contexts. In Alan C. Purves, Linda Papa, & Sarah Jordan (Eds.), *Encyclopedia of English studies and language arts* (pp. 275-276). New York: Scholastic.

Computers and School Contexts

Sociologists, philosophers, historians, technologists, and others delving into the relation between technologies and social contexts have significantly elaborated our understanding of the process whereby given technologies are constructed, interpreted, and used. This work has tended to shift the emphasis in technology studies away from technological determinism towards an integrated view of technological, sociocultural, historical, economic, and political processes (Bijker, Hughes, & Pinch, 1987). Studies of computers in school contexts exemplify the concerns within the broader study of technology and society.

Many researchers and practitioners start with the assumption of computers as change agents--tools to bring about specific benefits for teaching and learning. Such a view is manifest in a question such as, "Does the use of word processing improve student writing?" A large body of research has addressed questions of this type (see various entries including Basic Writing and Computers, Computer Aids to Writing, History of Computers and Composition Studies, Research in Computers and Composition, Writing Quality and Computers). Many of these studies adopt a problem-solving, and generally, optimistic, stance towards the possibility of change: Research is done in order to verify that positive changes are occurring, or to identify areas where further development is needed.

In contrast, other research has questioned whether computers change social systems or are themselves constrained, shaped, and transformed by those very systems. Under this view, computers and school contexts are mutually constitutive; no longer can we speak in terms of one-way causal models. On the whole, research with a social focus has adopted a more negative stance towards the benefits of computer use, seeing that computers often exacerbate social inequities, rather than alleviating them, or that they are not used at all unless they reinforce existing practices (Cuban, 1988). The focus on social contexts of use has also led to new research questions, such as "How is the technology shaped by its incorporation into the classroom writing community?" or "How is writing enacted within an evolving technological context?" Studies have examined the diversity in the use of computers, unexpected paths of change, and computer culture.

Diversity in the Use of Computers

A social perspective shifts our gaze from overall effectiveness to the diversity of ways that teachers and students actually use computers. Computers are often used in unplanned and unexpected ways, some of which may extend beyond what the software designers intended and some of which may contravene those intentions. As a result, careful design of a study may ironically lead to replicable results that have little relevance for actual classroom practice. For example, many studies ensure that teachers or students have standardized and adequate training in the use of new software, that the computers are properly maintained, and that resource people

are available to address technical difficulties, conditions that are unfortunately rarely met in school settings.

A striking example of this diversity can be seen in the widespread adoption of synchronous electronic communication as a tool for the teaching of writing (see Real-time Communication). In this approach, students sit at terminals connected through a local-area network. They communicate in writing, in real time, through the network. Each student composes a message at his or her terminal and then sends it to the class-at-large. As each message is sent, it appears in a scrolling text on every computer screen in the class. A central argument for this approach is that it allows students to use the familiar discourse form of conversation, but now in written form, as a bridge into academic writing. There are many hardware and software configurations supporting this general approach.

Proponents of synchronous electronic communication in the classroom share common values such as encouraging student participation, building writing communities, modeling good writing, and providing immediate feedback to students. Yet despite these shared goals and even common software, there has been a remarkable variety of realizations in the classroom. In one setting, the entire class participates in rather free-form discussions of class readings, while in another, students are paired for critical analyses and defense of their own compositions. Some teachers laud the approach as a way to take the teacher out of the usual authority role in the classroom; others criticize it for that reason; while yet others like it precisely because it gives them greater control over the students. Others have used the same technology for Socratic tutoring, distance communication, brainstorming, word games, and collaborative composing. This diversity suggests that an analysis of the innovation must take into account the variety of social contexts in which it is employed, since there is little sense in which the same innovation is in effect in every setting.

Unexpected Paths of Change

Studies of the effects of computers on learning often devote scant attention to the paths of change. But many effects may come about in indirect ways having a non-obvious relation to the computer per se. An incident that occurred in a sixth-grade classroom using the Quill software for writing illustrates how the computer's effect on the social context of the classroom was a more important influence on revision than the software's facilitation of text editing. The teacher had encouraged his sixth-grade students to write critical reviews of a school variety show. Many of the students went to the performance equipped with pad and pen, and were observed by the researchers to be taking notes throughout the performance. The next day students who volunteered to critique the show were asked to write a draft of their review on paper at their desks, bring it to the teacher for minor corrections, and then be assigned a number, which would determine their turn to enter their writing on the sole computer in the classroom.

While they were milling around the computer waiting for their turns, students read each other's drafts. When one student had her turn at the computer, she entered her first three paragraphs with few changes, but then felt compelled to explain the discrepancy between her review and that of a classmate who had written a much more negative draft. The motivation for the revisions derived

from the classroom social context rather than from the word processing capabilities of the computer per se. While waiting for their turn at the computer, students read and responded to each other's writing. These interactions affected both the content and form of their writing. These interactional factors--rather than the ease of typing at a keyboard and revising electronically--most influenced the final product. Different classroom organizations, incorporating more computers, constraints against reading fellow students' work, or simply different procedures for drafting and revising texts produced quite different outcomes, even when the software and hardware were identical (Bruce & Rubin, 1993).

Computer Culture

Another significant aspect of context is the culture that accompanies computer innovations. While hardware or software may be obtained via a catalog order with little knowledge of its history, practitioners often adopt a technological system on the basis of their contact with other users at conferences or workshops, or through reading about the experiences of others. What they adopt is then much more than a technological tool. Instead it is a system of practices, including typical activities, functions, expectations, and knowledge of how and when to make use of the tool. There is, in effect, a culture of use that the new user enters.

The idea that a technology comes wrapped within a culture points us away from technocentrism towards studies of innovations as systems of practice. Ethnographic studies of those cultures may help identify characteristics that contribute to the overall impact of particular innovations (Pea & Sheingold, 1988). Evaluations of new programs may need to take situation into account, not as a confounding variable, but as an intrinsic aspect of the innovation (Bruce & Rubin, 1993).

New Questions

Attention to the contexts of computing leads to new questions and new emphases in research and practice. In place of the dichotomous question of whether a new method is better than the old, there are process-oriented questions regarding how computers can be used, how they can be integrated with other forms of communication in the classroom, when they are most helpful, what sorts of students or student problems benefit in what ways, and what qualitative changes in the classroom result from their use. Factors such as accessibility, student experience with computers, teacher attitudes, and the context of other classroom activities, become phenomena to understand and explore, rather than to control for the purposes of hypothesis testing.

A focus on contexts may lead to specific goals of using computers to change the social organization of the school or classroom. An example of this would be a program that invites cross-disciplinary collaboration, through an electronic mail community that links student activities in social studies, science, and English (Writing Across the Curriculum and Computers). Another would be computer activities specifically designed to address gender biases in the standard curriculum. Perhaps the greatest effort has been applied towards using computers and communication networks as tools for creating communities in the classroom and school, or linking those communities to others outside the school (Computer-mediated Communication; Handa, 1990).

Further Reading

- Bijker, W. E., Hughes, T. P., & Pinch, T. (1987). *The social construction of technological systems*. Cambridge, MA: The MIT Press.
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See also: Basic Writing and Computers, Computer Aids to Writing, History of Computers and Composition Studies, Research in Computers and Composition, Writing Quality and Computers, Real-time Communication, Writing Across the Curriculum and Computers, Computer-mediated Communication