

Whither Educational Technology?

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The first educational technology was writing, and like every subsequent educational technology, it had its critics. Plato, most famously, denounced the medium for its inability to recreate the give and take of spoken discourse. Writing is analogous to painting, he has Socrates argue in *The Phaedrus* (a text that, fittingly, depicts an intimate conversation between teacher and student).¹

"The painters' products stand before us as though they were alive, but if you question them, they maintain the most majestic silence. It is the same with written words; they seem to talk to you as though they were intelligent, but if you ask them anything about what they say, from a desire to be instructed, they go on telling you just the same thing forever" (1961, p. 521).

In short, Plato holds that the technology of writing has the power to destroy the dialogic relationship that ought to occur between teacher and student. As he sees it, the medium in which we communicate determines the quality of our interactions. But this is a deeply flawed view, as many contemporary scholars have argued. Rather, the social impact of technology depends on how it is *designed* and *used*. Writing can lend itself to ongoing dialogues between teachers and students, and speech can easily become one-sided.

However, while Plato may have made an unfair generalization about writing, his critique still had merit in at least one respect: it's worth keeping in mind that whenever a new educational technology is introduced, we ought to be wary lest reformers configure it in a way that closes off the process of intellectual exchange. There is something about dialogue, and the active involvement of the teacher, that is fundamental to the educational process and that must be woven into the design of any new instructional tool.

The Deskilling of the Teacher?

In fact, this ideal has inspired many educators since the early 1980s, and considerable progress has been made in using computer technology to develop new forms of dialogic interaction among teachers and students (Harasim, et al., 1995: chap. 3; Berge, 1999). On-line distance learning, in particular, holds tremendous promise in this regard, offering the potential for great improvements over previous models. Correspondence schools, for example, have always achieved some success at using the mail to maintain written interactions, but the process is slow and unwieldy. With the Internet, for the first time, we have an educational technology that supports rapid and

convenient communication, and there's every reason to think that Socratic dialogue can flourish in this medium.

Unfortunately, though, the current rage for computerized instruction tends to emphasize a quite different set of possibilities for the Internet. We have seen a new round of interest in "teacherless education," or the automation of key parts of the teaching-learning process. Neither television nor stand-alone computers ever managed to accomplish this feat, but many believe that such possibilities wait for us just a few miles down the information superhighway.

To the extent that earlier attempts failed for purely technical reasons, the Internet does show promise. In its ability to transmit graphically exciting materials, programs, and text, it represents a considerable advance over earlier means of delivering information. It can even offer crude imitations of teacher-intensive tasks, such as answering questions using FAQs (Frequently Asked Question lists) and "Ask the Expert" help programs. "Intelligent agents" can adapt computer-based programs to students' learning styles (Kearsley, 1993). And, incredibly enough, it may even be possible to automate the grading of essay tests, as Peter Foltz and Thomas Landauer claim in describing their "Intelligent Essay Assessor," based on a technique called "Latent Semantic Analysis" (Foltz, 1996). According to a Coopers & Lybrand white paper, this kind of software will soon have a radical impact upon the daily realities of higher education. "[A] mere 25 courses" of packaged instructional software could handle 80% of enrollment in core undergraduate courses; a 24-hour help desk would add a personal touch (Coopers & Lybrand, 1997).

Why would we want to automate highly skilled educational tasks? Some may argue that technology can deliver certain kinds of education more effectively than can faculty. Others would claim that automated instruction offers "consumer-friendly" options for working adults. But in the final analysis, the main reason for automating is obvious: to cut costs. Skilled workers are expensive, and automation is a time-honored strategy for reducing the need for them. The story begins in the early 19th-century, when textile manufacturers in northern England discovered that they could lower costs by mechanizing and replacing skilled with unskilled labor. The whole history of the Industrial Revolution is dominated by this strategy.

Here is how the 19th century "philosopher of manufactures" Andrew Ure described the goal in 1835:

"By the infirmity of human nature it happens, that the more skillful the workman, the more self-willed and intractable he is apt to become, and, of course, the less fit a component of a mechanical system, in which, by occasional irregularities, he may do great damage to the whole. The grand object therefore of the modern manufacturer is, through the union of capital and science, to reduce the task of his work-people to the exercise of vigilance and dexterity" (p. 18).

Attempts to similarly de-skill teaching have never been very successful in the past, but many observers are beginning to believe that new technologies can do the trick. Perhaps it will be possible to create a system whereby a variety of educational tools are delivered over the Internet and supplemented by the recorded performances of a few star professors. Then, low-level staff will perform the last few remaining tasks, such as notifying students of the availability of materials or of tests and deadlines.

Is such a gloomy version of the future really plausible? Is it likely that "self-willed and intractable" professors will disappear as have weavers, shoemakers, and typesetters? Probably not, but whether our uses of technology are about to lead to the wholesale deskilling of the professoriate is less important than the fact that this idea occupies a key place in the imagination of some educational reformers. Much of today's reform rhetoric, with its appeals to the revolutionary potential of virtual universities and competency-based degrees, hints at the obsolescence of the traditional campus and its teaching methods, arousing suspicion among faculty that technology will be used against them. Perhaps this is what is most at stake in our present debates about the computer's role in shaping the future of higher education: in making plans for the use of our new media, do we threaten to delegitimize faculty's control of the educational process?

A Third Way for Educational Technology

Ironically, contemporary thinking (if not always practice) in the business world has long since left behind the industrial era's fascination with deskilling. Over the last two decades, a good deal of business literature has been devoted to exploring a third way, an alternative to the old opposition of "man" vs. "machine." Starting with Peters and Waterman's 1982 best seller *In Search of Excellence*, Frederick Taylor's old model of de-skilled labor and hierarchical management was blamed for everything that ailed American business. The lesson has been hammered home in dozens of similar books since then.

Harvard business professor Shoshanna Zuboff made a particularly persuasive contribution to the field with her book *In the Age of the Smart Machine* (1988). As she sees it, we can continue to de-skill and automate production, or we can choose to take a new path, one that leads to what she calls "informating," or the cooperation of skilled workers and computers in ways that enhance the productivity of each. Zuboff's work emphasizes the *complementarity* of human and computer capabilities. While humans are best at dealing with unexpected situations and responding to novelty, computers can organize the vast amount of data required by modern production processes. A similar complementarity is at work in education: the teacher manages the complex and unpredictable communication of the classroom, while data is delivered in textbooks (and now by computers as well).

Zuboff's view contrasts sharply with technological determinism, the belief that innovations cause unique patterns of social change. The determinist view is increasingly challenged in technology studies by social explanations of technological development (Pinch and Bijker, 1987). We now believe that innovations confront us with a choice, not a destiny. The computer is certainly a case in point.

Not long ago, computers were assumed to be mere calculating and information storage devices, and their occasional application to other arenas seemed irrelevant or wasteful in the eyes of most programmers. It was only in the 1980s that electronic communications exploded, first in France, where the Minitel system quickly attracted millions of users, and soon afterwards on the Internet. It was mainly non-professionals (or professionals not associated with the design and management of the systems) who pioneered such uses of the new electronic technologies. And they succeeded because

ordinary people wanted computers to serve their personal goals and not just the official functions emphasized by experts (Feenberg, 1995; chap. 7).

Just twenty years ago, few imagined what the future would hold for apparently trivial applications such as email. But it seems obvious today that the computer serves as a vital medium of communication, and not just as a calculating and information storage device. Its *definition* has changed in a direction determined by a social process. And the story is not yet over. The computer is not yet a finished product. It is still in flux, its evolution subject to a wide range of social influences and demands.

The specifics of the business literature are not always directly relevant to colleges and universities, but Zuboff and others' emphasis on technological *choice* is right on the mark. Unfortunately, though, higher education hasn't entirely gotten the message. Many college presidents continue to sell their constituents on the *inevitability* of computerization, as though the very existence of these new devices sets the reform agenda in some clear-cut and unambiguous way. And there still exists plenty of faculty opposition to the supposed *consequences* of the new media, as though their impact were pre-determined (Feenberg, 1999; Farber, 1998).

In reality, though, our technology does not determine whether teaching will be automated or informed. Technology by itself does not hold such power. On the contrary, we must ourselves make the decisions that will steer the future development of educational technology. And this is precisely why it is so very important for higher education to include a wide range of actors in technological design (Wilson, 1999). Students and faculty bring a number of considerations to the table, including the desire to create tools that support human interaction, a desire that has already manifested itself forcefully in the earlier evolution of the computer. To resist the automating trend in education is not simply to wallow in an old-fashioned Mr. Chips sentimentality. Rather, it is to make a case for a potential and important line of technological development. The danger is that we might listen so attentively to our technology gurus that we end up ignoring these other voices.

The Promise of On-line Distance Learning

The need for alternatives to automation may be most pressing in the field of online distance learning, a field that I helped to create in the early 1980s (Feenberg, 1993).

The origins of distance learning lie in the old-fashioned correspondence course, which feeds written documents to isolated students studying from their home. Given the economies of scale in the production of written documents, this model yields tremendous cost savings when compared to classroom education. Essentially, labor costs approach zero as the school acquires a body of reusable materials. But note the social condition for these economies: the isolation of the student.

The Internet promises to raise the level of correspondence education, and it promises to do so inexpensively, by improving the materials available to the student. Not only does it replace the Post Office, television, and radio as means of delivery, but it can also carry out new tasks, delivering film, audio, and automated educational programs quickly and conveniently. However, the Internet can do more than merely improve the traditional correspondence course; it can also be used to add human contact to an educational model that has always been relatively impersonal. Using email

and computer conferencing, groups of students can be assembled in online communities where they can participate in classroom discussion with teachers on a regular basis.

There are two alternative models of on-line distance learning here with quite different financial structures. An automated system takes advantage of the economies of scale associated with the distribution of written materials and extends them into the wide range of media supported by the Internet (Agre, 1999). On the other hand a system that *also* includes live interaction does so at a price: a qualified teacher must be in attendance at every iteration of the course. Institutions may save money on building costs but not on educational labor, the single largest item in most university budgets.

There are further implications for the design of courses. Automated products will tend to be quite elaborate, since they must rely entirely on the computer to dramatize their message and motivate the student. Courseware designers and producers will manage the work of star faculty who can offer a polished performance in the new medium. Predictably, educational technology will evolve to Hollywood levels of complexity.

By contrast, courses animated by a live professor will generally be designed under his or her control in relatively simple and flexible formats. No computer professionals need be involved. As in the conventional classroom, much of the interest of the product will lie in the interaction among students and between students and teachers. As far as techniques of presentation are concerned, a certain healthy amateurism is to be expected. Prepackaged computer-based materials will not replace the teacher but supplement his or her efforts, much as do textbooks today. Software designers will pursue user-friendliness and simplicity to serve faculty needs.

In sum, the field of on-line distance learning faces precisely the same choice between automating and informing that businesses face as they confront the challenge of the computer. And, surely, we ought to make this choice on educational grounds.

Shaping the Future of Educational Technology

We already have a base of experience with interactive forms of on-line education, and the evidence seems clear, at least to those who have tried it: written dialogue works. Using computer conferencing software, faculty in many universities have for years now been working to bring the excitement of classroom discussion to an electronic setting. Such on-line discussions are not the same as face-to-face interactions, of course, but they have their own advantages. For the instantaneous back and forth of real-time discussion, they substitute a slower but still engaging day to day rhythm. With time to think and compose questions and answers, students who might never have participated in a face-to-face setting bring forward their ideas. The use of writing imposes a discipline and helps focus thinking. Faculty learn to grasp students' ideas at a much deeper level as they engage with them on line. Innovative pedagogical techniques such as collaborative learning have been adapted to the Internet and new forms of interaction invented (Harasim, et al., 1995: chapter 6). From an educational standpoint, there is little doubt that competent teachers under these conditions can be effective at sustaining a true equivalent of classroom interaction.

But in shaping the future of our technologies, economic and political realities now look to play the leading roles. Higher education seems increasingly enamored with

corporate rather than professional models of organization. The erosion of traditional faculty status continues apace in innovative institutions serving adult learners, now half the students in higher education. Even the older universities that now teach a declining fraction of students employ more and more part timers in the search for "flexibility." And it is becoming more difficult to resist arguments against tenure, arguments that carry conviction with the public if not with most members of the university community. In short, there exists a great deal of temptation to think of technology as a managerial tool for centralizing the university. And if we are not careful, something like this may actually happen in the confusing environment created by technological change.

Fortunately, how we design our new technologies is still an open question; the answer will decide *which* benefits and *which* limitations we end up with. Indeed, that choice will decide who the "we" are that peoples the educational institutions of the future, since our models of computerized instruction will define the future identities and roles of students and teachers. If we can resist simplistic appeals to managerial efficiency and focus our efforts on sustaining the dialogue that has always been at the heart of the educational experience, then technology holds great promise; if not, then we face a great threat

NOTES

1. Ironically, Plato used a *written* text as the vehicle for his critique of writing, setting a precedent that we continue to follow in present-day debates about educational technology: many of the most vociferous attacks on web-based media circulate *on the Internet* (Noble, 1997).

REFERENCES

- Agre, Philip (1998). "The Distances of Education: Defining the Role of Information Technology in the University," *Academe*, September.
- Berge, Zane (1999). "Interaction in Post-Secondary Web-based Learning," *Educational Technology*, vol. 39, no. 1.
- Coopers & Lybrand (1997). "The Transformation of Higher Education in the Digital Age." Report based on the Learning Partnership Roundtable, Aspen Institute, Maryland, July 1997.
- Farber, Jerry (1998). "The Third Circle: On Education and Distance Learning," *Sociological Perspectives*, Vol. 41, No. 4, 1998.
- Feenberg, Andrew (1993). "Building a Global Network: The WBSI Experience," in L. Harasim, ed., *Global Networks: Computerizing the International Community*. Cambridge, MA: MIT Press.
- Feenberg, Andrew (1995). *Alternative Modernity*. Berkeley: University of California Press.
- Feenberg, Andrew (1999). "Distance Learning: Promise or Threat?" *Crosstalk*, vol. 7, no. 1.
- Foltz, P. W. (1996) Latent Semantic Analysis for Text-based Research. *Behavior Research Methods, Instruments and Computers*, vol. 28, no. 2.
- Harasim, Linda, S. R. Hiltz, L. Teles, and M. Turoff (1995). *Learning Networks: A Field Guide to Teaching and Learning Online*. Cambridge, MA: MIT Press.
- Kearsley, G. (1993). "Intelligent Agents and Instructional Systems: Implications of a New Paradigm," *Journal of Artificial Intelligence and Education*, vol. 4, no. 4.

Noble, David (1997). "Digital Diploma Mills: The Automation of Higher Education," <http://classweb.moorhead.msus.edu/teach/noble.htm>.

Pinch, Trevor, Hughes, Thomas, and Bijker, Wiebe (1989). *The Social Construction of Technological Systems*. Cambridge, MA: MIT Press.

Plato (1961), *Collected Dialogues*. New York: Pantheon Books.

Ure, Andrew (1835). *The Philosophy of Manufactures*. London: Charles Knight.

Wilson, Brent (1999). "Adoption of Learning Technologies: Toward New Frameworks for Understanding the Link Between Design and Use, " *Educational Technology*, vol. 39, no. 1.

Zuboff, Shoshana (1988). *In the Age of the Smart Machine*. New York: Basic Books.