

Interactive Technologies in the Academic Library

PETER H. WAGSCHAL

AS WE APPROACH the middle of the decade, there seems little room for doubt that interactive electronic technologies are emerging as the single most dominant force in reshaping our daily lives. While this penetration of "chip" technologies is proceeding more slowly than some of the more ambitious forecasters had anticipated, it has already gone far enough to make it clear that the shape of things to come will be determined in large measure by the manner in which we choose to computerize America.

The irony—and the challenge—is that, as technological developments in the computer realm proceed with a whirlwind pace, most public institutions are finding it difficult, if not impossible, to cope with the choices that these new tools force upon them. While the business environment rushes to take advantage of the productivity-enhancing features of interactive electronic technologies, a variety of institutions in the public sector—most notably schools, libraries, and social service agencies—find themselves bewildered by the numerous possibilities and reluctant to enter a territory which is so rapidly evolving and so unpredictable in its overall direction.

For America's library system as a whole, and its academic libraries in particular, developments in interactive electronic technologies force a set of choices and dilemmas which will be as crucial in their results as they are difficult in their resolution. As more homes are equipped with

Peter H. Wagschal is Director, Ed.D. Program, School of Education, National University, Vista, California.

computers that can be networked to large databases, one might argue that the fundamental purposes of academic libraries—as storehouses of the most up-to-date information—are being replaced by a more convenient and universally-accessible information system. On the other hand, the driving force behind such developments is grounded in the profit motive, and there is every reason to believe that the commercial interests which are developing these databases could radically alter the shape, content, and operating principles of information access. As academic libraries struggle with these new technologies, it is crucial that they place themselves in a knowledgeable position from which they can have impact on the dimensions of the information storage and retrieval systems of the future.

On the Inevitability of Interactive Electronics

To say that technological developments have played a major role in shaping the course of human life on this planet is to belabor the obvious. From the taming of fire to the widespread use of the wheel, barbed wire, the automobile, or the television set, human history is as much an account of our inventions as a chronicle of their unanticipated effects upon our daily lives. And while the pace of such technological development has clearly hastened in this century, our ability to foresee the shape of new technologies or their likely effects on us has remained primeval.

Now, as the twentieth century winds to a close, there emerges a new set of technologies which bears all the marks of being the successor to television in its widespread impact on all facets of American life. While others would describe these times as the dawn of the “Computer Revolution,” my preference is to describe the phenomenon as a “Chip Revolution,” a shorthand way of referring to all manner of *interactive electronic technologies* based on silicon chips. The word *computer*, after all, has connotations which limit our thinking either to large machines of the *Space Odyssey* kind, or to visions of the current shape of personal home, desktop, lap-size, or “micro” computers which are likely to change rapidly as the chip revolution speeds up.

Whatever term one uses to describe the current dynamics of the chip revolution, there is an inevitability to its progress that is crucial for all of us to understand. For those who purchased calculators twenty years ago, the basis for that inevitability is firmly embedded in our empty wallets, for the calculator—and its startling drop in price over the last two decades—is the model for future developments in all chip technologies. Unlike any other technology that has emerged over the past fifty years,

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chip products embody the age-old economic conception of “economies of scale” with a vengeance.

As was the case with calculators—which now have production costs somewhere in the neighborhood of three cents apiece—chip technologies of the present and future begin with a large capital investment required to produce the first chip that performs whatever new function a manufacturer has in mind. Once that first chip has been invented and perfected, however, the process of mass producing duplicates is not only easy, it is exceptionally inexpensive. The story of the chip revolution—past, present, and future—is written in this basic structural economic factor. Chips will infiltrate every nook and cranny of American life precisely because there are enormous profits to be made in developing and marketing them.

Over the coming twenty and thirty years, virtually every product currently on the market, and a wide range of new ones, will see the incorporation of some aspect of “interactivity” through the use of electronic chips, and the driving force behind all such developments—from hand-held games to electronic maps in our cars to mainframe computers in the workplace—will be the same as the economies of scale that led so many to buy calculators. As more and more become interested in any particular piece of interactive electronics, the price of that item can be reduced drastically so that even more are tempted to buy it.

The dazzling variety of such products already on the market is enough to give one pause without even having to speculate about possible future inventions:

- The “Eye-identifier” currently used by some banks as a security system. This device allows entry only to people whose retinal image (as unique as a fingerprint) matches a previously-stored image. If prices drop as rapidly as those for calculators did, we’ll all be using them in five years instead of front door locks.
- General Motors plans to have an option on its automobiles soon which provides an electronic map of any place in America which shows (via Landsat satellites) the vehicle’s current position, and plots the easiest route to anywhere else.
- Academics already can access, through telephone lines and a home computer, more up-to-date information on virtually any topic than is available through most small- to medium-sized academic libraries. National networks like The Source, CompuServe, BRS/BRKTHRU, Knowledge Index—to mention only a few—provide rapid access to bibliographic and full-text information on general and specialized aspects of many topics.
- Voice-identification is already getting fairly sophisticated, with IBM

and several other smaller companies already marketing devices which can recognize as many as 500 words spoken plainly by almost anyone.

- The current versions of many ovens include chips which take the cook through the entire cooking process, from recipe to cooking times to completed meal.
- Seiko already markets a watch/computer with a detachable keyboard and modem so that it can be used to connect with any of the currently-available national databases via telephone. And ITT is hard at work on the computer/watch which will connect to the world of voice and data transmission through satellite from any place on the planet.

As more such chip-based technologies emerge over the coming decades, it becomes increasingly impossible to imagine an American home which does not make substantial use of interactive electronics. While it may be possible for many to get along without a “computer” in 1990, it is hardly possible to see our homes—not to mention our workplaces and sources of entertainment—without a variety of chip-based products by the turn of the decade.

Interactive Television

While the kinds of chip-based products previously described may appear trivial, they represent the kind of full-scale invasion of the minutia of our daily lives that will become commonplace over the coming decades. More important however, chips—for the kinds of economic reasons already discussed—will make major changes in the kinds of entertainment and education available in homes. In particular, chip technologies will play a major role in making the television experience an *interactive* process.

Imagine such a system at the most expensive end of the spectrum of interactive television. It includes a large-screen television with a touch-sensitive screen, a home computer, a videodisc player, the most sophisticated voice-recognition device, and currently available software:

- You sit down in front of your interactive television and say, “Aspen, please,” and the screen shows you Main Street in downtown Aspen, Colorado. If you say “Faster,” you move down Main Street faster. If you say, “Turn right,” you turn right at the next street. When you say, “Stop,” the image freezes, let us say at the door to the Aspen Hotel. When you touch the door (on your television screen) you are taken inside the hotel, where you can inquire regarding room prices

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- or see the penthouse suite, or look at the dining room menu, or make reservations.
- Tiring of your travels through Aspen, you might ask your interactive television set for its “calculator” which will allow you to do your income taxes on the screen, or for its “telephone” which enables you to place a phone call. Or you might tell your set that you want to see *Hamlet*, in which case it might respond with, “Would you like Richard Burton or Richard Chamberlain as Hamlet?” Or it might ask where you want to start in the play or whether you would like to play the leading role yourself and have it perform the rest of the play around you.
 - At this point you might hunger for instruction on some topic of your choice—anything from beginning Spanish to advanced differential calculus—and by request from your interactive television set pick up on your studies right where you had left off. Your interactive television will be a patient, individualized tutor, capable of using the full range of instructional styles (e.g., drill-and-practice, tutorial, simulation) and utilizing video images as models and examples of the lessons it teaches.

Fantasyland? One would be tempted to think so, except for the fact that systems like those described have been in operation for over five years and are being used in a variety of industrial and military settings in training programs.

As chip technologies continue to develop, to decline in price, to fill the nooks and crannies of our day-to-day lives, to provide more and more information stored in ever-smaller amounts of space, and to connect us to still larger computer systems which provide access to still more information, they hold the threat and the promise of drastically revising our conceptions of what it is to live a normal life. The inevitability of these transformations can, I would argue, no longer be avoided. But while we are in no position to put a halt to the chip revolution, we *are* in the early stages of a process which can move in any of a variety of ways.

In attempting to come to grips with the choices—the major questions of *how* America computerizes itself—it is fruitful to look more carefully at another technology which transformed our lives—television.

Television as a Counter-Example

In 1946, there were less than 7000 television sets in America. By 1956, over 85 percent of American households had at least one television

set, and by 1978 there were more television sets in America than bathtubs, a fact which led many to wonder which is washed more frequently, brains or bodies. For at least the past twenty years, Americans have watched, on average, four to six hours of passive television every day, 365 days a year. In the past forty years, America has gone from a nation which watched no television whatsoever, to a country in which television watching is the second most frequent activity—after sleep.

Television has become the common coinage, language, and ideology-vendor of the times. Since it occupies so much time, its impact on what we do, feel, think, and value is central. Even though there is no clear idea of what all of this television-watching is doing to us as individuals or as a nation, there are enough studies of the relationship between passive television watching and day-to-day life that it is becoming commonplace to think that television puts power and influence in the hands of a very few.

Because we spend so much time in front of the tube, we have no small tendency to credit its images with more reality than they deserve. And while it is true that everyone knows more about more things, people, and places than they ever could without television, it is also true that relying unquestioningly on the television image does not help develop critical thinking abilities. Most, for example, believe that they have a fairly clear conception of what it is like to be arrested, since they have seen so many arrests on television. But few have first-hand experience with arrest procedures that could be used to compare with the television images. Television even has impact on the manner in which certain occupational groups are perceived by the public and how those groups perceive themselves. A group of small-claims court judges in Jackson, Mississippi, for example, recently demanded of their supervisor that they be supplied with black robes as a replacement for their sport coats and ties. The reason? If Judge Wapner, on "People's Court" wears a robe, then they should as well!

The irony is that, while television occupies more waking hours than any other single activity, it has virtually no place in the schools and libraries which are responsible for teaching critical and skillful information use. Despite a flurry of misguided activity in the 1950s and 1960s, the American public schools and libraries have—for all practical purposes—found no room for commercial television in their day-to-day operations. While the schools continue to devote their energies to developing critical reading skills (despite the fact that recent polls suggest that Americans read no more than one book per year), and academic libraries continue to provide storehouses of printed information, no institution has emerged which takes seriously the task of developing

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critical skills in television watching. Apparently, school boards and administrators believe that interpreting visual information and judging the accuracy of television portrayals of events are instinctive and require no formal training. This nation has become one in which access to information, ideas, values, and wisdom is in the control of an exceedingly small number of television producers and advertisers, with no counterbalancing institution which can effectively bring into question the underlying assumptions and biases of that small but powerful group.

Interactive Technologies in the Library

In this larger context, the inevitable emergence of interactive television poses a series of problems for both our schools and our libraries which demand our attention. Many libraries are struggling with the relatively minor problem of finding a role in the present craze over videocassettes and videocassette recorders, where often it is difficult to compete with private "libraries" of videocassettes. But as the interactive and chip-based technologies are used more widely, finding appropriate and meaningful roles for them in libraries becomes urgent. The influence of passive television is frightening enough, but the potential power of *interactive* television in shaping attitudes, values, and ideals is orders of magnitude greater, raising the specters of *1984* and *Fahrenheit 451*: totalitarianism, mindless conformity, and antibookism, where no institution or individual would think to question the unilateral authority of the omnipresent, interactive television screen.

Furthermore, the most likely developments in chip technologies over the coming decades would suggest that academic librarians will have to rethink some of their basic assumptions on the library's role in the information-distributing process. As more homes gain access to computerized databases, as home computers gain the power to hold larger quantities of information, and as the private sector continues to search for larger profits in the information storage and retrieval realms, libraries face a serious threat to some of their most long-standing functions in American society. As electronic media increasingly take their place as the major source of information, they pose the threat of turning what we now value as "libraries" into little more than museums for an outdated information technology: the printed word.

As we face these potential challenges, four primary guiding principles seem to be crucial to the overall success of libraries in surviving the transitions sure to be brought on by the chip revolution:

1. It will do no one any good to proceed as if the chip revolution were merely a temporary fad that could be ignored. Above all else, libraries will have to take an active role in acquiring, using, and guiding the development of interactive electronic technologies lest they find themselves relegated to a set of functions that remove them from their central place in providing access to information, ideas, values, and wisdom.
2. It seems obvious that academic librarians will be in no position to have any influence on the development of interactive technologies unless they quickly become more knowledgeable and competent in the uses of those tools. Unless library schools begin to stress the importance of these technologies, and begin educating and training all professionals in their use, it is all too likely that academic librarians will be isolated from the decisions involved in implementing those technologies.
3. As chip technologies spread, it becomes increasingly important for libraries (and schools) to play an active role in helping the American population to become *critical* users of electronic, information-related technologies. Without such a major effort on the part of public institutions, the likelihood is high that most of what Americans know and believe will be derived from private institutions whose major concern is for profit, rather than for independent and critical appraisals carried out by an informed public.
4. There is a function which libraries have performed since their inception but which has literally no equivalent in a world where information storage and retrieval occurs solely or primarily through electronic means—i.e., “browsing.”

Browsing in the Twenty-First Century

Fantasizing and carrying forward the developments just described into the twenty-first century, it is not difficult to arrive at a scenario in which virtually every American home is equipped with interactive television tied via telecommunications networks to central computers which hold the accumulated knowledge and wisdom of human kind. In such a “wired” society, an individual can call up any information, at any time, from home. Whether searching for news, entertainment, or education, the latest research papers in a highly technical field, or the results of last night’s football game, that information may be called up from home with no need for a trip to a building known as a “library.” All of the information a person might ever deem useful for any purpose will be readily available in convenient form, and will require only some idea of

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what is being sought so that it can be pulled out of one database or another.

In such a world, however, we will have lost one of the most powerful and stimulating experiences that those of us who have used libraries often can gain from our frequent trips to those stacks of printed materials—i.e., browsing. When I was an undergraduate, some of my most valuable hours were spent browsing in a very large academic library. As I wandered through those stacks of books, my eyes would scan titles, authors, and subjects that I had never dreamed existed. I could glance through an original edition of Thoreau's *Walden* and then, moments later, find myself fascinated by the cover of a book I'd never heard of. I could go in search of a particular work of Edgar Allen Poe, only to find that the library held in its collection everything that Poe ever wrote, and then find myself spending the next month impelled to read it all. I could walk through dimly-lit rows of volumes upon volumes without anything seeming to impel my searching besides a raging curiosity. Had you asked me what I was looking for, I could only have said: "I don't know, exactly, but I'll know it when I find it."

For those of us who have spent large portions of our academic lives browsing the library stacks, the experience ranks high among the joys of learning, and deserves special attention in a society that seeks to base its life on the informed choices of its citizenry. It would not be an exaggeration to claim that the very course of my academic career has been shaped substantially by the times I have spent browsing through books in libraries, looking for something that I could not identify by name or subject but could always walk away with when I found it. There must be at least 200 books which had major influence over my thinking, but which I would never have found if I had known in advance what I was looking for.

As we jump headlong into the age of computer-based information systems, my concern is less with making sure that we develop databases that enable us to find the information that we are looking for, and even less with making sure that we can receive the information that a select group of database developers want us to have. The economics of the chip revolution are almost certain to provide us with those benefits, regardless of what stance American librarians take toward interactive electronic technologies. But what institution besides the library gives full range to the benefits of browsing? Where, except in a library, can I fulfill that thirst for knowing which has not yet developed its specific direction but seeks something that will be quenched only when I chance upon it?

The choices that face us in adapting to and incorporating chip technologies will be many and crucial over these coming decades, but

none seem to me to be more central than the question of how we preserve for ourselves the ability to browse in an electronic environment which makes such activity difficult if not impossible. If we find ourselves in a world some thirty years from now, where we can find any information that we want, but cannot look around aimlessly at what there is to know, we may well have thrown the baby out with the bathwater.

What I am suggesting is that many of our most fundamental institutions—including libraries—will have to take an active role in developing interactive technologies in their settings. It will serve no purpose for librarians to hope that chip technologies will be a passing fad, nor will it be advantageous to wait passively as manufacturers make decisions on *how* chip technologies will be used in libraries. On the other hand, if librarians begin to adapt interactive technologies to libraries' terms, the highest and most fundamental purposes of the library system may have been preserved and extended through technologies that might otherwise have eliminated them.