Editor's Comments

Transforming the Learning Industry

A book publisher's representative recently appeared at my office door. Usually he would have been there to peddle books or to coax me to write a book. But the mission this time was more intriguing. His firm had sent him to ask faculty to estimate the life expectancy of the venerable textbook.

Our readers value careful survey research, so some may already be wondering if faculty members are the right population to predict the date of the textbook's demise. Elementary school kids, familiar with the wonderfully engaging multimedia products of Broderbund Software, Inc. or addicted to action-packed video games, might have better instincts on this topic. For if a paradigm shift is at hand, those most deeply invested in the old scheme may be the last to awake to it. But, survey methodology aside, the future of textbooks is a timely issue for publishers to face. For multimedia, in one form or another, is as sure to push aside textbooks as "talkies" muscled aside silent pictures. Over the next several years, as multimedia becomes pre-eminent, both the publishing and education industries stand to be radically transformed.

Books are familiar old friends that by mere presence and silent dignity cast a comforting warmth over my office. But aside from decorative ambiance or collectibility, a book's value lies primarily in its information content. Yes, you can take a book to the park, bed, or bath. But books have many less desirable attributes, including their weight and susceptibility to deterioration. Bookshelves may be attractive, but they gobble up space, attract dust, and are, in my office at least, the frequent site of frustrating searches for misplaced titles. Such irritants become major headaches for libraries, bookstores, and publishers. The resulting high inventory and logistics costs mean high prices, outdated material, and limited availability of titles to the consumer.

Books have other limitations. A search for a passage vaguely remembered requires struggling with an index or a page-by-page search. A term defined in chapter four may not be used again until chapter ten, long after the reader may have forgotten meaning and location. As eyes age, typefaces become more difficult to see. Books intended as texts have further limitations. They are typically designed for the less than average student. Linear by design, the student progresses through the book from the front to the back and from the top of the page to the bottom. Skipping forward or backward is discouraged, with little ability to reroute to remedial or advanced materials. Errors, even when quickly discovered, may lie in wait for the unsuspecting student for years to come. And the high cost to purchase, produce, and distribute texts limits revisions. Under this time-to-revise umbrella flourishes a profitable used-book industry. While delighting students and school bookstores, used-book sales nibble painfully at the financial ankles of publishers and authors alike.

Given these limitations, it might not be unexpected to learn that in two years Microsoft Corporation has seen the percentage of sales of its CD-ROM multimedia products jumping from 2 percent to over 30 percent of consumer-related revenues.[1] Homes equipped with compact disk-equipped personal computers have increased from 40,000 to nearly 2 million during that same period.[2]

Many multimedia products are little more than electronic books, amplified by the ability to quickly branch from one section to another, to reveal hidden information, or to employ some amount of graphics, animation, or voice. Book publishers, with their current stable of authors and established distribution channels should, at least for the short run, do well in this market. Encyclopedias, for instance, are already proving to be popular on compact disks. But the real long-run threat to the established publishing industry will

[1] Lohr, Steve. "The Silver Disk May Soon Eclipse the Silver Screen," *New York Times*, March 1, 1994, p. A1.

[2] Ibid.

come instead from innovators who look well beyond the narrow role that a textbook currently plays in the learning process. It is learning, rather than our current conception of either text publishing or education, that must be the starting point for innovating with multimedia. Initially these new multimedia learning vehicles will travel on CD-ROM disks. Later they will migrate to the emerging interactive information highway, thus disassembling the current distribution networks.

Multimedia will provide additional threats to both the publishing and educational establishments because of the value it will add to the way we learn. Most students learn best if they are involved in a personalized way. Reading or listening to a lecture is involvement of sorts, but it is the passive collective involvement of fans in the stands rather than the active and committed involvement of the player on the field. In fact, a fan in the stands is usually having a lot more fun and participating more actively than is a student reading a text or watching a lecture. But the student who is actively engaged in active multimedia-based learning, or "edutainment" as it has been recently labeled,[3] may find themselves learning and laughing at the same time. To some the transformation of education into fun might seem as knowledge-age alchemy; but here there is real opportunity for success and with a far greater potential benefit to mankind.

Learning is enhanced if students can immediately apply the knowledge learned. Interactive simulations, such as a virtual reality tour of a factory, circulatory system, or internal combustion engine can provide attention-riveting learning opportunities. Equally compelling is just-in-time learning, where skills are acquired on a need-to-know basis. Conceptual knowledge can also be closely linked to concrete examples via the multi-dimensional nature of multimedia. For instance, a music student watching a recorded presentation of a symphony might be able to interrupt the performance to explore the nuances of a repeated musical theme, listen to the conductor's interpretation of the piece, or benefit from several noted violinists' renditions of the same solo.

Learning can be enhanced by bringing together students with similar interests, ability, and expectations. A standout high school junior in a small town in upstate New York can participate in a virtual physics lab with gifted students from all over the world—perhaps facilitated by college professors anxious to lure these gifted prospects into their labs. Most education systems, at least in the U.S., tend to simultaneously reinforce homogeneity of culture (by culturally similar students attending similar institutions) with heterogeneity of interest and skill level. In a networked educational environment, cultural heterogeneity will be promoted without the need for cross-town busing or study-abroad programs that are financially out of reach for most students. At the same time, students can be grouped by interests and skills, thus letting them learn at the fastest speed possible.

Learning is now well accepted as a life-long necessity. But as learning becomes more critical to employees, retirees, or preschoolers, it becomes simultaneously less school-oriented and more home-, office-, or transportation-centered. For instance, two old friends living in retirement communities in Queens, Ontario and Orlando, Florida may join electronically to accompany a virtual expert on an expert-agent guided tour of Impressionist paintings in the Cyberspace galleries of Europe. Toddlers in Paris could similarly make new friends, and perhaps learn some Italian, by joining in a multimedia experience with preschoolers in Rome.

Learning will be increasingly two-way. Students will come to expect errors in learning materials to be immediately corrected and to demand the most current knowledge and knowledge-delivery systems available. But authors will benefit from this personal electronic connection with their customers. For instance, MOSAIC, a hypertext interface to the Internet produced by the National Center for Supercomputing Applications at the University of Illinois, provides an online feedback capability that links the user directly to the developers. User feedback loops will provide a steady and free source of potential enhancements. Scott Adams, the creator of the daily comic strip *Dilbert,* has learned to magnify his own creativity through such feedback. Adams prints his e-mail address with the comic, a spoof on the

[3] "The Learning Revolution," *Business Week,* February 28, 1994, pp. 80-88.

life of a software engineer. His systems-literate fans reward him with a steady source of fresh ideas for future comic strips.

Both publishers and the education establishment must examine closely the way they add value to learning. Many of the functions they now provide will become increasingly available via small entrepreneurs in the electronic marketplace. Already authors are experimenting with selling their works directly to consumers. For instance, the author Steven King recently started selling a short story over the Internet for $5.[4] Handling distribution for King was the Online Bookstore in Rockport, Massachusetts. They presumably left King with a far greater share of the revenues than did his book publisher, while providing him, overnight, with a worldwide audience.

Similarly, universities with rich traditions and reward systems faithfully tuned to the creation of new knowledge may find themselves badly shaken by private sector investments in new methods of rapidly disseminating old knowledge. Few universities have yet to clarify, or even think about, their visions for participating in the technology-fueled learning revolution, though some exciting work is underway. One promising example is a new Harvard Business School multimedia course module focused on international business.[5] Students can listen to live interviews with managers, call up taped pronunciations of foreign words and names, or compare full motion clippings from British and German versions of television advertisements. It may be that, with the exception of a few strongly branded institutions such as Harvard who will serve as organizers, packagers, and endorsers, the real financial windfalls of the knowledge era will go directly to individual contributors. Consider for instance a promising young finance professor who, with the assistance of an artist and multimedia consultant, develops a learning module that lets a student understand, experiment with, and apply in real situations the challenging concept of *net present value.* Such a module could, in a matter of days or even hours, be available online in major universities and businesses around the world. Much of the promotion of the module's capabilities could be by electronic word-of-mouth as one instructor first learns of, and then broadcasts to his or her friends, colleagues, and former students the benefits of this marvelous new morsel of knowledge. Using standard interface conventions, this could be implemented as a software object easily plugged into an integrated multimedia application that provides access to a wide range of financial tools and learning modules. A sophisticated billing system could provide the module's author with a payment for every access of the particular routine. But, in this near perfect electronic marketplace, prospective competitors from throughout the world will quickly learn of this new entrant and, having seen how the module works, immediately begin to develop an even better mousetrap.

Despite my confident tone, no one can readily predict how the convergence of communications and computer technologies will transform learning. There will surely be the usual delays, detours, and derailments along the way. But it also seems safe to assume that the publishing and education technologies that, with only modest evolutionary progress, have educated our parents, grandparents, and great-grandparents will no longer suffice for our children, grandchildren, or even ourselves. The transition to these new learning technologies will look less like the transition from 33⅓ RPM vinyl records to compact disks, than it will look like the revolutionary change from Perry Como to Chuck Berry. Any information-intensive industry must prepare to respond to this revolution. Success will require that we look with suspicion at the goals, reward systems, and policies that have been the comforting signposts of the past.

For universities such introspection may be long overdue. The information revolution bubbling up about us is a revolution in knowledge dissemination. If the university wishes to participate it must encourage and recognize innovations in knowledge dissemination with the same, or probably greater, fervor than has been long reserved for knowledge creation and classroom performance. The U.S. Apollo moon project is credited with advancing the frontiers of science in many unanticipated ways. Placing a superbly

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[4] Deutschman, Alan. "Scramble on the Information Highway," *Fortune,* February 7, 1994, pp. 129-131.

[5] Bartlett, Christopher A. and Ghoshal, Sumantra. "Managing International Business: A CD-ROM Based Multimedia Course Module," Course Technology, Inc. One Main Street, Cambridge, MA 02142.

learned and constantly learning populace high atop a magnificent knowledge dissemination infrastructure will also produce, as a byproduct, an increase in the rate of growth of new knowledge.

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With this issue we lose the much valued service of six members of our editorial board. Each of these individuals served us with distinction and dedication while adding considerable value to the articles that they have helped our authors publish. We offer sincere thanks for a job well done to Gordon Davis, Bob Goldstein, Enid Mumford, Judith Olson, K.S. Raman, and Bill Remus.

—Blake Ives