

Chapter Seven

Electronics and the Decline of Books: The Transformation of the Classroom

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Noam believes that books eventually will become secondary tools in academia, usurped by electronic media. Textbooks, he says, will be replaced by multimedia instructional technologies incorporating pictures, symbols and video clips. Change will come not because the new forms are superior to traditional face-to-face teaching, but rather because they can be provided for significantly lower costs. Further, commercial firms will be the primary providers of the new electronic curriculum, not today's nonprofit colleges and universities. Noam reviews the effects of these changes on the publishing industry and the higher education marketplace.

The paradox of American higher education is that on the one hand, it is a highly successful model. It produces more Nobel Prize winners than any other country. Students from all over the world come to America to study, despite the high price of tuition. The system is strong at the top and fairly broadly distributed at the bottom. On the other hand, American higher education is deeply worried

about its future: how to run the institutions, how to finance them, and how to maintain their quality. Such unease is not unique to higher education. Indeed, all of society is subject to the same process of "creative destruction," to use Joseph Schumpeter's phrase, that is emerging as part of the information age.

Revolutionary Change

It is characteristic of revolutions that institutions do not understand the forces of change that are enveloping them. It is easier to see the need for transformation when it comes to industries other than one's own. Take, for example, the banking industry, which currently finds itself in the throes of a technology-induced revolution. Bill Gates has described banks as dinosaurs, and the ATM machine is one example of how traditional banks are becoming obsolete due to technology.

Banks first embraced ATMs as a cost-saving strategy: convenient and cheap, they allowed banking institutions to close branches and shed tellers. Banks closed thousands of branches, but in so doing, have unleashed a dynamic that is still playing itself out. Many ATMs are not associated with a local bank anymore, but are supported through a network by distant banks—nonbanks—which will likely include banks from other countries in the future. Soon, one will be able to replenish one's electronic wallet from any phone. From the customer's point of view, it matters little which financial entity is associated with the ATM machine. This scenario illustrates how through the implementation of a simple cost-cutting information technology, the ATM, banks make themselves obsolete by stepping back from the direct link with their customers.

Money itself will change enormously in the future. As we progress from credit cards to smart cards and finally to electronic wallets, cash will become electronic, and money will be issued not just by governments but also by private institu-

tions. We will see privately owned and competitive currencies, as well as cash, that can only be used for specific purposes. In introducing those changes, the nonbanking financial sector is moving much faster than the banking industry as a whole, and this will have long-term implications. Banks are losing the competitive advantage they have accumulated for centuries.

Another industry that has undergone massive change is the telecommunications industry. Before technological change and liberalization changed the telecommunications landscape in America, AT&T was an admired and feared company. It was the largest corporation in the world, owned and operated about 80 percent of American telecommunications, and had Nobel Prize winners on its payroll. And where is AT&T today? It has been federally splintered, and must compete with hundreds of hungry start-up companies—by interrupting the dinner of potential customers to beg them to sign up for AT&T's service. Although still a large company and doing reasonably well, AT&T clearly was not prepared for what hit it.

Yet it was AT&T's own technology that opened the doors for competition. During World War II, microwave technology was harnessed and soon spilled into civilian applications. It thus became possible for competitors to enter the market, and the rest was mere implementation.

So what can colleges and universities learn from the banking and the telecommunications industries? Many of the problems American universities will face result from changes in their three pri-

mary functions: producing information, storing information, and disseminating information. Technology will allow these functions to be performed more conveniently and perhaps more powerfully in the future. In the past, information was scarce. Scholars came to the information and students came to the scholars to learn. Today, information can be found everywhere and, therefore, so can scholars and students. This dramatically reduces the need for the information nodes we call universities.

Books Today

Technological changes will also affect one of the prevalent objects in higher education, the book. A symbiotic relationship between books and universities goes back 3,000 years, to the large libraries in Nineveh. This ancient library at Nineveh was organized around specialized sections. There were rooms for the study of history, literature, poetry, astrology, etc. In these rooms scholars worked, surrounded by their disciples. The form of what would become the modern university had taken shape, marked by centralized information, scholars coming to the information, and students coming to the scholars. The close link between books, manuscripts and universities continues to this day. Because university books are being produced and consumed in large quantities, it is shocking to contemplate that this situation is likely to unravel. It is doubly ironic to imagine the demise of the university book at a time when information, knowledge and scholarship are more important than ever before.

Nevertheless, books will cease to be the main-

stay of knowledge in academia, and their role will become primarily that of an entertainment medium. Culturally, books will descend to secondary status and the firms associated with books—publishers—will economically decline. This will be difficult to accept because the concept of books is very near and dear to our hearts. Yet books in academia will go from romance to divorce.

In academia, there are basically four main types of printed material: *texts*, as source material for analysis; *textbooks* for instruction; scholarly *monographs*; and *academic journals*.

Source Material

The first type of book, source material, is probably least likely to be affected by the information revolution. Old texts, traditional books, and the classics will continue to be available in book form. Rare books are certainly going to be around, although for reasons of protection and dissemination they are likely to be stored and distributed electronically. For example, for a long time, the Dead Sea scrolls were available only to a small group; today they are becoming available electronically to all researchers.

Textbooks and the Traditional Classroom

The second category, the *textbook*, will flourish but in a totally transformed way. Printed textbooks will become secondary; textbook publishers, however, can become quite important for the simple reason that they can transform themselves from

book publishers into providers of the courses themselves. University courses are very expensive. In Ivy League schools, a single lecture hour per student costs approximately as much as a Broadway show. At these prices, competitors are bound to enter the market and provide alternatives. Some of these alternatives will be provided by other universities using new communications technologies. More common will be courses provided by textbook publishers—some of them may even offer degrees or certificates. The key question then becomes whether society will value these credentials in the marketplace: where the quality of the courses is assured, and their rigor to students strong, these degrees will without doubt be valued.

Distance education will not be as effective as face-to-face (although the latter can become romanticized if one considers the large classes that are typically offered at large universities). Electronic courses, however, can be provided at dramatically lower costs, and will reduce the role of traditional textbooks.

Scholarly Monographs

The third category of books are the scholarly volumes. Here the buyers consist of individuals and libraries. Individuals will continue to buy books, but alternative information on the Internet is often available, and is more updated, easier to link up with citations, and often free. This will reduce demand for books.

The library system, too, will shift away from the physical book to electronic publications. And publishers will establish pay-per-read arrangements or site licenses to access the material. These scenar-

ios will put the go-between role of publishers in jeopardy. Self-publication will become popular, particularly in the case of authors who have some reputation, and are in a rush to publish. Much self-publication will be done through an academic department, research center, or professional association.

Academic Journals

The fourth type of books, academic journal volumes, has an economic foundation that has become unsustainable. Approximately two million articles are published each year. It costs over \$100 million to buy a single complete set, each year. Nobody can afford this cost.

The advantages of electronic media go well beyond the economic, as electronic journals are superior in accessibility and in cross-linking references. The latter feature, after all, was the motivation behind the development of the World Wide Web by physicists in Geneva who wanted to be linked directly to the sources. Some of these journals can be selective, thus maintaining the academic pecking order.

The Decline of Books

Let us add up these trends. Printed textbooks will shift into electronic-based courses, scholarly books will move to an electronic version, and journal volumes will become electronic. The inescapable conclusion, therefore, is that there will be a significant shift away from books in academia, the inner sanctum of book culture.

Many people will rise to the defense of the book. One main response is that of practicality. One can not curl up with a computer. Here, the tradition-

alists have a point—electronics really are not user-friendly. But this is likely to be a temporary disadvantage. In time, high resolution screens will adopt many of the physical characteristics and conveniences of the book. Thus, to rely on the ergonomics of books versus electronics is a risky and short-sighted proposition.

Another argument in defense of the paper-based book extols the advantages of the written word over pictures. This is a holdover from the struggles of the print culture over television. Like generals fighting the last war, book lovers sometimes confuse writing with the choice of technology, computer screen versus paper. Plenty of writing takes place over electronic screens, and much of it is done by the same young people whose brains have supposedly been fried by television.

Another advantage of electronics is its multi-track capability. A major drawback to print is that it is slow to absorb. People read at a relatively slow rate. Society has settled on a protocol that cannot be easily changed. Julius Caesar could still fairly easily read today's newspaper headlines. To speed absorption of the enormous amount of information being produced, one would expect to see the adoption of a faster delivery system so that the information could be moved faster. Pictures, or information vehicles, have certain advantages in some situations, while symbols have advantages in other situations. For abstract concepts, the written word is superior. The optimal way to communicate therefore is to have multiple tracks of information: in other words, multimedia. Today, multimedia enables consumers of information to receive print, pictures and

sound, all brought together to enhance the act of communication.

As multimedia develops, it will become a creative medium in which some of the best minds of society develop new forms of literature and entertainment. Multimedia will be at the leading edge of communication. Technological books are going to be old, tired and convenient. In this sense, books may become more like Muzak—comfortable, soothing, but not on the creative leading edge.

Thus books will become a vehicle for popular culture, while electronic media becomes the vehicle of scholarship and creativity. How ironic it would be, after the book culture disdainfully lording it over popular video culture for so long, that now the tables would be turned.

Books are yesterday's technology. They are bulky, environmentally suspect, and bad for the eyes. They wear out, are expensive, hard to find, forever out of print, slow to produce, slow to write, and slow to read. Gutenberg's Bible is still one of the most beautiful books ever made. But does that not point to the static nature of the medium? If children and adults do not read books as much as they used to, maybe the problem lies with the book's deficiencies as a medium? Not in terms of the content, which can be fixed; but the medium itself might be the issue.

Conclusion

The book and the university will part company due to changed technology and economics. Like the radio, of which there are quantitatively more than ever, books will survive, but without

their past centrality. Books are likely to stay with us as an entertainment medium—novels for couch, beach and bus. And, where an exquisite presentation is part of the experience, such as for poetry or art, books will prevail. But when it comes to the pure informational aspect of books—storing and accessing useful information—the paper and ink technology will lose out. This change will not come overnight. Nor will it be complete; media tend to coexist. Nor will it be uniform; the hard sciences have never shared the humanities' love affair with books. But changes will come in time. We in academia will hate many of these changes, because as a profession, we are beholden to books. We write them, we read them, we review them, and our status is often derived through them. But is it not really knowledge that we cherish? Books are merely the receptacle. There is a new and creative medium out there knocking at the door, and we should embrace it.