An Introduction to Hypermedia and the Implications of Technology on Graphic Design Education

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Abstract:

Computers are a new medium—not merely tools. They combine many forms of information and offer new ways of organizing information. Designing for computers—using computers as a medium—can open up business and creative opportunities. Design education should recognize the opportunities, embrace the use of computers as a medium, and adapt curricula accordingly.

This article is based on a talk I gave to the Graphic Design Education Association at its 1989 annual symposium at the Chicago Art Institute. I have expanded my notes from the talk and included some recent developments in the computer industry.

The main point of the article is that graphic designers should view computers not only as tools for completting traditional tasks but also as a new medium for communicating ideas. This view suggests a need to change design education.

For many years, computer scientists such as Alan Kay and Nicholas Negroponte have seen the potential of computers to become a medium. Their vision has not been practical until quite recently. A look at the past will help show how much computers have changed.

Ten years ago in 1980, I first visited MIT's Media Lab—then known as the Architecture Machine Group. I had gone to see some interesting work that Wendy Richmond was doing on fuzzy or "anti-aliased" fonts. By accident I happened to see Andy Lippman's "Movie Manual," an interactive car repair manual.

Remember, this was still 1980. I was drawing low-resolution fonts on graph paper because no other method was available outside sophisticated labs. Personal computers were barely four years old. IBM was a year away from releasing its first PC. Apple had not even begun planning the Macintosh.

What I saw at MIT was a large screen—perhaps 19 inches across. On the screen was type that looked like type—not jagged green dots pretending to be letters. There was also a mouse controlling a cursor. (I had never seen a computer mouse before.) And there were also colored diagrams and photos. With the mouse I could move the cursor over a photograph, click the mouse button, and like magic the picture would become video—complete with narration. At the time I thought the demonstration was impressive—largely because I had never seen anything like it. I assumed that most computers worked pretty much the same way. Later I was surprised to find the rest of the world not quite as advanced as MIT, and I began to appreciate Lippman's achievement more.

Think about what he had to do—well before the days of personal computers. He had to assemble or build all the hardware. He had to develop the basic software—the operating system and the applications (or authoring environment). Having done all that, he could then get down to the task of designing the content and interface of the manual. It seems to me an almost impossible task for one person. Few individuals possess both highly developed engineering skills and highly developed design skills.

Ten years later the task is much easier. You can accomplish it with off-the-shelf parts. You can use Macintosh II or IBM 386 class computers. Their operating systems provide much of the basic software. Apple throws in HyperCard, and Microsoft offers Asymmetric's Toolbook. You'll also need a laser-disk player such as the Pioneer 4200, a video-card, and a couple of cables. You can put together a complete system for $10,000—maybe a lot less.

Of course you still have to design whatever shows up on screen. And you have to create the video. But now you can actually concentrate on the design of the content and the design of the interaction—on what you see and how you use it. You do not have to worry (relative to ten years ago) about how the hardware and software works.

The MIT Movie Manual story illustrates an important point. Computers have advanced enough that graphic designers now have a major role to play in the development of what shows up on our computer screens and in the way we use our computers—that is, in the design of content and the design of interaction. I believe this is the area where computers will most change the way we communicate, the way we design, and the way we teach design.

The problem of using computers as graphic design tools has been solved.

In order to focus on the potential of computers to be a medium, we must move beyond our fascination (or fixation) with them as tools. We are exhausting the topic—and the audience.

Most designers did not give much thought to computers before 1986. If they noticed computers at all, it was probably for billing or word processing. Macintosh, PageMaker, the LaserWriter, and PostScript changed our view of computers. Designers found a new tool for comping and page layout. Many people complained about quality, but the software improved. And now, most design offices use computers as part of their regular business. (In 1988 Wendy Richmond reported the results of a survey of Communication Arts Magazine readers in which 70% of those responding said their businesses owned computers.)

The rate at which computer software has improved has been quite extraordinary. Today programs like Adobe Photoshop and Letraset ColorStudio can handle photo collaging and retouching. Before last year, high-quality, digital photo-retouching was only possible on expensive systems like Scitex.

Now everything graphic designers have traditionally done from generating comps to setting type, from drawing logos to retouching photos, can be done on personal computers. In fact, designers can now create their own high quality, color separations.

In its essence, the problem of using computers to produce traditional print graphic design has been solved. Certainly designers would benefit from faster machines, more storage space, and better screen calibration. And computers will continue to improve, but software aimed at the design and production of print will not radically change. It will simply become faster and handle increasingly complex pieces.

Computers are *not* merely tools.

We have heard a great deal of discussion about the computer revolution in design. The emerging wisdom is that computers *are* merely tools—tools for students to master like ruling pens and paint brushes.

Reputable designers as diverse as Paul Rand and April Grieman agree on this point. In Rand's words, "[They're] just like pencils. Nothing special." I am sad to report, Rand will not tolerate discussion of the matter. I think his view is a little short-sighted. It overlooks the potential of computers to be a medium. What I mean is that computers are not just something to design with; computers are also something to design *for*.

Computers are not just fancy typewriters. Computers are not just a new way of doing the same old things. Computers are also a way of doing new things—unexpected things. Here is the promise of technology, the promise of science fiction. It is magic—the magic dream of a better world. The reality is that computers differ from the other tools designers use in two important ways. Computers can simulate and combine most forms of information, and they can combine information into new structures.

The development of computers is a history of their ability to simulate new forms of information. The first computers understood only numbers. Text followed quickly. Type and pictures are much more recent, as is sound. Animation and video are now limited mostly by available memory. Computers can combine all these information forms on screen creating a kind of super-medium. (Several electronics manufacturers are working to make computers handle video more easily—Apple, Fujitsu, IBM, Intel, Matsushita, Philips, Sony, and others.)

Computers also offer a way of organizing information into new structures or structures that would otherwise be too cumbersome to use. Most of the time, we structure our information in one of two ways. We organize information so that we can see it all at once—in a point source like a magazine ad or stop sign. Or we organize information so that it unfolds over time—in a linear sequence as in movies or books. But unlike movies, computers can offer more than one path. Screen 1 might lead to Screen 2 and also to Screen 3—and to any other screen as well. A screen describing Joe DiMaggio might lead to screens describing baseball, Marilyn Monroe, and Mr. Coffee. A screen about baseball might lead to screens about rules, history, and current statistics. Each successive screen might lead to still more choices. All these choices lead to a new way of presenting information. The viewer takes control and can ask for more—or for less.

The different structures available for organizing information offer much potential for research. A quick look at information structures reveals that aside from points and linear sequences, we can organize information in structures such as parallel time-lines or parallel texts, hierarchies including definitions and magnification, matrices of 2, 3, or any number of dimensions, overlays of maps or diagrams, and webs or networks. Probably there are other structures. Design would benefit from further research.

The point is that computers make it possible for us to organize large quantities of information in new ways—ways that would have been hard to create or hard to use in the past.

The combination of several forms of information in structures that are not only linear is called hypermedia or multimedia. For a better idea of what multimedia might become imagine something new—something that combines the properties of books, movies, and video games. Imagine pointing to an area on a map and then watching the details enlarge or calling up video of the area. Imagine pointing at a word in a novel and then seeing a definition or photograph appear. Imagine an interactive annual report or an interactive newspaper or an interactive telephone book where you could ask for more information about any topic that interests you.

We are at a point in using computers as a medium very similar to the point movie making was at before *The Great Train Robbery*. We have a new technology but cannot yet see how to use it in a new way. We can set up the camera to record an event like a car driving by or even to record a play. But we have not found the best way to use a movie camera to tell a story. We have not yet figured out how to pan or cut. We have not yet invented the computer's equivalent to the language of film.

Still, the limits of our technology or our ability to understand it have not stood in the way of making a business of multimedia. If you have any doubts, look at the investment on the part of large corporations. In one of the largest deals ever, Matsushita purchased MCA. Sony owns Columbia pictures and CBS Records. The Japanese are hardly alone. Philips owns Polygram, and Polygram owns American Interactive Media. GE owns RCA, and RCA owns NBC. ABC has a multimedia division—as does GTE. Time-Warner has a multimedia publishing group. Disney has a software division. Microsoft has a publishing division, and The New York Times recently reported that Microsoft Chairman Bill Gates is negotiating with museums for the right to electronically reproduce paintings and photographs in their collections. While there are only a few published titles, the investment is already enormous.

In Los Angeles, the San Francisco Bay Area, and New York, graphic designers who understand multimedia and today's software and who are skilled at typography, art direction, animation, or video are in demand. This is partly because they are rare, but the market for their skills is also growing.

Design education should embrace computers as a new medium. While we have seen a lot of business activity surrounding computers and multimedia, we have seen little activity on the part of design education.

Most graphic designers may choose to work only in print and not to experiment with other media. They have a narrow view of design. It is a view of design related to Rand's and Grieman's view of computers as merely tools.

A broader view sees design as a process. It is a process of bringing order, of solving problems, of communicating. The idiosyncrasies of any particular technology—be it printing, photography, or computing—are not the primary subject of design. Therefore they should not be the primary subject of design education.

Even while design educators grapple with the problems of how to integrate computers into traditional curricula, they must look beyond. They must look at the problem of teaching students to design for computers—to design what shows up on screens. They must build curricula that anticipate rapidly changing technology.

Video monitors will become large, high-resolution, flat panels. A myriad of hand held computers will appear. Computers will connect to—and then be built into—goggles and glasses and also into clothes, cars, and buildings. All these computers will display information. The information will require form. And the people using the computers will need to interact with the information. Both the form of the information and the form of the interaction will require design. Someone must figure out what to show, how it looks, and how it works. That someone will be a designer.

Graphic designers who design for computers—who use computers as a medium—should receive encouragement and training in college. They will require familiarity with traditional skills including communication, typography, photography, animation, and video production. They will also require new skills especially in the areas of interaction design, design process, problem solving, team dynamics, and project management. They should also be somewhat familiar with programming though they need not be programmers.

Introducing students to the idea that computers can be used as a medium should not be difficult for any school with a computer lab. Schools with Macintosh computers probably already have HyperCard software. Macromind Director and Silicon Beach SuperCard also work well. Schools with IBM 386 class computers can use Asymmetrics Toolbook. Schools can also have students tackle the subject with paper storyboards.

The biggest problem may be keeping assignments simple. Design an interactive map of your building. Design an interactive system that explains a process such as how to play baseball. Design an interactive history of typography with references to the arts, sciences, and politics. The essential questions to ask students about their work are these:

- What is the message?
- Why should it be interactive?
- Who is the audience?

The ultimate criteria is this:

- Does the piece make sense?

Before design curricula can change, design educators must make important choices. Is graphic design about producing print or is it about communication? Must design education be specific to a particular medium or can it span a number of media? Do computers have a place in design education as more than mere tools? Resources are always scarce, and computers can be costly. However the cost of not investing now may be high later.

The change I advocate for design and design education—from using computers as specialized tools to using computers as a medium—will happen in the rest of the world as well. In the 1980s computers changed from a few isolated mainframes used by highly trained specialists to millions of personal computers used as business tools. In the 1990s computers will change again becoming even smaller and more widely distributed. Computing, television, and telephone communications will merge. For the rest of society as well as for designers, computers will change from specialized tools to universal medium.

The opportunity for designers is great. We have a chance to do things never done before. We have a chance to explore, to play, to invent the future. It's time to get started.

Further reading:

"As We May Think," Vannevar Bush, *Atlantic Monthly*, July, 1945, reprinted in CD-ROM the New Papyrus, Microsoft Press, 1986.

Computer Lib/Dream Machines, Ted Nelson, Microsoft Press, 1987.

Design & Technology: Erasing the Boundaries, Wendy Richmond, Van Nostrand Reinhold, 1990.

"Hypertext: The Future of Writing and Designing with Computers," Hugh Dubberly, *AIGA Journal of Graphic Design*, Volume 6, Number 4, 1989.

The Media Lab, Inventing the Future at MIT, Stewart Brand, Viking, New York, 1987.