Harnessing the Power of Technology

BY PETER F. MCATEER

From scattered points of light on your computer screen, a rainbow of colors emerges to form tumbling boxes filled with images of people's faces and blocks of text. A low rumble fills the air and builds into the sound of a human voice. One of the rainbow-colored boxes settles in the middle of your screen—and the face it displays is talking to you.

The computer program the above scenario describes is not a fantasy. It's not a video game, and it's not wildly expensive. It's a customized product update incorporating video, graphics, photographs, and sound. It was created with off-the-shelf software on a reasonably priced multimedia computer system. Members of a worldwide salesforce can pluck it off their company's computer network whenever they want. It provides economical, just-in-time training. And it was designed, created, and delivered not by a computer wizard, but by a training specialist.

Since the birth of the personal computer in the mid-1980s, powerful technologies have evolved that enable businesses to do things in radically different ways than they did in the past. Computer technology is more powerful, more affordable, and easier to use than ever. (See "Trends in Technology, page 66.) But unlike

the training specialist who created the program described above, most training and development specialists have not taken advantage of the burgeoning crop of technologies.

In most organizations, training remains largely a centralized function, anchored in classrooms, bound by place and time, tied to textbooks, directed by instructors, and separated from day-to-day work.

These characteristics do not reflect new business trends toward leaner, flatter organizations; high-speed communications; rapidly changing information; a global outlook; diffused decision making; and team-based management. Nor does traditional training reflect current knowledge about the importance of self-directed learning, just-in-time training, and on-the-job learning.

Nancy Newman, vice-president of management development at Bankers Trust, describes the challenge this way:

"We get great feedback from students...but there is still a [strong sense] that the training process is disconnected from basic business processes. We need to become more functionally aligned with our core business functions and connect our management concepts to real, day-to-day issues. The problem is that the business and industry are changing faster than our ability to respond with traditional systems."

Technology can enable trainers to keep pace with constant change, connect learning directly to work, and build pathways for both formal and informal learning throughout their organizations.

The opportunities afforded by new technologies fall into three broad areas:

▶ Creation of learning materials. Many easy-to-use, off-the-shelf products produce high-quality results formerly available only from expensive systems

requiring highly specialized skills.

▶ **Expanded delivery channels.** Flexible and widely available communications technology, such as fax machines, computer networks, and videoconferencing, greatly expand options for delivering training.

▶ **Integration of training with business functions.** Trainers can embed learning in organization-wide systems by using the same technologies that companies use for business processes.

The number of new technologies and ways to use them seem endless. The key to choosing what you need is to think about what each technology enables you to do.

Technology overview

Here is an overview of current technologies and some of their applications to training. The list is not exhaustive. Major manufacturers such as Reach Software, IBM, and FileNet are omitted due to a lack of space. Most of the products described are designed for IBM-compatible computers and networks running DOS or Windows software, because this is the most common platform found in businesses. Many comparable products are available for other operating systems and hardware platforms.
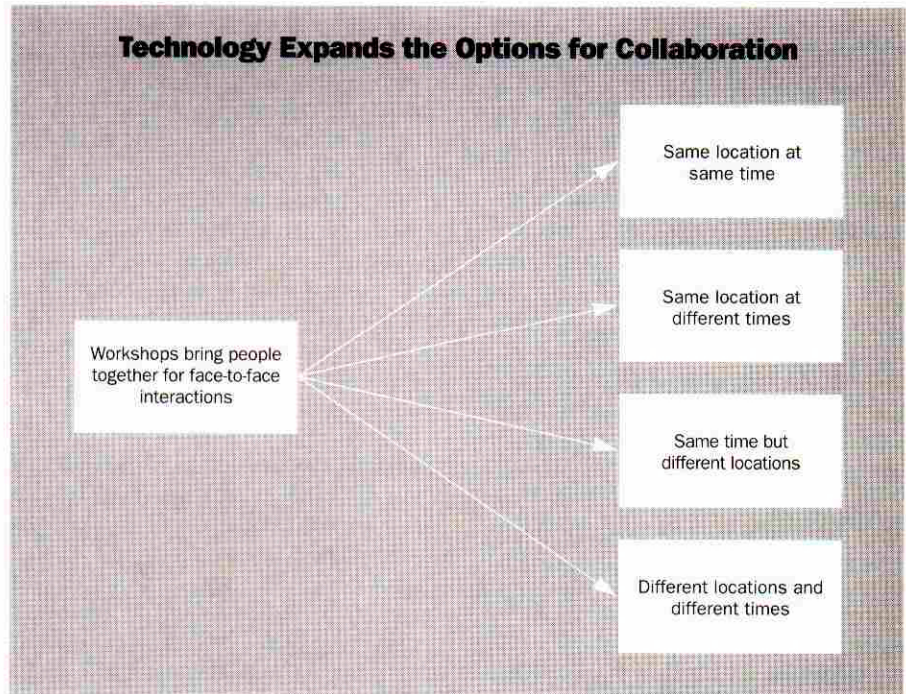
Networks. Sharing computer files used to require a high level of technical expertise, but high-speed modems, simplified communications software, and—especially—client-server technology have changed that.

A server is a powerful personal computer that acts as both a "gateway" for information sharing and a common file cabinet. A client is any person who has access to the server from a desktop or portable PC.

With client-server technologies and powerful PCs, even small companies can install networks that make huge amounts of information available to everyone in the company.

E-mail. E-mail is the basic building block of computer-based communications. E-mail lets you send and receive messages over your computer, either across hardwired networks or through a modem attached to a telephone line. Popular e-mail packages include Microsoft Mail, ATTMail, and CC:Mail.

Work-group applications packaged with e-mail programs enable a group of users to collect and organize messages for certain purposes, such as scheduling meetings, keeping calendars, or tracking time spent on various projects. Popular examples include the DaVinci Coordinator and "office suite" products such as WordPerfect Office.

Some new e-mail packages allow you to record voice messages. Products that currently offer voice e-mail include LANtastic and NvMail.

Three years ago, Richard Colt, then-manager of organization development for AT&T's Treasury Group, worked with a staff of six to design new training and quality-management interventions. The designers spent a lot of money on airline tickets and overnight mail and a lot of time waiting for people and documents to travel from place to place.

Today, Colt manages a 10-member, nationwide training team that supports AT&T's call-serving operations. During 1993, all team members began using the same hardware and software, including Unix and Windows applications for wordprocessing, graphics, and desktop publishing. Team members in New Jersey, San Francisco, Boston, and Montana use communications software and ATT-Mail, the company's e-mail system, to share memos and documents.

"Even though we have just scratched the surface with collaborative document development, we already save thousands of dollars on travel costs and have dispersed our training staff to locations closer to our customer base," says Colt.

"The next step in the process," he adds, "is the addition of a groupware system."

Groupware. Loosely defined, groupware is software designed to support collaborative activities over computer networks. Groupware creates an internal information highway. Lotus Notes, for example, acts as a common channel for distributing information, tracking projects, and facilitating group discussions. Other types of groupware enable users to share specific types of information. For instance, Adobe System's Acrobat lets users share graphic images.

Other groupware products focus on managing work flow by mapping the steps in a process or by routing forms or documents from worker to worker.

Some work-flow software also delivers documents in their original or "native" formats, preserving colors, formats, fonts, and similar characteristics of the originals. Recipients then can view or work on identical files.

Still other products, such as BeyondMail, offer message management that automatically forwards messages and creates "tickler" files, or sends messages to colleagues when

Technology Expands the Options for Collaboration

Workshops bring people together for face-to-face interactions

- Same location at same time
- Same location at different times
- Same time but different locations
- Different locations and different times

Trends in Technology

Training and development specialists should take advantage of four current trends in technology.

▶ Technology is affordable. Over the past few years, companies that sell mail-order brands of personal computers such as Gateway 2000, Zeos PC Brand, and Dell cut prices. In response, most major labels introduced new "low-cost" lines. Examples are Compaq's ProLinea Series and IBM's Value Point series. These economy lines sparked a new round of price slashing from the mail-order firms and prompted more manufacturers to introduce less expensive models of computers.

▶ For your dollars, you get more power and options than before. Many PCs now include CD-ROM drives as standard equipment. Prices of oversize, high-resolution monitors have dropped dramatically. Innovations such as the Pentium chip from Intel; the Power PC chip being jointly introduced by Apple, IBM, and Motorola; and Digital Equipment's Alpha chip vastly increase computers' speed and memory. Multimedia add-on packages including sound boards and CD-ROM drives now sell for less than $400.

▶ Software is bigger and better. New software takes advantage of hardware gains in speed, video resolution, and memory. For example, the latest version of Aldus Corporation's popular PageMaker for Windows requires 15 megabytes of hard-disk space. And the latest version of SPC Software's Harvard Graphics for Windows requires more than 20 megabytes. Larger programs such as these are more flexible and easier to use than older versions.

▶ New technologies make it easy and inexpensive to link both small and large groups of computers into local area networks, or LANs, and wide area networks, or WANs.

particular actions are taken, in accordance with previous instructions.

Colt envisions using groupware to automate the steps in the training design and development process. Colt's team could share documents, collect edits, automatically update data bases so that everyone works on the latest versions, archive valuable documents, and track the progress of multiple projects. The system also would automatically gather the data that contributors need to analyze their performance.

"Once you eliminate a single physical document as the focus of your attention and eliminate the need to work in person, the design process takes on a whole new look," says Colt. "It's much easier to get help from subject-matter experts when they don't have to leave their desks, and the software tracks and manages much of the administrative work. Our team designers and subject-matter experts can work collaboratively without being PC experts."

Newman of Bankers Trust is experimenting with using the company's Lotus Notes system to deliver training that's timely and linked to real-life issues. Lotus Notes enables widely dispersed managers to share information as if they all had access to a common desktop equipped with tools for sharing, routing, and updating files; sending messages; scheduling meetings; and sorting information. This capability "opens up a range of possibilities for interactive management development that were never possible before the introduction of the Notes software," Newman says.

Process mapping and decision modeling. Another way to improve the connection between training and development and line functions is the use of process-mapping or decision-modeling software. Although still in their infancy, these products encourage in-depth analyses of issues, model problem-solving processes, and create prototypes of business processes.

Corporate Memory System's CM/1 program is a Windows-based tool that tracks problem-solving discussions over a network and maps (displays) the process graphically. The system has a range of potential uses such as quality and process redesign,

group problem-solving training, and business simulations.

Data bases. The latest data-base products are nothing like the row-and-column format of typical desktop products of only a few years ago. Programmable data bases such as Borland's Paradox and Microsoft's FoxPro store images and text in attractive, easy-to-use formats. Most packages include user-friendly programming tools. Current data-base products provide powerful tools for salespeople, customer service representatives, and anyone who needs quick access to large amounts of information.

CD-ROM drives. CD-ROM drives rapidly search for and retrieve large amounts of information. The typical double-speed CD-ROM drive searches almost 600 megabytes of data in the time it takes a user to leave a voice-mail message asking for help. Triple-speed and quadruple-speed products are already on the market.

New CD-ROM data-base programs store images and sound, as well as text, opening a variety of possibilities for just-in-time training.

Until recently, copying or "mastering" a CD was an expensive process. Today, you can buy a CD-ROM drive that writes to a blank CD for about $4,000. Blank CDs cost about $20 each. Although not as durable as professionally mastered CDs, "locally" mastered CDs are more durable than diskettes or tapes. You can use this technology to create libraries of technical materials, to document company processes, and to create demonstrations combining text, images, and sound.

"Chat" systems. On-line "chat" systems allow live communication via typed messages. Although limited by the typing speed of the user, chat systems work well in conjunction with other technologies.

Suppose you want to deliver a live training event to a geographically scattered audience. Over a network equipped with groupware, you can deliver documents and images almost instantly to all participants. Participants can tackle business simulations as teams, drawing on information stored in a CD-ROM archive. They can brainstorm in "chat" mode. Add a telephone conference call to the mix, and you can talk participants through a technical demonstration.

Videoconferencing. Many observers consider desktop videoconferencing the most desirable vehicle for delivering training. Briefly, here is how live, interactive videoconferences work: A computer-linked camera captures images. A video processor digitizes and compresses the video images. The images then travel over a computer network. The accompanying audio signal typically travels over a telephone line or through the existing network to participants' modem-equipped PCs.

Companies with access to private telephone networks or high-speed transmission lines can buy systems that provide point-to-point videoconferencing.

These systems remain very expensive for most applications. Also, most organizations do not have access to the digital-grade transmission lines necessary to provide high-quality images and to support an interactive system. But the technology is evolving rapidly, and prices are likely to drop.

Videoconferencing does not have to display live images of people to be useful. The key to creating a "simulated" video conference—one that does not revolve around broadcast images of presenters—is to ask the question, "What is the focal point for the student?"

In many cases, the real focus of attention is a chart, a problem statement, a diagram, a list of procedures, or a specific process outline. These types of images can easily be sent using a groupware product over a standard local area network (LAN), wide area network (WAN), or telephone line. When combined with audio conferencing, faxes to participants, work-flow tools, slide shows, and other media, they can be used to effectively and inexpensively produce a video conference, training session, or business exercise.

Intel's ProShare and InVision Systems's InVision are examples of videoconferencing products that operate effectively in both video and nonvideo modes. Operating in a nonvideo mode means that users share and annotate graphics files or images during a two-way conference while speaking on the telephone. This provides many of the benefits of videoconferencing without requiring

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Rethinking Training Strategies

Here's how to rethink five traditional training strategies using technology.

Traditional strategy: Training design is a centralized process.
▶ New strategy: Training design is a decentralized process.
▶ Enabling technologies: work-group applications, e-mail, groupware.
▶ Benefits: less money spent on overhead, less money spent on overnight mail, and significantly reduced cycle time.

Traditional strategy: The best training takes place through person-to-person contact.
▶ New strategy: The best training delivers knowledge and skills whenever and wherever they are needed at the lowest cost.
▶ Enabling technologies: teleconferencing, audio conferencing, on-line chat systems, groupware, CD-ROM.
▶ Benefits: better return on investment, improved balance between needs and costs, improved accountability by line organizations for continuous learning.

Traditional strategy: Needs assessments are annual events that drive development requirements and budgets.
▶ New strategy: Needs assessments can be automated, ongoing feedback loops that capture actual behavior rather than opinion.
▶ Enabling technologies: programmable data bases, "smart-forms" software, process modeling software.

▶ Benefits: reductions in administrative time, less redundancy for user groups, error-free data exchanges, automatic summaries, automatic feedback loops, low design costs.

Traditional strategy: Training is event based and largely driven by classroom training.
▶ New strategy: Training should be a continuous process, closely associated with on-the-job performance.
▶ Enabling technologies: Modeling software, groupware, enhanced CBT\multimedia, client-server based multimedia, portable PCs.
▶ Benefits: More timely training delivery, better connection with business processes, decision modeling, less travel time and expense, less time away from the job for line and support personnel.

Traditional strategy: The primary outputs of a training department are workshops and training programs.
▶ New strategy: Training departments produce organizational systems that enable users to obtain information and that support skill development.
▶ Enabling technologies: client-server systems, wireless communications, modeling software, expert systems, interactive-media authoring systems, teleconferencing, modeling software, coaching software, media-conversion hardware.
▶ Benefits: increased ability to respond to customer demand and changing needs, more customized training products, reduced development costs.

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the investment in videocameras and related hardware.

Joseph O'Brien, president of Atlantic Rim Corporation, an importing and distribution company in Massachusetts, has tested ProShare as a way to provide product information to distributors. "What we like best is the ability to download the ProShare module via modem to someone without a copy of ProShare on his or her PC. We can immediately begin a product demonstration

without being on site or spending a lot of time setting up the conference," O'Brien says.

"Smartforms." A new category of data-base products are "smartform" programs. Programs such as Delrina FormFlow, JetForm, or WordPerfect InForms allow you to create documents designed to collect data, such as assessment questionnaires, employee surveys, course evaluations, and performance reviews. You can instruct smartform programs to distribute document

summaries automatically to users' computers or to print hard copies.

After the data are entered, they can be automatically stored in one or more data bases. You can pull the data to create form letters, reports, or new data bases.

With a little imagination these products can be used to create materials for interactive workshops. Imagine the following scenario:

Teams of three participants each are located at different sites across the country. Each team has access to a networked PC. Each team represents a certain company function. You present the teams with a problem related to slow sales and instruct them to complete a set of documents, including a business plan, financial projections, a product and staffing plan, and adjusted sales goals for the following quarter.

Teams can use the smartform system to feed each other data. You can use it to generate new material for the group. Combine a smartform system with an audio conference and a chat system, and you can present problems, answer questions, generate reports, track students' progress, and collect evaluations with almost no follow-up administrative work.

Multimedia. How do you turn a $3,500 computer into a $500 TV? The answer: with multimedia.

That's an old joke, but many training specialists weren't laughing after they invested heavily in multimedia equipment only to be disappointed with the results.

Recent improvements in memory capacity, machine speed, display quality, and, perhaps most important, design interfaces, have made multimedia cheaper and more broadly applicable.

For example, some inexpensive multimedia systems are equipped to convert video images to an electronic format or to convert PC slide shows to video.

Most current systems for integrating video into computer-based training produce on-screen video displays that are small and jerky. But, improvements are on the way. Several new products provide full-screen video at a smooth 30 frames per second.

Most multimedia authoring systems, such as AimTech's IconAuthor and Macromedia's Authorware Professional, effectively integrate video into a range of computer-based-training formats. Video clips also can be incorporated into standard graphics programs such as Lotus's Freelance Graphics, SPC Publishing's Harvard Graphics, or Asymetrix Software's Compel.

Any presentation that can be created on a PC can be displayed on an external monitor and recorded on videotape. In most instances, you don't need expensive hardware to complete the connections. If you can't distribute multimedia presentations over a network, videotapes of multimedia presentations offer an inexpensive and easy-to-update alternative.

Making the leap

Recently a senior training specialist at a large retailer tried a new graphics package for preparing training presentations. Soon she was building screen shows with full-color graphics and special effects. She decided to make copies of the program and use it to deliver presentations to each department.

Then she ran into a hitch. She couldn't carry out the relatively simple task of copying the program onto a diskette. The diskette size was 1.44 megabytes. The graphics file she created was 4 megabytes.

Technology does exist to squish more data onto a too-small diskette. But in this case, the ultimate answer was to stop thinking in terms of diskettes and instructor-led presentations tied to her availability.

Using the company's computer network and communications software, the training specialist distributed the program to all departments. Soon she discovered that staff members were comfortable receiving training and information this way because it resembled other familiar processes and created new scheduling options.

As technologies change, we need to challenge our assumptions about how we use technology to add value. We need to consider the options provided by technology and the ways we can use it to improve the connection between support and line functions.

As software tools become more integrated into the work lives of workers and teams, it is possible to think of people's interactions with these tools as "transactions." With each transaction, a person extracts information, sends a communication, or adds information to the organization's knowledge base.

The same software that provides information or coaching to workers can track where and under what circumstances the information or support is needed. When compiled and summarized, this information provides a useful snapshot of organizational behavior. You also can use the technology to estimate future information needs, improve the design and availability of support services, and target training activities where most needed.

Training departments can use the same technology to create just-in-time support systems. Software-supported instruction, network access to subject matter experts, and organization-wide knowledge bases could form "coaching nets" that support day-to-day business activities.

You don't have to become a systems analyst or computer programmer to apply technology to training. You do have to understand how technology changes organizations and how to use technology to improve or accelerate learning. You have to rethink traditional strategies and challenge long-standing beliefs. You have to develop new communication, negotiation, and facilitation skills.

New technologies provide information on demand, build banks of shared knowledge, and enable real-time, structured learning events to transcend boundaries of time and space. The technologies become tools that we use to build our solutions. ∎

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