



CHAPTER FIVE

INCREASING EMPLOYEE KNOWLEDGE AND UNDERSTANDING OF OPERATIONAL SYSTEMS: INTEGRATING MULTIPLE TECHNOLOGIES AT NYNEX

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What do you do when your corporate vision demands a higher degree of competence from its employees yet those same employees have no time to attend the training efforts that would bring them the knowledge and skills to achieve those competencies? What would you do when field organizations are more confident that their home-grown conference-room classes are superior to those of the centralized training organization? What happens when managers and employees are asking for courses in two-hour sections scheduled at the needs of the business or the individual not at the needs of the training school? For the NYNEX Corporation (now Bell Atlantic) the answer was large scale electronic education (using the computer and telecommunication to deliver education).

This chapter describes the need that drove NYNEX to make distance training a major portion of its educational program, the wide selection of tools that it used, and the planning and organizing processes that enabled the program to mature. It concludes with a review of the strengths and weaknesses of the overall program.

NYNEX'S Training Need

NYNEX, like most large multi-location organizations, was facing all of these challenges. With a growing Call Center operation at each of its major building sites and an increased requirement to keep employees close to the work location to satisfy customer requirements, locally delivered training was a must. Cost however was a principle concern in sending instructors out to each site, especially when the class size had to be reduced to keep employees on the line serving customers. In addition, there was a need for classes that were directly related to performance, short modules specifically focused on methods and procedures. Traditional instructor-led training would not have been cost-efficient for the short classes. The clients of the training, sensing the problems generated by their new requirements, were unhappy and considered creating their own form of training, which may have been fragmented, inefficient, and ineffective.

The NYNEX Solutions(s)

NYNEX had a number of alternatives to solve this increased remote, modularized training load that its clients demanded. Here are some of them:

Business As Usual

This approach was the easiest. It required no new organizations, no new infrastructure. It would have allowed the centralized training operation to continue with instructor-led courses, continuing the focus on primarily new employee training. It would have forced remote clients to develop and deliver continuation or ongoing training with their own instructors. While easy, this alternative was the least cost-efficient, allowing inconsistent instructor-led training to be delivered at each of its locations.

Rapid Cutover to Electronic Education

This approach, while successful in some companies, would not have fit the NYNEX environment. With its increased need for training and limited capital and expense funding, a successful mass cutover would have proved elusive. In addition a focus on a single tool (at that time) would probably have left NYNEX with touch screen or laser disk technology deployed in all of its locations, without

the opportunity to explore the new technology tools being offered in the marketplace.

Incremental Cutover to an Electronic Education Spectrum of Tools

The incremental approach offered NYNEX a cautious alternative. It would require a constant battle for funding and support. It would require a constant touch with the changing electronic education tools market. On the positive side however it would allow a high degree of experimentation on a small scale. The results of the early pilots would provide leverage for the production effort that could be implemented for all the locations.

The author selected the last alternative to bring NYNEX into the electronic education world. Initial staffing was drawn from the Information Technology (IT) training staff, replaced by an even larger circle of outside suppliers. Eventually, the IT training process was completely outsourced to a strategic training vendor that freed all but a skeleton staff to concentrate on electronic education. The multiple tool strategy was fundamental, allowing NYNEX to bring computer, video, and network-based solutions simultaneously. It allowed the planning and marketing effort to reach a wide audience with widely diverse needs.

The NYNEX Electronic Education Toolbag

Using in-building learning centers (see later sections on the learning centers), NYNEX had the opportunity to exploit a wide variety of electronic education tools. As delivery to the desktop and home has become more feasible (network enabled training (Internet, and so on), the tools have expanded. Here is the current¹ list, in the approximate order that NYNEX brought them into production.

- Computer-based training (CBT) (text and graphics)
- CBT simulation training
- One-way video (using business-broadcast television)
- Multimedia (video and audio and CBT)
- Two-way video (using video teleconference)

¹At the time of this writing, Fall 1997. With the growth of Internet and server-based tools, the list could be expected to grow at the rate of one to two new tools per year based on seven years of experience.

- One-way video interactive (using student response units and other non-video tools)
- Network-delivered computer based training
- Network-enabled training—synchronous training
- Network-enabled training—asynchronous training
- Electronic coaches (electronic performance support systems)
- Desktop Video Learning (planned)
- Transitional systems (video to CD-ROM)
- Electronic evaluation systems for distributed delivery

To assist the reader, I have supplied a series of tables that link most of the production tools to the key indicators and learning objective(s) that NYNEX employed.

TABLE 5.1. OPERATIONAL ISSUES FOR ELECTRONIC EDUCATION.

EE Tool	Audience Size	Cost/Student	Cost per Course	Time to Implement
Computer-based training generic	Entire organization	Low	Moderate	Weeks
Computer-based training custom	Organization	Moderate	High	Months
CBT simulation training	Department	Moderate	High	Months
One-way video	Hundreds	Low	High	Weeks
Multimedia	Organization	Low	Moderate	Weeks
Two-way video	40 'max.'	Low	Low	Weeks
One-way video—interactive	300 'max.'	Moderate	High	Months
Network-enabled training—Synchronous	Department	Low	Low	Weeks
Network-enabled training—asynchronous	Entire organization	Moderate	Moderate	Months
Electronic coaches	Department	Moderate	Moderate	Months

TABLE 5.2. ELECTRONIC EDUCATION TOOLS AND LEARNING OBJECTIVES.

EE Tool	Awareness	Knowledge Transfer	Skill Development	Expertise Building
Computer-based training	X			
CBT simulation training		X	X	
One-way video	X			
Multimedia		X	X	
Two-way video			X	X
One-way video—interactive	X	X		
Network-enabled training—synchronous		X	X	
Network-enabled training—asynchronous		X	X	X
Electronic coaches		X	X	X

Computer Based Training (Text and Graphics)²

The overall NYNEX strategy for most of its electronic education implementation was a proof of concept effort (a small pilot) followed by a leveraged implementation (a large scale cutover) using the proof-of-concept as the base.

²Both CBT as is described here and multimedia are different executions of computer-based training. Separating them based on video and audio capabilities allows me to describe different distribution strategies. In general, CBT with only text and graphic capability (especially with only sixteen colors) allows delivery on more basic computers. Multimedia requires a higher end computer workstation, generally with more elaborate video and audio capability.

Computer-Based Training in the early 1990s was a perfect tool for this strategy. By purchasing the CBT from quality vendors as off-the-shelf packages, NYNEX could be assured that the design had been tested across a wide group of users and that the cost of the first effort would be limited based on a wide market for the tools. The implementation process could be fast. This last characteristic was critical in the early stages, demonstrating that a change from instructor-led could bring early results. The early curricula chosen included CBT used for computer related subjects, allowing the displacement of outside vendors rather than full-time employees. It delayed the impact on internal forces until later tools were adopted.

Selecting good CBT from the maze of providers provided a model that was reused at many points in NYNEX electronic education history. A variety of evaluation tools were used to separate the real vendors from those who were just learning. They included

- Detailed vendor interviews (vendor strength)
- Subject matter expert review (for content)
- Instructional design review (for learning values)
- Operational reviews to be sure that the CBT would run on the many NYNEX computers
- Usability reviews to be sure that the students would be comfortable with the look and feel as well as the navigational tools
- Competitive bidding where possible (not frequently at that time)
- Industry reputation gathered from peers at conferences

Notice that production value was not one of the evaluation processes. The slick, demo-quality, upper management-focused product frequently fails the other tests listed here. For new players, high production quality in the opening portion of a salesperson's pitch can be a warning sign. One vendor was more anxious to demonstrate his production quality CD-ROM-based lingerie catalog than demonstrate his simplistic CBT.

NYNEX's early CBT was distributed by company mail. Later on, the corporate network provided a better tool. Early user acceptance was high, but a significant amount of attention needed to be focused on completion, measurement, and tracking to ensure that floppy disks and support material did not sit on the desk waiting for the right time for training. Penalties and rewards for returning the media helped, as well as certification programs. The requirement to attend a follow-up, instructor-led workshop had the highest potential of driving the student to complete the CBT (at the desk or home) and then return the media, the evaluation sheet, and the collateral material.

By selecting CBT that could run on simple computers (at that time a 386) user problems were minimized. Still, NYNEX had to invest in staffing a CBT help desk to handle the wide variety of computers on which this tool was run. Fortunately the personal computer with all its variations was the prime delivery platform.

As will be seen later, CBT delivery strategy parallels many of the same characteristics of multimedia, differing in the degree of interaction and distribution. (See footnote on page 96.) One very clear parallel is the changing expectation of the student after a CBT experience.

Because of the high quality of the purchased CBT, students quickly learn, adapt, and then enjoy the self paced, engaged user controlled experience. Within a few courses, the students begin to demand the same learning experience for their job-specific training. This enthusiasm pushes the demand for custom CBT for corporate-specific subjects. At NYNEX, custom CBT development followed purchased CBT by about one year, accelerating afterwards. Some of the most aggressive acceleration came from client (not trainer) stimulation. One type of customized training was simulation.

CBT Simulation Training

NYNEX's early attempts to bring CBT to the desktop were the direct result of client satisfaction with the purchased CBT. The first custom desktop applications that were requested were for training on NYNEX's own operational systems (systems that performed processes associated with NYNEX's core business-telecommunications, including order entry, maintenance scheduling, accounts inquiry, and hundreds of others).

CBT simulation training required training modules linked to specific portions of operational screens. Snapshots (bit mapped pictures of operational screens) were the way that the operational systems were captured to be brought into a training environment. Adding text and edits for each of the fields provided the equivalent of an on-screen tutor. NYNEX purchased a special-purpose minicomputer to assemble the text, edits, and images together in a learning flow. While moderately successful, each of these systems required significant startup time, significant investment in training technicians to operate the software and field support in supplying subject matter experts to insure that the training matched the working environment. In addition, the system was DOS-based at a time that the world was moving to more graphic windows systems. As a result, CBT simulation using a dedicated minicomputer for course creation was used for a few courses and then dropped in favor of the electronic coach (covered later). The training through simulation for operational systems that was completed found its way to desktop training and as a classroom enhancement.

One-Way Video (Business Television)

NYNEX had developed its business television facility for a variety of applications including corporate leaders' announcements and a newscast operation. Using this facility for training was reasonably easy. With little investment a number of classes were delivered, reaching large audiences with courses that needed knowledge transfer objectives. What limited interaction was needed (mostly question and answer) came from students who called in. While successful, the medium had many limitations, namely cost per broadcast and the very limited engagement of the student. The video studio was controlled by expert practitioners who were more focused on high production values rather than learning objectives. These cultural conflicts frequently required a compromise in the quality or efficiency of the training classes. They did however demonstrate that learning could be carried on the medium. A number of years later, training turned to this one-way network for a more interactive effort.

Multimedia (CBT with Text, Audio and Video)

The powerhouse of NYNEX's electronic education strategy is the learning center (discussed in detail later in this chapter). Initially built with low end PCs, some VCRs and videodisks (even some touchscreen technology), they have grown into a modern training factory using state-of-the-art multimedia workstations and a growing video local area network capability.

NYNEX's initial experience with multimedia focused on purchased courses. Inexpensive, well tested and implemented with high production values, these packages were perfect for the early trials. Initially installed in small groups, they appealed to the improvising learner who matched learning with business needs. The video and audio was a welcome addition to the simple text and graphics of CBT.

As the number of titles grew, a number of things occurred.

- NYNEX needed to build an evaluation process for the ever-growing number of tools.
- NYNEX also had to develop a set of standards that fed this growth process. They included
 - Technical standards (would they work on NYNEX's computers?)
 - Instructional design standards (would students really learn?)
 - Usability standards (would the users be able to handle the navigation, lessons and testing?)

NYNEX developed a number of panels, processes, and tracking systems to develop these tools.

Two-Way Video Using Videoconferencing

Of all the electronic education tools that NYNEX has used, video distance learning using video conferencing is closest to a standard classroom. The resemblance is deceptive however, as the classes look very little like the 'old' NYNEX classroom. With over 10,000 students affected each year, and a course variety that includes virtually any type of class, this medium is second only to multimedia in its impact on the NYNEX student.

An experience in two-way video is very different than one-way. Not only are both sides of the network seen but the atmosphere is relaxed, similar to the on-site classroom and a marked contrast to the broadcast-like one-way, high production value classroom. Errors are okay, and experimentation is fine. The student-focused nature of the class forces it into a very relaxed mode. When observing one early effort, when a craftsman had put his feet on a desk in the middle of a class exercise, a vice president said, "Look at him, he is really enjoying this." When a laughter-filled segment in the middle of a class focused on the accents of the Boston team versus the Brooklyn team, another vice president noted, "There is more culture sharing going on across the network than I get at all of my meetings."

Adapting the videoconferencing for distance learning was easy. Some additional microphones for the larger rooms, a personal computer for instructor's slides at each site, and some extra chairs and tables for the ten-plus student rooms were all that were really needed. The rest was garden-variety videoconferencing.

Adapting the course delivery was another matter. While early attempts may have looked like one-way classes, experienced trainers soon recognized that this was the perfect medium for a new kind of learning. Student-focused learning became more common. With its ability to originate anywhere, students quickly became the "instructors," reporting on team projects, participating in games, and helping classmates at other locations. Students easily learn the controls for the cameras and can easily be motivated to move the camera to highlight other students. As a result the instructor truly can become the facilitator.

Adapting the course development process was another challenge. The designer needs to think in terms of computer tools for visuals. He or she needs to design student interaction at 50 percent or greater, a NYNEX goal. A video transition is also planned every ten minutes, changing the setting or the focus of a lesson.

Adapting students to this medium was easy. The novelty of sharing the classroom with students from across the organization overcomes any concerns about transmission quality. The motivation generated by not having to leave home to take a course pays great dividends even when the student is asked to take the lead in the classroom. The ability to use the medium for short courses (such as "lunch and

learn" training at mid-day) brings managers into supporting roles when they realize how much work time can be retained while still having the training active. When senior managers can calculate return on investment from work time saved, they will pay for all the equipment and staffing that the training department could require.

Adapting existing instructors may turn out to be the most difficult part. Concerned about job elimination, loss of classroom privacy, and new technologies, the instructors may resist the change in their classrooms to the new distance learning format. Special management incentives or rewards will be required to motivate the old team. Some organizations may elect to staff the function with new blood. At NYNEX, the creation of the producer's position was an effective catalyst to make the change happen. The producer was really a combination project manager, salesperson, instructor, and developer who when trained could ease others through the distance learning change.

Over the years, the great success of the video broadcasts masked the administrative, operational, and developmental systems that keep the program going. These methods have survived two total changes in staffing (due to voluntary retirements and some downsizing adjustments) with the program continuing to function.

With the merger to Bell Atlantic, the distance learning program can only see expansion to a much larger geographic footprint, a much larger scope of courseware, and a much larger student and manager base. Expansion however should be easier, with a proven base of experience and operational procedures to support the larger delivery system. With the larger base, the cost of development per student of new courses will drop even lower.

One-Way Video Interactive

With the success of the two-way video program, NYNEX found its video conferencing straining with the new volume of classes competing with conferences. (The Training and Education department became the largest single user of the videoconference network.) NYNEX had to turn back to its one-way facilities for the capacity to handle the growing number of courses. With its experience in limited interaction one-way video, NYNEX turned to a consultant from another corporation who had used a one-way network to create two-way-like interaction. The secret was in the preparation of site-identity exercises and strong collateral material.

Site-identity exercises in this medium translate into competitive exercises in which the on-camera instructor advises each of the locations to complete some form

of project off line. Each site then works on its own, usually competing against the clock or the other sites. When completed, the sites then call or fax their results to the teacher at the expiration of the time allotment. The teacher then calls each site in turn at random ("Hot Potato"), or with a variety of other protocols. Prizes, a facilitator at each site, and a supplementary communication system (call-in phones) are necessary to make this work, along with a well-paced delivery. The producer has to limit the number of sites (three to four) to keep this interaction going.

The results have been very satisfying. The one-way interactive broadcast has been able to reach a large number of students (300–400) in a limited number of sites, with a short knowledge transfer lesson. One such effort was so successful that it grew into a bi-weekly update for Call Center personnel on Saturday mornings.

One-way interactive serves a totally different training objective from its sister formats and requires a great deal of planning to make it work. Some organizations have used student response systems (a keypad, microphone, and polling system that runs parallel with the video broadcast) to accomplish similar goals with a more technical flavor. It is a valuable adjunct to the other mediums and allows clients and developers to select the optimum medium for learning, time, and cost efficiency.

Network Delivered Computer-Based Training

When NYNEX purchased a groupware system (Lotus Notes) for its e-mail and database systems, Training and Education found it a perfect tool for delivering CBT directly to employees' desktops. Once at the desktop the employee could take the course, download it to his or her hard drive, or download to a floppy disk(s) to take at home. Purchasing libraries from a variety of vendors and adapting them to this new delivery engine, students could order and receive courseware without the heavy overhead of disk mailing and tracking systems.

The value of this new delivery system was seen in early months of operation where 500 or more courses were ordered. When the operational systems were improved to provide one-click access to the courses, the volumes grew even more. Of even greater value were surveys that showed the courses were being taken at home, on the employee's own time, creating enormous benefit for the individual and the organization.

To reduce network and disk download overload, the courses were kept to small sizes (less than five megabytes). This also ensured that the average home PC could handle the course, usually text, graphics, and some limited audio.

CBT, in this new delivery format, continues to attract a large volunteer student population. Tracking continues to be an issue as students complete their courses off the network. As the CBT moves onto the Internet, this missing link is expected to close.

Once developed, the employee support for this delivery system is minimal, with automated software and large server storage drives picking up the workload.

Network-Enabled Training—Synchronous

After NYNEX completed the delivery of CBT via the network, its attention switched to the more advanced use of the Internet for training using a synchronous strategy (students and teachers working together in the same time slot, using a separate medium for a talking path and the shared display as a common graphics screen). While NYNEX has not brought this tool into full production status, it appears to have great promise because

- The vendor tools are more mature.
- Synchronous training imposes a discipline that requires that students are at least present for the class.
- The Internet continues to gather extensive interest for classroom-like delivery.

Network-Enabled Training—Asynchronous

Asynchronous network-enabled training (Internet, and so on) has the potential to reproduce most of the interactions found in the classroom without requiring that students and instructor being engaged at the same time. With network-enabled-based tools, teacher-to-student communication can be maintained. With simple e-mail student-teacher communication can be accomplished. With chat rooms, shared documents, and multithreaded discussions, student-to-student communication and learning can take place.

With all this communication and graphics capability, asynchronous learning should be easy, allowing a true educational process to occur in a “your-time, your-place” mode. NYNEX’s early experience with this tool revealed the following concerns:

- Student commitment issues need to be addressed in advance. Students need to be aware that “your time” does not mean anytime, and the student must stay
-

up with the class. A significant student drop-out rate was attributed to students who had not allocated sufficient time for the course.

- Navigation issues, knowing where you are and where to go next, need to be simple. Any complexity will result in a student's loss of interest. New asynchronous engines (learning shells) may hold great promise by creating a simple, universal navigation process.
- Body language. The instructor must be able to read the body language through the network and determine when a student is slipping back, having trouble with the material, or falling asleep. The new shells may solve that problem by providing graphical representations of a student's activity and contributions by examining other indicators for this information (number of accesses over time, number of bulletin board entries, and so on.)

NYNEX's experiments with asynchronous web-based training ceased after its initial two pilots (team building courses) produced by an outside supplier, waiting for a good commercial shell to be produced that would automate the navigation and body language processes. At the time of this writing a number of the new software programs were just reaching the marketplace. As with most obvious but difficult market winners there are a wealth of marginal vendors in the market. Let the buyer beware.

Electronic Coaches (Electronic Performance Support Systems)

True electronic performance support systems, where learning is built within the operational system, available while the system user is trying to complete a transaction, are not simple to create. They require that the information technology (IT) organization make a commitment to building learning into its system while it is building the computer code that will operate the system. Too often the IT department is faced with cutover pressures, bug-free code pressures, and client anxiety pressures that make the embedded training effort a burden. In addition, those who have tried to make this work have found that the trainers waste significant time while the system designers change and modify their system to meet user demands, destroying much of the training in the process. We tend not to measure our IT whiz kids on the true cost of implementing their computerized systems, so the cost of training is something that the user or the training department must bear. Any illogical non-intuitive process that the user must learn now becomes a training process, separate from the system itself. Electronic performance support systems, while absolutely needed, are just beginning to be implemented.

An alternative is the “almost” electronic performance support systems, the electronic coaches (as NYNEX named them). These very new server-based systems allow the training department to build a shell around the operational system (main frame or server based) and add an icon for the user to call for electronic support. The beauty of the system is the fact that, except for knowing that the electronic coach is present on the network, the IT department is not involved at all. Lessons made of text, graphics, audio, or even video can be called by the educator to respond to a user’s questions. The questions can be at the system, screen, or even field level.

NYNEX’s early pilot of an electronic coach demonstrated this freedom from IT restrictions and had immediate benefit to the user. The system being used by NYNEX also allows these lessons to be called from other courses, creating a learning repository. In addition, student notes and comments made during the lessons (for example, “I don’t understand the lesson”; “this lesson was great”) can be fed back to the developer to close the loop on instructional design.

The promise of these electronic coaches is to provide true desktop support for the enormous population of legacy computer systems, while true electronic performance support systems are built for the new ones. This training on older computer systems is so vast that electronic coaches could be active for decades.

The benefits of electronic coaches include

- Reduced initial training time for line employees (only the frequently required learning is necessary, the “Just In Case” can be embedded within the coach)
- Improved customer perception of employees (reduced requirements to transfer the call to an expert or supervisor)
- Reduced documentation required (methods and procedures can be placed within the coach)
- A living, constantly changing training environment (system changes, data content changes, and student suggestions can be changed with the system operational)

Transitional Systems (Video to CD-ROM)

When an organization invests in video distance learning *and* multimedia learning centers, there is a great opportunity to reuse the products of one medium within another. With the help of a number of service bureaus, transitions from video to CD-ROM based multimedia can now be done easily, quickly, and cheaply.

NYNEX's experience went like this. After a particularly successful one-way video production, many individuals would ask for a videotape to use for absentees, refreshers, and meeting support. The linear videotape however had limited learning value to the viewer, even though it contained interactions of peers captured during the broadcast.

With the help of the service bureau, the broadcast was converted to CD-ROM within weeks. But instead of a simple conversion, the service bureau enhances a basically linear process to create a user-controlled learning experience.

First the original video is broken into learning segments so that students can select the major section of the broadcast that was relevant to them. The multimedia screen divided into many segments can show the instructor, the slides or graphics, the navigation buttons, and the actual narrative in a text form. This last box also provides a powerful learning tool, a lecture text search engine. This allows the student to select only those words that are important and then allows the computer to display only that portion of the course. Although the student may ultimately watch the entire broadcast, he or she has total control of the learning environment and feels the control needed to match learning styles. A graphical look of the screen is shown in Figure 5.1. New versions of this transition software are being produced to allow Internet-based links between the student and other students and the instructor, further enhancing the learning experience.

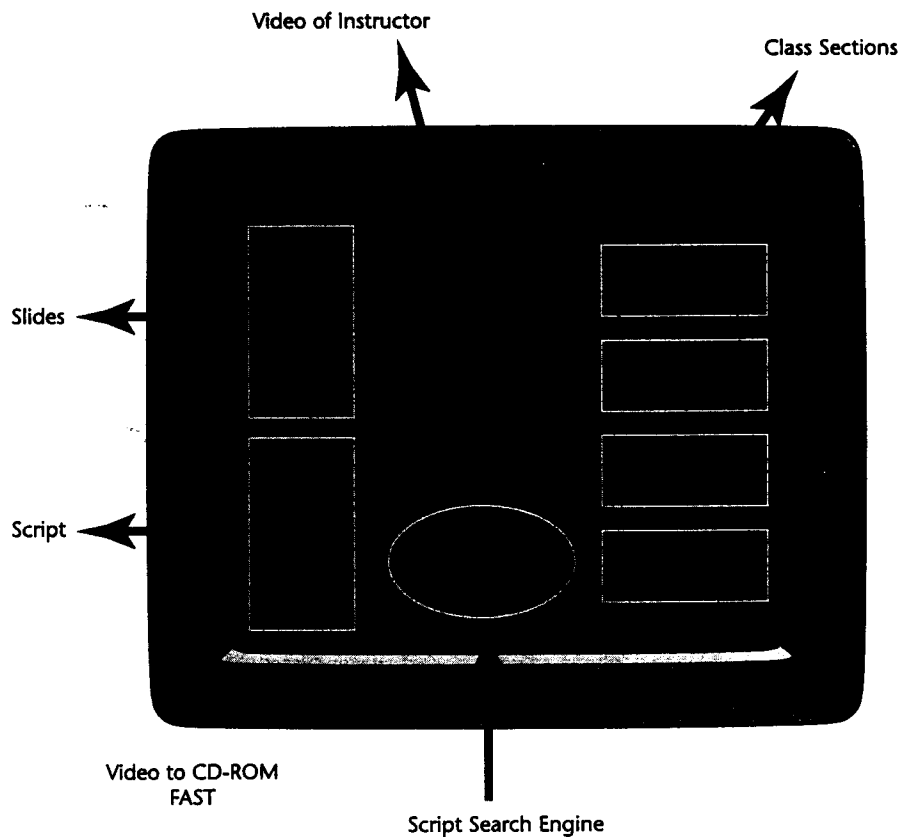
Electronic Evaluation Systems for Distributed Delivery

With all of NYNEX's activity in electronic education, moving education close to or at the desk or at home, many of the administrative support systems had to be modified to maintain the quality and efficiency of the educational product. The reader might well picture the change from well equipped, carefully planned classrooms in a centralized facility to a widely dispersed, more improvisational virtual classroom with characteristics that vary from geography to geography and culture to culture. Materials distribution (texts and exhibits) and materials collection (exams and assignments) all require a new look. Fortunately, the same electronic medium that enables learning technology can also be used to support these administrative activities.

One specific area that NYNEX implemented replaces a paper-based evaluation process. Evaluation has always been an issue in corporate learning, with the well known four levels starting with the end-of-class smile sheets we all recognize with all their bias and time weaknesses.

Some highlights of the system include

FIGURE 5.1. MULTIMEDIA SCREEN



- A thirty-day interval for improved student reflections on job impact
- An easy to use interface making student entry easy
- A facility to capture numeric data (“On a scale of one to nine rate the . . .”), for subsequent analysis using PC tools
- A facility to capture narrative data that allows the student to provide rich details. By capturing the student’s own voice, the emotions associated with that information are also captured
- A facility that allows the information to be reviewed by higher management and then forwarded back to the manager responsible, closing the loop
- A system built on a low-cost voice mail system with minimum technical requirements

Summary: Electronic Education Tools Strategy

Large-scale electronic education is a concept built on proof-of-concept pilots that expanded to large-scale implementation soon after ROI was established. It was also a strategy that depended heavily on off-the-shelf, vendor provided materials (especially in multimedia and CBT), followed by custom development. Most important, it involves the use of a wide spectrum of electronic education tools rather than relying on any one tool to satisfy the expansive volume of learning needs.

Planning Processes for Electronic Education

Every organization has some form of structured process to create major changes in its infrastructure. Electronic education has to fit into that structure to obtain commitment at a variety of levels within the organization. While the processes can include organization strategy, technology infrastructure, measurement systems, briefings, vendor negotiations, and so on, it usually begins with the "Business Plan."

The Business Plan

The basic building block for any corporate change is the business plan. While different for any organization, business plans invariably force the training manager to justify the building of an electronic education infrastructure in terms of ROI.³ For NYNEX, the plan included a population-based model that showed that a small number of locations could be used to service a significant number of NYNEX employees. The plan was submitted with an incredible ROI. And it was turned down.

When The Plan Is Turned Down

While a good plan, it failed to link with the major forces that were changing NYNEX at that time—process reengineering. As it turned out, process reengineering was a perfect partner for the training plan. Breaking down departmental isolation and moving employees together to serve the customer both helped to make electronic education feasible, especially in building-based learning centers.

³Return on Investment calculated by a number of different accounting packages that combine capital and expense based costs as well as variety of cost savings. These analyses rarely include the soft values of electronic education, including improved employee retention and the value of using a familiar work tool (personal computer) as a teaching tool.

Best of all, linking the electronic education plan to an existing change process made the effort so much easier. Later on, after the initial installations, new locations would vie to get the same level of facilities as their peers.

Key to the business plan was the ROI calculation. Driven by the population of potential students and the annual training requirement, calculating the reduced cost was simple. Key to that effort however was including the saved time off the job for the potential student. It's the multiplier that demonstrates the real value of electronic education:

- The ability to deliver training locally
- The ability to deliver courses in hourly increments, matching business volume shifts with training opportunities
- The ability to use tools that reduced the time needed to learn specific educational goals
- The ability to deliver "Just In Case" training

One Development Process: The In-Building Learning Center

A major element of the NYNEX plan was the concept of an in-building facilitated learning center. It included five major elements:

1. A multimedia room with fifteen or more learning stations using high end MPEG CD-ROM workstations
2. A video conference room adapted for video distance learning
3. An instructor-led technical classroom with LAN-linked workstations
4. A full time (outsourced) facilitator to run the complex and the multimedia center
5. A quick start-up supply of off-the-shelf multimedia

The learning center provided a place for electronic education to happen by being at the center of a remote corporate location. The place allows the centralized training organization to have a presence within the client's space. The creative value of the outsourced facilitator has gone beyond loading CD-ROMs and turning on video equipment to include things such as the following:

- Marketing
 - Scheduling
 - Guidance counseling
-

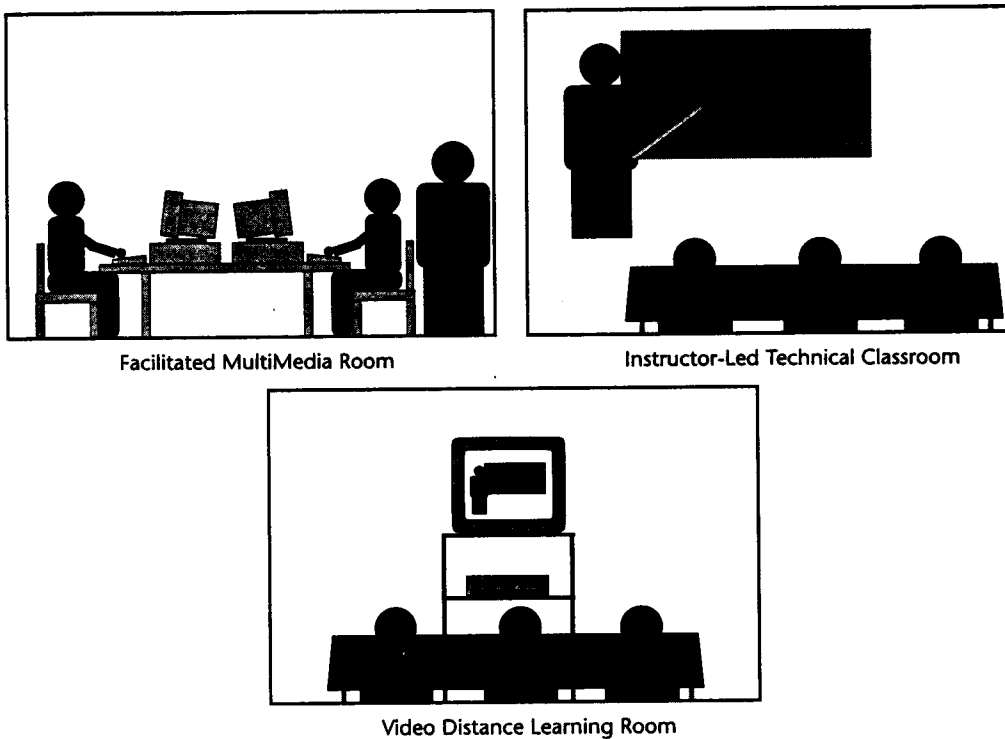
- New media evaluation for individual students
- Building newsletters
- Local curriculum design
- Video distance learning support for locally originated courses

NYNEX now operates sixteen locations and is expected to expand to Bell Atlantic and new locations.

A sample learning center could look like Figure 5.2. The multimedia learning centers have been built in every major population center within NYNEX. Using population studies, they can reach over 90 percent of the employees who

- Work in the building that houses the learning center
- Live near the building that houses the learning center
- Work in a satellite location near the learning centers

FIGURE 5.2. FULL SERVICE FACILITATED LEARNING CENTERS.



The multimedia learning center usually includes fifteen workstations equipped with earphones for private listening. Driven by a video LAN learning centers will receive both courseware and course video from a LAN server located on site. The primary courseware is bought off the shelf from a variety of suppliers, with a large concentration of courses in the computer field. The key ingredient of the success of the learning center is the facilitator.

The learning center facilitator is a full-time support individual who markets, schedules, operates, and tracks the learning center activity. In addition, the facilitator supports the video distance learning center, usually located in an adjacent classroom. The skills of the individuals vary but usually include computer literacy, marketing, and curriculum assembly (assembling modules of multimedia courses to fit individual requirements). Outsourced from a variety of sources (usually PC training companies) they have proven their value and versatility in providing standard courses to match custom requirements at each of the individual locations. As with CBT, the success of the off-the-shelf products has driven the demand for custom multimedia after students have their early experiences.

What cannot be seen in visiting the multimedia learning center is the administrative infrastructure that ensures the smooth operation of each of the learning centers. The scheduling, tracking, marketing, new course evaluation, and client information systems keep working occupancy close to 60 percent, even when each student visit is measured in fragments of a day. The ability of a student to use a lunch hour for training, of a manager to allocate a slow period for training, and to shift hours to the evening to reach after-hours students on their own time all contribute to expanded use of the facilities. A single NYNEX (now Bell Atlantic) manager telecommuting from her home manages the entire operation.

Strengths and Weaknesses of Electronic Education

After almost ten years of implementing the electronic education tools mentioned earlier, NYNEX can look back to a perspective that includes a high degree of electronic training, successes, and failures. Early projects (purchased CBT for instance) have led to more elaborate technology (multimedia), more involved distribution (network delivery), and more involved development projects (custom CBT for NYNEX-specific subjects, simple video broadcast that has led to two-way video, one-way interactive and so on.) With each step NYNEX became more committed to the electronic education delivery concept.

Building electronic education requires an organizational investment in people, both insourced and outsourced. The evolutionary plan requires an organizational continuity to learn from one production operation and turn it to the next technology step. As each technology step improves student engagement, the continuity ensures that lessons learned are leveraged and disasters avoided. While combinations of employees, contractors (who function as occasional employees), vendors (suppliers), and custom development houses will work better for some organizations than others, someone with more than just today's focus must maintain the long-term view to ensure that projects come to fruition. NYNEX created a small permanent staff, supported by the "outsiders" listed previously and some key insiders drawn from other training disciplines or clients.

The bottom line includes the following contributions from electronic education:

- Less time off the job for commuting for training
- More use of shortened, modular courses
- Improved employee performance
- Increased employee satisfaction with training
- Reduced cost per student
- Improved distribution of time critical training materials
- Reduced centralized classroom need
- Reduced centralized instructors

And the potential in the future of

- Reduced initial training days
- Improved employee confidence
- Faster implementation time for new courses

Some of the weaknesses include

- An initial requirement to market both concept and courses
 - The building of an electronic education staff or infrastructure within the existing staff
 - A risk that senior management will view electronic education as a substitute for all educational efforts
 - A risk that local management will see electronic education as a replacement for corporately funded training (providing the time for training)
-

- Some false starts in early custom development projects
- A resistance from existing instructors and managers in implementing electronic education

Utilization⁴

NYNEX's aggressive program using the wide spectrum of electronic education tools has resulted in over 10 percent of its courses being delivered in some form of electronic education. This figure is probably understated, failing to count CBT courses delivered to one person but taken by many, fractional students who just take a portion of a course in multimedia, or one-way video students who are difficult to track. Of even greater significance is the fact that more than 60 percent of NYNEX's training effort is directed at new employees, leaving electronic education as the delivery agent for one in three classes for existing employees.

More specifically, NYNEX delivered

- Over 20,000 student days of multimedia training (custom or purchased) in facilitated multimedia learning centers. Note that many of these days consisted of fragmented sessions over a number of days. The result is far more training events, matching business peaks and valleys.
- Over 10,000 students in two-way video distance learning.
- Over 500 students per month ordering CBT delivered via Lotus NOTES.
- Bi-monthly broadcasts using one-way interactive video distance learning in a news program format.
- Many one-way video broadcasts using business television.
- A number of trials of asynchronous learning using a notes delivery system.
- Multiple custom developments of CBT and multimedia running simultaneously using a pool of external vendors.
- A video-to-LAN implementation for linking facilitated multimedia learning centers.
- A pilot of audio graphic training in preparation for Internet-delivered synchronous training.
- Multiple CD-ROM-based transition courses, using video distance learning as the source for multimedia courses delivered in the learning centers.

⁴As this article was completed after the author left NYNEX, the data reflects 1996 full-year data.

Putting It All Together

NYNEX's experience with electronic education tools spans almost ten years of business planning, trial implementation, and expansion into production for a wide variety of tools. NYNEX's strategy was to embrace each tool for its specific advantages, maximizing its contribution on a wide scale. NYNEX rarely was an "Early Adopter," preferring to learn from the experiences of others and then apply them on a macro scale. The process required creative vision, driving management, and a team of enthusiastic managers to keep all of the systems operational. As NYNEX approaches the year 2000, it is well positioned to absorb the next revolution of electronic education tools.