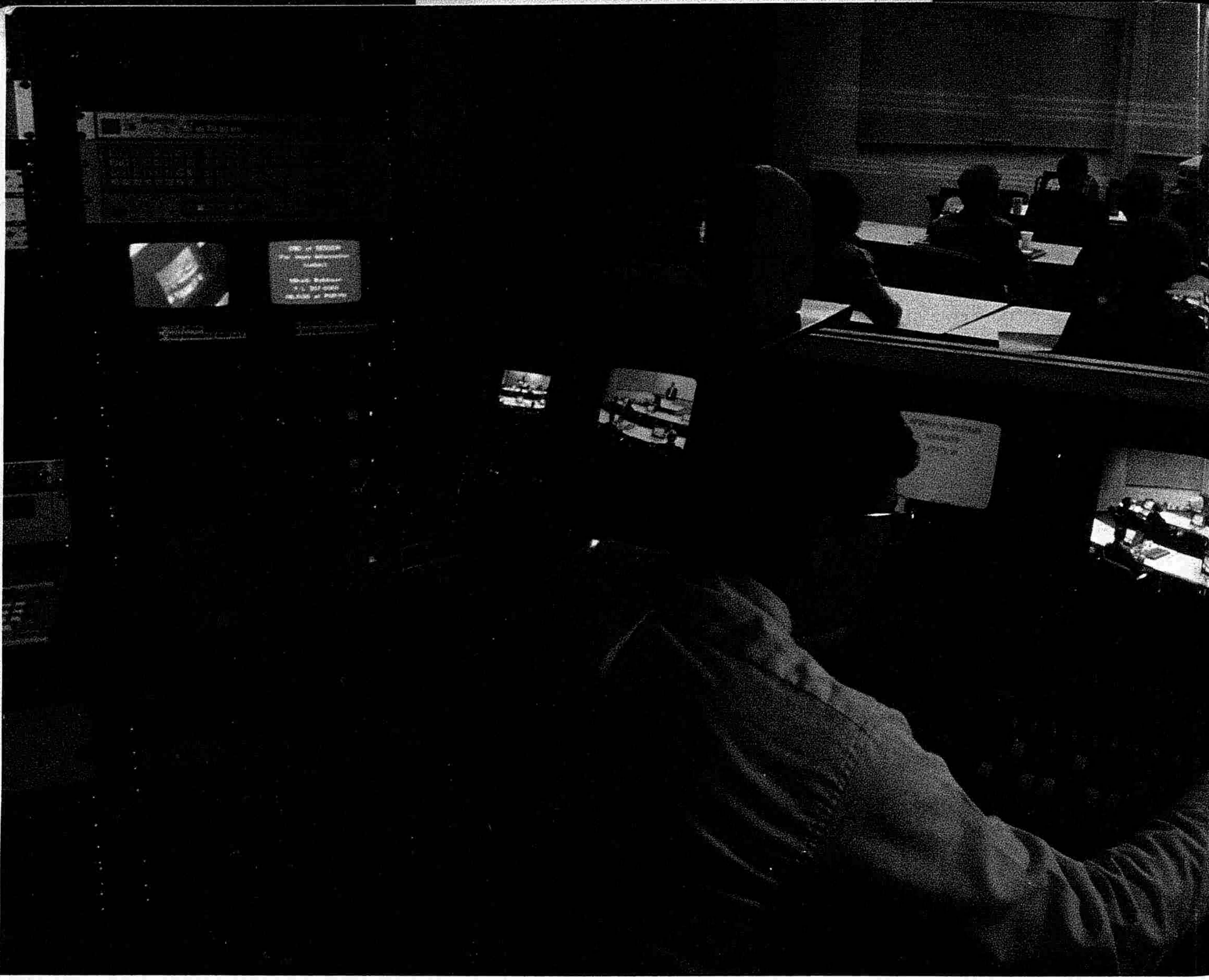

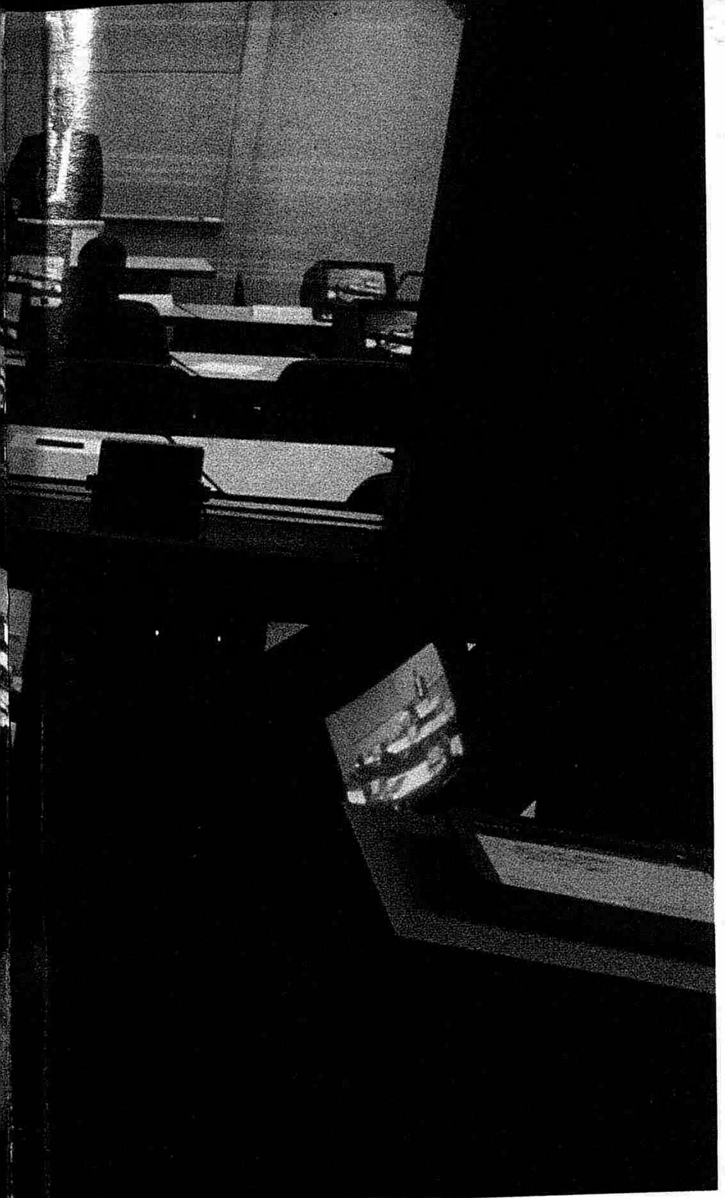

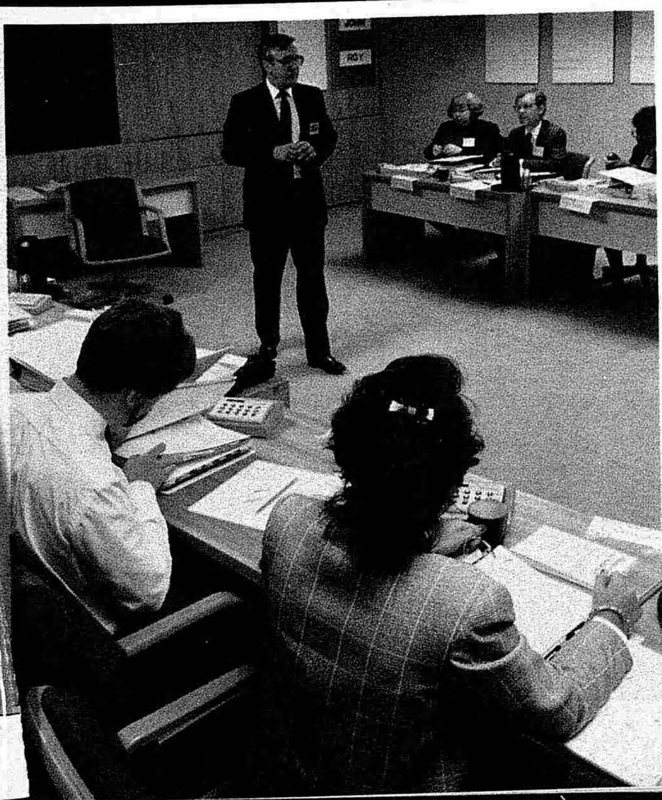

IBM Gets Its Arms Around Education

By Patricia A. Galagan

When IBM discovered it was spending $900 million a year on education and training with no central planning, it made some big changes. In this article, IBM's top training executives tell how they restructured the entire education function at IBM, pushing it right to the top of the company. Learn how much IBM saves by using advanced training technology.

In 1984, IBM decided it needed to get its arms around education. That embrace fell to Jack Bowsher, director of education for external programs, whose two-year study revealed that IBM was spending $900 million a year on education without an overall management system. That discovery led to a major restructuring of education, tied training directly to jobs, and streamlined delivery with big doses of instructional design and advanced technology.

Education at IBM is on the move. It has jumped to the top of the company, joining other key business functions, such as manufacturing and finance, that report directly to the top-ranking management committee. It is also heading rapidly out of the classroom into the world of advanced technology.

Those two changes—a central role for education at a high corporate level and more technology for delivering it—are good predictors of what could happen in other large companies interested in getting high quality from their big-ticket training expenses.

Ursula Fairbairn, who holds the top corporate education job at IBM, says, "We restructured education for three reasons: to ensure the company's growth, to improve the quality of education, and to contain costs."

The importance of education to IBM shows up clearly in some simple numbers. On any given day, 18,000 of its 390,000 employees take part in some kind of formal education event—in a classroom, through self-study, or via computer-based training. IBMers around the world complete a staggering 5 million student days per year, giving each one an average of about 12 days. The yearly education budget of $900 million includes the costs of the people, equipment, and facilities needed to deliver the training but does not include the salaries of the people being trained.

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Photos Courtesy of IBM

Why so much education?

IBM uses education for five major reasons: growth, change, customer productivity, employee productivity, and human resource management.

"Almost any program brought to the management committee could contain an education component, especially if it involves growth or change," explains Fairbairn. "We believe that if IBM is going to succeed, our people have to know more and be able to do more than the competition, and so we educate them accordingly.

"We also use education to support IBM's full employment practice. When people are freed up, perhaps by technology or by a reorganization, we train them for other jobs instead of laying them off. Retraining and redeployment are a way of life for us."

The route to restructuring

In 1983, following the publication of *A Nation at Risk*, the report that challenged U.S. education to improve, many IBM executives were asked to serve on government task forces on education. The retired CEO was a member of one of those groups, the Hunt Commission. Looking closely at public education sparked his curiosity about education inside IBM.

A retired vice president was asked to look at internal education and make some recommendations. The first was that there be a director of education at the corporate level once again. He also recommended a closer look at what IBM was doing in education and what it should be doing.

Jack Bowsher took over at that point, spending the next two years examining IBM education with a large magnifying glass. Bowsher is a 32-year veteran of IBM who came to education via accounting, marketing, and personnel. That turned out to be the perfect mix for his assignment, because he had to think about education like an accountant, market his plan to top management, and tie in its implications for the rest of the company when the plan was approved.

As Bowsher recalls, centralizing education and moving it to the top of the organization was a return trip. "In the mid-fifties education reported directly to Mr. Watson, the founder, along with only two other people—the directors of product development and manufacturing."

In the 60s and 70s, IBM decentralized heavily to deal with its explosive growth. Education was so decentralized that in 1973 the corporate director of education wasn't reappointed. For the next ten years there was no central focus on education in the company. Bowsher recalls, "We didn't know how much we were doing and we just assumed it was in good shape." His assignment was to "get his arms around education."

"The first thing we discovered was that we had a very typical education system," he recalls. "We had a cafeteria curriculum of thousands of courses. We put a rich smorgasbord on the table and left the choice of courses up to managers and their workers, who were often overwhelmed.

"Education in those days had no central direction. People were trying out every kind of delivery system, every kind of measurement system. We were learning a great deal, but we were

How IBM Uses Technology to Deliver Education and

In the woodlands of Thornwood, New York, IBM operates a state-of-the-art Corporate Technical Institute. Opened in 1985, it can house 250 students attending classes there or it can broadcast education programs to IBM locations around the country via satellite.

One of its designers, Ralph E. Grubb, claims with pride that from a communications standpoint everything can be connected to everything. Because communication takes place by voice, data, and video, each traveling in different forms, the center's superconnectivity is a neater trick than might first seem apparent. Under its raised floors are miles of cables for audio, video, telephone, TV, data, security, lighting, and public address systems. Open up a floor panel, hook in, and *voila*, you've turned the cafeteria into an electronic classroom. In a few years Grubb expects the center to have an integrated network through which voice, data, and video will all pass in digital form.

Thornwood is an example, in concentrated form, of the way IBM uses technology, such as interactive video, electronic classrooms, and satellite links, to deliver education. Expensive as educational technology is up front, it still reduces the cost of delivering training to IBM's 390,000 employees.

Lower costs and higher quality are the business reasons for using educational technology. William M. Ouweneel, program manager in corporate education for external programs, claims "In education we have to justify the technology just like a customer would."

The advanced technology classroom

IBM's newest classrooms put technology to work for the instructor and student. A personal computer lets the instructor call on visual material in a myriad of forms, from computer-generated slides to videos of role-playing. A keypad at each desk lets students answer all the instructor's questions. There is no putting your brain on hold after your turn has passed.

The instructor's computer tabulates students' responses and displays the pattern of right and wrong answers. The object is not to rate the students, but to let the instructor know whether the material is getting across.

A computerized log of all previous responses shows the instructor the history of right and wrong answers to the same question by other students. Instructors and course designers use the data to check how well a course is delivering its message.

Comparing a module on performance planning and evaluation, with 130 teaching points, designed and delivered for the technology classroom and a conventional classroom, IBM found that students in the conventional course got 68 percent of the points while those exposed to the technology version got 83 percent. "We'd like to push it up into the 90s," says Ouweneel.

Ouweneel emphasizes that the technology-based presentations are more interactive, are richer in ways to present information, and depend less on the skill of the instructor and more on that of the instructional deinventing too many things. We had lots of duplication and yet there were voids. Costs were going up without control and quality was going unmeasured.

"The thing that really got everybody's attention was when we figured out that IBM was spending $900 million dollars a year on education."

The discovery that the company was spending four percent of its total operating budget on education coincided with IBM hitting a plateau in its growth, accompanied by heavy expense control. When the management committee asked education to give back $200 million dollars, Bowsher told them it would be difficult to know what to cut without damaging the company. No one knew what was good and what needed work in education at IBM. "All we knew was that we were doing a lot of it. My message to the directors of education was that either we were going to show that education had value or it would be taken down $200 million."

After the cost study, Bowsher assembled a group to write a set of guidelines for education, answering the question "how should it be done?" They specified best practices in nine areas:

- curriculum planning and development;
- course development;
- delivery systems;
- measurements and evaluations;
- transition programs;
- administration planning and support;
- planning education facilities;
- instructor training and development;
- management of education resources.

Putting the guidelines together convinced the group that education needed to become much more structured and more clearly related to the company's business requirements. "We defined two reasons for being in the employee education business, says Bowsher, "to train people for the jobs they have today, and for jobs of greater responsibility. That meant no more nice-to-have courses."

The next crucial decision was to organize the planning of education according to major jobs in the company. Almost everything else would flow from that categorization. Curricula would exist only to support jobs and the development of people. The company would have an inventory of trained employees for all its major jobs.

More instructional designers

Courses were pared down, overhauled, and sometimes scrapped. Instructional designers went to work on all the major, high-volume courses, making sure they included measurements of quality and ways to evaluate student performance.

"Instructional designers are the architects of education," says Bowsher. "They can build high-quality, efficient, motivating courses. Instructional design can often reduce the length of a course by about 25 percent."

It can also put more measurement into training. IBM has always measured students' reactions to training but now it tests systematically how much knowledge and skill passes to the student. Bowsher explains, "We don't test for the purpose of giving the student a grade, but to tell the instructor how well the course has delivered its message.

"We also test, through interviews

Reduce Cost

signer. Limited studies with instructors and students show they prefer the advanced technology classroom and that it does appear to increase learning.

Satellite education

IBM's satellite network has six transmitting studios, two in New York state, one in New York city, one in Dallas, one in Chicago, and one in Los Angeles. They beam courses up to two satellites and down to classrooms around the country.

The IBM Education Network studios contain two video monitors, one to carry the instructor's image and one for visuals. Instructors call the visuals up from a personal computer or put them under document cameras in the studio. They can also view slides, videodiskettes, or videotapes. Visual transmission is one way; audio is two-way so that students may ask questions.

Candid studios send voice and image in both directions. The instructor is assisted by a producer in a control room where input from cameras can be mixed and manipulated much like TV news.

Sending a course out by satellite saves IBM the cost of transporting and housing students at distant learning centers. Most students, including IBM customers being trained, can get to a satellite classroom without traveling overnight.

Satellite instruction also cuts the number of instructors. By satellite a single instructor can reach a class of 200 students at a time. It takes just three days to train an instructor to use a satellite classroom.

By 1992, IBM expects to deliver 250,000 student days per year on the satellite system, avoiding expenses of several million dollars each year on instructors, student travel, and housing. It is the high volume of students served that brings IBM its return on the expensive education technology.

Individual learning

In another effort to bring instruction to the student rather than the other way around, IBM has expanded the number of courses offered as self-study programs. Its Application System 400, a new midrange computer, and its Personal System II both come with training modules for users. IBM calls it system-delivered education.

"Individual learning is not the right form for every course," says Ouweneel, "so we have developed criteria to guide our choice. We consider things like the life of the course, the stability of the material in it, and the potential number of users."

One of IBM's power tools for individual learning is its interactive videodisc/personal computer combination known as Infowindow. Its current uses include safety training, customer engineer training, and sales training. In the works is an instructor training course.

IBM finds that courses prepared for self-study are about 25 percent shorter than classroom courses covering the same number of learning points.

Photo Courtesy of IBM

Jack E. Bowsher, director of education for external programs, and Ursula F. Fairbairn, director of education, help lead IBM's education efforts.

and surveys with students and their managers, whether the course content is being applied to the job. We couldn't do that kind of measurement without having first planned education around the 85 major jobs."

IBM is just beginning to measure the effects of education in terms of business results. In service, for example, it is comparing the quality of service provided by a trained employee to that of an untrained person doing the same job.

Each of the 85 major jobs now has its own set of manager's guidelines for selecting courses. Gone are the days of wandering unassisted through once-massive course catalogs. A programmer's manager, for example, can use the guidelines to help the programmer pick out appropriate courses. A person being redeployed as an applications programmer would be guided to one set of courses while a newly hired college graduate with a degree in computer sciences would choose from another set. A third set of courses covers training in the specific job and a fourth set takes care of specialization.

Training tied to jobs

Defining the major jobs in IBM in order to link them with education proved to be a huge but very important step. "Executives had a hard time understanding the value of 5 million student days a year," says Bowsher. "Their first reaction was to say the number had to be reduced. But by breaking out 85 major jobs in the company and showing how education supported each one, we made our point. People could see how much training it took to have trained purchasing agents or accountants or programmers. We could say give us headcount, facilities, and dollars, and we will return to you trained employees. The return on investment began to be clear as the budget for training became more meaningful."

In the course of its study, IBM discovered that although the company was spending $900 million on education, there were some voids. Microcode engineers, for example, were not getting the right training. There were also courses that were nice to have but not essential to jobs. With an eye to making all training have value to the company, they whittled away the excesses and filled in the blanks.

"We're confident now that the vast majority of our people are getting the right courses, that is, the ones necessary for their jobs. We have a good inventory of trained employees and many more options than we used to have for retraining now that there are 85 job categories for which there are courses."

Getting reorganized

Education at IBM is now of three types: management development, job training and development, and employee development. (See Figure 1). Employee development comprises about 25 courses that anyone may take regardless of function or division. They include topics such as effective communication or accounting for non-accountants. Management development is targeted for executives, middle managers, and first-line supervisors.

The third category includes the 85 major jobs that fall into the broad categories of marketing, service, technical, information systems, office systems, and finance and planning. They are also classified by levels: entry, experienced, and expert.

Delivery for dollars

The cost study gave the company some very useful information.

- It costs an average of $350 a day to train each student using a central classroom at one of IBM's education institutes. More than half the cost is for transportation and living expenses.
- Classroom training at IBM plant sites around the world costs an average of $150 a day for each student.
- Courses carried by satellite from a central classroom to distant sites around the U.S. cost roughly $125 a day per student.

Retraining Is a Way of Life

Intending to switch to making electronic typewriters, IBM revamped its plant in Lexington, Kentucky, where workers had been turning out a million electric typewriters a year, each having 2,000 parts and requiring hundreds of adjustments. A new continuous-flow assembly line was installed, much of it controlled by computers. Producing a new product in a new way changed the jobs of most of the plant workers. IBM retrained hundreds of assemblers in electronics, robotics, and computers. Other people freed up by the changes were retrained to be accountants and purchasing agents.

• Self study, whether computer, video, or print-based, costs $75 a day.

Using those figures to construct a business case, Bowsher came up with a way to justify the expense of using technology to deliver training. He demonstrated that designing some courses for delivery with advanced technology systems would pay off quickly because of the large number of students that could be trained with each course.

For example, suppose that IBM wants to train 500 employees for ten days. The average cost of their payroll and benefits during one year is $25 million. The cost to train them all in a central classroom, at $350 a day, comes to $1.75 million.

A combination of using more technology to deliver training, and instructional design techniques to streamline the training would reduce costs by 65 percent. "But," cautions Bowsher, "you have to put the money back into building new courses for the new delivery methods."

Bowsher's case convinced management that in a large company, it costs less to take training to the employee through some form of technology than to bring the employee to a central training site.

"If the cost of developing six new technology-based courses, using instructional design techniques, is $2 million, and you are a company with at least 5,000 employees, you will begin to realize a payback in less than two years because of the numbers of people you can train with those few courses.

"This strategy works best with large-volume jobs and with training that can be delivered effectively via technology."

Since the 1970s, education at IBM has been moving steadily out of the classroom into the circuits and airwaves of its increasingly sophisticated delivery systems. About half its courses currently are classroom-based and half are self-paced but Bowsher predicts that by the end of the 1990s only 25 percent will still take place in a classroom. "That's a revolution," he says.

If it's a revolution that will affect other large companies, as is likely, there will be much more demand in such companies for instructional designers. "Instructional designers are as important to systems-based education as programmers are to computers," says Bowsher, who predicts a shortage in that career specialty.

How much $$$ is enough?

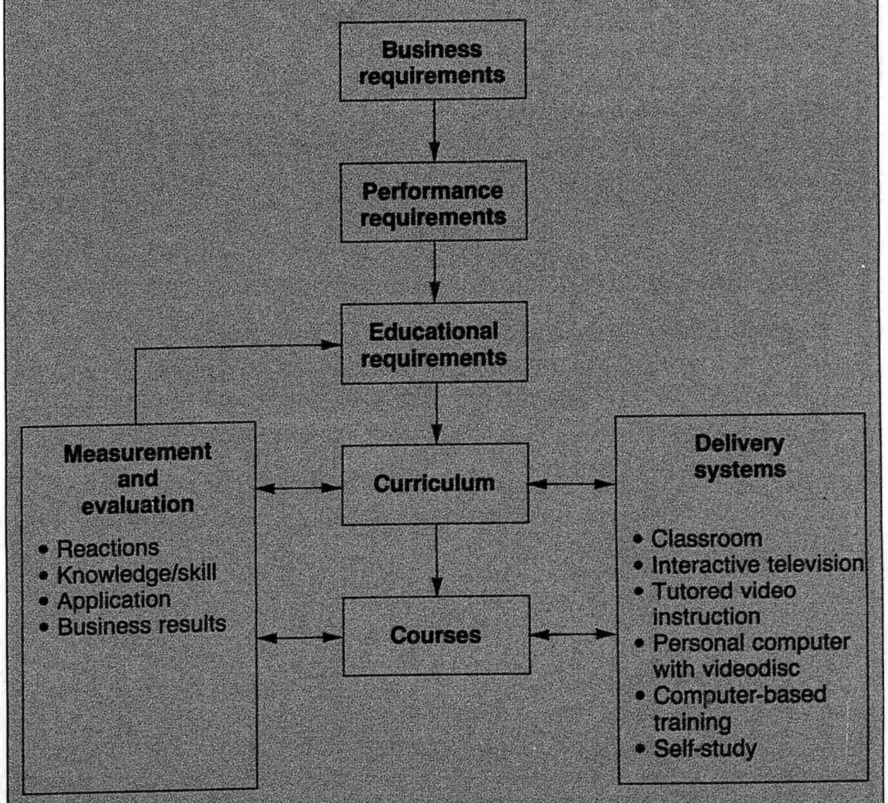
Bowsher is often asked by people in other companies to name a percentage of operating expenses that a company should devote to training and education. He rejects that formula, saying that "education isn't like research. It's like a manufacturing cost. You should spend whatever it takes to do the job and nothing more or less."

It helps, of course, that Bowsher can back up his rhetoric with hard numbers. His "business case" for education outlined for the top management committee why education was necessary, what the costs and benefits would be, and most importantly, what it would cost not to do it. "That's how you get top executives to buy into the need to

Figure 1—Major areas of education

Management development	Executive development				
	Middle management				
	First line management				
Job training and development • Expert • Experienced • Entry	Marketing and Customer Education	Service	Technical	Information Systems and Operating Systems	Finance and Planning
Employee development					

Figure 2—The vision: a systems approach to education



back up education with resources. You show them that education can be run just like any other part of the business."

Take, for example, the production line for the Application System 400, a midrange computer. "It goes down the production line and many things are done to it, but at the end there is a finished product. Education isn't terribly different. A person goes through a series of courses and comes out as a finished product, a trained applications programmer or a trained accountant."

The important thing, insists Bowsher, is to produce a quality product in the most cost-effective way. "That's why we choose delivery systems so carefully. We need to make the best choice in a range that runs from $75 a day for self-paced study to $350 a day for training in a central classroom."

Start with a vision

Like anyone spearheading a big corporate change, Bowsher got his show on the road with a vision (see Figure 2) of what it would be like when IBM took a systems approach to education. To get people to see what a systems approach could be like, he asked them to look back to 1981 when IBM entered the personal computer business. "If we'd had a systems approach, he says, we'd have figured out a performance requirement for each of our 85 major jobs with respect to our business in personal computers."

Taking the job of secretary as an example, he explains that if secretaries had been expected to keep using typewriters, there would have been no performance requirement for them related to the personal computer business except to be aware of what the company was doing and to be positive about the IBM personal computer. Switching to personal computers, as all secretaries did, created a huge new performance requirement for them.

With a systems approach the company would then have turned to its instructional designers to translate the performance requirement into courses with objectives and teaching points. "We would have modified the curriculum for secretaries or created new courses, and we would have built in measurement and evaluation.

"Then we would chose a delivery system, considering whether it was better to bring all the secretaries in IBM to the training center in Atlanta or to design training that they could use right on their personal computers at their desks.

"But we didn't have a systems approach to education in 1981. When secretaries got their personal computers, every unit in the company started inventing courses for them. Some were good, some were average, and some were poor."

Fitting into the big picture

Establishing a systems approach to education was an important step, says Bowsher, but it had to be integrated into the company's management system. Like most companies, IBM sets goals and plans strategies for achieving them over a number of years. Annually it plugs in specifics about programs, money, and people but they must all support the company strategies.

"In most companies that's as far as the management system goes," says Ursula Fairbairn. "But at IBM we be-ve that unless we meet the education requirements that flow from business needs, none of it will happen." In 1987, education took its place in the official management system.

Making education the supporting base of the management system triangle means that it has to be part of everyone's operating plan. For example, the operating plan for making midrange computers at the IBM plant in Rochester, Minnesota, must state how people will be trained and how much it will cost.

Part of Fairbairn's job is to keep tabs on how well education is doing. She makes an annual "state of the union" report to the top management team, covering points that parallel the original guidelines for education. The annual review covers:

- Has the curriculum been developed for each of the 85 jobs?
- Do we have the inventory of trained employees?
- Have we implemented the course-development process?
- Is there a staff-development plan in place?
- Do we have measurements and evaluation systems?
- Are there financial control processes in place?

Supporting that intricate cycle of planning and measuring progress is an education staff of about 7,000 throughout IBM worldwide. That number, which is about 1.8% of all the people working for IBM, includes every person in education, from receptionists to executives.

Some take rotational assignments as instructors for two years, usually teaching in a area in which they have been successful, such as sales or management. "They're subject-matter experts and role models, not professional educators," notes Fairbairn. "We train them to be teachers." Still others are professionals from other disciplines who take long-term assignments in education, and people with degrees in education.

Training for educators may cover basic instructor training, a course in the systems approach to education, a course-developer curriculum, and an education manager's course.

For the first time at IBM there is a documented career path through education to the top echelons of the company. "That wasn't true in the days when education was not in the mainstream."

From the center

While IBM itself is decentralizing, education is going the other way. "We're back to the central focus we had in the 50s," says Bowsher. Planning and course development are centralized now because it's clearly more cost-effective, he says.

For a company that has been viewed as one of the leaders in employee education, this all seems like a tremendous amount of change. But Fairbairn points out that "It is easy to talk about the concepts of a competitive workforce, but training and retraining your employees to be competitive in a worldwide marketplace forces constant change within employee education. What we have done is not unique to IBM. Change must be part of our education systems for our companies to be competitive."