assigned an appropriate Learning Resource. After the LR is completed, the test can be re-taken and the cycle starts over again.

After running 38 students, the number of days to complete the course has ranged from three to seven, with an average of 4.6 days or 22.9 hours on PLATO. Besides the decrease in training time, the majority of the students who wrote comments about the course seem to like best the flexibility designed into the course.

Another project which will be utilizing the computer-based training system to manage and teach an individualized course has to do with the DC-10 Flight Guidance System. Many pilots are taking extra simulator periods to become proficient in the use of the Flight Guidance System and so the goal of this program is to reduce simulator time. This program will rely on both knowledge and performance testing, with the mastery of the knowledge portion a prerequisite to the performance testing.

Due to the limited availability of simulator time, the high cost of operating the simulator, and the importance of the performance area, extensive use of the graphics and interactive simulation capabilities of the PLATO system will be utilized.

The student will see a simulated flight guidance panel with operating switches, knobs, and annunciators and then be told to conduct a "flight." During the performance training segments, the student will be prompted through the flight. For the test the student will be given a flight between two cities. This flight will include such flight phases as takeoff, climb, cruise, and landing. By being able to record the student's inputs for each phase of flight, the student will either attain mastery or will be directed to some further instruction. Also, once mastery is attained, no-risk testing will be allowed so the student can maintain proficiency.

This is a good example of utilizing the interactive graphics capabilities of the CBT system to off-load a much more expensive device, in this case a full motion, visual simulator.

The success of the new hire program and the progress made to date on other courses, including the DC-10 Flight Guidance system, has led United to consider utilizing PLATO at the center of the Boeing 767 program. The acquisition of a new airplane will provide the first opportunity to design from the ground up, an airplane transition course utilizing the CRI concept and taking advantage of PLATO to manage the entire student's progress from the first day of ground school through the last training flight.

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TRAINING IN THE BELL SYSTEM

BY RON ANDERSON

Addressing the topics of "Training in the Bell System" and "Bridging the Gap Between Academic Efforts and Industries' Needs" is no simple task. It occurred to me that coping with these subjects is something akin to explaining the universe. The size and variety of Bell training efforts are far too large for one person to explain with any confidence — especially in one short discussion. And, the complexity of the problems widening the gap between academic and industrial training, tempts one to wax philosophical and vague — as many of us have for too long.

So I shall only give my very personal (and limited) views on these topics and try to relate them by isolating some of the causes of the problems we may be facing in the future . . . hopefully together.

It's hard to determine just when Bell System training began. We could speculate that it started when Alexander "taught" his assistant where to say "hello" into the gadget. But whenever it started, training has always reflected the unique needs of the Bell System structure.

One primary need is to support the separate operations of the research groups (Bell Labs), the manufacturing arm (Western Electric), the interstate network (Long Lines), and the 22 autonomous operating companies. Another need is to provide a training link *between* these separate operations allowing the System to function in a standardized, cohesive manner. Any changes in the relationship of these parts has enormous impact on training structure and operations within the Bell System.

My first encounter with Bell training was during the '50s. It was obvious that Bell's reliance on technology to solve its problems had created a belief that technicians made the best supervisors — and the best instructors. Craft training was generally of the on-the-job variety and usually conducted by a skilled technician.

Some formalized classroom training was available, again conducted by a good technician so courses were, frequently, long in theory and lecture, while short on efficiency and evaluation of results. "Cold storage" training was common and students were expected to brush up on forgotten skills through the help of an experienced fellow worker when the need arose.

Management training generally reflected the same philosophy as craft. Fascination with technology had filled management ranks with technicians, some of which frequently went on to become the supervisors of other technicians. So, other than for a few administrative skills courses (frequently referred to as "charm school") most training evolved around technical subjects. Frequently this meant management courses were a condensed or rarified form of craft training.

Training efforts in the '60s tended to follow the same patterns

as the '50s with a few notable exceptions. The Traffic department introduced the first self-paced training administered in a standard format throughout the Bell System. This was in a programmed instruction format, prepared for AT&T by an outside contractor. The success of this effort led to the introduction of other self-paced courses by Long Lines and other departments later in the '60s.

Management training was also affected by some Bell companies' projections that rapid turnover and expansion required direct hiring of managers from colleges and universities. Although still leaning heavily on technical subjects, more managerial skills training was added to the curriculum and the need for expanded professional training staffs and more objective evaluation techniques became issues for pondering.

The '70s were a decade of rapid and profound changes in Bell training. The advantages of a systematic approach to training efforts were accepted by Bell along with some of the principles remaining from the programmed instruction movement. Issues involved in training efficiency and effectiveness became important and people began to discuss the differences between training and education.

The concepts and techniques involved in problem analysis, performance analysis, task analysis, training design and evaluation became a part of most training staff's vocabulary and bank of skills. Some of the Systems efforts to improve efficiency through centralization took the form of:

- Assigning course development responsibilities to one company and sharing the product throughout the System.
- Centralizing training efforts to better utilize plant facilities.
- Developing a cadre of "professional" in-house personnel trained in problem and worth analysis skills to screen training requests from the field.

These moves toward efficiency brought about other necessary changes required to standardize and qualify training development activities. In the early '70s AT&T developed its own Training Development Standards, based on a variety of available systems approaches to training. The Bell version evolved into seven discreet phases beginning with problem and worth analysis and concluding with course evaluation. Outside professionals were also brought in to develop materials for training Bell personnel to perform these activities. Although certainly not the final answer to quality control, these standards do provide a useful tool for Bell training people in performing and monitoring training efforts in a standard and orderly manner.

What may come about in the '80s is purely conjecture at this point. Much, of course, depends on any changes in the System structure resulting from either current litigation procedures or from the massive training organization restructuring study presently underway by AT&T. But, if my personal crystal ball has not stopped on me,

I'll venture some guesses and predict the following trends for both the Bell System and industry in general:

• There will be more centralization and standardization of training efforts. Economic conditions will require this in the near future. Later it will be due to our good sense.

• Training ranks will be filled with more career type personnel either "home grown" or hired from universities. This will result in more concern by training staffs with the results of the training product than fascination with the jargon and process.

• Course development activities will become more fractionalized using people with highly specialized skills to work or, at least, advise on specific areas of the training process. This will be especially true in the field of communication or design and production. Industry is slowly becoming aware that course developers cannot be all things to all people and although there will always be need for the generalist, sophisticated training efforts also require the help of people with specialized skills.

• More importance will be given to communication design and the production aspects of training. Industry will recognize, again, that good training products are the result of the combined disciplines of science and art. Once recognizing the contribution in effectiveness and cost savings that professional media specialists (either print or A.V.) can provide training efforts, graduates in these fields will be sought after by industry.

Should these trends come to pass in the '80s, they may promote an interdependency between industries' needs and academic efforts that may eventually bridge the existing gap. But, this strikes me as somewhat of a Pollyannish view when considering some of the problems both sides must overcome in closing that gap. I can offer no quick painless cure for the problems but would like to offer some comments on some of the causes of the problems — as I view them.

It seems to me that academic efforts to meet industries' needs for training personnel is an exercise in frustration since I don't believe industry has really determined what its needs are. It's an impossible task to emulate a model that either doesn't exist or one that changes from year to year. This seems particularly true in the area of course and media design and production techniques.

The reasons for this unsure or volatile attitude by industry may be many, but one of the causes seems apparent. Since most upper management and policymakers in industry tend to have backgrounds in engineering, business or some other related fields, they usually have little understanding (or possibly even disdain) for disciplines and skills needed from schools of education and communication. In fact, I can't place one "captain of industry" with graduate studies in either instructional systems or media and vice presidents with backgrounds in printing or lesson design are hard to find. As a result, when hiring personnel from "academia," industry usually has few criteria to base their decision on. Too often candidates from schools like Indiana, Arizona State or San Jose, appear to have the same skills (on paper) as someone from Podunk University. Frequently the results can be disastrous. It will take some time before industrial training reaches the level of professionalism necessary to deal with this problem.

The academic community, on the other hand, would do well to concentrate more of its efforts in *applied* research and curriculum to adult learning and devote less effort to the traditional preparation of students to function in public school systems. What interests people like me is learning styles, curves, and motivational factors of adults . . . not first-grade toddlers. Skinner's pigeons may be functional at 80 percent body weight but our target population is not. We in industry look to the academic community for help in solving some of these problems but seem to get little help — at least in the past.

Students in schools of education and communication should be prepared to accept the notion that education does not solve all the world's problems. It can, in fact, often cause others. Having to "wean" graduates from a world that frequently places high stake on education for education's sake, fixed instructional time frames, and viewing the "rounded person" as the answer to most problems can be a harrowing experience.

Courses could be offered on cost-worth analysis, performance analysis and promote the idea that training (especially the unnecessary brand) costs industry and the consumer money. The student bringing these backgrounds and skills to industry can save considerable retraining and money.

Love-Hate Relationship

Finally, there seems to me that there's sometimes a strange love-hate relationship between industry and the academic world. While some industrial training folk are frequently bemoaning the academic community's supposed insufficient approaches to education (or training), these same people often are quietly mimicking the academic structure and methods. It may be the nostalgia brought about by the bricks and mortar or memories of the "old school" environment that prompts this behavior, but they can't have it both ways. At some point the differences between these operations must be recognized and dealt with . . . possibly with the help of the academic world.

So these are just a few of the problems I see causing the gap. I could continue the list and try to isolate specific causes, but the end result would still only reflect my personal views.

If my probing generates further discussion and analysis of the problems ahead of us . . . I'll have been successful. I hope we can, at last, stop philosophizing on our differences and work, together, to solve them.

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