



# FBI

June 1988

## Law Enforcement Bulletin



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### Dealing With Crack Houses

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## Law Enforcement Bulletin

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# Computer-Based Training for the Law Enforcement Community

***"With a well-developed CBT program in place, managers may anticipate that their training needs will be served expeditiously and economically."***

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Law enforcement agencies face two persistent problems with their training: 1) Job demands make it difficult to send personnel away for training, and 2) there is no single convenient time to schedule training for the various shifts. Computer-based training (CBT), a result of technology, is a partial solution to these problems. This article will define CBT, examine its benefits and limitations, and explore some considerations managers may use to determine if their agency should implement CBT.

## **Definition**

The most whimsical definition of CBT is a situation in which a person and a computer interact and one of

them learns something. More precisely, CBT is the use of a computer to teach or help teach a learner. CBT occurs when a learner sitting at a computer observes information, receives a task/question, individually makes a decision, and receives feedback as to the correctness of the decision.

Since CBT is an emerging field, conformity is lacking in the terminology. As table 1 shows, various terms are generally synonymous. Related Terms, such as computer-managed training (CMT), further confuse the issue. CMT, for example, does not require the application of CBT. CMT is the use of a computer to keep track of student performance. For simplicity, if the computer is a primary medium for

presenting information, consider it CBT.

CBT is different from other types of media in terms of three elements—information display, interactions, and branching. Due to these elements, CBT trainers must give careful attention to the way the information is presented to the learners. For example, the amount of text that can be displayed at one time is limited. Similarly, trainers must plan for all the questions and learner responses (interactions). And finally, one must devise a strategy concerning how the learners will progress through a lesson (branching). Good instructional design results in good instruction. CBT *requires* good instructional design. An instructor may "fake" a lecture, but you can't fake CBT.<sup>1</sup>



Special Agent LeDoux



Special Agent McCaslin

**TABLE 1**  
ALTERNATIVE TERMS TO DESCRIBE  
USING THE COMPUTER TO LEARN

Computer-Based Training	— CBT	Computer-Assisted Instruction	— CAI
Computer-Based Instruction	— CBI	Computer-Assisted Education	— CAE
Computer-Based Education	— CBE	Computer-Assisted Learning	— CAL
Computer-Based Learning	— CBL	Instructional Application of	
Computer-Assisted Training	— CAT	Computers	— IAC

### Advantages

CBT has advantages for management and students. Due to the careful instructional design procedures required, management may be confident that the learners receive information that is both accurate and consistent. Management may determine exactly what is taught rather than assuming that instructors are following lesson plans.

Another management advantage is that unlike an instructor, CBT is available whenever and wherever needed. An instructor, unlike CBT, cannot be scheduled in several places at once. Further, research findings suggest management may anticipate a 40-percent timesavings when using CBT.<sup>2</sup> And, CBT guarantees mastery of a topic. When a lecture is over, it's over; however, a CBT lesson may be taken as many times as necessary to learn the material.

CBT should also reduce the rate of instructor burnout, since the role of the instructor changes. Instead of being a performer standing in front of the class, the instructor becomes a facilitator who may spend his/her time coaching individual learners. Research has verified

this learner preference for individual attention.<sup>3</sup> Another advantage is that training needs may be met more expeditiously. With CBT lessons available, it will not be necessary to wait until the training academy offers a particular class—the needed training may be taken anytime. Finally, CBT is economical in the long term. While the original development of CBT is cost-intensive, once developed, its continued use adds little additional cost.

Students also will find advantages in using CBT. Some of the advantages, such as the availability of instruction, accrue to both management and learners. Anyone who has ever worked an 11:00 p.m. to 7:00 a.m. shift and then attended training will quickly realize the impact of the availability of CBT. Training may be received during "normal" working hours.

During a traditional lecture, learners passively receive information for a set block of time, such as an hour. When the time ends, the assumption is that the students have "learned." With CBT, each student is actively involved in the learning process and progresses at an appropriate personal pace. CBT is not based on an assumption that all

**“...the power of CBT to meet the needs of adult learners is one of the major strengths of the medium.”**

persons learn a given topic at the same rate.

Learners receive individual feedback for each question asked of them. If a question is asked in a traditional class, one or two students may attempt to answer the question. Each student's answer, however, is not evaluated—time is too limited. In our opinion, a student often learns more from errors, if the error is noted and explained, than from correct responses.

Unlike traditional role plays, each learner has the opportunity to play the key role when using CBT simulations. CBT allows each learner to be the investigator, not just one or two students from the class. The importance of *doing*

as an essential ingredient in learning has long been realized.<sup>4</sup> In summary, the power of CBT to meet the needs of adults learners is one of the major strengths of the medium.<sup>5</sup>

#### Limitations

While CBT has many benefits, limitations exist. The first limitation, of course, is the need for computers. Second, as noted earlier, technology restricts the amount of information presented on a computer screen. Also, most CBT simulations may lack “visual realism.”<sup>6</sup>

In addition, similar to other technology-based media, such as video tapes, the initial investment of re-

sources is high. Time is required to produce quality CBT because of the careful quality control/curriculum process necessary.<sup>7</sup> Time is also required to develop personnel capable of producing CBT. Spending time means spending money.

The production of CBT requires a team of trainers well versed in adult education, educational psychology, testing procedures, microcomputers, and authoring procedures. These persons must be able to interview the subject matter expert (SME) familiar with the topic, help the SME focus the educational purpose of the lesson, and be able to write clearly and concisely. For one person to be an expert in all of the above areas is difficult. Thus, a major consideration is the need to assemble a team of experts.

Further, most members of law enforcement training academies are skilled lecturers. They may not have, however, the skills necessary to create quality CBT. A general industry standard is that assuming the prerequisite background, it requires 2 years to develop an independent CBT developer.<sup>8</sup> Our experience suggests that the most suitable type of personnel are those capable of logical/analytical thinking who are well grounded in adult education, curriculum development, or instructional design. Familiarity with, or at least no fear of, a computer is also necessary. The addition of a nonsworn professional staff with special qualifications may be necessary.

The selected personnel will not immediately blossom into CBT experts. They will have to spend time reading, attending conferences, and attending training specifically relating to CBT development. Table 2 lists examples of or-

**TABLE 2**  
EXAMPLES OF POTENTIAL  
SOURCES OF INFORMATION

#### Organizations

American Society for Training & Development (ASTD)  
Suite 306  
600 Maryland Avenue, S.W.  
Washington, DC 20024  
Association for the Development of Computer-Based Instructional Systems (ADCIS)  
Miller Hall 409  
Western Washington University  
Bellingham, WA 98225  
National Society for Performance and Instruction (NSPI)  
Suite 315  
1126 Sixteenth Street, N.W.  
Washington, DC 20036  
Society for Applied Learning Technology (SALT)  
50 Culpepper Street  
Warrenton, VA 22186

#### Periodicals

*Data Training*  
Weingarten Publications, Inc.  
38 Chauncy Street  
Boston, MA 02111  
*Educational Technology*  
Educational Technology Publications, Inc.  
720 Palisade Avenue  
Englewood Cliffs, NJ 07632  
*Instructional Delivery Systems*  
Communicative Technology Corporation  
50 Culpepper Street  
Warrenton, VA 22186  
*Journal of Computer-Based Instruction*  
ADCIS  
*Performance and Instruction*  
NSPI  
*Training & Development*  
ASTD

ganizations whose members are interested in CBT.

### When to Use

Whenever a trainer designs a curriculum, decisions must be made as to which are the appropriate media to employ. The use of CBT is not always the most appropriate. Take, for example, the design of a curriculum dealing with management training. The instructional delivery choices are traditional classroom instruction, text-based instruction, video, and CBT.

Table 3 summarizes some of the areas where each instructional delivery technique could best be employed. Sometimes, any of several techniques could be used. Individuals might disagree whether the topics are best served by one medium or another. In general, however, CBT is most appropriate for analytical areas and least appropriate for interpersonal skills areas.

An important consideration concerning the use of CBT is determining when it is cost-effective.<sup>9</sup> First, you must determine the cost of developing traditional classroom instruction. This cost includes preparing instructional objectives, lecture notes, test questions, visual aids, student handouts, and integration of a given topic into the curriculum. Estimates of the time required to produce 1 hour of instruction vary between 10 and 100 hours. A commonly used ratio is 15 hours of development time for 1 hour of instruction, 15:1. In addition, the costs include the instructor's salary for each time the class is taught. And, the costs must include student-related expenses—travel to and from the school, lodging, subsistence, and salary during travel to the class and for each hour of class instruc-

**TABLE 3\***  
PREFERRED METHOD OF INSTRUCTIONAL DELIVERY—MANAGEMENT

Topic	Classroom	Text	Video	CBT
Leadership	X		X	
Planning		X		X
Delegation	X			X
Problem Solving		X		X
Interviewing	X		X	
Performance Appraisals			X	X
Communication	X		X	
Motivation	X		X	
Interpersonal Skills	X		X	
Time Management	X			X
Budgeting		X		X

\*Adapted from John J. Hirschbuhl, "The Computer as Management Trainer," *Data Training*, October 1983, pp. 24-27.

tion. Another student cost, most difficult to assess, is the cost of the total unavailability of the learner for customary work during the time spent training.

You must figure CBT costs differently than the traditional classroom instruction. Estimates of the ratio for CBT development vary from 25:1 to 300:1. We find the ratio of 100:1 to be a logical estimate. A variety of factors, such as the experience of the CBT developer or the complexity of the lesson, determines the amount of time required. To this cost must be added the concomitant student costs. With CBT, travel, lodging, and subsistence costs often do not occur. Similarly, training will consume less salary due to the anticipated 40-percent timesavings.

Next, compare the two costs. The cost of classroom instruction accumulates each time you offer the class,

while most CBT costs will remain constant. This difference is shown in the hypothetical example presented in table 4. The break-even point for CBT occurs with the third inservice held. At this point, the total cost of training is more for traditional training (\$440) than for CBT (\$387).

How often a course is offered and the projected number of students are important considerations when doing the cost-benefit analysis. The greater both figures, the more likely CBT is cost-effective. Similarly, the "shelf life" of the CBT lesson is important. If the information presented in the lesson changes considerably several times a year, CBT may be inappropriate. Minor or infrequent changes provide no obstacle to using CBT. Thus, a course with a stable content that an organization offers to only a few employees a

***“...CBT is most appropriate for analytical areas and least appropriate for interpersonal skill areas.”***

**TABLE 4\***  
COST BENEFIT ANALYSIS OF CBT AND TRADITIONAL INSTRUCTION

Number of Students	Method of Delivery	Cost	Cost Per Student
50	Traditional	\$22,000	\$ 440
50	CBT	58,000	1160
150	Traditional	66,000	440
150	CBT	58,000	387

\*Hypothetical Example

year might be a viable candidate for CBT. Whereas, a course with a constantly changing curriculum that an organization offers regularly to numerous learners would probably best be taught through traditional classroom instruction.

#### Implementation

Aside from the above issues, several other considerations are important when implementing CBT. First, you must determine whether to buy generic off-the-shelf CBT, pay a vendor to produce it, or produce it inhouse. Each choice has advantages and limitations.

Off-the-shelf CBT is relatively inexpensive and requires little or no effort on the part of the training staff, but it is written for mass audiences. Such CBT tends to be quite general in its approach. Good lessons on the basics of management techniques or using software, such as Lotus 1-2-3, abound, but it is difficult to find advanced lessons with detailed specifics. In addition, no single reference lists all commercial

software; each vendor publishes his own list. Thus, off-the-shelf CBT is desirable for some basic training needs but will not meet organization-specific training needs.

Software produced by a vendor will be far more expensive, but it can deal with your organization's specific training needs. The vendor will need the guidance of the training staff to ensure meeting the correct training need. The less involved the staff, the less likely the product will be suitable. If only the vendor performs the task, the product cannot be easily altered, nor will the training staff develop the capability to produce CBT.

With proper personnel, inhouse production should be less expensive, attuned to specific training needs, and alterable as needed. If, however, CBT is a new enterprise and the training staff possesses platform skills rather than skills such as screen design, graphics design, or developmental skills that translate the lesson into highly interactive CBT, inhouse production is in-

appropriate. The strategy of choice in this case is to contract with a vendor to help produce the first few lessons.<sup>10</sup> While more expensive, this strategy enhances the quality of the initial CBT and prepares you to develop inhouse CBT.

When ready to begin developing inhouse CBT, the training manager must decide how to code the information into the computer. Programming languages, such as BASIC and PASCAL, produced early CBT. These languages allow the use of the full power of the computer; however, they require the services of an experienced programmer. Also, the use of traditional computer language introduces all the attendant problems, such as debugging, associated with programming.

The above problems, in conjunction with the continued emergence of CBT, have resulted in the development of two relatively new options. The first is the authoring language. This is quite similar to the traditional programming languages, but the code is specifically designed to manage the types of programming activities, such as drawing a circle on the screen, used with CBT. While authoring languages do not require knowledge of one of the traditional computer languages, problems of debugging still exist.

The second option is an authoring system. The system, through a series of menus, assists the author who may not know any programming languages in producing programming instructions. The system would prompt, for example, "What type of screen?" and the author would choose the option "multiple choice question." The author's choices are often limited.

Thus, at one extreme, traditional programming language allows use of



the full power of the computer, but requires extensive computer knowledge. While the authoring system guides a trainer through the needed choices, some systems may severely limit flexibility. Each choice has its proponents. Unless an experienced programmer who understands CBT is readily available, we recommend the authoring system or authoring language options.

The sale of sophisticated authoring languages/systems has blurred the distinction among the three choices. Some, for example, allow one to escape the authoring system, display information through a programming language, and return to the system without the learner being aware of this special procedure. Such systems allow the author the option of using menus or programming. In this way, the traditional limitations of the authoring system are negated. At the present time, at least 93 different authoring systems or languages exist.<sup>11</sup>

If you have decided to embark on a CBT project, a few words of advice are in order. For the initial project, select a fairly uncomplicated, stable topic with a well-organized, up-to-date lesson plan and an SME who is both knowledgeable and willing to support CBT. Carefully plan the developmental procedures and then allow twice as much time as seems necessary. Well-designed CBT requires far greater performance standards than traditional instruction. Therefore, from the very beginning, encourage open discussion/criticism of the product by team members.

As a final item of advice, try to locate someone in your area who has experience in CBT. CBT has been embraced by private industry due to the

economical nature of CBT. In fact, among the first large companies to employ CBT widely were the "Big 8" accounting firms such as Arthur Young and Ernst & Whinney. We have had contact with trainers from numerous other corporations, such as Union 76, Dow Corning, and IBM, who use CBT as an integral part of their training.

Law enforcement agencies are also using CBT. For several years, officers have logged on to the University of Illinois PLATO CBT system to take courses offered through the Police Training Institute in Champaign, IL.<sup>12</sup> The authors are involved in the CBT efforts of the FBI. CBT, for example, has been used to help train the FBI National Academy, New Agents, and various Federal, State, and local inservice personnel. In addition, off-site CBT training is occurring in several FBI offices in various parts of the country. Other locations, such as the Central Florida Criminal Justice Training Center in Orlando and the Detroit Police Department Training Academy, are actively exploring CBT.

### Summary

The conflicting demands for the limited personnel resources of law enforcement agencies require managers to develop new means of ensuring that their personnel are well-trained. One such method is computer-based training. CBT is used in private industry because it is efficient and cost-effective, and CBT is growing in popularity in the law enforcement community. With a well-developed CBT program in place, managers may anticipate that their training needs will be served expeditiously and economically.

**FBI**

### Footnotes

<sup>1</sup>Personal conversation with Bob Yeager, President of Intercom.

<sup>2</sup>J.C. LeDoux and C.J. Stanley, "A Comparative Study of Computer-Based Instruction vs. Lecture," Proceedings of the 26th International Conference of the Association for the Development of Computer-Based Instructional Systems, 1985, pp. 10-14.

<sup>3</sup>C.J. Stanley and J.C. LeDoux, "Learning Styles, Computer Attitudes, and Preferences for Instructional Delivery Methods," Proceedings of the 29th International Conference of the Association for the Development of Computer-Based Instructional Systems, 1987, p. 304.

<sup>4</sup>George J. Dudycha, *Psychology for Law Enforcement Officers* (Springfield, IL: Charles C. Thomas, 1960, p. 29).

<sup>5</sup>J.C. LeDoux and C.J. Stanley, "Making Feedback in Computer-Based Training Meaningful," Proceedings of the 27th International Conference of the Association for the Development of Computer-Based Instructional Systems, 1986, pp. 5-8.

<sup>6</sup>Hal D. Christensen, "Scaling Down Training," *Data Training*, January 1987, pp. 42-43.

<sup>7</sup>J.C. LeDoux and C.J. Stanley, "Making Feedback in Computer-Based Training Meaningful," Presentation to the 28th International Conference of the Association for the Development of Computer-Based Instructional Systems, Washington, DC, 1986.

<sup>8</sup>Gloria J. Gerry, "Implementing CBT: Issues for Training Managers," Presentation at the 1983 Data Training Conference, San Francisco, CA.

<sup>9</sup>David Weltz, "Breaking Even with CBT," *Data Training*, April 1983, pp. 14-17.

<sup>10</sup>Patrick M. Dillon, "Write It or Buy It?" *Data Training*, March 1986, pp. 44-45.

<sup>11</sup>J. Stein, (ed.), "Data Training's 1987 Survey of CBT Authoring Systems," *Data Training*, April 1987, pp. 28-62.

<sup>12</sup>Roy O. Walker and Christopher J. Flammang, "Instructional Application of Computer-Based Education in Police Training," *Journal of Police Science and Administration*, 1981, pp. 224-229.