

"WE MUST BE EVER ALERT TO NEW TECHNOLOGIES THAT WILL HELP TO MAKE THE MISSION OF HUMAN RESOURCE DEVELOPMENT MORE EFFICIENT."

# PUSH-BUTTON TRAINING

BY FRANZ E. FAULEY

*"Societies growing toward new forms of greatness have often had an image of what might become possible, a vision that inspires the young and draws out the best in people. It is vitally important to understand that the immense riches of today's technology permit us to create visions of a better world."* — James Martin

As professionals in the field of human resource development, these words may well underscore the intent and purpose of our collective mission. "Visions of a better world" certainly play a pivotal role in motivating each of us to develop the human resource.

The thesis of *The Wired Society* by James Martin<sup>1</sup> rests on the word "technology." As professional educators, who are as concerned with our own development as we are with the development of others, we must be ever alert to new technologies that will help to make the mission of human resource development more efficient. One of these technologies falls into

the broad and often maligned area of Computer Assisted Instruction.

There are many reasons why CAI has been so severely criticized. The fact that there are large chunks of this computer-spawned technology that have not been accurately nor completely described for an audience of trainers and educators may well contribute to the general criticism of the medium.

This article will attempt to remedy this deficiency. The broad strategy will be to dissect and analyze segment after segment of the intricate mechanism of computer-based education. When all is completed, the professional who seeks to keep pace with the expanding technology of computers in the field of human resource development will be better prepared to design, develop and implement computer-based education systems within his or her organization.

Our stepping-off point in this anatomical study of computer-based education focuses on delivery mechanisms. One of the first major decisions that must be made

when an organization begins thinking about adding CAI to its existing training methodologies concerns the key issue of delivery. How is the CAI courseware going to be packaged so it can reach the intended audience in a timely fashion?

Broadly speaking, there are two major mechanisms for the delivery of computer-based education: stand-alone and centralized CAI systems, examines some of the functional and economic differences which exist for both these alternatives, and reviews the advantages and disadvantages related to each.

The stand-alone system normally consists of a microcomputer having a keyboard, central processing unit, visual display, floppy disk drive, and, if desired, a printer. One user can access the system at a time and the hardware must be duplicated at each site where CAI is desired. Depending upon the volume of training required, multiple stand-alone systems may be necessary at some sites. Lesson material or courseware is usually developed at a central location and

distributed on a floppy disk to remote sites.

Centralized systems are generally implemented on machines ranging from minicomputers to the larger mainframes. In centralized systems peripheral hardware devices are roughly comparable. The main distinctions lie in the size and processing speed of the central processing unit (CPU), the increased capabilities and sophistication of the input and output devices, the overall cost, and the resulting increase in power that allows all users including trainees, course designers, and programmers, to access the same system simultaneously. Courseware is distributed to regional or district offices and other remote training sites via telephone lines, or, in the not too distant future, satellite communication systems.<sup>2</sup> The remote sites require one or more terminals for the display of the courseware, a telecommunications interface, and, if desired, a printer.

Choosing between stand-alone and centralized systems is often difficult. To help trainers and educators differentiate between these two mechanisms, my analysis of the major functional differences will focus on three broad areas: system support considerations, economic considerations, and courseware development considerations.

#### **System Support and Economic Considerations**

Hardware, software, and courseware problems are diagnosed and corrected differently for stand-alone and centralized systems. Since stand-alone systems operate independently of each other, a hardware problem occurring in one stand-alone system does not affect the operation of the others. In a centralized system a hardware failure in the main processor will usually result in a cut-off of service to all remote training sites.

In a stand-alone system, simple hardware problems can occasional-

ly be diagnosed and corrected by remote site personnel. Complex problems, on the other hand, may require the assistance of central site personnel. In this case, the actual correction of the hardware problem may take place in the field or by sending the faulty component to a central repair facility. In a centralized system, by comparison, hardware problems in the main computer are normally resolved by the central support staff and, if necessary, by vendor system engineers. Vendor support personnel may be required to resolve problems in the communications network and/or terminals at remote training sites.

When a problem is diagnosed to be in the software supplied by a vendor, the response time to make a mid-stream correction may be longer for stand-alone systems than for centralized systems. This is because vendor support of software for microcomputers is generally not as well established as it is for mainframe machines.

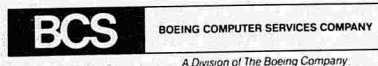
MORE THAN AN ALTERNATIVE.....

# **Scholar/Teach 3**

**Computer-Based Instruction Software and Services for IBM Systems**

For more information call your nearest BCS office or (206) 575-7450

PO Box 24346  
M-S9A-90  
Seattle, WA 98124



Circle No. 166 on Reader Service Card

"For centralized sites without access to telecommunication networks, the stand-alone system may be more economical to operate."

When a problem is diagnosed to be in the CAI courseware, the process of making the required updates and corrections in a centralized system may take minutes or hours. Once made, however, these changes are immediately available to all remote training sites. In a stand-alone system the corrections may take the same length of time, but the new version of the courseware must be copied to floppy disk and shipped to the remote training sites. The time delay for packaging and shipping the revised courseware is much longer and therefore potentially more disruptive to a student's training.

The economics of stand-alone and centralized CAI systems differ widely. Although there are many cost considerations, we will focus on two of the major ones: start-up hardware costs, and courseware distribution costs.

**Start-up Costs:** Stand-alone CAI systems which can be either leased or purchased, are less expensive than centralized systems. The total cost incurred is the product of the unit price times the number of systems required to fulfill the training need. Although the hardware and software for centralized systems may also be purchased or leased, the cost is usually so great that only rarely will an organization buy a large mainframe computer for CAI.

Many companies already own or lease one or more computers to handle the data processing requirements of their business. Typically, these systems are large enough to run a number of programs or applications concurrently. When a centralized computer system has unused capacity, the opportunity to "piggyback" CAI on that system is a very real possibility. Running your CAI courses on existing business hardware obviously lowers your start-up costs since no large outlay of capital is required.

A third option which is attractive to many training organizations from an economic and operational perspective involves the use of CAI service companies. The use of these organizations permits a human resource department to acquire CAI capability without the necessity of purchasing hardware, software, or the associated operations personnel usually required for CAI. The services company uses a telecommunications network to permit users to access a centralized CAI system which is shared by many training organizations. The user need only acquire the staff to develop courseware and to monitor and facilitate the use of CAI at the remote training sites. The hardware — computer terminals, etc. — operations personnel, communications, and maintenance are provided by the CAI services company. This option is a relatively low risk because the heavy start-up expenses normally associated with CAI are eliminat-

ed. For some training and development organizations, this option represents the most attractive alternative.

**Courseware Distribution Costs:** Costs for distributing courseware to remote training sites vary with the system used. Because stand-alone systems are self-contained, there are no communication line costs logged for each hour of use. Distribution of courseware in stand-alone systems requires that copies of the various courses be duplicated and shipped to each remote site.


Centralized systems, on the other hand, use telephone lines to disseminate courseware to remote training sites. These communication line charges can play a significant role in the overall cost of any CAI system. Centralized systems may also employ data telecommunication networks as a mechanism of reducing communication line charges. Access to these networks is located in most major cities in North America. However, if a CAI site requires the use of conventional long-distance telephone lines, the cost of communication increases. CAI training sites located in cities without network access would use conventional long-distance telephone lines to reach the nearest network access point. In summary, for centralized sites without access to telecommunication networks, the stand-alone system may be more economical to operate.

### Courseware

#### Development Considerations

Perhaps the most important consideration for organizations that are looking at CAI as an alternative or supplement to their existing training technologies, concerns the issue of instructional tasks. There are three major areas where stand-alone and centralized CAI systems differ in terms of their instructional capabilities and their overall impact upon the training mission.

**Authoring Strategies:** Centralized systems generally support



**Write Right!**  
A Desk Drawer Digest  
of Punctuation, Grammar & Style  
by  
Jan Venolia

### A Training Tool That Keeps on Training!

- Use this lively book to improve writing skills ..... during training sessions and on the job.
- Write Right! is fun, easy to use, and ... it works!

Available in three versions:

- Paperback, \$3.95
- Spiral-bound, \$4.95
- Hardcover, \$6.95

## Periwinkle Press



P.O. Box 1305-B  
Woodland Hills, CA 91365  
(213) 346-3415

"An invaluable tool for executives, secretaries, students ..." *Los Angeles Times*

"unique in its remarkably intelligible treatment of common writing difficulties..." *Women in Business*

Circle No. 222 on Reader Service Card

**"Response time is guaranteed in a stand-alone system for tasks that do not require significant computation."**

CAI authoring languages that contain a larger number of machine instructions than do stand-alone systems. Courseware developers combine instructions together to create computer-based training materials. CAI systems with large instruction sets generally give the author greater control of the computer's resources and therefore permit a wider range of instructional capabilities. In other words, centralized systems generally permit the implementation of a greater range of instructional strategies. Of course, the larger the instructional set within an authoring language, the greater the skill required to use the language effectively.

*Reporting and Instructor Control:* In a centralized CAI system, data on student progress and performance is compiled at one location, usually corporate headquarters, and reported to management

on demand. In the stand-alone system data is typically written on a floppy disk and returned to a central training location for analysis. A centralized system also permits the on-line monitoring of student progress and performance. The instructor can exert control over a student's instructional sequence based upon the feedback obtained from the analysis of the student's performance. In contrast, when multiple stand-alone systems are utilized, reporting and instructor control is more difficult to achieve since there is no direct communication link to each of the systems.

Another important function of a CAI system is the collection of student response data as a by-product of a student's interaction with the training materials. The collection of student response data permits the courseware to be refined and improved so that it's more responsive to the student's needs. In

centralized systems student response data is collected at corporate headquarters. In many stand-alone systems, however, student response data is not collected at all. Stand-alone systems that do collect response data write student responses to floppy disk. It's worthy to note that after CAI programs have been thoroughly tested, the recording of response data is not as critical, and stand-alone systems are therefore not at such a disadvantage.

*System Response Time:* The user of a stand-alone CAI system has the computer to himself/herself and does not compete with other users for common computer resources as is the case with centralized systems. Therefore, response time is guaranteed in a stand-alone system for tasks not requiring significant computation.

Stand-alone systems, however, do not have the computing capacity of centralized systems, and for

**IN THE 1980s  
CORPORATIONS THAT  
WANT TO EXCEL  
MUST IMPROVE THEIR  
PRODUCTIVITY**

**Computer technology will be an increasingly important tool for improving productivity.**

Isn't it time you looked at Computer Based Education as an alternative or supplement to your training and human resource development needs?

For consultation, design and development, and seminars:



**Computer Based Education Systems**  
13 Acorn Drive  
Hawthorn Woods, IL 60047  
Attn: Franz E. Fauley - President  
Or Call: 312-438-8271

certain computing tasks the centralized system may have significantly faster system response time. For example, natural language simulations can currently be performed only on centralized systems because of the amount of computing necessary and the size of the data base required to perform this task. Similarly, some types of simulations involving a great number of calculations can only be performed on centralized systems which have faster central processing units than most microcomputer systems. Where tasks are heavily compute-bound or require large data bases, the centralized systems provide quicker response time than do most microcomputer systems. It should be noted that CAI instructional strategies using heavy CPU and/or large data bases generally make up a very small percentage of most training courses.

#### Advantages and Disadvantages

The major advantages and disadvantages of stand-alone and

centralized computer-based education systems are summarized as follows:

#### STAND-ALONE SYSTEMS

Advantages:

- Greater portability
- Guaranteed system response time in programs not requiring large amounts of computation
- No communication line costs
- More appropriate for small training operations
- Less costly to operate
- Installation of hardware is easier and faster
- System down-time affects only one training site
- Less expensive per individual unit

Disadvantages:

- Courseware must be duplicated and shipped to training sites
- Refinements and fixes of courseware bugs cannot always be accomplished in a timely fashion
- Student response data is difficult to compile
- Some instructional strategies are difficult to implement
- Vendor support of hardware and software is generally not well established
- Student progress and performance reports are not always available on demand

#### CENTRALIZED SYSTEMS

Advantages:

- Refinements and fixes of courseware bugs is instantaneous
- Data on trainee progress, performance, course completion, and responses is compiled centrally and may be reported on demand
- Hardware, software, and courseware problems can usually be resolved by central support staff
- Instructors can monitor and control sequence of instruction
- Greater range of instructional strategies can usually be supported
- Faster computing speeds permit free language simulations and other CPU-bound strategies
- Opportunity to "piggyback" on existing hardware is often possible
- Vendor support of hardware and software is fairly reliable

Disadvantages:

- System failure results in discontinued service to all training sites
- Rapid system response time is not guaranteed
- Communication line charges may be costly, and are incurred for each training hour
- Network and remote terminal problems must be resolved by vendor support staff
- Hardware is expensive — rarely will a CAI application justify the purchase of a large mainframe
- Complete systems are more difficult and time-consuming to install

When you're faced with the challenge of designing and implementing a computer-based education system within your organization, the careful analysis of the functional and economic differences between these two major alternatives for delivering courseware will help to provide you with a blue-print for effective decision making.

#### REFERENCES

1. Martin, James, *The Wired Society* (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1978).
2. *Ibid.*, page 238.
3. The author wishes to acknowledge the contribution and input of Verl E. Dennis, Ph.D., of Arthur Andersen & Co. for his help in the preparation of this manuscript.

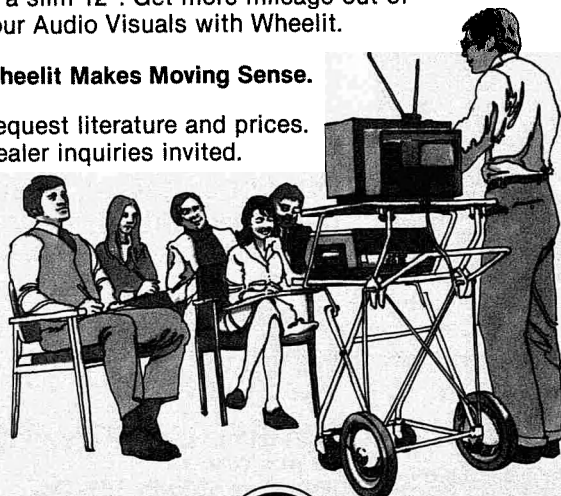
Franz E. Fauley is president of Computer Based Education Systems, a consulting firm located in Hawthorn Woods, IL. The firm custom designs educational and training programs for large and small companies as well as educational institutions.

## AV is on the Move With Wheelit Slim Line

Your Audio Visual Equipment will be getting around with the new Wheelit Slim Line. Take your message to the viewer quickly and efficiently without risk of damaging your equipment. For storage, Wheelit folds to a slim 12". Get more mileage out of your Audio Visuals with Wheelit.

**Wheelit Makes Moving Sense.**

Request literature and prices.  
Dealer inquiries invited.



GRUBER PRODUCTS CO. 5254 JACKMAN RD. TOLEDO, OHIO 43613  
TELEPHONE (419) 476-7200

Circle No. 191 on Reader Service Card