THE AUSTRALIAN JOURNAL OF
EDUCATIONAL
TECHNOLOGY

Computer based training in the commercial sector

Neil R Perry and Jane S Hemstritch
Arthur Andersen and Co

This paper presents an interpretation of computer based training in the commercial sector in Australia. It outlines a number of issues that organisations considering the application of computer based training might consider. These issues include the selection of systems, administrative matters, in house issues and learning principles.

Computer based training has been one of the most referred to subjects in commercial training houses for the past several years. The reasons for this are various. First, some experienced trainers are viewing computer based training as the latest educational technology "gadget". These trainers are making comparisons between computer based training and programmed learning, film, video and the like. They claim that we have been in this situation before, and that the technology failed to live up to its somewhat overrated expectations. Second, some other trainers see computer based training as the answer to most training problems in their organisations. The real value of computer based training probably fits somewhere between these extremes.

This paper identifies a number of factors that are of importance to any deliberation of the possible implementation of computer based training in a commercial setting. Computer based training is assumed to be a generic term encompassing computer managed learning and computer assisted learning.

Computer based training is, in the final analysis, one of many possible vehicles by which training can be delivered. As sophisticated and "glamorous" as it might be, computer based training needs to be subjected to the same critical analysis as other delivery mechanisms. There are a number of challenges facing trainers in a commercial setting, and computer based training must address these challenges if it is to succeed in the longer term. In summary, these challenges are:

- Making training available on demand so that employees become productive as quickly as possible
- Improving employee productivity
- Ensuring training is delivered with consistent quality
- Providing only the training that is needed, no more, no less
- Design of training that actively involves the learner
- Improving transfer of knowledge to the job
- Controlling prerequisites
- Controlling training costs

Benefits of computer based training in industry

The features of computer based training are apparent to most trainers, but those features are often translated into costs by management. For the idea of computer based training to sold, even in house, the benefits of this technology need clarification. The benefits of computer based training can be categorised in under two major headings:

Benefits for the learner

There are six main benefits of using computer based training from the learner's point of view.

- training is available on demand and at the learner's convenience
- the use of computer based training is an enjoyable learning experience
- course/unit exemptions - there is no need to go through training that the learner can demonstrate competently
- focused study time - the learner need only focus study effort on the areas of deficiency
- provision of a "standard of performance" and a means of measuring actual performance against the standard
- on demand testing - no need to wait for a scheduled test

Benefits to management

The list of the potential benefits for management from the implementation of evolving from computer based training is much longer. Such benefits include:

- on demand training allows people to obtain training when it is needed
- reduction in training time
- improved instructor productivity - instructors become a facilitator of learning and can handle more students
- consistency of training delivery
- improved transfer of training to the job through realistic simulations of the job
- elimination of risk to people and equipment when teaching employees on potentially dangerous equipment or processes
- reduction of training costs through decentralisation of training, reduction of training time, improved instructor to student ratios, spreading fixed front end costs for computer based training over large training populations
- elimination or reduction in use of costly training simulators or equipment with large operating costs used for training purposes
- provides a means of getting rare/key resource people out of the classroom and back on the job
- makes training available on the same computer equipment that employees use to do their job functions
- enforces compliance with training plans
- controls prerequisites so employees are fully qualified to enter the next phase of training
- reduces time to administer tests
- automated record keeping of training activity
- provides a means for ensuring that employees obtain a predetermined level of proficiency in accomplishing the training objectives
- employees get only the training they need

System selection

Assuming that an organisation has established a business and educational case for CBT, one of the first tasks that must be undertaken is the selection and purchase of a system. The range of systems is enormous. At a recent conference and exposition in the United States one of the authors counted some 75 vendors who were selling computer based training systems in one

form or another. The important point to be made is that in the commercial environment the system selection procedures need to take into account both costs and features.

Management

Time and cost estimations

One of the most important issues facing the use of computer based training in commercial settings has been the estimation of the cost of selecting, implementing and maintaining the system. This of course is a critical issue in the business world. Put simply, there must be sufficient benefits flowing from a training system to warrant the investment. Not surprisingly, the implementation of computer based training is expensive. There is therefore a need for the training industry to become more conversant with time and cost estimating techniques so that the correct investment decisions can be made. Unfortunately, simple formulas do not exist for these purposes. Nevertheless, methods for estimating the courseware, technical, human and "other" variables are available and need to be applied.

Administration

There are a series of computer based training administration issues which, while not unique to industry, are especially important in a commercial environment. The bottom line in a commercial training environment is whether the benefits are greater than the costs. The costs associated with project start up, development, implementation and management can be contained if appropriate procedures are installed.

Successful planning and management of the development of computer based training courseware in a large corporation can be paved with pitfalls and detours. Procedures which include planning development schedules and workplans, identifying and assigning courseware development and implementation responsibilities, setting design agreements, and tracking progress are all critical to the success of a project.

In house issues

In order to successfully implement computer based training in an organisation there are a number of "in house" variables that should be considered and managed.

Training integration

First, the relationship of the proposed computer based training to existing training should be examined. For any new training system or course to be effective, there needs to be a close and obvious relationship between it and the existing training in the organisation. If possible, there should be a close integration with existing training in both instructional strategy and course content. In the case of computer based training, there is the real chance that one is simply converting existing courses to a new delivery system. Decisions about the use to which computer based training might best be put are critical in the early stages of an investigation into computer based training.

Data processing department

A second in house issue concerns the relationship between the training department and the department that usually has control of matters relating to computers. In most organisations this is the data processing section. Such sections may feel threatened by the existence of computers in other sections of the organisation. One remedy is to involve the data processing section as fully as possible in all technical and programming matters concerning the computer(s) to be used for computer based training. The training section should, however, take full control and responsibility for the instructional design and development of materials.

Training staff

Education of the training staff to accept computer based training is another issue worthy of consideration. In some instances this matter manages itself because of the enthusiasm demonstrated toward the product. However, longer term commitment to the notion of design and developing materials for computer based training is also necessary. If additional staff are not being employed specifically to design and develop computer based training materials, there will be a significant change in the nature of duties of the training staff.

Convincing the staff of a training department of the worth of computer based training is another issue which, not properly addressed, may cause problems for a project. The support of staff working in related areas is critical for several reasons. First, some staff may feel computer based training will take over their job. Reassurance needs to be forthcoming, as does honesty. Second, those instructors in functionally related areas

should be kept fully briefed about the implementation of computer based training. The links between the proposed computer based training courses and existing training should be made apparent to all concerned.

Organisational matters

The implementers of computer based training projects will increasingly be required to take on the role of preparing, presenting and following up on executive briefings. These briefings will probably be the means by which funds, staff and recognition are obtained.

It could be that the training section will also be required to "sell" the concept of computer based training to the remainder of the organisation. Certainly, some staff will view the whole existence of computers in the training function as another "toy". This attitude needs to be monitored and, if necessary, addressed. Other hindrances may include fear of, or resistance to, the use of computers. A large proportion of people have not so much as touched a keyboard. For these people, this problem may get worse as computers come closer to them - such as in the training department. The implementers of computer based training in industry need to be able to identify and deal with this problem.

Learning issues

The new area presently being addressed in the context of computer based training in commercial settings is that of learning and instructional design. There is a strong movement in the industry to apply sound principles of instructional design to computer based training materials.

Learner control

There is a growing sophistication in the commercial sector as to the expectations of computer based training. Management and users are coming to anticipate more than simplistic learning episodes in the use of computer based training. Learner control is being provided in a number of ways. First, there is an expanding interest in giving users control over the learning. Much of present computer based training instruction is patterned after the linear programmed instruction techniques of the 1960's. While this approach is superficially interactive and individualised, it often produces tedious programs broken into trivial steps controlled by the author's program. Alternatively, learner controlled instruction can allow the earner to select and practise what they need to attain course objectives.

A variation on standard branching in regular computer based training programs is worthy of consideration in the commercial environment. Learner control of learning paths, as opposed to conditional branching, is a means by which learning can be kept relevant to perceived needs and total training time reduced.

Embedded training

A related procedure used as a part of computer based training is known as embedded training. Such an approach builds instructional features into a software tool so that the learner can receive training which is much closer to reality. Building embedded training into an applications tool suggests that we should reassess how we view learning in the commercial environment. There are also implications for the design and evaluation of such training, as well as the relationship of learning performance to job performance.

Interactivity

Interactivity is probably at the heart of computer based training. This technology has the unique ability to provide individualised, interactive instruction. Many computer based training developers have not fully realised this potential in the past. The implications of fully developed interactivity are of course critical in the commercial environment. Any possible reductions in the time employees are away from the workplace are worthy of consideration. The process to be able to "test out" of a program and thereby studying only material not presently known is a distinct advantage of computer based training. Certainly, more emphasis needs to be placed on the development of interactive design strategies, interactive presentations and applications.

Instructional psychology

Like any delivery, vehicle, computer based training is only as effective as the instructional design built into the program. Effective instructional design is based on the ways that humans process information. Designers of computer based training are becoming more aware of this cognitive information processing and designing instructional materials which are best suited to match the information processing abilities of adult learners. Such procedures might include the use of analogy or examples, information chunking and attention supporting techniques.

This factor is particularly relevant in the commercial sector given the high costs of training and management's anxiety to achieve a high return on investment. Increasingly organisations interested in computer based training are showing interest in the application of sound principles of instructional psychology to the development of computer based training materials. It is clear that computer based training will teach more effectively if certain principles of learning and behaviour are followed in the development of the materials. Such factors as frame components use of different frame types, differing levels of interaction, avoidance of "lecture" frames, choice of response formats, feedback choices, screen design, branching structure and lesson structure are all factors which alter the effectiveness of the learning materials. Demonstrated effectiveness of the materials achieves a critical status in the commercial sector.

Assessment

The assessment of student learning is an essential feature of a systematic approach to the design and development of computer based training materials. Yet computer based training managers in the commercial setting are often caught in a bind over assessment. First, commercial computer based training systems are dealing with adult learners. Whether or not it is a valid perception, many people react adversely to being tested. Second, there can be an industrial issues over the testing of "already trained" people. Some organisations consider that once an employee has qualified and is working in a role all further assessment is unnecessary. Some unions will not allow further assessment of their members. The assessment of learners is therefore an issue which requires careful consideration and delicate handling in the commercial setting. Certainly, it is incorrect to assume that students will happily accept the normal pre-test post-test phases of much computer based training courseware.

Computer based training in commercial settings

Computer based training is an application of technology that has an excellent chance of making a large impact in commercial settings. The eventual success of the technology seems to be less dependent on its inherent capabilities than on the people who manage its introduction and application. Computer based training will succeed in industry if it:

- improves employee productivity
- controls training costs
- ensures the consistent quality of training
- provides only the training that is needed.

The bottom line in industry is measured in dollars. If computer based training can provide organisations a reasonable return on investment for the training dollars it will succeed. Should the technology become another "toy", it will be overlooked by management.

Please cite as: Perry, N. R. and Hemstritch, J. S. (1986). Computer based training in the commercial sector. *Australian Journal of Educational Technology*, 2(1), 33-41. http://www.ascilite.org.au/ajet/ajet2/perry.html