

# Improving Safety Attitudes with Computer Based Training

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## ***Introduction***

Most people are exposed to learning situations in their everyday lives. In most instances these are not planned experiences, and whether or not someone learns from them is dependent on a host of factors. Training programmes, on the other hand, are planned experiences that are concerned with the systematic acquisition of skills, rules, concepts or attitudes that result in improved performance in the work situation.

Typically, in-house attempts to improve safety rely almost exclusively on the provision of safety informational campaigns, in the form of the posting of rules and reminders and/or safety training. As well as attempting to motivate and encourage particular actions, safety training and safety campaigns contain elements which attempt to alter individual's beliefs and attitudes towards safety. In relation to conventional safety training, however, the available evidence suggests that the effectiveness of safety training to improve performance and attitudes is inconclusive, unless the link between hazards and harm are emphasised, feedback about an individual's learning is provided, and the material being taught is relevant to those being trained.

The provision of individual feedback to trainees is a particularly important feature of any learning process as the retention of training material is considerably enhanced. However, unless conducted on a one-to-one basis, it is extremely difficult to provide this with conventional training. Similarly, because of the costs involved, particularly when large numbers of personnel need to be trained, individual feedback is rarely provided even when it is feasible. A realistic alternative that offers many additional advantages is provided by computer based training (CBT), whereby the progress of each trainee can easily be monitored and feedback provided immediately by the computer.

## ***Advantages of CBT as a training medium***

Due to CBT's versatility and ability to train employee's to perform any task or procedure, without suffering the results of wrong actions and error, CBT software is becoming increasingly popular as a training medium in both private industry and government across a wide range of applications. For example, the offshore industry uses CBT to train people in permit-to-work procedures. Other industries have applied CBT to food hygiene, management training, financial planning and recruitment and selection. Indeed, most trainees' express a preference for CBT over conventional training because of it allows people to work at their own speed while testing their understanding before allowing them to progress.

In essence, a trainee progresses through each learning sequence, while gradually acquiring the skills and understanding that are necessary for mastery of the task / activity described in the course objectives. Enabling a trainee to systematically gain job-related knowledge and skills through a series of *interactive* learning sequences is one of the main strengths of CBT. The interactive nature of CBT allows the trainee to converse with the computer on a one-to one basis; take decisions about the direction of their training; receive immediate feedback on their answers and, if necessary, be directed to remedial units for further study. Therefore, CBT directs an

individual along a path of learning that is determined by the trainees solutions to the problems presented to them. CBT also allows for the systematic testing of the knowledge learnt, by randomly selecting tests from a data bank. This ensures that an individual does not receive the same test repeatedly, but is tested on various problems of comparable difficulty. In combination, these features allow responses to individual training needs, thereby providing a personalized training programme that enhances a trainee's motivation to learn. Additional advantages reside in the consistency of training by ensuring that the quality, quantity and content of the training material does not vary.

CBT is also cost-effective as less training time is needed than more traditional methods of instruction - a 30% reduction in training time is considered a conservative estimate. For example, Dossett & Hulvershorn (1984) compared conventional training against CBT, with military electricians. They found that CBT training in peer groups, was faster than CBT training with individuals, both of which were faster than conventional training. In other words, they found that more people can be trained in less time, using fewer terminals, which is an important consideration for organizations with limited resources.

The cost savings associated with less training time, however, need to be balanced with the costs of development, which has often proved to be a major stumbling block to the introduction of CBT. Development costs may, however, be recouped in a surprisingly short time as a result of obviating the high costs associated with off-the-job residential courses; eliminating travel costs incurred in traditional training methods; and enabling trainers to make more effective use of their time. In addition, time-consuming administration and marking duties are performed by the computer, enabling the trainer to concentrate on providing remedial or specialist tuition. These advantages become increasingly salient as the number of trainees increase.

Another important feature of CBT is its flexibility. For example, CBT programmes can be undertaken as and when required, without being dependent upon the availability of a tutor, supervisor or expert. This makes it possible to provide simultaneous multi-site training in a cost-effective manner, by providing CBT on workplace computers, close to the point where the skills being learnt are going to be applied, thereby facilitating the transfer of learning.

Similarly, CBT software can be easily updated and distributed. This is particularly important where the subject material changes rapidly (e.g. new safety legislation). CBT also enables management to assess the training requirements of individual employees and the organization as a whole; the particular elements of a course in which trainees score well (or poorly); the amount of training uptake, and levels of performance achieved.

### ***Safety attitudes and performance***

Clearly, in comparison to conventional training CBT offers many advantages to an organization, in terms of its positive effects on retention-rates and cost-effectiveness. However, to what extent does CBT influence people's safety performance and attitudes about safety?

A worldwide review of the published scientific literature reveals a paucity of research specifically aimed at evaluating the impact of CBT on safety attitudes and behaviour. The research that is available, however, does suggest that CBT positively influences knowledge, attitudes and behaviour. For example, Brogan (1992) studied the effects of CBT on 147 hourly and salaried workers employed by large automotive manufacturers. She found that regardless of age, educational level, work experience or prior training experience, CBT positively affected learning outcomes. Moreover, attitudes towards safety and on-the-job safety behaviours significantly improved. Gerbert et al., (1988) studied the effects of a CBT programme on the knowledge, attitudes and behaviours of 35 dentists towards treating patients with AIDS, in comparison with 66 dentists trained by conventional means. Six months later, relative to the control group, the CBT trained dentists showed statistically significant improvements in their knowledge, attitudes and behaviour. The authors concluded that CBT was a very effective approach to increasing the positive response of dentists to the AIDS epidemic. Vaught et al. (1988a) investigated the impact of three training strategies on 150 miner's ability to don breathing apparatus. The

strategies used were a live demonstration, a structured lecture, and CBT. The results indicated that CBT resulted in better performance than the other instructional modes. Similarly, in an extension of the study, Vaught et al. (1988b) studied the effects of different types of training on the ability of a further 241 mine workers to don breathing apparatus. The authors concluded that CBT, plus a hands-on talk through is the best way of training miners to use the equipment properly. Lancianese (1983) evaluated a 27 module CBT safety training programme for an electricity supply company. Although no data was supplied in relation to attitudes, the author reports an 80 percent reduction in lost-time accidents and recorded injuries.

## **Conclusion**

The above evidence suggests that a well designed CBT programme will deliver the intended benefits by providing on-the-job access to integrated information, advice and learning experiences, that incorporates immediate individual feedback. Safety training with CBT has been demonstrated to positively affect the attitudes and behaviour of employee's. Both of these features directly impact upon an organizations safety culture (Cooper & Phillips, 1994). As a result, the use of CBT to provide safety training should help to improve an organizations safety culture, in addition to reducing accident rates and their associated costs.

## **References**

- Brogan, P.A. (1992) *The effects of organizational and learning climate, and changes in perceptions of environment on learners' knowledge, attitude and behaviour after participation in an interactive video safety training program*. Unpublished PhD Thesis: Wayne State University, USA.
- Cooper, M.D. & Phillips, R.A. (1994) 'Validation of a safety climate measure'. *1994 Proceedings of the British Psychological Societies Annual Occupational Psychology Conference*. Birmingham, Jan 3-5.
- Dossett, D.L. & Hulvershorn, P. (1984) 'Increasing technical training efficiency: Peer training via computer-assisted instruction'. *Journal of Applied Psychology* **68**, pp 552-558.
- Gerbert, B., Maguire, B., Badner, -V., Greenspan, D. Greenspan, J. Barnes, D, & Carlton, R.S.O. (1988) 'Changing Dentists Knowledge, Attitudes, and Behaviours Relating to AIDS: A Controlled Educational Intervention'. *Journal of the American Dental Association* **116**(7), pp 851-854.
- Lancianese, F.W.S.O. (1983). 'Computer-Based Safety Training In Action'. *Occupational Hazards*, **45**(9), pp 54-57.
- Vaught, C, Brnich, M.J. & Kellner, H.J.S.O. (1988b) *Instructional Mode and Its Effect on initial Self-Contained Self-Rescuer Donning Attempts during Training*'. U.S.Department of the Interior, Bureau of Mines, Pittsburgh, Pennsylvania, Report No. 9208.
- Vaught, C., Brnich, M.J. & Kellner, H.J.S.O. (1988a) 'Effect of Training Strategy on Self-Contained Self-Rescuer Donning Performance'. *Mine Safety Education and Training Seminar, Bureau of Mines Information Circular, U.S. Department of the Interior, Report IC 9185*, pp 2-14.