

INFORMATION TECHNOLOGY AND TRAINING IN SAFETY

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During the last decade downsizing in the process industries has led to a number of problems. The removal of experienced employees reduces corporate memory and has implications for safety, health and environmental performance. This reduction in staff numbers leads to increased pressures on trainers to provide materials and courses to train personnel who are constrained by time more than ever before.

The advancement of information technology has now progressed to the point where it is possible to train people remotely or in an open learning situation where personnel can access courses at times convenient to them, fitting around busy work schedules.

This paper describes the benefits and pitfalls of using computer based training (CBT) and illustrates its points by considering a recently launched safety training CD ROM called 'Hazard Spotting'.

Keywords: multimedia, competency, computer based training, distance learning, intranet

BACKGROUND

In today's leaner, flatter organisations, there are less people to do the same job as 10 or 20 years ago. This means that it is increasingly difficult to take people off the job for formal classroom training as there is little cover. While training for performing a particular task can be done on the job, vital issues such as safety, health and environment (SHE) could get sidelined if it means sending people away.

Also, normal staff turnover could mean that even a continuous program of training could omit important personnel until the next tranche of sessions is organised.

There is no getting away from training in SHE: incident prevention and mitigation, control of environmental impact and welfare of personnel all have knock on effects for business performance and training is an integral part of the mix of control measures.

If people cannot be taken off the job for formal training sessions then the next best thing is to make available training that people can access whenever they want and allows a trainer to track the performance of trainees. This can be achieved through training delivered via multimedia CD ROM installed on a computer that appropriate people can have easy access to. The rest of this paper describes some of the main elements of computer based training and, as an illustration, describes 'Hazard Spotting' a new CD ROM providing interactive training in the main hazards from handling chemicals in the process and chemical industries.

COMPUTER BASED TRAINING / MULTIMEDIA

What it is

Multimedia is an imprecise term applied to all kinds of different applications, but a common interpretation is the presentation of information on display screen through the combination of text, images, animation, video, interactive exercises and sound. The information can be presented on demand by the user clicking on-screen buttons or the information can just scroll through like a video.

Common examples of multimedia applications include CD ROM encyclopaedias, web sites, training programs, corporate information CD ROM's, training programs and computer games.

The delivery of these programs can be via CD ROM, computer disk, Internet or company network.

In the training field there are many companies producing material that covers all sorts of different needs such as display screen equipment, manual handling or management techniques. As well as the enforced necessity of companies using computer based training for the reasons outlined previously, there are some benefits to using this medium:

- reduction in travel, time, costs;
- reduction in study time;
- a consistent message is given;
- ensures a longer term retention of information;
- material is self-paced;
- trainees' progress can be recorded and tracked.

This is all based on the premise that the training program itself is effective in conveying the information. Unfortunately there are some programs available that purport to be multimedia training but do not do a good job in driving the messages home.

Too often, the programs are simply electronic books with little or no user interaction other than simply clicking a mouse to get to the next page. Also some multimedia relies heavily on static photographs with a voice-over explaining what is happening.

There is the danger of going too far the other way. Multimedia producers can get carried away with their own cleverness by creating applications that have overly complicated graphics or animations that may look attractive but do not convey information effectively or cannot work on the end user machine.

While elements of the above can be present in successful training programs there is a need for variety in how the information is conveyed. The user also needs to interact with the program for a truly cognitive training experience.

The following elements are common to successful training programs:

- ease of use;
- simple navigation, ie back and forward buttons, exit, bookmark or resume functions;
- meaningful contents;
- quality media - video, animation, graphics and photographs;
- interactive elements where the user can explore concepts or learn by discovery;
- program should provide feedback to trainees and trainer.

To illustrate how multimedia can help with safety training, the rest of the paper considers 'Hazard Spotting' a recent CD ROM training package.

HAZARD SPOTTING

'Hazard spotting' is aimed at teaching personnel the main hazards of handling chemicals in the process and chemical industries:

- fires and explosions;
- chemical reaction hazards;
- occupational hygiene.

The program specifically excludes direct injury incidents such as slips, trips and falls and manual handling.

After logging on to the course new trainees are automatically taken to the Introduction module which describes some common terms for safety and sets the scene with regard to people's responsibility and the scope of the course. There is also a hazard spotting exercise involving a domestic situation which acts as a gentle taster of what is to come.

Once they have completed this section, trainees are presented with the main menu screen where they can choose a topic module (Figure 1).

Each topic module is designed to generate awareness in the subject. The information is conveyed using a mixture of animation, video clips, interactive exercise and information screens. The navigation allows personnel to plough through the course or skip about the main headings to recap on particular points of interest - it is their choice.

Each topic module contains several interactive exercises where familiar principles are brought to life by the power of multimedia. For example the module on chemical reaction hazards explains the principle of why exothermic reactions runaway with the help of an interactive version of the Heat flows versus Temperature graph. Trainees can explore the effects of increasing the reactor set-point temperature by moving a pointer (Figure 2).

As the trainee increases the temperature, the reactor animation gets more vigorous and an explanation is given by the caption. Eventually the reaction runs away and the reactor explodes if the set-point goes beyond the critical temperature.

It is in this type of interactive exercise that the program really comes into its own, helping trainees gain a fundamental understanding of an important principle.

Hazard spotting exercises

Once trainees have been through a topic module they can attempt the multi-choice question set and the appropriate hazard spotting exercise.

There is one hazard spotting exercise for each topic module:

- **fires and explosions** - potential ignition sources;
- **chemical reaction hazards** - hazards that could contribute to an uncontrolled runaway reaction;
- **occupational hygiene** - areas of exposure to toxic materials.

After seeing an animated description of the plant and information about the materials and processes being used, trainees have to click on an area that could be a hazard. There is a specific number of hazards to spot in each exercise and the trainee gets an explanation of each hazard they spot successfully (Figure 3).

The sample plant has a typical array of hazards handling toxic and flammable liquids and powders and the reaction materials can also run away or decompose thermally (Figure 4).

Administration

As well as providing the course material, Hazard Spotting tracks the performance of trainees by writing scores in the hazard spotting exercises and question sets to text files for the course tutor to assess (Figure 5). The program also gives trainees the option of viewing and printing out their scores for each particular session and resuming at the last page they were viewing within the topic modules.

CONCLUSIONS

Computer based / multimedia training will form an important part of future initiatives in SHE training. Although it is hard to beat a good trainer in a classroom training situation computer based training, if done properly, can provide a highly effective alternative.

Effective SHE training is usually an implicit and explicit requirement for complying with laws and regulations. It is also an important element of control measures for eliminating hazards and reducing risk. The advent of effective multimedia training now means that vital training can be provided without disrupting busy work schedules.

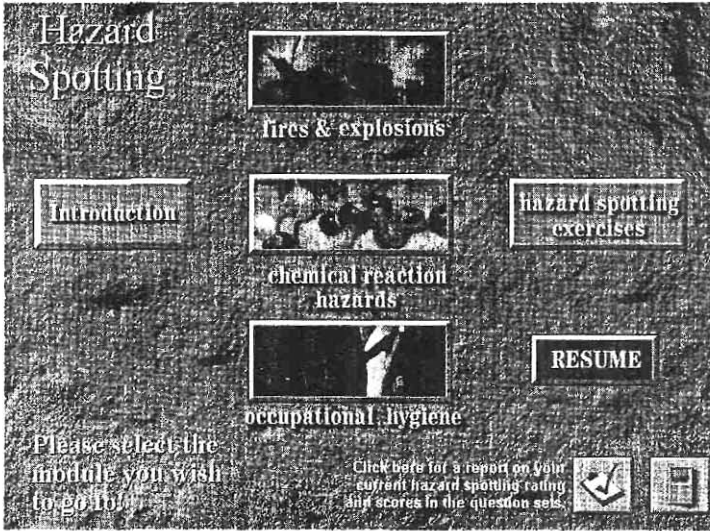


Figure 1: The main menu screen for Hazard Spotting.

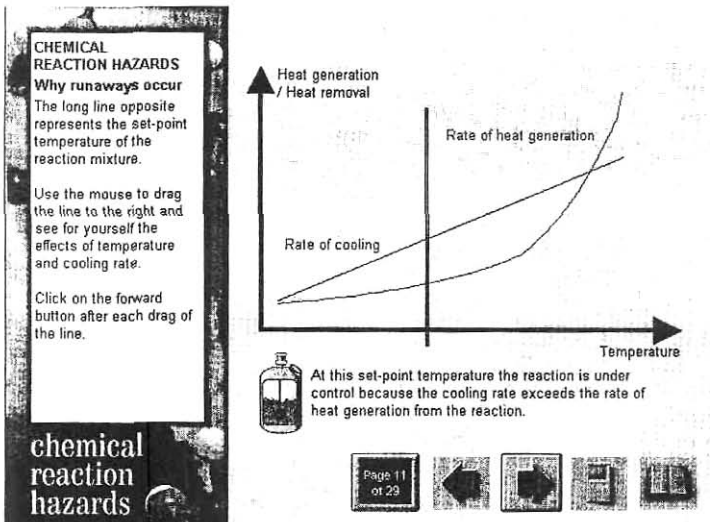


Figure 2: The interactive exercise for why runaway reactions occur.

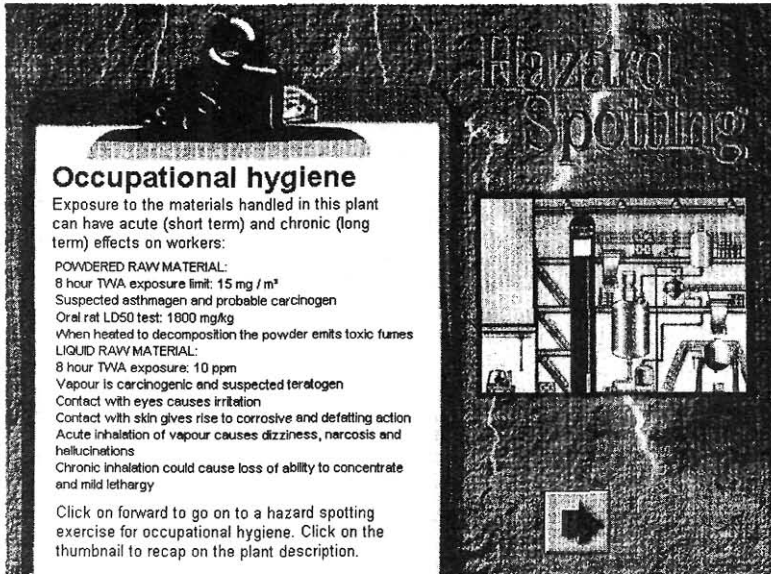


Figure 3: The information screen for one of the Hazard Spotting exercises.

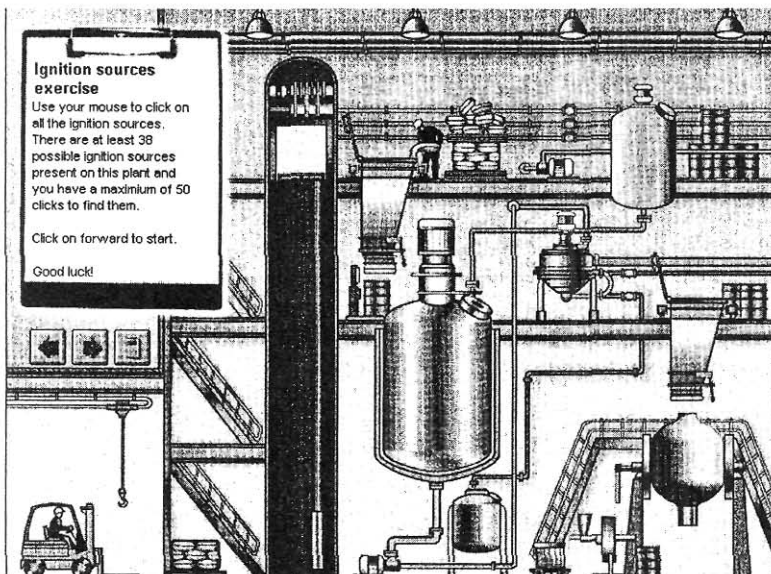


Figure 4: The main screen for a Hazard Spotting exercise.

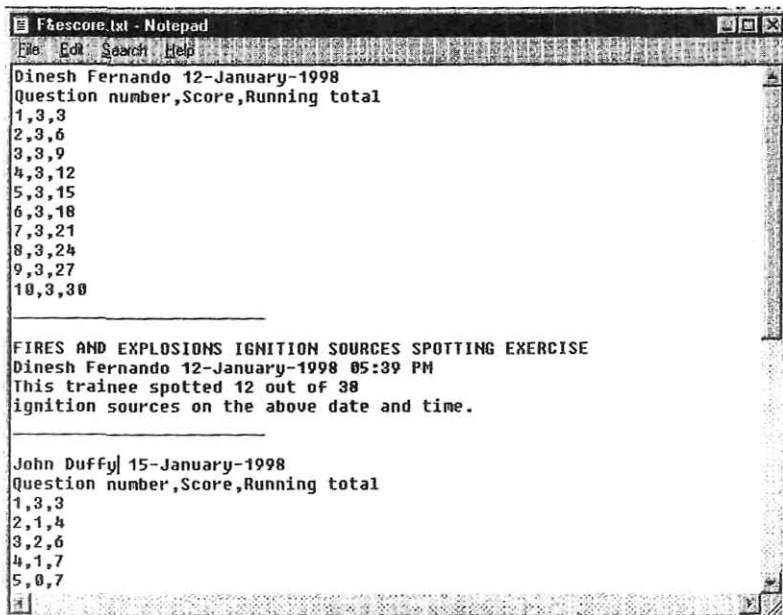


Figure 5: Text file containing details of the trainees' performance.