SAFETY AND HEALTH TRAINING

IT'S AN INDIVIDUAL CORPORATE THING

Whether to use the blackboard or the web? That is the question.

And when it comes to training in the use of PPE (Personal Protective Equipment), another important question is raised: what is the point of PPE training if the lessons learned aren't taken on board and acted upon by employees?

Juxtapose the two question and you're presented with the original chicken and egg dilemma - and for the purposes of a safe working environment, it's clear training has to come before learning the hard way does.

In that sense, it pays to invest a great deal of time and thought into your training programmes.

The most effective way to teach and implement safety and health concepts is not a one word answer. Training can come in many forms:

- *Classroom instructor led*
- *Multimedia*
- *Technology*

There are many advantages to classroom training versus other types of technology based training. No matter how good the content, the instructor in a classroom setting is the key. Boring instructor = non responsive participant. And, if the content in technology based training is not offered in a manner that promotes interest, boring content = non responsive participant.

Safety covers a broad area of knowledge from the individual employee through the process of work requirements and there is also a component of off the job safety to consider.

Any company interested in a solid safety and health training process, where it could be life or death, needs 'transfer of knowledge' and the employee needs to 'get it' - and retain it.

A company must first understand their own corporate culture and needs and translate these needs into an action plan for training.

First, ask yourself the following questions:

- *Is Safety and Health knowledge part of your company's core competency?*
- *If it is, do you have content materials developed?*
- *Has the content been updated to comply with new regulations?*
- *Does the content need continuous updating for compliance or regulatory requirements?*
- *How many employees do you want to train?*
- *Is the intended training population widely scattered, have diverse skills, varied proficiency levels, or wide ranging learning styles or languages?*

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- *Where are they located?*
- *Are your workers able to take time away from work for training?*
- *Does your content have dangerous components or require interfacing with equipment or tools?*
- *Can you afford to take the equipment or tools out of service to meet the training requirements?*

The classroom approach

Many different safety training options can be offered through the classroom approach. You can train large groups, train the trainer and develop modular training for specific topics. A multitude of training modalities can also be included in classroom training and can be customised easily with photos and case studies regarding successes and failures at the company. Including photos of employees throughout the classroom training is a great way to achieve undivided attention and retention of knowledge.

The company that chooses classroom based instruction must be fairly flexible in scheduling. The need to offer retraining for new hires, for example, is very important so that all employees are trained. If you have a 'revolving door' of employees, hence high turnover rate, classroom training can be an expensive proposition since it must be regarded as mandatory by management for all employees.

Physical interaction with tools and equipment (logout tagout) may need to be performed. This hands on approach requires special planning based on time and the need to organise. The course development team needs to be alerted during initial discussions of the curriculum.

Classroom-based team training does not require an expensive, high-fidelity simulated environment. This type of safety training may incorporate lectures, instructional videos, case studies, interactive problem-solving exercises, question-and-answer sessions, and examinations to test knowledge, pre and post instruction. Remember, in classroom training the instructor is the key to success.

Comparison of multimedia to classroom training

There are several categories for discussion: cost, instruction, and administration.

Cost

One of the biggest reasons why companies adopt multimedia training is the cost savings it brings. Under the right conditions, multimedia can far surpass classroom instruction relative to the cost of doing training. Studies have shown that training costs can be reduced from 25% to as much as 75% over classroom instruction (Multimedia Training Newsletter Study, 1996).

Two examples of cost savings attributed to the use of multimedia attest to this. The first is a report by the U.S. Coast Guard, where the HH60J helicopter CBT flight simulator training programme saved more than $11 million over a three year period (Janson, 1992). The other is a report by Federal Express, where the company estimated savings of more than $100 million on employee training (Miller, 1990).

The types of savings typically found when multimedia is used include fewer dollars spent on instructors, renting facilities, and the travel and lodging of students. Fewer dollars are spent because training takes less time, productivity is not lost to travel time, and administrative activities (like grading tests by hand) are not necessary.

Custom multimedia courseware, the kind developed for a specific company, is cost effective beginning at about 1,000 students. Off-the-shelf multimedia courseware (not customised) can have a much lower break-even point depending on the initial outlay for the product(s) and computer systems on which the product(s) runs.

Instruction

The application of instruction, or how the course content is dispensed to and manipulated by the student, varies widely between multimedia and classroom delivery. In a typical safety training classroom, students spend many hours listening to one-way teaching by the instructor and performing some workbook or other exercises, ask some questions, and then take quizzes and a final test.

Safety course content can vary drastically and is heavily dependent upon the skill of the instructor. Also, the monitoring of student progress is not performed until the course is over, and how they do on go/no go tests is assessed.

What is known about the current use of technology in the classroom, how new technologies compare to histories of past technologies, how we use our knowledge of teaching to guide our use of technology, and what role might technology play for teacher education in the future?

Technology has advanced rapidly - perhaps more rapidly than many in the field expected - over the last few years and there have been literally hundreds of published studies investigating its educational effect.

Although there might not yet be a definitive conclusion, since it is becoming apparent that the type of learning that technology best enhances is difficult to quantify (Johnson, 1996), there are many research reports that indicate we now have a deeper understanding of how to maximise the benefit to learners through a variety of technology-rich educational environments.

Hopefully there is no longer any need for the impatient premise that the value of technology is self-evident since there is now a more significant body of research findings which support its ▸

usefulness. These studies also help us answer the important question: 'useful for what?'

With regard to the earlier issue of the relevancy of technology in education, most of the more current literature is overwhelmingly positive about the potential of a variety of technologies to be powerful components in accomplishing current educational visions.

The most recent research indicates that interactive, self-directed learning and higher order thinking can be fostered by technology, and that technology can have the greatest benefit when the environment is conducive to such experiences.

"The tools are already in hand to make transformative change - and I would not have said that as recently as 1993. We can make some good surmises about technologies that are coming to help us further, but even if we have only the PC and the Internet, we have enough to revolutionise education. We can create teaching tools interactive enough to let students seek them out and work with them at their own pace." (O'Donnell, 1996).

Many companies are feeling the pressure to employ technology-based training solutions instead of continuing their reliance on traditional classroom training. Some have even taken the plunge with pilot projects, producing both favourable and unfavourable results.

But before you go wading into the pricey waters of technology-based training, take the time to look at why many professionals feel it will vastly improve and enhance your training efforts.

Instructional multimedia, the kind of training delivered over the computer, has some major differences and some powerful benefits over classroom training.

The two current frontrunners, CD-ROM and Web-based training (WBT) have many similarities, but some vastly different capabilities that may require some trade-offs on your part.

Self-paced multimedia instruction engages students at the same time as they encounter new content. It allows students to learn at their own speed, skipping or skimming areas where they are strong and investing more time in areas of weakness.

This new-found control enables them to take more responsibility for their own learning and become more efficient and effective learners.

The use of multiple sensory modes, combining visual presentation with audio and text explanations, delivers information in a format that is easily personalised and understood by those with differing learning styles.

Immediate interaction and feedback provides constant, highly effective reinforcement of concepts and content. The course content and its delivery remain the same each time it is taught. Student progress is monitored and assessed with a multitude of statistics that can be used to do anything from correcting inappropriate student behaviour to modifying faulty course content.

Two areas where classroom instruction is considered superior to multimedia delivery are in the teaching of higher order cognitive skills, and the application of past learner experiences in the learning process (See Table 1 - Comparison of Multimedia versus Classroom Training).

Table 1. is a comparison of multimedia and classroom training using these delineations

RATED FACTORS	CLASSROOM	MULTIMEDIA (INCLUDES CBT, CD-ROM, INTERNET/ WBT)
COST		
Cost per Student	Initially lower at startup, but increases over time. Cost remains constant for each student, each time course is taught	Has higher development cost, which declines as the number of students increases
Cost of Training Resources	Equipment simulators and the associated classroom instruction have higher life cycle cost	Multimedia simulations have comparable development cost, but much lower life-cycle cost
Safety/Accident Prevention	Use of costly, dangerous, or scarce equipment in actual environment increases cost and number of accidents	Use of computer simulations reduces accidents and reaches training goal through successive approximations to actual equipment and conditions
INSTRUCTION		
Application of Instruction	Learning scheduled in discrete blocks, applied at later time after instruction	Learning takes place in context, at the moment knowledge is required
Consistency of Content and Instruction (Delivery Variance)	Depends largely on instructor's skill	Consistently high, no variability in content or way course is taught
Student Interaction / Sharing of Past Experiences	Extremely effective at sharing personal experience	Ineffective for sharing spontaneous anecdotal experience
Instruction/ Assessment of Higher Order Cognitive Skills	Better accomplished by classroom instructors	Difficult to create applicable interactive methods on computer
Monitoring of Student Performance	Can record attendance, not actual learning, during instruction. Record performance on quizzes and tests	Automated systems track usage, capture student progress, correct poor performance, reinforce successes, and record a variety of statistics related to performance
ADMINISTRATION		
Scheduling Flexibility and Access to Training	Student must adjust to the training schedule and instructor's availability	Training can be adapted to student's schedule

The instruction of cognitive skills with multimedia is highly dependent upon the skill of the developer. The sharing of anecdotal student experiences is becoming less and less a problem in multimedia with the advent of electronic conversations via the Internet.

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Administration

When it comes to administering training, flexibility is a key concern. In classroom instruction, the administrator must wait until there are enough students to form a class so that training is cost effective. With multimedia training, the more students that take it, from across the hall or across the nation, the more cost effective it becomes.

Deploying multimedia training on CD-ROM or over the Internet or Intranet makes training immediately available to workers. So there are no real 'class' schedules to maintain. Multimedia training allows students to make use of courseware whenever it is needed, promoting the benefits of just-in-time learning.

The tracking and reporting features of multimedia training can help companies certify that employees have been trained on required safety, regulatory, and other job specific issues. Unlike the classroom where much of this is done by a person, multimedia courseware has built-in tracking and reporting and automates the process.

What are the benefits of multimedia?

There is a substantial body of research supporting the prowess of multimedia training as one of the more effective ways to deliver training. There are also some commonly accepted facts about the value of WBT and CD-ROM training.

Benefits according to the research

Over the last 15 years, a number of research studies have shown the effectiveness of multimedia to deliver training.

Adams explored six studies conducted by the US Army, IBM, Xerox, United Technologies, WICAT and Federal Express that compared multimedia to classroom instruction in 1992.

Miller analysed more than 30 evaluative studies that conducted the same comparison in 1990.

And Wright examined approximately 25 studies comparing multimedia to classroom instruction on a number of variables in 1993.

Their research findings can be broken down into the five categories shown below:

- ***Less time needed to train.*** *Training compression, the amount of time it takes students to complete an interactive course compared to classroom, was reported between 25-75% for interactive. The learning curve relative to the amount of time it takes learners to reach mastery of their course content was 60% faster for multimedia learners compared to classroom learners.*
- ***Higher student achievement/job proficiency.*** *Learning gains of how well students performed on final tests or comparisons between pre and post test were analysed for multimedia and classroom subjects. Gains for multimedia students were found to be between 38-56% greater than their classroom counterparts. Three other studies found a significant difference in gains for multimedia students. Concerning how consistent the interactive learners' understanding of content was compared to the classroom learner (consistency of learning), the interactive learners' understanding of the content was 50-60% more consistent.*
- ***Higher content retention.*** *Students receiving multimedia instruction had a 25-50% higher retention rate compared to those receiving the same content through classroom instruction. Content retention refers to the learner's ability to recall content days, weeks, or months after the initial training is completed. It is a measure of how much content reached long-term memory.*
- ***More consistency in delivery of content.*** *Multimedia learners had a delivery variance of between 20-40% less than their instructor led counterparts. The slight variance for the multimedia learners can be attributed to the different paths available to the students as they progressed through the interactive courseware.*
- ***More student/course satisfaction and motivation.*** *Several studies reported high student satisfaction with multimedia training because they felt they could move at their own pace, were more involved in their own learning process, received individualised responses, and had privacy.*

Benefits of WBT compared to CD-ROM training

The following advantages favour WBT over CD-ROM training:

- *Lowers development and distribution costs*
- *Allows immediate updates and revisions to courseware*
- *Makes courseware available to a wider range of platforms (Windows, Mac, O/S 2, and Unix)*
- *Makes assessment and certification easier*
- *Harnesses the use of electronic conversations to expand the learning environment*
- *Improves access to a wealth of knowledge on the Web (linking to numerous sites)*

- *Makes courseware more accessible as a resource and reference*

Benefits of CD-ROM training compared to WBT

The following advantages favour CD-ROM training over WBT:

- *Allows for a wider range of sophisticated teaching designs*
- *Has fewer restrictions on media like video and audio due to lack of bandwidth*
- *Allows for more types of interactivity - a greater number of test question and exercise types*

When is multimedia appropriate to WBT?

Taking the leap into multimedia is best accomplished in small increments. Conducting pilot projects, building momentum and support within the organisation, and proving the technology is the best way to start.

The use of off-the-shelf courseware is usually preferable to developing your own custom courseware in house. Developing your own multimedia requires more stringent criteria because of the greater cost involved.

Now to 'fortify' the training, there is also 'coaching'.

Guaranteed process success through coaching

Coaching is an applied technique used after the team has been formed and the goals of each project are understood. When a company has a motivated, selected team and the goals are clearly defined, it is time to guarantee the success of the team building through coaching.

Each step in a coaching process is based on the individual's specific needs. No one said it was going to be easy to build and maintain a successful team.

Allow each team member to understand the coaching process and your style as the coach or whoever has taken that role.

Ask the questions and the team member will share specific challenges and together you can identify core issues.

Here we go again, outlining specific objectives for the process. We need the team to target the specific challenges and skill needs for the members to achieve success within the team.

Each member will develop strategies for reaching the goals and an established progress report will be discussed - any problems or blockers will be addressed at the time they arise.

The coach (you or your designee) must provide proven techniques for making progress and getting results in a timely fashion. For example, if a facility is having problems with employees wearing personal protective equipment, such as safety glasses or hearing protection, the team members have developed increased wearing as a goal with a percent number of employees identified. Then the team will gain insights into why these behaviors of not complying are happening and find a leadership style that works for the employees.

When the team is successful, the members will gain confidence through personal and confidential guidance. Trips to the medical office might be decreased. Eye injuries, headaches and other symptoms might be the measurable response to a successful process.

Barriers that had previously minimised successes will be identified by the team and skills will be developed based on natural style and talents of the members. These team members will be able to achieve career objectives by developing the skills that later will help them as leaders.

In effect, we are building more than a team; we are building our own internal leadership through team building. The team members learn more about their own company and more about their individual talents and with new found confidence, can apply their talents through personal growth gains - and mentoring those just might be beginning the process. ■

Author

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Cynthia Roth has been a professional in the ergonomics industry since 1987. In 1993 she co-founded Ergonomic Technologies Corp (ETC), where currently she is the Chairperson of the Board and Chief Executive Officer. She has lectured to the Fortune 500 Companies in the US and abroad, and many international companies. Ms Roth lectures on safety, ergonomics, product designs, future trends, motivating employees, and biomechanics to top engineering universities and colleges around the world.

Ms Roth was elected to the Board of the American Society of Safety Engineers Foundation (ASSEF), served as Vice Chair and Chair and currently serves on the American Society of Safety Engineers (ASSE) Council on Professional Affairs. She has also been appointed as a permanent member of New York State's Commission on International Trade and has travelled to Brazil, Argentina and Chile on behalf of the State of New York. Ms Roth is a member of the NYC Advisory Board to the Mayor and has also served as a consultant to the Department of Labor, OSHA, Occupational Hazards and CTDNews. She represents University of Pittsburgh, as a board member to Fiat Pax (using technology for world peace).

Ms Roth is a published author, having written the chapter on Ergonomics for Maynard's Industrial Engineering Handbook, used by the majority of engineering students worldwide, and wrote the Handbook on Ergonomics for the National Safety Council. She has been published in more than 50 professional magazines worldwide.

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