Radiation Protection Training

Teaching a combined audience – the gains and the losses

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ABSTRACT

With an eye to providing training that meets the exact needs of his or her staff and in getting best value for money, employers will often bring in trainers to deliver bespoke courses that take into account the employer's specific working environment, sometimes sending managers, supervisors and operators on a single training event. In contrast, commercial radiation protection training providers such as Public Health England offer generic radiation protection courses which appeal to audiences from a broad range of workplaces.

This paper examines how much the training needs vary from one industry to another and according to the role of the participants, and answers the question "What is gained and what is lost when we combine our audiences?"

What do we gain and what do we lose when our audience is heterogeneous? Is it better for participants to undertake focussed training with those from the same workplace, who are expecting to undertake the same work with the same radiation hazards, or does such an approach constrain the learning and encourage an inward-looking culture? Are the networking and cross-learning opportunities given by open courses worth the costs of sending an employee away to a remote training venue? Is it better to use a trainer who knows and works with the participants or does the experience brought in by an external trainer justify the additional cost?

The answers to these questions will depend on a range of factors including the subject matter, the nature of the training and the characteristics of audience. This paper discusses the issues, and finally considers, in the context of "value for money" what an employer should consider when choosing a training format.

The training formats

1 Internal course, internal trainer

Training personnel within the working environment, alongside colleagues, is often seen as a cost-effective solution. Using this format, an employer can bring together managers, supervisors and operators to learn about new procedures or to develop new skills. Practical work can be realistic and appropriate and discussions can focus on local, practical issues. This format can also encourage team-working, which may be especially important where regulatory compliance may require a collective effort and willingness on all parts.

An employer who is looking to minimise costs might prefer to have the training delivered by an internal trainer, however the success of this model depends significantly on the radiation safety and the training expertise available within an organisation. Where such expertise exists, this can be a cost-effective option, however where this is missing, the training may just reflect (and perpetuate) local culture.

There is a real and significant risk if this approach is used too widely. Habits (good or bad) become embedded in a workforce as they are passed from manager to worker, and an personnel may only learn to follow procedures without feeling compelled to take wider responsibility.

Internal training events need to be carefully managed so that staff are not distracted and pulled away to other work business during the course. Employers should also be aware that by putting everyone through the same training programme, there may be a perceived loss of value because 'everyone has to do it'.

2 Internal course, external trainer

If radiation protection, or radiation protection in the context of a new application, is new to the site, if a workforce is cynical and dis-trusting of the employer, or if bad habits have been passed down from managers to staff over the years, it may be appropriate or necessary to bring in an external trainer with appropriate expertise. While this may be more expensive, the training will normally be perceived as more valuable since the trainer will have a non-partisan perspective on the radiation protection arrangements and is more likely to be perceived as a specialist. Discussions may be more open, particularly if managers aren't present, and the trainer might introduce new skills, ideas and

information. An external trainer is also more likely to be allowed to stick to his or her programme, and not be pressured into curtailing the training to fit with operational pressures. An external trainer must, however, have a good understanding of the employer's particular radiation application and the associated issues.

3 External, open course

External, open courses are those where an employer sends his employee(s) away to learn alongside others from other businesses, and sometimes from other industries. Typically, the participants will learn the principles of radiation protection and how to apply them in a generic sense. While critics might argue that this is not targeted training, that there is a risk that the subject is too broad to be taught to a mixed audience, in practice the radiation protection principles do not change, these principles simply need to be applied according to the workplace. Whether the employer operates a nuclear power plant, an NDT firm or a hospital, the concepts, dose limits (and the basis for them), monitoring techniques, routes of exposure, time, distance and shielding and contamination control techniques are the same. In fact, the variety of radiation applications amongst participants, offer opportunities for discussions that may not be available on internal courses.

This format is very often appropriate for RPOs and others who are expected to take on radiation safety responsibilities, and offers added value in a variety of ways including:

Perceived value: If an employer invests in sending his employee off-site for training, the training is likely to be perceived as more valuable, by the employer, the employee and perhaps also the regulator, especially if the training is delivered by a recognised radiation protection training provider. The employer is more likely to expect a tangible difference at the end of his training (a return on his investment), and will expect participants to 'step up' and take on a role when the training is complete. This expectation is likely to encourage the trainee to engage fully with the training.

Networking: When a participant is the only person fulfilling a role within an organisation, they may welcome the opportunity to discuss issues with others. This will be particularly relevant for refresher or update training, where participants already have experience of radiation protection, and for professional level training where radiation protection is to be that person's main job. The participants have an opportunity to learn from others, and each participant will be a good resource, bringing their own perspective and experience to the classroom.

Perspective: It is especially helpful for regulators and other radiation protection professionals to appreciate the role and point of view of other professionals. In terms of workplace training too, RPOs should recognise how their own workplace compares with others. A sense of perspective can strengthen knowledge and engender confidence so that participants are better placed to supervise others and talk to them about the requirements and the risks in their own workplace.

Learning by analogy: This is a learning technique whereby the trainer makes a point using an example that is not directly relevant to any member of the audience; by

seeing how the principles are applied in another workplace, participants may be more able to see 'by analogy' how to resolve their own issues and apply their solution in their own workplace. This technique has the added benefit that the participant feels that he or she has created, and therefore 'owns' the solution. This method of learning engenders a deeper level of understanding than learning by rote.

Speaking up: If the atmosphere in the classroom is right, participants may be more willing to air concerns or mis-understandings than if managers or colleagues are in the room. More than any of the above points, this depends on creating the right learning atmosphere, however there are various well-established classroom management techniques that can achieve this.

The success of off-site, 'open' courses depends on the technical and practical experience of the trainer who should be acquainted with a range of radiation applications and radiation protection issues.

Considerations

1 Cost vs benefit

The employer will always consider the cost of his training carefully: the training fee, his own staff travel costs and their time off-site. The employer will want to spend the company money wisely and will be looking for a training package that meets the exact needs of the workforce. An employer may be attracted to an efficient training programme that ensures 'Person A' can complete 'Task B' or can fulfil 'Role C', no more and no less. In fact, an employer may be reluctant to 'gold-plate' the training in case the employee takes the new skills (especially transferrable skills) and applies for work elsewhere.

A more circumspect employer should also see the long terms gains of investing in training that offers all the elements of added value outlined above: a confident and responsible workforce, a workforce where radiation protection culture is strong, where employees can apply the principles to atypical situations, use monitors, dosemeters and contamination control techniques skilfully and a working environment where incidents are minimised or handled safely.

It is worth noting here that the website "OTHEA" contains the descriptions for over 100 radiation incidents where there are lessons to learn: In several cases, poor training is cited as a cause. There are many relevant examples, two of which are:

"Loss of control of a well-logging source being transferred from a transport container"
"Unsafe Transport of a Waste Radiotherapy Source"

The descriptions in OTHEA indicate that the employees in question did not take responsibility for radiation safety, that they were simply required to follow a procedure. The incidents resulted in significant financial penalty in both cases; the employers may have saved money by arranging cheap training at the time but in the long term, both employers were financially (and reputationally) poorer.

2 Nature of the training

Where training is task-orientated or in support of a system of work, it can be appropriate for the training to be provided in-house, perhaps by experienced personnel within the company. This provides a good opportunity to practice skills in a realistic workplace and discuss practical issues with colleagues.

However, when participants are simply taught (told) to perform certain tasks in a certain way, or tackle incidents by following specified procedures, their capability will always be limited to the issues for which an employer has systems of work in place, in addition, there may not be any personal incentive to take responsibility for radiation protection. Those who know the principles and then discuss issues with others in the classroom, and who see an issue from other's point of view, will be able to make better and more informed decisions in their own workplace and be able to tackle novel problems.

The need for perspective and independent thinking is particularly relevant for professional level training. Not only will the trainees need to see radiation protection and risks in perspective; respect the expertise of others; and understand operational issues, but applying some complex principles in any novel situation is an essential part of their professional capability.

3 Nature of the audience

Audiences will respond to the training environment according to a range of factors, including the culture of their workplace and their own personality. It is often the case that those working in very large organisations may be more passive because they may feel that they are expected to simply comply with local procedures. However an employee who is part of a small team (or is from a smaller workforce) or is being required to take on a role on their own, may be more inclined to take responsibility for implementing anything they learn on a training course.

More cynical audiences may respond better to external trainers and previously trained audiences may welcome an opportunity to discuss their experiences with (and learn from) others. Individuals who have a more reserved nature may not respond well in a classroom of strangers, those who are more outgoing are likely to make the most of the networking opportunities.

Example 1 *An employer is looking to implement or improve his radiological monitoring programme. The employer wants his health and safety managers, RPOs and operators to understand the monitoring programme, what and when to monitor, how to record the results and what to do if trigger values are exceeded. The various parties (managers, employers, supervisors) all have a different role to play, but collectively, their work will ensure legal compliance.*

Here, the training is given in support of local systems of work and the participants will certainly want to discuss local issues. There is a benefit in managers, RPOs and operators being part of the same training event because:

- *Each participant should know that their colleagues / staff / managers have heard the same message.*
- *Regulatory compliance and good radiological protection is achieved as a team and participants will need to understand the part they play – discussion is a good means to achieve this understanding, and trust in each other.*
- *The requirements are specific to the workplace. Running the course internally will enable specific monitors / monitoring techniques and areas to be used to practice techniques.*

In this instance, it may be cost-effective to train employees together, even if their role is different, because of the number of employees who require training. The employer may also want the training to run on a mutually convenient date and time; such flexibility is not usually available for open courses.

Example 2 *Five RPOs from the same workplace require refresher training. They have all worked together since their initial training five years ago and this training is to update and possibly extend their knowledge. They have worked together for a while and have developed their own good and bad local habits and they have experiences to discuss and share with others. In this situation, (and dis-regarding the financial considerations for now), a public course would be ideal since participants would benefit from hearing the views of others (and vice versa – the rest of the course will benefit from hearing their views and experiences), they will be keen to network with others and are likely to be fully engaged in the training as they have some previous experience. To get the best possible benefit from this approach, the five should consider attending the training in smaller numbers.*

However, cost is likely to be significant in this example and an employer will probably consider bringing in an external trainer to train the five on-site. For all the reasons given above, however, a more outward-looking employer might consider open courses, perhaps phasing the training over five years, to stagger the cost.

Example 3 A regulator recruits three graduates to train as radiation inspectors over a period of five years. Their training programme will include formal qualifications (examined) and on-the-job training / mentoring. In practice, the candidates need to pass examinations. They have an option to study privately, and sit the exams when they feel they are ready, or go off-site to a public course, attended by trainee radiation protection professionals from their own country and from abroad.

Academically, the qualification may be the same regardless of where an employee sits the examination, however the added value of attending an open course are considerable. The trainees will learn how as a regulator, they can work with other experts to undertake fulfil their role, develop working relationships and mutual trust in each other's expertise. As trainee radiation protection professionals, it is expected that these participants will be outward-looking on a training course and ready to engage with others, especially if the training is likely to deliver career development for them.

Summary

Taking all of the above into account, the gains and the losses of teaching a heterogeneous audience can be summarised as:

Teaching a heterogeneous (mixed) audience in an open source	
Gains	*Losses*
• Participant's access to expertise beyond that in their own work environment • Encourage a sense of responsibility • Training is perceived as more valuable • Deeper understanding can be achieved • Networking and understanding of wider issues / other roles • Participant's own experiences are a learning resource, (especially during refresher training) • Participants are away from the workplace – fewer distractions	• Individuals learn in isolation from colleagues • Practical and group work may not be specific • Expensive for a large workforce • Shy participants may not engage fully • Dates / times not flexible

Acting on this information, and considering the cost of training, an outward-looking employer might consider:

- Is this training in support of in-house processes and procedures only, consequently should it be delivered locally so that local equipment and facilities can be used?
- Is my radiation hazard significant – could the consequences of an incident be serious?
- Do I expect my employees to think independently and take some responsibility for radiation protection? If so, I should consider investing in training that will engender confidence, and provide a deeper level of understanding.
- Do I think that habits (good or bad) have become embedded? If so, I should look for appropriate, new perspective.
- Will my employees respond well to an external trainer?
- Is it important that my employees have an understanding of the wider risks?
- Are my employees the sort of people who will make the most of the opportunities to engage with others and learn from others' experiences and is this important in their role?
- Is it important for the company or for the employees that the training is given by a recognised radiation protection training provider?

Conclusion

The employer's ultimate choice in relation to radiation safety training must be made by balancing a range of issues: the radiation hazard, the resources (financial and time) available, and the nature of the employees.

In-house training delivered by colleagues will often offer savings in the short term and may be an appropriate choice in some situations, however the long term cost of poorly managed incidents, staff doing no more than following procedure, and ultimately fines arising from regulatory action, are also 'costs' to the business and should be factored in. Difficult decisions may need to be made