



TESTING THE EFFECTIVENESS OF TRAINING - a practical solution

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Introduction

A traditional approach to 'testing training effectiveness' is to set a written paper at the end of the training event. A good paper might include multiple choice questions (a quick way to test knowledge) and short answer questions (to test application). The results of this type of assessment tell the trainer how well students can recall information, how well they understand radiation protection principles, and whether the student can apply them on paper. This testing method is straightforward to administer and the results are quantitative, allowing for 'grading' and 'ranking' of performance. However, under classroom examination conditions, it can be difficult for a student to demonstrate that he or she would take an appropriate course of action in the heat of the moment - when it might matter most.

PHE's Centre for Radiation, Chemical and Environmental Hazards has been using a combination of traditional written paper, practical assessment and group discussion, to test knowledge, application and the competences of emergency responders at the end of a training event. This has provided a number of advantages over a written test alone, but introduces a range of challenges too.

This paper discusses the format of the assessment, its advantages and disadvantages, and looks at areas for possible future development.

The training event – target audience and expected outcomes

The course in question is a four-day radiation safety course for ambulance personnel who are required to co-ordinate radiation protection on behalf of their employer during any incident with the potential for exposure. Such incidents might include (but are not limited to) transport incidents, industrial (including nuclear site) incidents, 'false alarms', trivial incidents as well as larger scale CBRN situations.

The participants are typically:

- fast-thinking and fast-acting
- highly practical
- team-players, relying on colleagues and collective decision-making



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- comfortable with seeking and implementing expert advice
- clear and confident communicators
- focussed on patient well-being
- looking for a quick 'black or white' solution

The expected outcomes (personal competences) are that participants can:

- identify a radiation hazard, and evaluate its significance
- ensure compliance with radiation policies drawn up by the employer
- liaise with other parties, including owners of incident premises, receiving hospitals, other agencies (fire, police, ambulance) and radiation protection experts.

In order to achieve this, course material includes:

- the nature and properties of ionising radiation
- radiation protection terminology
- the hazards associated with ionising radiation (and the need to restrict exposure)
- how radioactive materials are used in industry and medicine,
- where to find information about radioactive sources in the workplace
- the basic principles of practical protection
- making measurements and how to use the available instrumentation
- agreed national protocols for dealing with radiation incidents.

This material is explained, discussed, explored, and demonstrated throughout the course to encourage participants to develop their decision-making and radiation protection capability.

The assessment

The client specified that the course should be assessed and that there should be a 'pass/fail' decision for each candidate. The participants normally work in a dynamic, fast-moving environment, and may be called upon to provide quick, decisive advice, upon which the course of a response might turn, for example the decision to commit a team into a radiation area. In creating an assessment, it was important to focus on the *personal competences* outlined above to reflect the practical nature of the role. Knowledge and understanding / application could be tested through multiple choice and short written answer questions, leaving us the challenge of individually testing the relevant skills of 15 participants, who are normally working in a team.



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To produce a meaningful and comprehensive assessment of capability, we have adapted our methods over time; the latest assessment is conducted in three parts as follows:

- Part 1: Multiple choice and similar questions (20% of the total marks)
- Part 2: Short answer questions: a series of connected questions based on an unfolding scenario (60% of total marks)
- Part 3: Practical work: assessment of skills and practical application (20% of total marks)

Part 1 (multiple choice) This part stands alone and is used to test key facts, especially those not related to the scenario.

Part 2 (short answer) This is an individual, written test of application and decision-making which comprises several related questions. The current question begins with a summary of a telephone call from colleagues who are en route to a suspected radiation incident, and a straightforward question “what is your advice to them?” As more information is revealed, more searching questions are asked but as would be the case in practice, decisions may be demanded when the information is incomplete. Marks are awarded for sound advice that does not put either the casualty or the attending crews at unnecessary risk, it is important at this point that candidates don’t ‘jump to conclusions’.

Part 3: Participants are taken to the simulated scene of the incident and are given an explicit task to perform, for example “get your contaminated colleague out of the cordoned area” or “make any measurements required to determine if radioactive contamination is present”.

The practical test typically takes between 15 and 30 minutes to complete and is conducted in groups of five or six. There are practical reasons for this: the participants are team players, they are supportive of each other and would ordinarily work together and the tasks require more than one person present. There is also an issue of logistics: it would be impossible to undertake 15 individual assessments at this level in the time available.

Success or failure in the practical sessions is judged by two independent observers, who are looking for specific tasks to be completed competently, for example, marks are awarded if a person entering a contaminated area uses the right PPE, and demonstrates good clean-barrier practice; further marks are awarded if the measurement technique is sound. The marks are determined by the whole group’s performance, so all members of the group are awarded the same mark, regardless of the part they play.



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This has been a step forward in terms of assessment of competence, but there are still some challenges around isolating and assessing individual performance of practical tasks. Those of a senior rank and those who are confident will usually take the lead and others in the group could, therefore, pass or fail on the basis of someone else's decisions or actions.

Assessment results

Participant's scores have been strong in the multiple choice section, typically 80% or more. Performance is mixed in the scenario question, typically 50-80% and polarised in the practical session: either the tasks are all completed competently, and the group gains all available marks, or the group cannot complete the tasks competently and scores almost no marks.

Discussion and Conclusion

The practical assessment clearly identifies competent / not competent performance of a group, so it has merit. However, there are limitations associated with testing in a group scenario that we have been working to resolve, with some (perhaps not total) success. Our main concern is to make sure the competent participant who does not get the chance to demonstrate his skills, is treated fairly, and also that poorer performers are not passing due to the work of one or two strong performances in the group work. Options under consideration include:

- 1 "Streaming"
Getting to know the participants throughout the week and putting the strongest, most confident personalities together in the same assessment group. This would be fairer on the quieter personalities, but still does not isolate individual performance.
- 2 Individual assessment.
A considerably shorter (up to 5 minutes) more focussed practical assessment requiring candidates to work alone, but allowing for simultaneous assessment of four or five candidates. While compromising on the scenario and team working, not testing competence to the same extent, and requiring significantly more resource to manage, this would at least isolate the individual and test his / her skills alone.
- 3 Viva assessment
We are considering conducting an interview for anyone who doesn't actively demonstrate their competence during the assessment. This may be a way



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forward but is again, time-consuming, and adds to the pressure at the end of a long course – also, this does not test practical skills.

4 Pass/fail judged on written performance only

Performance during practical work would be provided for information but only the written paper is used to judge pass / fail. This does focus on the individual but can only test application in a classroom environment.

5 No change

Having developed the assessment over a number of years, we could accept that no assessment system is perfect, that this one is as good and as flawed as any other system and we should accept it – with its imperfections.

We would welcome the opportunity to discuss this and any similar experiences.