NOTE

Strategies for engaging with future radiation protection professionals: a public outreach case study

To cite this article: P Cole et al 2015 J. Radiol. Prot. 35 N25

View the article online for updates and enhancements.

Related content

- The state of radiological protection: views of the radiation protection profession: IRPA13, Glasgow, May 2012
  Edward Lazo, Rachel Smith, Roger Coates et al.
- An analysis of the changes in ability and knowledge of students taking A-level physics and mathematics over a 35 year period
  Peter J Barham
- NEWS
Note

Strategies for engaging with future radiation protection professionals: a public outreach case study


1 Radiation Protection Office, University of Liverpool, Liverpool, L69 3BX, UK
2 SRP Media Officer, 24 Five Acres, Dursley, Gloucestershire, GL11 4JP, UK
3 The School of Environment & Life Sciences, University of Salford, Salford, UK
4 CLEAPSS, Gardiner Building, Brunel Science Park, Uxbridge, UB8 3PQ, UK
5 Environment Agency, Ergon House, Horseferry Road, London, SW1P, UK
6 Amec Foster Wheeler, 601 Faraday Street, Birchwood Park, Warrington, Cheshire, WA3 6GN, UK
7 Safety Department, Imperial College London, London, SW7 2AZ, UK
8 EDF Energy, Qube, 90 Whitfield Street, London, W1T 4EZ, UK
9 Sellafield Ltd, Seascale, Cumbria, CA20 1PG, UK
10 AWE, Aldermaston, Reading, RG7 4PR, UK
11 Harris Associates, DS009, Dartington Space, Dartington Hall, Devon, TQ9 6EN, UK
12 Chapelcross Decommissioning Site, Nr Annan, Dumfriesshire, DG12 6RF, UK
13 Onephoton Ltd, 7 Carncoagh Road, Ballymena, County Antrim, Northern Ireland, BT43 7LW, UK
14 Babcock International Group, Devonport Royal Dockyard, Plymouth, Devon, PL1 4SG, UK
15 Centre for Radiation, Chemical and Environmental Hazards, Public Health England, Chilton, Didcot, OX11 0RQ, UK

E-mail: pcole@live.ac.uk

Received 5 May 2015
Accepted for publication 19 August 2015
Published 7 October 2015

Abstract

It is evident that there is a nuclear skills shortage within the UK, and logically it can be assumed that the shortfall extends to the radiation protection arena. Plans for nuclear new-build and the decommissioning of existing nuclear sites will require many more people with radiological knowledge and practical competencies. This converts to a nuclear industry requirement in the order of 1000 new recruits per year over at least the next ten years, mainly as new
apprentices and graduates. At the same time, the strong demand for persons with radiation protection know-how in the non-nuclear and health care sectors is unlikely to diminish.

The task of filling this skills gap is a significant one and it will require a determined effort from many UK stakeholders. The Society for Radiological Protection (SRP) has adopted a strategy in recent years to help address this skills gap. The aim is to engage the interest of secondary school students in the science of radiation and inspire them to follow a career in radiation protection. This paper presents the reasoning behind this strategy and, in an ‘outreach case study’, describes the establishment of the annual SRP Schools Event. This event is becoming an important addition to the national efforts aimed at increasing the numbers of skilled UK radiation protection professionals over the forthcoming decades.

Keywords: public, outreach, schools

(Some figures may appear in colour only in the online journal)

Introduction

The UK’s Society for Radiological Protection (SRP), founded in 1963 and granted a Royal Charter in 2007, is Europe’s largest learned body for radiological protection professionals. By its nature, the nuclear industry provides approximately 38% of the membership, so the fortunes of that part of the energy sector are directly relevant to the on-going business of the Society. Moreover, the SRP has a Charter duty to ‘promote … radiation protection … for the public benefit’ and a number of strategic goals directly involved with outreach to the public generally and to school students in particular.

There can be little doubt that the UK is experiencing a huge shortfall in manpower with nuclear skills, and it is reasonable to assume that there is a similar situation with regards to radiation protection skills.

Plans for nuclear new-build and the decommissioning of existing sites will require more people with radiological skills; an issue recognised 13 years ago in a report from the DTI’s Nuclear Skills Group (Coverdale 2002). It concluded that ‘the health sector currently has a shortage of people with radiological skills and although the nuclear sector does not have an immediate overall shortage, a number of ‘hot spots’ exist in disciplines such as safety case production and radiological protection’. The report goes on to note that conservative estimates ‘suggest that the sector will require around 50 000 recruits over the next 15 years, excluding potential demand from new build’.

Whitmore (2013) reported in Nuclear Engineering International that a study by Cogent (the UK’s Sector Skills Council for the nuclear industry) revealed a skills gap of up to 14 000 by 2025 which is mainly driven by the age profile of the existing workforce. This converts to an industry requirement in the order of 1000 new recruits per year over at least the next 10 years, mainly as new apprentices and graduates.

Although there are various international initiatives that have been established to help address the skills gap, the UK faces an acute problem due to the combination of nuclear renaissance and extensive decommissioning and waste management activities. By 2025, 70% of the UK’s existing nuclear workforce will have retired. At the same time, the strong demand for persons with radiation protection knowledge and skills in the non-nuclear and health care sectors is unlikely to diminish.
Actions to meet the nuclear demand are now in place. A National College for Nuclear has been announced by the Government (University of Cumbria 2015). There is a partnership between Lakes College, Sellafield Ltd and the University of Cumbria, which will create a Northern hub; Bridgwater College, EDF Energy and University of Bristol will be the Southern equivalent. The universities of Bristol and Cumbria will provide a connection to the higher education sector, ensuring a pipeline through to the top level of science and engineering education. While this initiative is not specifically focussed on radiological protection, the University of Cumbria already offers a part-time foundation degree.

Other higher education courses on radiation protection and allied specialist disciplines are in short supply in the UK, and the majority of the courses available are at a post-graduate level. For example, the University of Manchester offers a postgraduate programme in Nuclear Science & Technology to help supply the industry with expertise to help fill the predicted skills gap. The University of Surrey runs an MSc course in Radiation and Environmental Protection, and likewise the University of Southampton has a master’s level module relating to Environmental Radioactivity and Radiochemistry. However, undergraduate courses with a focus on radiation protection are on their way. For example, at the time of writing, the University of Liverpool are developing a full-time 3-year undergraduate BSc degree (UCAS Code: F351) entitled ‘Physics with Radiation Protection’.

Such courses need to be ‘fed’ with a supply of school students enthused to study the subject and inspired to become the radiation protection professionals of the future. However, a recent survey conducted by the Nuclear Industry Association (NIA 2014) has revealed that 35% of 1,376 young people studying science, technology, engineering or maths did not believe they could work in the nuclear industry. More alarmingly, it showed that 14% of the young people questioned had not heard anything about career opportunities in nuclear power. It is the authors’ opinion that this is the same situation with radiation protection career opportunities in non-nuclear sectors. It appears that there is poor communication between the profession and young people, and that a culture that embraces outreach to a cohort of the public who are potentially the professionals of the future is under-developed. The SRP is addressing this issue.

Osborne et al (2003) have noted ‘that the percentage of students pursuing science … post-16 has declined’ by more than 50% in recent years. This decline appears to be most evident for A-Level physics. There are multiple reasons put forward to explain such a significant drop including student interest in the topic, the importance with which it is viewed, and utility—that being the level to which the student perceives that a particular line of study will lead to a fruitful future career.

Engaging the interests of school students before they make educational choices that lead to a particular career path has long been a way of influencing the young people to follow a career in science. The UK Government’s STEM programme, established in 2006, already provides an example of how industry and the professions are responding to the skills gap shortage through the medium of education. This initiative is supported through a network of regional centres providing curriculum related resources and activities. A national body SCORE (Science Community Representing Education) includes partners from the Royal Society, the Institute of Physics, the Royal Society of Chemistry, the Society of Biology and The Association for Science Education. The Engineering Council’s ‘Inspiring the Future’ programme brings professionals into schools to talk directly to students about the work experience. Popular ‘Big Bang Fairs’ already highlight the exciting possibilities that exist for young people with science, technology, engineering and maths backgrounds.

Following these examples, and as part of its charitable duties to serve the public, as well as its duty to promote the profession, the SRP has recognised it needs to take a proactive
outreach role to engage with young people and inspire them to become the radiation protection professionals of the future. In 2013, the SRP established a schools outreach working group (SOWG) with the responsibility of providing information to schools. One objective was to develop a central resource of material that would be available for members and teachers to use in encouraging and developing students’ interest in a scientific career, specifically in the field of radiological protection. Another objective was to establish an annual event for secondary school students and their teachers, and the SRP’s annual Schools Event, which at the time of writing is preparing for its fourth year, is becoming an important addition to the national effort.

Development of the SRP schools event—a case study

The SRP Schools Event targets GCSE students (typically aged 14 to 15) to encourage them to consider a career in radiation protection. It does this by engaging students to excite, enthuse and inspire them. This case study primarily reviews the planning of the third ‘commissioning’ of the event because much experience had been achieved about producing successes.

The Schools Event is linked with the Society’s Annual Conference, usually held in May. The conference is held at a different regional venue in the UK each year. For the Schools Event, this increases geographical coverage with a cohort of new attendees at each location. The first Schools Event was held in Glasgow in May 2012, at the International Radiation Protection Association congress. About 1200 students attended this first Schools Event. The lecture was ‘The Importance of Radiation to the Medical Profession’ (SRP, 2013). The second Schools Event was held in Harrogate at SRP’s 50th Anniversary annual meeting. It attracted just over 400 school students. Harrogate, in North Yorkshire, has fewer secondary schools within easy travelling distance, which partly explains the reduced student numbers. The lecture was entitled ‘What’s the Risk?—Putting numbers on the chances in your life’. This was delivered by Professor Sir David Spiegelhalter, Winton Professor of the Public Understanding of Risk at the University of Cambridge.

The third staging of the Schools Event was at Southport, at the SRP 2014 annual conference. As in the previous two Schools Events, it involved a large exhibition of fun and interactive activities plus an on-stage lecture. However, there were two departures from previous Schools Events. The Southport Theatre and Convention Centre had insufficient space to permit a schools exhibition concurrently with the main SRP conference, so the Schools Event was set a day earlier than the main SRP conference. Secondly, the lecture was developed and delivered by a team from the SRP’s Rising Generations Group, called ‘Radiation: Don’t Panic!’ This allowed the students to see young radiation protection professionals as role models. It also supported the SRP’s policy of developing its younger members to become speakers at such events, which helps increase in-house lectures and lecturers. The aim of the lecture was to be entertaining, relevant to a career in radiation protection and appropriate to the GCSE science curriculum. About 400 students attended, similar to the previous year at Harrogate.

Marketing of the schools event

Schools were given early notification so that the date could be reserved. For the Southport event, an invitation letter was posted to schools in October 2013, and booking forms followed in the New Year. The invitation included an offer to reimburse reasonable travel costs.

Marketing was as follows:
(a) Direct mailing of invitation letter and booking forms to 120 secondary schools. 
(b) E-mail distribution via the Institute of Physics mail base to all Physics teachers in UK. 
(c) Flyer included in a CLEAPSS mailing to 528 northwest schools and also advertised the CLEAPSS website. 
(d) Advertised on the SRP website.

Each booking was acknowledged; schools were told that more details would be provided nearer the time. Schools were asked to make their own travel arrangements and to submit the invoices for payment after the cost was approved. The school responses by January 2014 were encouraging.

The exhibition at southport

The exhibitors at the main Annual Conference exhibition were invited to take part in the Schools Event; six took up the offer. In all there were 30 exhibition stands from 25 organisations at this Schools Event. The arrangement of the exhibition hall required careful planning to accommodate the exhibitors’ needs and to mix the content of stands evenly around the hall (i.e. not having stands with too similar a ‘subject’ next to each other). This made the exhibition more stimulating for the students and helped the circulation of groups around the hall. Some exhibitors had experience of engaging the attention of school students and helped ensure that exhibits were interactive and interesting. Nevertheless, several had no previous experience of working with this age group, and guidance was made available on the types of exhibit that would be relevant and also maximise the educational benefit of their displays. This guidance benefited from having members of the SRP project team with teaching experience.

The trade stands were complemented by 43 SRP-produced posters covering factual material with colourful diagrams and photos; these had been used successfully at the previous School Events. (PDF versions of the current set may be downloaded from the SRP website). Before the third Schools Event, all the posters were reviewed, and revised where necessary, and two more added on radiation risk. The poster display area helped to manage student flow, providing a buffer zone within the exhibition area to reduce students needing to queue for exhibition stands. A quiz, with prizes, was devised to focus interest on the posters; the posters were printed with QR codes giving access to further on-line learning resources via the students’ phones and tablets.

The southport schools event lecture show

‘Radiation: Don’t Panic!’ was well received by students and teachers. The SRP presenters (two female and one male) introduced themselves and explained their background and jobs. A few students were then invited on-stage to take part in a practical demonstration of naturally-radioactive substances. These volunteers had been selected beforehand, and given ‘costumes’ off-stage, comprising Tyvek suits, gloves and masks for theatrical effect. The audience participated by holding up a different coloured card in response to questions from the stage (see figure 1). The presentation moved on to a practical demonstration of the concept of time, distance and shielding, using darts (representing gamma photons) fired from a NERF gun (representing a radioactive source) at a well-protected SRP volunteer. Pre-selected school students kept the score and helped graph the number of ‘hits’ on the ‘target’.

An on-stage video team transmitted close-ups that were projected onto a large screen at the back of the stage. The interactive nature of the lecture held the attention of the students for an
hour. Feedback forms were distributed to all teachers and pupils. These showed that 83% of the respondents thought that the exhibition was ‘good’ or ‘very good’. Similarly, 85% said that the lecture was ‘good’ or above. Overall, including venue, exhibition, posters, competitions, lecture and marshals, the ‘good’ or ‘very good’ rating was 81%. The responses showed that students and teachers thought the choice of subject for the lecture was good.

Specific comments from teachers included:

“The learners came back to College very enthused and complimentary about the event.”

“It was incredibly well organised and pupils and staff alike had a great day.”

“It was an excellent day out and the pupils really felt the value of it.”

“The day was really exciting and students particularly enjoyed the lecture.”

**Media coverage**

Getting interest from national newspaper and broadcast media for a regional-based conference on any specialist scientific discipline is difficult. However, local newspapers tend to be more interested in stories and pictures relating to local schools, so Southport newspapers were contacted prior to the lecture and exhibition and invited to send reporters and photographers. Regrettably, none attended on the day. The SRP also employed a professional photographer, and it was these pictures that were used subsequently by stories run by local newspapers.

**Health and safety**

The risk assessment for the event was built upon the control measures provided by the venue providers and the risk assessments prepared for the previous years. The document was written five months before the event and was made available to schools on request. Changes from the previous years were needed to take account of the change of venue, and to improve on child safety, radioactive substances and lasers. Classes of people at risk were identified as students, teachers, marshals, volunteers, disabled persons, exhibitors and presenters. Contingency plans were made for major incidents, and illness amongst students. A professional first aid team was employed.

**Costs and resources**

The total spent by the SRP for the Schools Event was about £13,600 with the main expenditures being the venue hire charges and the SRP’s professional administrative support. The
2014 event in Southport cost around £8,000 less than the previous year thanks in part to a number of valuable donations from industry and the Society’s Affiliate members. The SOWG, who have responsibility for the Schools Event, will continue to look at sponsorship, grants, and other sources of funding to make the Schools Event more affordable and sustainable for the future.

Conclusions

The 2014 SRP Schools Event in Southport was a great success. Key to this was the ethos to entertain with science and show that it can be both fun and informative. It is clear that there is a role for future Schools Events along similar lines, and, at the time of writing, planning for a 2015 event in Eastbourne in parallel with the SRP’s Annual Conference is underway. The costs, both in monetary and manpower terms, are significant and there are financial advantages in running such events in association with other major events, such as all future SRP annual conferences, IRPA Congresses, and Associated Societies national meetings. Areas for funding and sponsorship need to be identified to alleviate future expenditure.

From 3 years’ experience, the following have been found useful when planning the ‘show’:

• Consult with teachers to ensure the lecture content is curriculum relevant.
• Give the lecture a continuing story-line.
• Plan to grab the audience’s attention right from the start with special effects and striking images, and continue to use striking images throughout.
• Choose the presenters so that they are young and mixed with respect to gender.
• Present the team as normal people who happen to work with radiation, avoiding the stereotype of science ‘geeks’.
• Plan to involve students on stage and promote interaction with the audience
• Include visual and practical demonstrations.
• Link where possible to the associated exhibition to see examples of what’s talked about on stage.
• Avoid sudden switches of subject.
• End by summarising the key facts and messages.

And the following points were useful in the production of the ‘show’:

• Presenters should learn and rehearse the key messages.
• Presenters should be good actors, prepared to ad-lib confidently on stage as necessary.
• Ensure the backstage crew is familiar with the lecture content and what is expected of them.
• Rehearse the entire lecture, including any special effects, on stage at the venue with the venue’s backstage, sound, lighting and front-of-house staff. Include any audio-visual contractors integral to the presentation.
• Ensure any computer systems to be used are functioning correctly and operators are rehearsed.
• Familiarise the presenters and support team with theatre jargon; upstage, downstage, stage right and left etc.
• Rehearse and brief audience volunteers either before the lecture starts or at least in the wings before bringing them on stage.
• Brief the volunteers managing students in the exhibition on how to enter and exit the lecture theatre and what is expected of them during the performance.
• Have appropriate music played as the audience enters, before curtain-up and again at the end as the audience exits.
• Gather feedback after the lecture and use it to plan and improve future presentations.

It is worth emphasising the value of legacy material from the School Events, such as posters and DVDs of lectures. These will link into wider strategies for careers information and informing the public.

The event continues to help fulfil the SRP’s Charter duties and its strategic goal of establishing an ‘Outreach Programme for Schools, Employers and the Public’. In this way, the society aspires to engage with school students and contribute to initiatives aimed at reducing the UK skills shortage. SRP is committed to ensuring that Schools Event is a continuing success.

References


University of Cumbria 2015 National college for nuclear: collaboration to combat future national skills shortage University of Cumbria News Release (www.cumbria.ac.uk/AboutUs/News/Articles/201415/March/PR1453.aspx)

Whitmore D 2013 Mapping the skills gaps Nuclear Engineering International (www.neimagazine.com/features/featuremapping-the-skills-gaps/)