

EPSRC

Engineering and Physical Sciences
Research Council

Chemistry Programme

Analytical Science Summer School Workshop held on 2 November 2006
Jury's Inn, Birmingham

For further information

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Introduction

A one day workshop was held to examine the requirements for a Summer School type training activity for analytical science PhD students. The driver for the workshop had been the March 2006 Theme day in Analytical Science. A key aspect of the theme day had been to examine the training and impact of the EPSRC / RSC analytical science studentship scheme. The theme day panel was broadly supportive of the studentship scheme and the requirement to underpin the postgraduate training base in this research area. However, there was a concern that there did not appear to be any differential between the students funded through the scheme and those funded through other routes including EPSRC Doctoral Training Grants or Responsive Mode. It was considered important that this key scheme should have associated with it enhanced training to ensure the scheme was best fit to meet its objectives.

In taking forward the recommendations of the theme day report EPSRC examined a number of potential mechanisms for delivering such training. The conclusion of this examination was the provisional decision to invite applications to operate a summer school in the area. The criteria for the studentship scheme itself were also re-examined in this light, with the 2006 call inviting proposals with increased emphasis on collaboration and enhanced training.

Thirty analytical science researchers, split between academe and industry, attended the one day workshop.

Summer School Challenges

The key elements for a summer school in this area are to develop both increased awareness of analytical techniques and of the research challenges of users. It was considered important that the school is grounded in the practicalities of research, including an overview on the current state of the art along with what is being implemented within industry. Specific issues for this area are the barriers of taking new techniques and methodologies developed in academe into industry, the take up of existing technology across sectors and highlighting of best practice. The challenge of delivering increased awareness can only be delivered through problem solving based learning. This approach should be at the centre of a Summer School based activity.

What are the key elements of a summer school?

- The school should last at least 5 days in order to cover all the necessary basics about what analytical science actually is, through its industrial and social context.
- How analytical science is carried out experimentally, with an emphasis on the development as well as the use of analytical techniques.
- In response to changing analytical needs, the importance of innovation, design and creation of new analytical methods
- The summer school should demonstrate the academic rigour of analytical science training, highlighting the value of curiosity driven research.
- A range of students should be invited and it should not be exclusive to the EPSRC / RSC funded ones.
- The training within the school should be broad and cross disciplinary, and based on problem solving skills

- Key speakers should be carefully chosen in order to engage and hopefully inspire the students
- Networking opportunities should also be provided, possibly through a poster session.

Which of these elements are best provided by industry or in partnership?

Industry

- Innovation should be highlighted with venture capitalists.
- Highlighting key technology areas from a number of sectors
- Problems solving sessions incorporating a wide range of industries.
- Exemplars from SMEs would also be important where analytical scientists can often be the chemist.
- High quality lectures from suitable analytical scientists in industry.
- Examples of production failure and rapid trouble shooting.

Partnership

- Cross discipline awareness. Need to be exposed to areas not directly covered by their PhD programme. Examine how their skills and knowledge can make an impact within another area.
- Technology transfer; learning how to look at business, examine the market and issues with trying to transfer research outcomes to the commercial sector.

Ideal Summer school programme

- There should be a welcome and the opportunity for introductions. Speed networking could also be incorporated at this point.
- A Summer School should initially address the question of what analytical science actually is, highlighting the challenges of technique development. Core components of this are to address questions such as accuracy and choice of techniques. The school should be delivered through a mix of presentation and group exercises.
- Issues to be addressed could include; quality sampling, statistics, method control and ISO, calibration, meaning of data, systems of accreditation.
- The programme should include an industrial and social context including health and wealth generation. There should be a strong user perspective, start with industrial people moving to group working. The sessions should be facilitated.
- It is important that the programme highlight the importance of inspiration, creativity and rigour to analytical science delivery and research, which could be delivered through case studies. The case studies should cover real problems over a range of disciplines and techniques; however, they should be based on a user perspective. It would also be useful to cover a range of application areas such as pharmaceutical, forensic or environmental. Despite the different sectors, key messages regarding quality, application, and innovation should come through. Following the case studies there should be a workshop element where they can

apply the key learning points, there may be the opportunity to utilise some of the tools developed by the Laboratory of the Government Chemist. The existing technology gaps should also be highlighted.

- Theory of problem solving including creativity and ethics. This would be seen as a key opportunity to inspire students during their PhD. The exploitability spin off and entrepreneurs possibly from ISIS innovation or Cambridge consultants.
- There should be an opportunity for networking within the programme, possibly through an evening poster session.

How could we measure the success of such a school?

This aspect causes difficulty as it is difficult to measure an exact baseline; however there are distinct measures which could be put in place to examine this:

- Feedback; both immediate and upon completion of their PhD.
- Destination data
- The group could meet again to present results at a suitable event such as the Analytical Research Forum
- Have the groups networked following on from this?
- How to embed a summer school within a PhD programme?
- PhD students have a number of commitments to their time, the benefits of possibly a week long activity would have to be clear to both them and their supervisors. A key element to ensuring this is to incorporate academic challenges which will directly impact on their studies. There will have to be collective involvement from both academe and industry. The industrial component is crucial as this may be the only time some students will be directly exposed to industry challenges.
- The summer school should have a significant element of problem solving; this should be of a technical nature which can be seen as applicable to their own research, as well as exposing them to skills relevant for their future career.
- How to embed a collaborative approach between stakeholders in PhD training?
- At present non-CASE students have little or no contact with industry, there should be the opportunity to expose them to an industrial research environment. The key issue here was considered, giving the student an insight into industrial research, this would not only better prepare them but also allow them to make more informed career decisions. Students should have an insight as to what is expected of a PhD recruit in industry and what areas of career progression to expect.
- Ensure students have seminar programme in place to widen knowledge, improve knowledge by providing broader context. It would be hoped that such interaction with stakeholders occurs throughout the PhD programme including; progress monitoring, industry tours.
- Involvement could be event rather than student centred; for example sponsorship and help in judging in-house communication events such as the Pfizer poster competition. Industrialists giving lectures in post graduate specialist courses. The

courses should be based on real problems / experiences e.g. 'how my company developed pharmaceutical X' as part of a drug design course.

- In terms of looking specifically at how industry is contributing effectively to training, the CASE system was considered a good example. The CASE system facilitates industrial investment into a project and this allows the student to experience the industrial context through visits or a placement. The CASE system also allows the institution access to specialist equipment. Through the CASE mechanism industry provides, financial support, an industrial context for the research and specialist equipment. In return industry can get considerable scientific input provided there is some continuity of industrial personnel.
- As analytical science researchers are strongly engaged with a variety of funding sources, including industrial, a summer school should include an element highlighting the issues surrounding IPR and exploiting research. An understanding of IPR issues should be introduced, including what the major issues regarding IPR are likely to be in the future. More broadly, participation of industrialists in postgraduate modules e.g. 'the business of science and technology' or 'making money out of chemistry'. These courses could be also linked through a university's business development office.
- Throughout the school attendees should get an insight into industrial approaches through real life exemplars. An industrial context can give a student an increased sense of value to the PhD, through putting their training in a career context. There was also felt to be a role in introducing more generic business skills, such as project management and decision making.
- Lectures delivered by stakeholders should demonstrate the value of knowledge breadth and expertise outside core area. More broadly, students in one traditional discipline should be regularly exposed to problems in another, which would instil the philosophy of cross / inter disciplinary research.
- Industry could play a role in training through access to specialist scientific knowledge, and access to materials and equipment not routinely available at a university.