

The Scottish Schools Education Research Centre (SSERC) organises and delivers the Scottish Universities Science School (SUSS), which is a residential professional development event for secondary science/education students across Scotland, routinely attended by more than 95% of the eligible cohort. SUSS has a positive impact on student teacher subject knowledge, confidence and motivation, but also provides a unique opportunity to explore the value of career-long professional learning and identify sources of effective, high quality support for student teachers as they enter the profession. This article focuses on the structure and effectiveness of the follow-on programmes for probationer teachers that SSERC offers in the year following their involvement in SUSS. The article also demonstrates how SUSS is an effective starting point in an ongoing relationship between SSERC and student/probationer teachers as they progress in their careers.

## Introduction

Donaldson, in his influential report about teacher education in Scotland, summarised the available evidence and noted that *'...perhaps unsurprisingly, the foundations of successful education lie in the quality of teachers and their leadership. High quality people achieve high quality outcomes for children'* (Donaldson, 2010, p.2).

The Scottish Government, in its review of Education Governance (Scottish Government, 2017a), emphasised that *'Initial teacher education is the gateway to the profession, and we want to continue to attract aspiring and highly motivated individuals who are attracted to*

*teaching because it makes a difference. We also want to inspire an ongoing commitment to learning throughout a teacher's career'*.

The STEM Education and Training Strategy for Scotland (Scottish Government, 2017b) emphasises that effective career-long professional learning (CLPL) is vital to allow teachers and other practitioners to develop their STEM knowledge and skills. Such a conclusion accords with the views of several groups (see, for example, Jordan, 2019; Cordingley *et al*, 2018) that effective continuing professional development (CPD) environments have the potential to reduce staff turnover and this seems critical in an era when staff retention is high on the agenda.

In Scotland, there has been a shift in emphasis from 'one-off' professional development events to those that support CLPL. The Scottish Schools Education Research Centre (SSERC), with support from a number of agencies (including the Scottish Government, the National STEM Learning Centre, the Wellcome Trust and the Primary Science Teaching Trust), provides a national programme of professional development in support of science and technology education. One aspect of our provision is the organisation and delivery of the Scottish Universities Science School (SUSS). This event is seen as *'an important and enjoyable part of PGDE science courses across Scotland'* (Findlay, 2017) and we have previously described how SUSS has become an integral part of the educational landscape for Professional Graduate Diploma in Education (PGDE) student teachers or graduating science/education students in one of the secondary sciences (Andrews *et al*, 2018).

In this brief article, we wish to extend our previous observations about SUSS, its immediate impact, and explore how we maintain links with attendees as they continue their journey in the profession.

## The Scottish Universities Science School (SUSS)

The key aims of SUSS are to:

- offer a 2-day, residential event for biology, chemistry and physics PGDE students and graduating science/education students across Scotland;
- explore activities not usually available during Initial Teacher Education (ITE) programmes;
- develop expertise in topics outside subject specialisms;
- offer networking opportunities with other students from across Scotland;
- share information on where to access further development opportunities; and
- showcase other practical support that is available for science educators in Scotland.

At the time of writing this article (July 2019), we are well into the planning cycle for SUSS 2020 and SUSS 2021. Both these events are scheduled to take place during January, when the majority of attendees will have completed one block of teaching practice. Tutors from all nine of the institutions (the Universities of Aberdeen, Dundee, Edinburgh, Glasgow, Highland & Islands, Napier, Stirling, Strathclyde and West of Scotland) that offer routes into secondary teaching in Scotland are involved in the planning process and, additionally, ensure that SUSS is part of the formal academic calendar; such support allows us to routinely welcome more than 95% of the eligible cohort to SUSS. The intake target into secondary science PGDE programmes for the 2019/2020 academic year is 406 (biology - 134; chemistry - 150; physics - 122) (Scottish Funding Council, 2019).

The programme at SUSS includes both subject-specialist and cross-curricular sessions, which consist of a mixture of hands-on practical

sessions, lectures, demonstrations and discussion sessions; all these elements are designed to support aspects of the various Scottish science curricula. Regardless of their specialism, each attendee will experience practical work in biology, chemistry and physics.

## SUSS – evaluation and impact

In our previous paper (Andrews *et al*, 2018), we reported on the cumulative evaluations of SUSS during the period 2013-2018 inclusive. Response rates in excess of 80% are routinely obtained from student participants and, overwhelmingly, feedback is very positive.

Feedback from PGDE tutors is also sought and again this is very positive. At SUSS 2019 we interviewed several tutors. One of the questions asked in those interviews was ‘Why do you recommend SUSS to your students?’. The following captures the collective responses of the tutors:

*‘It represents an opportunity for students to mix and meet with fellow students from different institutions and gives them a chance to talk about their experiences and recognise that “one PGDE” does not fit all. On the scientific side I think it’s great; it lets them see that the Scottish Government supports them and also see what other organisations (e.g. the Royal Society of Biology, the Institute of Physics) – can do to help them in their development...More valuable, I think, is the chance to revisit the science, especially the unfamiliar sections. Many of my students are nervous regarding the biology input, for example, and they see in the biology sessions that there are other ways of studying photosynthesis. SUSS also gives my students a chance to revisit where their ideas are maybe incorrect – and explore misconceptions which they may have’.*

We place a high value on SUSS since, in addition to its immediate impact, it offers us a

unique opportunity to (i) 'capture the future teaching generation' at the start of their careers, (ii) offer attendees an early opportunity to think about professional learning and (iii) explore the concept of CLPL and its potential impact on attendees' future development.

## What happens after SUSS?

In Scotland, those students who successfully graduate from their PGDE programme are all offered a one-year post at either a local authority or independent school. During this follow-up year, individuals are known as 'probationers' and they benefit from a variety of mentoring schemes either at school or local authority level. Full registration is confirmed by the General Teaching Council for Scotland (GTCS) upon successful completion of the probationary year.

In our conversations with probationers, it appears that only a small proportion of the mentoring support available to them is reflected in subject-specific activities and significantly less is aimed at enhancing learning and teaching related to practical work. Such a situation is clearly not ideal (Cordingley *et al*, 2018) and, within SSERC, we have sought ways by which we might address these 'deficiencies'.

In the academic year 2012-2013, with funding from the Scottish Government and STEM Learning (formerly the National Science Learning Centre), we embarked on a programme of professional development specifically aimed at probationers in the secondary sciences. The funding available allows us to offer places to approximately 10% of the corresponding cohort who attended SUSS in the previous year. The content of the programme has changed over the years and we now have a robust model that builds upon the experiences available through SUSS. As a result of participation in the programme, probationers will be able to:

- demonstrate an enhanced portfolio of ideas for practical work both within and outside their own subject specialism;
- use a wider variety of teaching strategies to promote pupils' learning in science, including demonstrations and scientific enquiry;
- exemplify the importance of contemporary science and its applications in the context of the curriculum;
- network with fellow professionals and explore mechanisms for ongoing support; and
- develop an action plan related to their teaching practice.

A detailed description of programme content is beyond the scope of this article, but, in broad terms, we seek to develop practical skills especially in areas outside of participants' subject specialism. Our probationer course is delivered in two parts, each of 2 days in length and, in the period between Parts 1 and 2, attendees undertake a piece of action research (a so-called 'gap task') related to the content of Part 1; this is followed up by a presentation during Part 2. The gap task continues to be a useful part of the programme as evidenced by responses from participants over the past 3 years:

- *Is the gap task useful in supporting your own personal and professional development? Agree or Strongly Agree - 93% (N=82)*
- *Has the gap task made a valuable contribution to the work of your department / faculty? Agree or Strongly Agree - 83% (N=82)*
- *Was being able to discuss the gap tasks of other participants a valuable exercise? Agree or Strongly Agree - 96% (N=82).*

Our experience shows that many probationers struggle with practical activities and techniques, especially those that cover areas outside their



# Student and probationer teachers

● Kate Andrews ● Paul Beaumont ● Emma Bissett ● Kath Crawford

subject specialism. So, for example, chemistry and physics probationers welcome support in basic microbiology techniques, since they are likely to have to teach these aspects to first- and second-year pupils in the secondary sector. We do not claim that our observations are novel; the important aspect for us is that there are opportunities for probationers to enhance their skill sets prior to full registration as subject specialists.

Since we started the probationer programme we know, through evaluations and personal communications, of many individuals who have benefited hugely from attendance. Few, though, touched us quite as much as a recent attendee who, in reflecting on his participation, said:

*'...More generally and perhaps most importantly, attendance at the SSERC course for Probationers gave me the encouragement and inspiration to continue as a teacher when I was so close to giving up.'*

We are happy to record, here, that this attendee has recently been offered, and accepted, a full-time post.

Once fully registered with GTCS, teachers are expected to undertake a minimum of 35 hours of professional learning each academic year; such activities are to be recorded and reported upon on a 5-year cycle. There are several challenges that teachers face in being able to take part in effective professional learning (Cordingley *et al*, 2018) and principal amongst these are time, cost and quality. With support from a range of organisations, much of our CLPL is offered at little or no cost to the school, although we are not able to support cover costs. In Scotland, SSERC is one of the few organisations to be awarded the 'GTCS Quality Mark as a Professional Learning Organisation'. In practice, this means that all our provision is approved and the GTCS Quality Mark raises confidence amongst senior managers that

supporting attendance at one or more SSERC programmes is valuable and worthwhile.

## Future areas of activity

In December 2018 we piloted the Scottish Universities Technology School (SUTS) for PGDE students who were following either Design and Technology or Technological Education routes into secondary teaching. Evaluation of that event, by the attendees from the Universities of Edinburgh and Strathclyde, was very positive, with practical sessions being particularly well received. Following this success, the Scottish Government has invited SSERC to plan for further SUTS events. It is our hope that SUTS will become established as part of the educational landscape.

It is our belief that the SUSS model, coupled with structured interventions at probationer level, could have a major impact on the confidence of primary teachers. SSERC has for a number of years been working very successfully with colleagues in the primary sector (Lowden *et al*, 2019), although our involvement with primary PGDE students has, to date, been relatively limited. Clearly a particular challenge in this regard would be the number of PGDE primary entrants (the target for 2019/20 entry in Scotland is 1230 (Scottish Funding Council, 2019)), although, with sufficient resource in place, we believe that the quality of learning and teaching in the classrooms of probationer teachers would be much enhanced at a time when the Government's STEM Strategy (Scottish Government, 2017b) calls for such change.

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# Student and probationer teachers

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