

Cross-border traffic: THE SCOTTISH 'ISE 5-14' PROGRAMME

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EXPLAINS THE BACKGROUND TO
THE SCOTTISH 'IMPROVING SCIENCE
EDUCATION 5-14' INITIATIVE WHICH,
AMONG OTHER THINGS, IS CONCERNED
WITH COHERENCE AND CONTINUITY IN
LEARNERS' EXPERIENCES IN SCIENCE
ACROSS BOUNDARIES OF AGE
AND STAGE

Improving Science Education 5-14 (ISE 5-14) is a national programme in Scotland, which looks to both integrate and improve approaches to learning and teaching in science from early years to early secondary and beyond. It is, undoubtedly, an ambitious programme and that perhaps is no bad thing. It may appear so ambitious now merely because some science educators have apparently so lacked both aspiration and inspiration in the past.

The ISE programme is a response to some concern about Scottish science education, over the past decade, which led to a strategic review group being set up to look critically, but constructively, at Scotland's science base. A key component of that review, in the context of this article, was a hard yet sympathetic

look at what needed to be done to improve matters educationally. The results of that review were subsequently published as part of the Scottish Executive's Science Strategy.

Discontinuities

Over the years the inspectorate and other observers have pointed repeatedly to a number of weaknesses in learning and teaching in our school science. These observations continue to be underpinned by evidence from research.

Not the least of these weaknesses has been a failure to achieve a smooth and effective transition for pupils across the primary-secondary interface. Latterly, similar issues have been identified at other supposed boundaries. Discontinuities may also be seen at the transition from

pre-school to early primary or at the interface between secondary and further or higher education. In the last case, there would appear to be a chronic decline both of recruitment to, and retention in, science-based degree courses. At FE level there are problems attracting sufficient young people into science-based crafts and the technical trades. For many young people, science simply has no *cool*.

Such flaws run through the science education system. They may now terminate as fault lines. At those points, we see losses nationally of science and engineering talent and a simultaneous decline in social empathy for science and its works. Such fault lines aren't confined to Scotland or indeed to the UK. They have been identified around the world.

Primary/secondary transition

This is the major area of concern to the ISE 5–14 team. Primary science has made great strides in many of our schools. It has really galloped ahead in some. It may be that significant numbers of primary colleagues continue to lack confidence and understanding in some science areas (particularly in aspects of the physical sciences). To set against that perception, is the routine application in primary schools of a range of learning and teaching approaches of a breadth and richness rarely seen at secondary level.

The presentation of science-related topics in the media, and in visitor attractions, has also seen great change. This has generally been for the better in broadcast media and in 'informal' science education but generally for the worse in popular print. Too few of our colleagues in the secondary sector have taken such developments on board. For example, books by major publishers targeted on the first year of Scottish secondary schooling still have patronising titles such as *'Starting Science'*. This sort of thing is at best thoughtless. At worst, it is hurtful to primary colleagues and unnecessarily counter-productive.

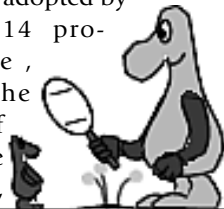
What are the practical priorities?

To their credit, the Scottish inspectorate did express a clear view on these matters. They made a number of recommendations in the publication *Improving science education 5–14* (SEED, 1999) – in particular that:

All teachers of science in primary and secondary schools, school managers, parents, education authorities, teacher education institutions and Scottish national bodies with an interest in improving standards in science

education should work together...

Such recommendations underpin strategies adopted by the ISE 5–14 programme, including the espousal of collaborative approaches, working



Assessment

across sector boundaries, concentrating more on the 'How?' of science education and getting rather less hung up on the 'What?'

So much for strategy. What about the tactics?

Homework



ISE 5–14 currently has four components. Activities in two of these areas

(innovations in assessment and homework) are being led by Learning and Teaching Scotland (LTS). Other key initiatives, chiefly continuing professional development (CPD) programmes on practical learning activities and web-based support, are managed by, or facilitated through, a support service based within the Scottish Schools Equipment Research Centre (SSERC). ISE 5–14, nonetheless, is a coherent programme and all of the central personnel meet and work together as a single team.

SSERC's responsibility is chiefly for the CPD on practical activities and the website and these are the two components on which the remainder of this article focuses.

Collaborative CPD

In recent financial years the Scottish Executive, in light of the Science Strategy, has assigned significant additional funds to school science education north of the border. For this financial year and the next two, some ten million pounds has been set aside for this purpose. It has been

Box 1

ISE 5–14: Criteria for CPD consortia

A Essential elements

Collaborative arrangements and working

- across local authorities
- across school sectors (age and stage)
- Direct involvement of classroom practitioners
- in the development of CPD materials
- in the training process as tutors and trainers

B Desirable

Collaborative arrangements and working between local authorities and third parties in

- higher education
- commerce and industry
- the informal science education sector (science centres, museums, etc.)
- local facilities such as research institutes

indicated that a significant proportion of these monies (about 40%) should be assigned to CPD for teachers of science.

Such funding has fuelled the 'demand side' of science CPD. The CPD element of ISE 5–14 is intended to build Scotland's capacity on the 'supply side' of that professional development equation.

SSERC is working with partners across the country to establish up to four centres of activity for CPD through practical science activities. So as to match basic principles of the programme, and to secure funding, partners have to meet a small number of basic criteria. These criteria are set out in Box 1 and exemplified in Box 2. A number of founding partners and other bodies are also seen as integral components of the programme. This is because:

- they contributed to the thinking behind the initiative and to its formulation (e.g. the local authorities' Scottish



CPD

Science Advisory Group, the 'CASE' network, the Institute for Science Education Scotland [ISES], etc.);

■ evaluation evidence has shown that their earlier work gives us proven models on which to base sound and effective provision (examples would include the Science and Plants for Schools [SAPS] project funded by the Gatsby Foundation, the Partnerships in Primary Science [PIPS] project funded by the AstraZeneca Science Teaching Trust, the ASE and individuals like Brenda Keogh and Stuart Naylor for their excellent work in supporting science investigations);

■ they are respected 'gatekeepers' to networks, facilities or specialised expertise.

We also have to bear in mind discontinuities other than those between primary and secondary. To that end, we have particularly welcomed proposals including relevant partners from outwith the normal or formal school-based system. We aim also to pull off the twin miracles of both gearing up the system and making it sustainable.

What about ICT and the web?

ICT generally, and web-based techniques in particular, underpin the whole ISE 5–14 programme. SSERC's own involvement in ISE 5–14 sprang from earlier work on various phases of the Science Online Support Network (SOLSN). The ISE 5–14 programme has its own development site funded as part of the National Grid for Learning. The site is designed around curricular principles. These were learned the hard way through the SOLSN experience. Like SOLSN, the ISE website uses curricular frameworks on which to hang relevant resources.

The current consensus seems to be that the Scottish science curriculum is unacceptably

Box 2

The South East Earth and Space (SEES) Consortium meets all of the ISE 5–14 criteria

A Essential elements

Collaborative arrangements and working

- four local authority partners
- both primary and secondary actively involved
- Direct involvement of classroom practitioners
- CPD materials to be developed and delivered jointly by primary and secondary teachers seconded full time and working as a team with support from specialist earth scientists

B Desirable

Wider collaborative arrangements and working

- SEES partners also include the Royal Observatory (Edinburgh) Trust, Our Dynamic Earth (visitor centre), the Scottish Earth Science Education Forum and The Moray House Institute of Education at Edinburgh University. Some of the team are active members of ASE Scotland.

overloaded (for example, see *Science 2020, Proceedings – ASE, 2003*). It looks content-driven and is minutely dissected, in terms of so-called 'targets', probably to the point of excess. These look likely not to be solely Scottish weaknesses. Paradoxically, cataloguing such a curriculum in detail, but in web-based formats, seems to us to hold the key both to its simplification for learners and teachers and to the reconnection of science education with mainstream society and culture.

You can see the ISE site for yourselves at: www.ise5-14.org.uk Some words of warning: don't just skim its surface but be careful and don't fall in – it's deeper than it looks.

References and further reading

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Graphics courtesy of Ian J. Birrell.

Resources



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