A Response from the Learned Societies' Group on Scottish Science Education to Education Scotland's Sciences 3-18 Curriculum Impact Report, 2013 Update

January 2014

1. The Learned Societies' Group is pleased to have the opportunity to respond to Education Scotland's 2013 Update Report, *The Sciences 3-18*.[1] While we realise that the report is not being formally consulted upon, we recognise that Education Scotland is keen to encourage engagement from the wider science community. We thought Education Scotland would welcome feedback from the Group as it seeks to gauge the impact of a changing curriculum on learners' experiences and achievements and continues to highlight areas for discussion and further development.

2. The collaborative Learned Societies' Group was established in 2012 and comprises representatives from the Royal Society of Chemistry, the Institute of Physics, the Society of Biology, the British Computer Society, the Royal Society of Edinburgh, the Association for Science Education, the Scottish Schools Education Research Centre and the Engineering Policy Group in Scotland. The establishment of the Group has purposes arising from concerns about, and a need to contribute to, major reforms in the delivery of science education in Scottish schools. While the constituent organisations are individually active in this area, we believe that more can be achieved by a formal collaborative grouping that identifies, discusses and takes action on common issues. Further information about the Group is available from: http://www.royalsoced.org.uk/1076_LearnedSocietiesGrouponScottishScienceEducation.html

General comments on the Update Report for the Sciences

3. The update report provides a detailed and useful narrative, including the provision of good practice examples and guidance. However, we believe the report would be strengthened if it had a more strategic focus, providing judgement on the actions that need to be taken to improve the delivery of learning in the sciences 3-18.

4. Within the report there are references to practitioners, children, young people, parents and the wider scientific community. However, it is not clear to us who the report is principally aimed at. If teachers are a primary target, key considerations are what would a teacher take from the report and do teachers have the time to reflect on all areas of teaching and learning covered? We would be interested in finding out to what extent this report and the series of CfE briefings have been disseminated to schools and teachers? Does Education Scotland have a way of evaluating whether and how teachers are acting on such reports and briefings? We are concerned that unless teachers are actively monitoring the Education Scotland website on a regular basis, which they are unlikely to be able to do due to time constraints, they may be unaware of these reports and briefings.

5. It is helpful that the report highlights those areas that will need to be developed to improve the sciences 3-18 in Scotland (page 48). We expect that Education Scotland intends to reflect on these areas and provide progress updates in future versions of the report. In doing so, Education Scotland might wish to draw attention to specific actions that schools are making to address the areas for development and also reflect on the

[1] http://www.educationscotland.gov.uk/resources/0to9/genericresource_tcm4817001.asp

logistics of how they are achieving this. We suspect schools and teachers would find this type of information very useful.

6. In relation to the delivery of the experiences and outcomes for the sciences, there is a statement on page 6 that, *At times, staff are micro-managing the curriculum…* We believe that the report could have made it clear that there is no requirement for practitioners to showcase how every experience and outcome up to the third level is being met. We understand that this point was also highlighted at a STEMEC meeting.

7. There is a comment on page 4 of the report that, *Many schools are providing a range of opportunities for children and young people to develop relevant sciences knowledge and skills outwith the timetabled curriculum.* It is worth noting that this will, in many cases, be driven by one or two highly motivated teachers and often by probationary teachers. While this might result in short-term impact, encouraging schools to include such activities as part of their improvement plan could be a way of sustaining gains over the longer-term. Similarly, more consideration could be given to how Eco-Schools activities and Go4SET can be enabled as part of formal learning in the curriculum.

Good Practice Examples

8. We welcome the inclusion in the report of the good practice examples. They are interesting and demonstrate that there is clearly some very innovative practice being adopted in schools. While we understand that there are good reasons for anonymising the examples, it would have been useful to include information on the geographical spread of this work, particularly in relation to the nature of any collaborative activity that is taking place.

9. The basis upon which the 43 good practice examples have been included in the report is not clear. Have they been filtered in some way or do they simply reflect all those that were encountered in the process of compiling the report?

10. We firmly believe that the report would be strengthened if all of the examples were framed with reference to a set of criteria. For example, this could include the extent to which they are underpinned by disciplinary knowledge and skills, the applicability of the learning, the potential for transferring what has been learned into different learning areas and contexts, the extent to which the learning promotes higher order thinking skills and whether partnerships were developed in order to consolidate good practice.

11. Having highlighted the good practice examples in the report, what is being done to ensure that they are rolled out in schools throughout Scotland? To what extent do the examples reflect the picture of 3-18 science education in Scotland? From a teacher's perspective, where would they start if they wanted to implement an example in their school?, who would they contact for support? and how are they to be provided with the time to undertake this? Consideration also needs to be given to geographical aspects and the fact that in some areas there will be greater opportunity for schools to collaborate with tertiary education providers and industry compared to others. If this is not already being done, it might be worth considering whether the good practice examples could be exemplified at national science events by the teachers and staff who developed them.

12. We note the reference to the Primary Science Quality Mark project in example 42. This is however essentially self-evaluated and costs in excess of £600 per school. Unfortunately, it is simply not a viable option for the majority of Scottish primary schools.

CPD and Professional Learning Communities

13. We note the statement on page 43 of the report that, *Online CPD should be part of the blended, tailored approach to CPD for all teachers.* We agree that there is a need to utilise the different models and means of CPD as appropriate to the circumstances. CPD is diverse in nature. The overarching need is for new understandings and skills to match innovations that appear on the educational scene, to maintain familiarity with new ideas and findings that emerge in academic disciplines or studies of teaching, and to sustain teachers' interest and enthusiasm for what they are teaching. It may be time limited or continuing and focussed on the individual teacher or on collaboration groups. It may be designed as a formal qualification or not, based in the school, school cluster or regional/national context and delivered online or face-to-face. It may be peer-led, local authority or national led, Teacher Education Institution (TEI) or university department led, led by a professional association or framed to encourage teachers' self-initiated learning.

14. The uneven provision of science-specific professional learning and barriers to take up including remoteness and accompanying costs; lack of supply of teacher cover; education authority budget cuts; and the demise of education authority science advisers are recognised on page 45 of the report. Against this background, we would like to stress that online science CPD should certainly not be regarded as a panacea.

15. We note the references in the report to CPD Central. While CPD Central is still live, it is no longer being regularly updated with new CPD opportunities. The platform is due to be changed over by June 2014 and will, we hope, form part of the new national professional learning community. It would be useful if clarification were provided on this as there is confusion among practitioners about what CPD resource to use. If a website is not working effectively from the outset teachers are unlikely to use precious development time trying to access it. There is an argument for holding back from encouraging teachers to use the new platform until such time as the new Glow is fully operational. However, Education Scotland will need to balance this with the demand for greater sharing of resources in the context of the implementation of the new CfE Highers and then Advanced Highers.

16. With HE and industry unable to access Glow except at the request of a guest account (which are likely to be more difficult to obtain under the new Glow), then the ability for them to engage with teachers and support curriculum developments is likely to be restricted to the locality that the HE institution or industry is based.

17. We were surprised that there is no reference in the report to, for example, the Scottish Physics Teaching News and Comment (SPUTNIK) and the SSERCCHEM group. These on-line communities are examples of existing professional learning communities where teachers can share ideas and concerns and ask others for advice and support.

Interdisciplinary Learning

18. Interdisciplinary learning (IDL) has been adopted as an essential element of CfE. The report recognises that the use of IDL is an increasing and widely welcomed feature of learning and that many examples of good and innovative practice in working across discipline boundaries are now emerging. However, the implementation of IDL also presents major challenges such as an adequate breadth and depth of STEM knowledge, understanding and skills, especially in interdisciplinary areas, and the current narrowness of the science subject discipline base. These need to be addressed in order to embed IDL within the culture of Scottish education.

19. Within the report there are references to the contextual and thematic delivery of IDL. We agree that contextual learning is an important and widely used type of IDL where different disciplines or curriculum areas are focused – or converge – on a context, issue or problem. However, it should be emphasised that merely linking discrete subjects together around a theme is not by itself interdisciplinary. In good IDL, learners will tackle relevant and meaningful questions or problems that will allow them not simply to make connections between two or more disciplines but to ***draw on and develop their disciplinary knowledge and understanding*** and thereby deepen their understanding of these disciplines. Only in this way will IDL enable and enhance the vital capacity to ***transfer*** and ***apply*** disciplinary knowledge and understanding to new problems and contexts and into other areas of learning. It is not clear whether these fundamental characteristics of good IDL are key features of the various examples of good practice cited in the Report.

20. The Learned Societies' Group has identified IDL as a priority area for activity. Under a joint initiative between the Group and the STEMEC, a strategy meeting on IDL was hosted at the RSE in November. This brought together senior representatives from key education organisations in Scotland, including Education Scotland. The IDL strategy group will reconvene in February with a view to agreeing the establishment of programmes, actions and responsibilities for delivery of IDL in STEM education and more widely. This will mean creating a more permissive environment for IDL, including: addressing the practical impediments, providing support for incoming and existing teachers and ensuring that the assessment regime is compatible with IDL.