

# THE LEARNED SOCIETIES' GROUP ON SCOTTISH SCIENCE EDUCATION

NOVEMBER 2015

## THE NATIONAL IMPROVEMENT FRAMEWORK FOR SCOTTISH EDUCATION: A RESPONSE TO THE SCOTTISH GOVERNMENT

- 1** The Learned Societies' Group on Scottish Science Education<sup>1</sup> (the LSG) welcomes the opportunity to respond to the Scottish Government's consultation on the draft National Improvement Framework for Scottish Education.<sup>2</sup> The LSG comprises representatives from the: Association for Science Education; BCS, The Chartered Institute for IT; Edinburgh Mathematical Society; Engineering Policy Group in Scotland; Institute of Physics; Royal Society of Biology; Royal Society of Chemistry; Royal Society of Edinburgh; and Scottish Mathematical Council. The LSG collaborative grouping brings together these organisations to discuss and contribute to the major reforms in science and mathematics education in Scottish schools.
- 2** The Framework represents a fundamental development for Scottish education. While the Government is clearly consulting and engaging on it, we are unsure as to the reason why the draft Framework has not been issued as a formal consultation. It is unfortunate that the deadline for responses has not been made clear in the document. We recognise that the Government intends to publish a revised Framework in December. We are concerned that this leaves the Government with little time to take full account of the responses it receives. The Government should therefore provide reassurance that there will be ongoing opportunities (with sufficient timescales) to contribute to the Framework as it evolves, particularly as more details on its implementation become available.
- 3** The draft Framework aims to create the conditions for improving attainment overall, while also closing the attainment gap between the most and least disadvantaged children. In doing so, it has sought to
- build on best practice which exists internationally for the systematic and objective collection and use of data to develop an understanding of how learners are performing and on how to improve the quality, equity and efficiency of school education. The draft Framework has been informed by the OECD's research on *Synergies for Better Learning*.<sup>3</sup>
- 4** The OECD research makes clear that in contributing to national reform agendas, a certain degree of national consistency of approaches to evaluation and assessment is desirable. In this context, 30 out of Scotland's 32 local authorities already use some form of standardised assessment in order to develop an understanding of their learners' progress in primary and in lower secondary. However, under the present arrangements there is not a consistent approach for collecting locally-derived performance data with individual local authorities using different forms of assessment. It is therefore not possible to have a coherent understanding at the national level on the performance of Scotland's education system at the broad general education phase. The availability of centrally procured assessments may also free-up funding within local authority education budgets, and the standardisation of assessment materials across Scotland would allow comparison of performance across local authority areas.
- 5** We have focused our response on a range of key issues that will need careful consideration by the Scottish Government as it works towards finalising the Framework. LSG members would be pleased to discuss further our response with Scottish Government Learning Directorate officials.

### Vision and Priorities

<sup>1</sup> Information about the LSG is available at: [https://www.royalsoced.org.uk/1076\\_LearnedSocietiesGrouponScottishScienceEducation.html](https://www.royalsoced.org.uk/1076_LearnedSocietiesGrouponScottishScienceEducation.html)

<sup>2</sup> Draft National Improvement Framework; Scottish Government; September 2015 <http://www.gov.scot/Publications/2015/09/7802/downloads>

<sup>3</sup> OECD (2013), *Synergies for Better Learning: An International Perspective on Evaluation and Assessment*, OECD Reviews of Evaluation and Assessment in Education, OECD Publishing, Paris. <http://www.oecd.org/edu/school/synergies-for-better-learning.htm>

## Implementation Plan

- 6 While the draft Framework seeks to articulate the vision, purpose, priorities and drivers for improvement, much greater detail is needed on how they will be delivered. A prominent question is: *how will the desired improvements in attainment, including reducing the gap in attainment between those from different backgrounds, actually be achieved through the Framework?* This emphasises the importance of there being greater clarity on how the Framework and the data generated will be used to support improvement. A key question that needs to be addressed is whether the Framework is principally concerned with evaluating the performance of the school education system or is it intended to provide a diagnostic assessment at the level of the individual child? The answer to this question has important implications for the number and nature of the assessment points, including the balance between summative and formative assessment.
- 7 We are firmly of the view that a fully costed *implementation plan* needs to be developed to support the introduction of the Framework. We see this as very important given the requirement to build the capacity of the system. The actions identified on pages 8 – 9 of the Framework would benefit considerably from more information on what level of support will be put in place, the specific targets sought and on how progress will be monitored and evaluated.
- 8 On pages 15 and 16 there are statements pertaining to the roles and responsibilities of teachers, headteachers, parents and local authorities, among others. While these statements set out the expected obligations of these influential groups, there is little information or advice on how they are to be fulfilled and progress towards meeting them monitored, and the support that will need to be provided. This should be addressed by bringing forward an implementation plan in conjunction with the Framework.

## Influencing Classroom Practice

- 9 The OECD research<sup>4</sup> is clear that the rationale of improvement frameworks is to *improve classroom practice and student learning*. Focussing only on improvement frameworks without attention to developing and improving classroom practice is unlikely to result in the desired improvements.

The final Framework and its implementation strategy will need to be clear on the Framework's approach to shaping classroom practice.

- 10 The use of standardised assessments can be an invaluable tool for informing policy and practice but only if used with care and in combination with other tools. Their design and implementation should be thought-out together with teachers and head-teachers, so that they will be used in practice to facilitate improvements in educational outcomes at pupil, school and national levels.
- 11 In developing improvement frameworks, the OECD research also informs us of the need to find a balance between achieving a consistent national approach and remaining flexible to the particular circumstances of different local authorities and schools.

## Potential implications of National Standardised Assessment of reading, writing and numeracy on science education

- 12 In introducing national standardised assessment in Scotland, extreme care will need to be given to identifying potential unintended consequences, including those highlighted in the following paragraphs, with a view to preventing them from materialising.
- 13 It is instructive to consider the developments in England where Standard Assessment Tests (SATs) have been used to assess the attainment of children attending maintained schools since the early 1990s. In May 2009 science SATs were abolished in England, with national testing in literacy and numeracy continuing. The rationale for this change was to allow for greater innovation in the classroom, allowing teachers more time to focus on learning and teaching beyond narrow external assessments. However, research undertaken by the Wellcome Trust<sup>5</sup> has shown that since the abolition of the science testing, almost two thirds of teachers surveyed felt that science was now regarded as being of lesser importance in their school when compared with mathematics and English. Furthermore, Ofsted<sup>6</sup> has directly linked a decline in science teaching with the fact that, whilst English and Maths were still subject to national testing, science was not.

<sup>4</sup> *Ibid.* 3

<sup>5</sup> Primary Science Survey Report; Wellcome Trust; December 2011 [http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh\\_peda/documents/web\\_document/wtvm053596.pdf](http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtvm053596.pdf)

<sup>6</sup> *Maintaining curiosity: A survey into science education in schools*; Ofsted; November 2013

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/379164/Maintaining\\_20curiosity\\_20a\\_20survey\\_20into\\_20science\\_20education\\_20in\\_20schools.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/379164/Maintaining_20curiosity_20a_20survey_20into_20science_20education_20in_20schools.pdf)

**14** It is widely acknowledged that the introduction of a programme of standardised assessment lends itself to the following risks, among others: distortion of teaching and learning, including “teaching to the test” and narrowing of the curriculum (which would be in tension with the philosophy of CfE); high-stakes testing resulting in the creation of school league tables; increasing workload and bureaucracy for schools and teachers; and increasing stress levels among teachers and learners. In bringing forward the revised Framework and implementation plan the Government should set out how these potential consequences will be avoided. The LSG is particularly concerned with the need to avoid creating unhelpful comparison and competition among schools. The Government therefore needs to define a publication strategy for the Framework, making clear which data will be published and in what form, and who will have access to it.

### Potential implications for Initial Teacher Education and Teachers’ Professional Development in Science

**15** The draft National Improvement Framework sets out the following statements in relation to the role of Initial Teacher Education and teachers’ professional development in supporting its priorities.

*“Universities will focus on the key priorities when refreshing courses of initial teacher education, for example by significantly increasing content on literacy and numeracy, and including data literacy.”* (page 16)

*“The General Teaching Council for Scotland will ensure that the priorities are reflected in courses and programmes when accrediting initial teacher education and professional update.”* (page 16)

*“Teachers should: Prioritise professional learning time to focus on achieving the key priorities at classroom and school level.”* (page 15)

**16** The LSG is concerned that the draft Framework’s focus on improving attainment in reading, writing and numeracy could have, as an unintended consequence, an adverse impact on other important areas of teacher education and professional development, including those relating to science.

**17** *Teaching Scotland’s Future*<sup>7</sup> was clear on the need for science to feature prominently in initial teacher education programmes for Primary teachers. It stated: *“Improving their knowledge of a few areas of the curriculum, such as aspects of mathematics, science and modern languages, are priorities for many prospective primary teachers”*. This has been reinforced in a recent study<sup>8</sup> from the Wellcome Trust on Primary science which calls for *“high-quality initial teacher training in science, and commitment to the provision of intensive subject-specific CPD to equip existing science subject leaders to support colleagues and lead improvement in science.”*

**18** In evaluating current school practice in the sciences, Education Scotland reported<sup>9</sup> that a lack of confidence in teaching the sciences is still an issue for many primary teachers. Similarly, the independent Science and Engineering Education Advisory Group (SEEAG) (now STEMEC) which has been advising the Scottish Government has highlighted the limited knowledge and understanding in science of primary teachers and the resulting lack of confidence as a major cause for concern.<sup>10</sup> Education Scotland has emphasised the need to provide primary teachers with opportunities to engage in career-long science-specific professional learning. Research<sup>11</sup> undertaken into the uptake of science CPD in English schools found that, in a context in which literacy and numeracy are subject to a programme of national testing, headteachers do acknowledge that subject specific CPD would improve core knowledge and pedagogy, but in practice resources for training are directed towards literacy and numeracy. If this outcome was replicated in Scotland it would run counter to the professional advice from Education Scotland and *Teaching Scotland’s Future*.

**19** The Wellcome Trust study<sup>12</sup> demonstrates that science provides a ‘motivating context’ for developing and improving skills in broader curriculum areas, including literacy and numeracy. Therefore, efforts to develop science knowledge and skills in primary teachers can contribute to a more varied and secure educational environment in which literacy and numeracy can be enhanced.

<sup>7</sup> Report of a review of teacher education in Scotland; Graham Donaldson; Scottish Government; 2010 <http://www.gov.scot/Resource/Doc/337626/0110852.pdf>

<sup>8</sup> *Primary Science: Is It Missing Out? – Recommendations for reviving primary science*; Wellcome Trust; September 2014 [http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh\\_peda/documents/web\\_document/wtp057648.pdf](http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtp057648.pdf)

<sup>9</sup> The Sciences 3-18; Education Scotland; September 2013 Update [http://www.educationscotland.gov.uk/Images/Sciences3to182013Update\\_tcm4-817013.pdf](http://www.educationscotland.gov.uk/Images/Sciences3to182013Update_tcm4-817013.pdf)

<sup>10</sup> Supporting Scotland’s STEM Education and Culture; SEEAG; January 2012 <http://www.gov.scot/resource/0038/00388616.pdf>

<sup>11</sup> *Ibid.* 8

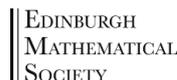
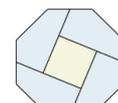
<sup>12</sup> *Ibid.* 8

## Provision of Resources

**20** The draft Framework states on page 9 that:  
*“New resources and support for teachers to enhance... and improve literacy and numeracy by September 2016 – to be used in professional learning opportunities (including in service days), teacher induction and initial teacher education.”* The OECD research recognises the risk of disproportionate support and resource being allocated to those areas that are being assessed. While we appreciate the importance of ensuring the provision of resources to support the teaching of literacy and numeracy, we would be concerned if this were to come at the expense of other curriculum areas, including science. The Wellcome Trust study is clear on the need for Primary science to be well-resourced, including the development of benchmarks of essential and desirable science equipment. However, research<sup>13</sup> commissioned by the LSG indicates that currently in Scotland school science resourcing levels are not sufficient to fully and effectively meet the requirements of the curriculum and that support to enable teachers to deliver practical science is low. As well as providing new resources to support teachers to improve literacy and numeracy, the Scottish Government should ensure that science is sufficiently supported within Scotland’s schools.

**13** Resourcing of Science in Scottish Primary and Secondary Schools; LSG; November 2014  
<https://www.royalsoced.org.uk/news/news.php?id=263>

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The Association for Science Education Charity No: 313123

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