

Sir Andrew Carter
Carter Review of Initial Teacher Training
Department for Education
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By email

From the Physical Secretary and Vice-President Sir John Pethica FEng, FRS

22 September 2014

Dear Sir Andrew

The Royal Society is pleased to respond to your review. The Society has recently published its *Vision for science and mathematics education*,¹ which addresses initial teacher education in detail and is the basis for this letter.

It is widely acknowledged that the curriculum is only as good as the teachers who teach it. Nonetheless, despite the great responsibility vested in teachers for nurturing young people's development and progression, teachers in the UK are generally held in lower esteem than their peers in other countries, and teaching is often considered a less enticing option than other, higher-salaried professions.² Significant changes are needed to raise the status of the profession and achieving these requires purposeful, collaborative action by Government, the teaching profession and subject associations.

We hope your Review can act as a catalyst for positive change in England. This submission complements the Royal Society's input to this review through the SCORE partnership.

Defining effective ITT practice

1. The term '(initial) teacher education' (ITE) should be used in place of 'initial teacher training'. Teaching is not simply a craft that can be learnt through on-the-job training. Rather it is a multifaceted occupation, demanding substantial subject-specific knowledge (often, in the sciences, involving knowledge and understanding across more than one of biology, chemistry, physics, computing and mathematics), pedagogical content knowledge (PCK) and a range of other skills and capabilities that enable teachers to move seamlessly between the roles of facilitator, enabler, coach, counsellor and disciplinarian on a daily basis. It is notable that 'initial teacher

¹ See <http://royalsociety.org/education/policy/vision/>

² Varkey GEMS Foundation 2013 *2013 global teacher status index*. London: Varkey GEMS Foundation.



education’ has been adopted in the rest of the UK and more widely internationally, and we can see no good reason why England should be different.

2. It is important that a range of initial teacher education routes should be maintained in England. There should be minimum barriers to entry into initial teacher education. In addition there should be routes back into the profession for those returning from career breaks,³ and flexible ways for professional scientists, technologists and engineers to enter teaching at any stage of their careers (provided they have or acquire the full breadth of subject knowledge and work towards pedagogical qualifications that complement their subject expertise).
3. In order to ensure all initial teacher education courses are of a universally high and rigorous standard, they should be constructed around a common set of principles, described in our *Vision* report (see Appendix 1). They should also instil in student teachers realisation of the importance of engaging in professional development throughout their careers, not only to keep their subject knowledge up-to-date, but to reinvigorate and stimulate their teaching. Evidence commissioned for the *Vision* report from the Institute of Education stated that this ‘is a ... key requirement for professionalizing science and mathematics teaching’,⁴ but it is of course applicable for student teachers in all subjects. As in other professions, such as medicine, it is important that teachers who successfully complete their initial teacher education should not be considered the ‘finished article’ and should commit to regular career-long professional development.
4. The Royal Society believes that these principles should be universally applicable, with a view to ensuring that every primary school has, or has access to, at least one subject specialist teacher in both science and mathematics and that all post-primary science and mathematics lessons are taught by suitably qualified subject specialists.
5. Although the Royal Society recognises the significant cost implications of an extended PGCE course, we believe that such principles cannot be adequately upheld within the length of current PGCE courses. By contrast, the time taken to complete primary, lower secondary and upper secondary ITE is greater in many EU countries.⁵
6. Some of the requirements of a number of these principles will be hard to meet through teacher education routes that are predominantly school-based (eg gaining skills in educational research methods, which are so important in informing practice and pedagogical development). Within these routes, a minimum requirement should be stipulated for the amount of time allocated to subject-specific content. Also, student teachers participating in initiatives such as School Direct should have dedicated time with an accredited Higher Education provider.

³ Initiatives of this kind already exist in Further Education to enable industry experts to teach part-time. ‘Teach too’ is being designed to encourage more experts from industry to spend some time ‘teaching their work’, as part of structured vocational programmes.

⁴ See <https://royalsociety.org/~media/education/policy/vision/reports/ev-8-vision-research-report-20140624.pdf>

⁵ See https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Main_Page and http://eacea.ec.europa.eu/education/eurydice/documents/key_data_series/151EN.pdf, pp. 26–28.

The extent to which the system currently delivers effective ITE

7. The UK's capacity to offer a high-quality science and mathematics education to all young people is hampered by shortages of suitably qualified teachers that have persisted for many years. It may still be too early to assess the impact of the Government's recent reforms to teacher education, but it is apparent that the targets for key strategic subjects such as computing, mathematics and physics will be missed this year,⁶ as has often happened in previous years.⁷
8. It is unclear from the diversification of ITE routes over the past 3 years whether HE-based and employment-based training are equally effective. A proper assessment is required.
9. In order to ensure that initial teacher education courses are rigorous and maintain the same high standard, it is essential that detailed subject-specific inspections should be made regularly, and indeed more regularly than is the case currently. This is a particular challenge given the increased diversity and number of teacher education providers.

Yours faithfully



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⁶ See <http://johnohowson.wordpress.com/2014/08/28/good-news-and-bad-news/>

⁷ See <https://royalsociety.org/~media/education/policy/vision/reports/ev-7-vision-research-report-20140624.pdf>

Principles of effective initial teacher education

BOX 16

Principles of effective initial teacher education

All initial teacher education courses should be focused on developing deep subject-specialist knowledge and conceptual understanding, and in the context of their specialist knowledge:

- excellent pedagogical skills, including mastery of new technologies;
- a comprehensive set of skills for assessing students' understanding, progress and development;
- substantial practical experience of teaching gained through placements, possibly in both primary and secondary schools, to help them facilitate the transition from primary to secondary education;
- a deep understanding of the sources and consequences of unconscious bias to ensure that achievement in all subjects is high for all pupils irrespective of gender, race or socio-economic background;
- deep knowledge and understanding of educational theory;
- skills in educational research methods;
- familiarity with educational research, building understanding of the importance of keeping up to speed with the latest findings with a view to being able to take advantage of these;
- knowledge of the structure and function of the education system and of the history of education policy reform;
- knowledge of the career pathways open to qualified teachers; and
- confidence to engage with STEM research and industry, both for teachers' own professional development and to ensure that they build the necessary links to provide their students with access to STEM information and careers knowledge.

Source: Royal Society *Vision* report (see <http://royalsociety.org/education/policy/vision/>).