

SEPTEMBER 2014

CARTER REVIEW OF INITIAL TEACHER TRAINING

RESPONSE TO THE CALL FOR EVIDENCE



GATSBY

INTRODUCTION

- 1 Gatsby is a Trust set up in 1967 by David Sainsbury (now Lord Sainsbury of Turville) to realise his charitable objectives. We focus our support on the following areas:
 - Plant science research
 - Neuroscience research
 - Science and engineering education
 - Economic development in Africa
 - Public policy research and advice
 - The Arts
- 2 Over the last decade Gatsby has invested more than £4 million in developing and supporting a number of major programmes to improve the recruitment and retention of physics teachers, including working in partnership with government and others to: pilot the first Subject Knowledge Enhancement (SKE) courses for both pre-initial teacher training (ITT) and for serving teachers lacking a physical science specialism; support universities in better marketing their physics ITT provision; and developing a mentoring programme to support early career teachers.
- 3 We are also currently supporting a wide range of projects aimed at improving, protecting and promoting practical science in schools. It is critical that students experience a hands-on practical science education to provide them with the skills they need to succeed in higher education and employment. This will only be possible if teachers are competent and confident in using practical work to its full potential across all three sciences. We are therefore committed to exploring how current teacher training provision develops these skills with trainee teachers, and to considering how practical skill development could be best supported.

EFFECTIVE ITT – SUBJECT KNOWLEDGE

- 4 The importance of specialism in secondary school teaching is paramount. Report after report has come to the same conclusion: that the quality of an education system cannot exceed the quality of its teaching workforce. The teaching of science continues to suffer because there are too few specialist physics teachers working in schools.
- 5 The last decade has seen a significant rise in the number of physics teachers recruited. In September 2012 900 physics trainees started their ITT, coming close, for the first time, to the government target for physics trainees. However, the last two years have seen this number fall substantially.
- 6 Subject Knowledge Enhancement (SKE) courses have been one of the most important factors in the rise of physics teachers in the classroom. Approximately 20% of trainees entering physics teacher training in 2012 came through an SKE course. The courses allow graduates who do not hold a degree in physics or chemistry (and some other difficult to recruit to subjects) to enter ITT and this allows for recruitment to the profession from a much wider degree pool than would otherwise be possible. Changes to the allocation of SKE courses coupled with a lack of awareness and understanding of the courses by schools has led to a drop in provision and take-up of these courses. These courses play a vital role in the recruitment of high quality candidates with good subject knowledge to shortage subjects and must be protected.
- 7 We are also concerned that schools are less likely than Higher Education Institutes (HEIs) to recruit and train physics teachers, especially if they do not already have a specialist physics teacher already in school. Similarly, schools without a physics specialist may struggle to ensure the trainees have sufficient subject knowledge and conceptual understanding.

- 8 In partnership with the Institute of Physics (IOP) and Royal Society of Chemistry (RSC), Gatsby has developed a physics and chemistry subject knowledge diagnostic tool. The online tool contains a large bank of questions specifically designed to probe deeply into subject knowledge and identify misconceptions. ITT providers can either use the tool to create their own tests for trainees, or to administer tests created by the IOP and RSC. These tests could be used to help new providers or administrators of SKE courses determine the type and level of subject knowledge trainees require. It would also be possible to create a test that could be administered at the end of an ITT or SKE course to determine whether an individual has achieved the required level of subject knowledge to become a specialist teacher.
- 9 We would welcome the opportunity to work in partnership with government and subject associations to develop further common assessment tests.

EFFECTIVE ITT – PRACTICAL SCIENCE

- 10 Practical work can be used for a variety of purposes; to teach students the practical knowledge and skills required for GCSE and A level qualifications, and as a pedagogical tool to explain scientific concepts. Science teachers are expected to begin using practical work as soon as they enter their first teaching position. It is therefore of utmost importance that teachers are given the opportunity to learn and practice a range of practical techniques during their training.
- 11 Insufficiently preparing teachers for the practical demands of secondary science teaching not only risks providing students with an inadequate science education but also risks creating health and safety issues if practicals are not taught with appropriate skill and care.
- 12 The George Spencer Academy and Nottingham University, supported by the Gatsby Foundation, carried out a small piece of research into the confidence of novice teachers in practical science¹. The results indicated great variation in the experiences of trainees during their placements which in turn led to differing levels of confidence across both basic and complex practical techniques in all three sciences. In addition, large numbers of new teachers were not completing, or even reading, risk assessments before carrying out experiments in class.
- 13 As a result of this work we are soon to be conducting a short review exploring how practical skills are developed through different teacher training routes. Following this, we will consider whether a tool supporting the development, assessment and tracking of practical skills would be appropriate. We would be happy to share the results of this work with the Carter Review and government and work collaboratively on developing a tool if deemed useful.

EFFECTIVE ITT – STRUCTURE OF ITT

- 14 Several years ago, Gatsby trialled several pilots with PGCE courses where the subject knowledge is enhanced by intensive, additional tuition. The conclusion from each one of these pilots has been the same: such approaches do work, but to secure systemic change, the science PGCE needs to be lengthened (from 36 to perhaps 42 weeks) to cover the subject knowledge necessary to teach the full range of school sciences confidently and effectively.
- 15 Given the depth and breadth of work that needs to be covered within the training of a science teacher, we suggest that a lengthening of the ITT period be considered. We would be supportive of the proposal to delay QTS for one or two years to ensure that trainees have additional time to obtain sufficient subject knowledge, practical skills and pedagogy.

¹ Youens, B., Gordon, J., Newton, L. (2014) *Developing confidence in practical science activities in novice teachers: policy, practice and the implementation gap*. Issue 332 pp71 School Science Review

EARLY CAREER MENTORING

- 16 We strongly believe there are significant variations in and problems with the support received by teachers during their training and early career, regardless of training route. This impacts both teacher quality and retention.
- 17 It is sometimes assumed that new teachers do not have any further need to develop subject knowledge and subject pedagogy as this has been dealt with during their training year. As a result they receive very little subject-based support. But this support is vital, not just in ensuring students benefit from high-quality lessons, but also in building the confidence of new teachers and ensuring that teachers remain in the profession. This problem is even more acute in physics and other shortage subjects, as newly qualified physics teachers can often find themselves as the only qualified physics specialist in the their school and consequently have nowhere to turn for specific support.
- 18 Gatsby has worked with the IOP to develop a mentoring programme for physics teachers in their early career, providing them with support from experienced physics teachers working in other local schools and helping them to become part of the wider science community. As part of this work, we commissioned Sheffield Hallam University to undertake research examining the effectiveness of a number of teacher mentoring programmes, including the government funded Starting-Out programme. The report² concludes that:
- “...external mentoring support for non-specialist teachers of physics in secondary schools has had a significant impact on those teachers, with related benefits for their pupils, schools and the education system. We have seen for example, that, external mentoring has helped produce more informed, more adventurous and more committed teachers of physics who are not just ‘teaching by the book’ and who are more likely to remain in teaching. The potential long term impact should not be underestimated: improved physics teaching and more engaged pupils can lead to more able physicists teachers of physics of the future.”*
- 19 Mentoring was also shown to improve a broad range of teaching skills but most significantly the ability of teachers to make use of practical work, reducing reliance on text books and creating engaging and exciting lessons.
- 20 The IOP already provides external mentoring for some physics teachers as part of the scholarship package, through its Stimulating Physics programme³. The scholarship programme provides a substantial bursary and additional support (including mentoring) for high-quality trainees who hold at least a 2:1 in their degree. We believe more teachers would benefit from similar support. Sheffield Hallam’s report suggests five priority groups of teachers where support might be focussed, including secondary teachers of physics and other shortage subjects and teachers employed in challenging secondary schools with a high staff turnover.

CONCLUSION

- 21 Recruiting and retaining a sufficient supply of well-qualified, specialist teachers is a long-standing problem. Furthermore, time and again physics recruitment has been shown to be a fragile ecosystem with seemingly small changes resulting in significant falls in the number of trainees. Gatsby has unparalleled experience working in this area and strongly believes that the best chance of success lies in a partnership between government and those who understand the physics community and landscape. We would therefore welcome the opportunity to discuss with the Carter Review the points raised in this submission.

² Andrew J Hobson, Joanna Mcintyre, Pat Ashby, Vanessa Hayward, Anna Stevens & Angi Malderez, *The Nature, Impact and Potential of External Mentoring for Teachers of Physics and Other Subjects in England*. www.gatsby.org.uk

³ www.stimulatingphysics.org