National Foundation for Educational Research – Written evidence (PSU0043)

1. The National Foundation for Educational Research (NFER) is the leading independent provider of education research and insights in the UK.

2. NFER welcomes the opportunity to submit written evidence to the House of Lords Science and Technology Committee's Inquiry into People and skills in UK science, technology, engineering and mathematics. In doing so, NFER's contribution to this inquiry brings its well-established research programme on teacher supply, combining analysis of large datasets and in-depth qualitative research to provide fresh insights and identify improvements to keep teachers engaged and aid retention.

3. In drawing upon our knowledge and expertise, our response will focus on the questions: 'How easy is it to recruit teachers with scientific skills and expertise?' and 'What more can be done to encourage highly skilled individuals from all backgrounds to go into STEM education?'

4. The long-term development of the right people and skills in UK science, technology, engineering and mathematics (STEM) depends critically on the quality of STEM teaching and education in schools. A crucial underpinning of effective teaching in schools is having sufficient numbers of high-quality teachers in STEM subjects.

5. There have been long-standing difficulties of recruiting and retaining STEM teachers in the UK. A lack of high-quality teachers has implications for schools and STEM education, such as teaching being carried out by non-subject-specialists. The knock-on impacts of lower quality teaching is fewer pupils having the knowledge and skills in STEM subjects and fewer pupils choosing to pursue studying these subjects in further or higher education.

6. Physics has historically seen the most significant issues of teacher under-supply, but chemistry, mathematics, computing and design & technology have also been affected over many years. Indeed, school science departments typically over-recruit biology specialists as general science teachers and expect them to teach across multiple subjects in the science curriculum.

Recent trends in STEM teacher recruitment and retention

7. The table below shows the number of trainees enrolled on postgraduate initial teacher training programmes in England for a range of STEM subjects, as a proportion of the target numbers required to maintain an adequate level of staffing in England's secondary schools for that subject. The data is a key indicator of the extent of teacher supply issues and emerging shortages. Where a number is below 100%, the subject has failed to hit its target, meaning there is an under-supply of trainees compared to schools' expected needs.

8. Prior to the Covid-19 pandemic, England's schools were facing a growing challenge of recruiting and retaining sufficient numbers of teachers to maintain supply. This was particularly the case for STEM subjects. During the period 2015-

18, and in 2019, the number of trainees was below target (numbers less than 100%) for all the subjects listed in the table, except biology. However, despite over-recruitment of biology trainees, the overall number of science trainees was below the combined target.

9. The Covid-19 pandemic led to an easing of teacher supply concerns in the short term due to the increase in applications to teacher training and improvement in teacher retention. The number of trainees recruited as a proportion of the target rose for all subject areas except physics in 2020. The recruitment numbers were also relatively strong in 2021 as a result of the pandemic[1]. However, recruitment in biology and design and technology fell due to large reductions in the training bursaries available for these subjects.

	Average 2015-2018	**2019**	**2020**	**2021**	**2022 ***
Physics	65%	42%	38%	22%	19%
Chemistry	99%	67%	76%	105%	94%
Biology	110%	163%	186%	117%	94%
All science	88%	90%	96%	60%	47%
Mathematics	80%	64%	84%	95%	98%
Computing	69%	75%	96%	69%	33%
Design and Technology	35%	42%	72%	23%	25%

Source: Department for Education Initial Teacher Training Census 2015 – 2021, and NFER analysis of ITT applications data.
Note: * 2022 is an NFER forecast based on ITT applications data up to August 2022.

The current set of financial policy measures aimed at ensuring sufficient STEM teacher supply are very likely to be insufficient

10. There has been chronic under-recruitment and higher-than-average leaving rates for teachers of STEM subjects, primarily due to STEM graduates having relatively financially attractive career options outside of teaching, compared to teachers of other subjects (Worth, Tang and Galvis, 2022). The competitiveness of teacher pay compared to earnings outside of teaching has fallen since 2010, making recruitment and retention more challenging across all subjects (Worth and Faulkner-Ellis 2022; STRB 2022).

11. The aim of the 2022 teacher pay award was to make progress in addressing competitiveness. However, while the DfE's pay award – a five per cent increase for all teachers, with larger increases for early career teachers – does this to some extent, it is far from sufficient to address the supply issues for STEM subjects (Worth, Tang and Galvis, 2022). Further, while the additions to the pay award between the DfE's initial proposal published in March 2022 and the final award in July 2022 were welcome, the lack of additional funding for schools to

[1] Physics recruitment compared to target was lower in 2021 than in 2020, but this was mostly due to a major overhaul in the Department for Education's methodology for estimating the targets, which attempted to account for extensive under-supply in previous years.

support these payments to be made is disappointing. Alongside rising energy and support staff costs, the pay award puts school budgets in difficult positions and could potentially lead to counterproductive staffing reductions.

12. The Department for Education has put in place a number of programmes of targeted financial support for recruiting and retaining STEM teachers. These include generous training bursaries and scholarships. There is strong evidence that bursaries are effective for increasing entry into ITT (Worth and Hollis, 2022). Bursaries for physics, chemistry, maths and computing are currently set at £24k, but were £26k before the pandemic. The biology bursary is currently £10k, up from £0 in 2021, but it was £26k before pandemic. We believe there is a strong case for raising the biology bursary to be the same as other STEM bursaries, to boost the supply of science teachers (Worth, Tang and Galvis, 2022).

13. The Department for Education also has a programme of early-career retention payments, targeted at physics, chemistry, maths and computing teachers. There is robust evidence from evaluation of a previous programme that these are effective at retaining additional teachers (Sims and Benhenda, 2022). The DfE's new scheme is highly targeted at schools serving disadvantaged areas. Given the evidence on their effectiveness and the extent of the teacher supply challenge that schools face after the pandemic, believe there is a strong case for expanding the scope of this programme to widen to more areas and/or make it more generous.

14. Taking the current set of policy measures aimed at supporting STEM teacher supply as a whole, our recent analysis with the Gatsby Foundation looked at forecasting the likely path of teacher supply over the spending review period. A key conclusion was that, particularly since wages in the wider economy are rising more quickly than previously forecast, the Government's current medium-term policy is insufficient to ensure adequate supply for physics, computing, chemistry and all science combined.

15. We also considered combinations of financial measures that could support STEM teacher supply, which include higher pay, higher bursaries and retention payments that are more generous and have wider coverage (as mentioned above).

16. Combinations of additional financial measures could support the improvement of teacher supply in physics and computing, but no reasonable set of measures are compatible with the current targets being met over the medium-term. In relation to physics, this conclusion should prompt debate about how the education system can realistically and sustainably staff science departments in schools with a range of specialists. This could include considering the range of ITT courses offered, additional subject specialism training in physics, for trainees and teachers in the classroom, ensuring physics teachers are deployed to teach physics rather than other subjects (for example, see Sims, 2019), targeting recruitment of graduates with engineering degrees into physics teaching, and addressing the relatively low numbers of students studying physics at A level and as an undergraduate degree.

Improving the non-financial attractiveness of teaching would also help to improve teacher retention

17. While policy measures aimed at boosting the financial attractiveness of teaching are important, particularly for STEM teacher supply, non-financial factors associated with the attractiveness of teaching are also important, especially for improving retention. Unmanageable workload is the most cited reason ex-teachers give in surveys for why they left teaching (DfE, 2017). Teachers work longer hours during term time than similar individuals in other professions and most would prefer to work shorter hours (Wort and Faulkner-Ellis, 2022).

18. Workload is an issue for all teachers and not one specific to STEM teachers. However, research we conducted with the Royal Society found that science teachers do spend more time on planning and preparation than other teachers (Worth and Van den Brande), which is an activity most teachers say they spend too much time on (Walker, Worth, Van den Brande).

19. Support from science technicians for science teachers can be crucial for managing workload, particularly with lesson preparation. Research NFER conducted for the Royal Society of Chemistry highlighted a number of current challenges with the science technician workforce (Worth 2020). The number of science technicians and the amount of support they provide for secondary school science departments has fallen steadily since 2011/12 and there has been no significant improvement in the pay and employment conditions of school science technicians over the past decade.

20. Access to high-quality professional development has also been shown to be associated with improved retention for science teachers (Allen and Sims).

6 September 2022

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