The characteristics of and earnings and outcomes for physics teachers

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Executive summary

Key findings

- Teaching is not a popular destination for physics graduates. Only around 3% of the cohort of physics graduates enter teaching in the first few years after graduation. In mathematics, by contrast, more than 12% graduates become teachers in the years immediately after graduation.
- Physics teachers are, on average, as well qualified as other teachers, at least as measured by their prior attainment level on entry into university (UCAS tariff points).
- Whilst there does appear to be a quantity issue with physics teachers, there does not appear to be a quality problem.
- Physics graduates have better outside options in the labour market and generally earn more than graduates with many other degree subjects. However, despite this, we find no evidence that schools are paying physics teachers more than teachers in non-shortage subjects.
- Physics graduates generally have higher quit rates both from their school and from the profession as a whole, as compared with other subject areas. Two-fifths of physics graduates who are teaching 6 months after graduating leave the profession by 3½ years after graduating.
- The consequence of the recruitment issues and high quit rate is that the physics teacher workforce is older and more experienced than the workforce for other subjects.
- Around half of all those who are teaching science have ‘other’ science degrees, rather than traditional science subjects. This may reflect the fact that it is easier to recruit and retain these individuals.
- Schools employ a relatively large number of teachers with physics or engineering degrees who do not appear to be teaching. Better understanding of this phenomenon and further investigation of the School Workforce Census are needed on this issue.
- Data on the effectiveness of different routes into teaching are partial. It is difficult to track trainees from different initial teacher training routes into specific schools (and out again) and to distinguish those who exit teaching from those who join the private school sector. Identifying those who go into teaching through the Schools Direct and Teach First routes is still difficult.

Implications

- Physics teachers have higher levels of prior attainment and better labour market options. If schools are to recruit and retain such individuals, the total reward package offered to such teachers needs to be attractive. This includes non-pecuniary benefits as well as financial benefits. Indeed, physics teachers also move schools more rapidly than other teachers. Given that they do not move for higher pay on average, this might indicate that non-pay factors and job quality are push or pull factors in these moves.

- Only a very small proportion of people teaching science in our schools have a specialist degree in physics. We need more robust evidence on the impact of being taught by a specialist teacher. Whilst a number of research studies appear to suggest that degree subject does not impact on students' test score gains in that subject, the evidence base on this issue is partial. We do not know what the broader impact of having a specialist teacher is on engagement with the subject and likelihood of taking it at A level and degree level.

- Much has been made of bursaries as a key lever to attract physicists into teaching. We did not evaluate the impact of the bursary scheme in this briefing note but our findings do suggest that high turnover and low retention of these teachers are likely to be significant problems. Hence when policy is being developed to tackle this issue, a more holistic approach that considers both recruitment and retention, and pay and non-pay issues, is likely to be more successful.

- Recent reforms (EBacc, new GCSEs and the Progress 8 accountability measure) may increase the emphasis on students with higher levels of academic achievement. It is unclear whether this will increase schools' demand for specialist teachers. Given financial conditions, even if demand for such teachers increases it appears unlikely that schools could use financial incentives to attract and retain them. Again this might suggest non-pecuniary aspects of the job will need to be enhanced to attract and retain specialist teachers.

Future research

- Further research is needed (along with better data and data linkage) to determine factors that affect the quit rate of physics teachers and to determine whether physics teachers who enter the profession via different routes have markedly different quit rates.

- We need better evidence on the non-pecuniary aspects of science teaching roles. For example, do science teachers have the same opportunities to engage in pastoral work and to earn teaching and learning responsibility payments?

- We need to continue to build the evidence base on effective interventions to retain physics teachers, including the role of mentoring and leadership.

- We need to improve our understanding of how schools value specialist teachers, particularly in physics, and what they do to retain them. Do schools use the full range of levers that they have at their disposal (pay, reduced timetable, professional development opportunities) to try to retain physics teachers – and, if not, why not? Alternatively, do schools prefer generalist science teachers as they are more likely to retain them? Also, are there barriers to retaining specialist teachers that still need to be identified?

- More generally, we still need to improve the data we have on who becomes a teacher, the nature of their initial training, the extent of their professional development and how they move around the system. For example, using a unique identification number to enable us to follow graduates as they become teachers and move around the state and private school system would improve our ability to research key questions on this topic.

1. Introduction

There are long-standing concerns about the recruitment and retention of teachers in the UK.[1] In recent years, there has also been much debate about the extent to which changes to the initial teacher education system have affected the recruitment and retention problem.[2] These concerns are most acute in so-called ‘shortage’ subject areas, such as physics.[3]

In response to these issues, successive governments have sought to attract graduates into teaching in specific shortage subject areas via a variety of mechanisms. In the case of physics, there have been ongoing and targeted efforts to increase recruitment, including adding physics to the shortage occupation list of the Migration Advisory Committee. There have been rather fewer efforts to improve retention. In terms of recruitment incentives, there has been considerable investment in trying to tempt physics graduates into teaching. Full details of the financial support on offer to physics graduates are set out in Appendix Table 1. In brief, bursaries for physics teachers were substantially increased for high-flying graduates in 2012. Having been around £9,000 per trainee up to 2011, physics graduates with a 2:1 or above could now receive up to £20,000 (tax free) each year, £12,000 if they had a 2:2 and nothing for those with lower classifications. These have since been further increased.

In 2015, the government announced that it would be investing a further £67 million over a five-year period on supporting the routes into mathematics and physics teaching.[4] This investment means that there are now various incentives provided to encourage physics graduates into teaching, including financial incentives (specifically new bursaries for high-flying maths and science undergraduates who commit to teach for three years after graduation, in addition to bursaries during teacher training). The aim of this investment is both to upskill non-specialist teachers of these subjects by providing additional specialist skills courses and to attract new physics specialists into teaching. Grants are also offered to schools to develop training programmes in these areas.

A pressing question is, of course, whether these initiatives appear to have affected the supply of well-qualified physics teachers. Unfortunately, it is somewhat too early to answer that question, since many of the physicists attracted into teaching under this scheme will only have been teaching for a very short time or indeed may not yet have started teaching. However, given that the issue of retention is as significant as the issue of recruitment, a first priority is to improve our understanding of the labour market for physicists and physics teachers and the factors that may influence retention. In the longer run, labour market factors are more likely to impact upon the supply of physics teachers than short-run financial incentives such as bursaries, and it is crucial that we have better evidence on this issue.

1. House of Commons, 2016; Policy Exchange, 2016; Education Select Committee, 2017; Migration Advisory Committee, 2017.
2. National Foundation for Educational Research, 2015; Public Accounts Committee, 2016; National Audit Office, 2016.
3. Smith, 2010; Smith and Gorard, 2011; Migration Advisory Committee, 2017; Allen and Sims, 2017.
4. See https://www.gov.uk/government/news/new-plans-to-attract-and-train-maths-and-physics-teachers.

The aim of this work is therefore to consider the relative attractiveness of physics teaching and how physics teachers compare with other physics graduates in terms of their educational achievement, their wages and their propensity to stay in their current career. We start by examining the characteristics of those who decide to train as physics teachers as compared with other physics graduates. We then compare the distribution of wages for physics teachers, again relative to all physics graduates. Finally, we examine the short-run likelihood of physics teachers remaining in teaching over the first few years of their careers. To do this work, we rely on a number of different data sets, including the Destinations of Leavers from Higher Education (DLHE), the Labour Force Survey (LFS), the School Workforce Census (SWC) and some earnings data from previous work we have undertaken using Her Majesty's Revenue & Customs (HMRC) tax data. Our intention is for the work to inform the policy debate on physics teacher recruitment and retention by producing an initial evidence base on which to base the discussion. We also suggest routes forward for future research.

2. Recent relevant policy literature

Three relevant pieces of work have been published on the recruitment and retention of teachers recently, in addition to the numerous government reports that have been produced in the face of growing concerns about this issue.[5] Work by Allen and Sims (2017), which we draw heavily on, has focused specifically on the retention and pay of science teachers. They found that science teachers in the earliest years of their career leave the profession at a marginally more rapid rate than other teachers. Specifically, they found that the odds of science teachers leaving their *school* within five years are 26% higher than for non-science teachers, rising to 35% among newly qualified teachers (NQTs) of science. The odds of a science teacher leaving *teaching* altogether are 5% higher than for a similar non-science teacher, rising to 20% among NQTs. This work also highlighted that the situation was particularly bleak for physics teachers. Another interesting finding from this work is that, contrary to what one might have expected, science teachers actually experience marginally slower pay growth than other teachers. The authors concluded that pay is an important lever to reduce quit rates and that increasing pay for science teachers might be an important policy lever.

Related work by the National Foundation for Education Research (NFER) has also considered both inflow and outflow rates from teaching.[6] It used a variety of data, including surveys of teachers' intentions. The authors concluded that the issues of recruitment and retention are long-standing and that, contrary to press reports, the quit rate from teaching has not increased markedly in recent years. However, they did report that the proportion of teachers who say they may leave teacher has increased over time, which may be a leading indicator of a higher quit rate to come. Intentions may, however, not translate into real quits, and other factors – such as the state of the labour market – will influence this. NFER also highlighted that science teachers (and, more generally, experienced male teachers; there is significant overlap between these two groups) are more likely to be considering leaving the profession. This may not entirely be driven by better outside opportunities since mathematics teachers, who arguably may also have good outside opportunities, were actually highly engaged and less likely to be considering leaving teaching. Allen and Sims (2017) have suggested that one factor that contributes to the situation with science teachers is the fact that often they are expected to teach three subjects rather than one, increasing workload and having a negative impact on their engagement and commitment to teaching.

Third, work by Amin-Smith, Greaves and Sibieta (2017), which we draw on here, examined the changing average level of educational attainment of individuals entering major public sector occupations over time through the Great Recession and during the period of public pay freezes. The authors found little evidence of any change in health occupations. They also found little change in the average educational attainment of new entrants to teaching. However, this masks changes in the educational attainment of teachers trained through different routes, with declines in the educational attainment of Postgraduate Certificate of Education (PGCE) entrants offset by rises amongst primary and secondary school teachers joining straight after an undergraduate degree. The report also examined the average educational attainment of PGCE entrants over time by subject of prior degree,

[5] National Audit Office, 2016; House of Commons, 2016; Public Accounts Committee, 2016; Education Select Committee, 2017.

[6] Worth, Bamford and Durban, 2015; Des Clayes with Full Fact, 2017.

finding that trainees with degrees in shortage subjects such as physics, maths and modern foreign languages tend to have higher levels of educational attainment than trainees with degrees in other subjects. However, this is largely because graduates in shortage subjects tend to have higher levels of average educational attainment and trainees in these subjects look like average graduates in these subjects.

We add to this body of research by taking an overarching view of the situation with physics teachers specifically.

3. Data

The various data sets that we use in our analysis are described briefly below. We use three different data sets to examine the occupations of physics graduates and their earnings – namely: the Destinations of Leavers from Higher Education, which is a relatively short longitudinal study of recent graduates; the Labour Force Survey, which provides a cross-sectional snapshot of the earnings of physics graduates of all ages, including physics graduates who are teaching; and the linked Student-Loans-Company–HMRC administrative data, which provide earnings information on a particular cohort of physics graduates from university into mid-career. Lastly, to look in more detail at teachers working in schools, we use the School Workforce Census, which provides information on the salaries and employment of physics teachers.

Destinations of Leavers from Higher Education (DLHE)

We use data from the Destinations of Leavers from Higher Education longitudinal survey carried out by the UK Higher Education Statistics Agency (HESA). This enables us to determine the characteristics of physics and engineering graduates[7] who go into teaching, compared with other occupations.

Specifically, the DLHE is conducted at two points in time – 6 months after graduation and 3½ years after graduation. The 6-month survey has relatively high response rates, with approximately 79% of graduates responding to the latest survey.[8] This allows us to look at the educational attainment of individuals who chose to enter teacher training straight after their undergraduate degree, comparing physics graduates with those from other subjects. We focus on teacher training as the PGCE route remains the most common route into secondary school teaching. For example, in 2015–16, there were around 750 individuals entering training to be a physics teacher, of whom 63% were training via a PGCE or other provider-led route, whilst around one-third were training via School Direct and about 3% via Teach First.[9] However, not all teachers choose to enter training in the first year after graduating from their first degree. We therefore also use the longitudinal DLHE survey, which is conducted up to 3½ years after graduation for subsamples of students who responded to the 6-month 2006–07, 2008–09 and 2010–11 surveys.[10] We pool the samples from these years and limit our sample to graduates (including part-time students) who: finished higher education in 2006–07, 2008–09 or 2010–11; completed the survey at 3½ years after graduation; studied for an undergraduate degree; and provided occupational data (SOC 2000) at 3½ years after graduation. The occupational status of graduates 3½ years after graduation is measured using five-digit SOC 2000 codes. These codes enable us to identify whether each individual graduate is working as a teacher, and will include individuals who trained through a PGCE or other route into teaching. The

7 The category includes engineering graduates since this matches the specified eligibility for initial teacher training (ITT) bursaries.

8 https://www.hesa.ac.uk/stats-dlhe.

9 https://www.gov.uk/government/statistics/initial-teacher-training-trainee-number-census-2015-to-2016.

10 The HESA technical report indicates that the pattern of non-response meant that women were more likely to respond than men to the earliest survey, and across all three surveys older graduates, white graduates, and graduates in certain subjects and from certain institutions were more likely to respond (Higher Education Statistics Agency, 2015).

sample will also include those who might have also done a masters degree in the interim. All longitudinal results are weighted in order to account for non-response bias.

Over the three cohorts covered by the longitudinal DLHE sample, just under 6% had an undergraduate degree in physics. And, as we shall we see in Section 4, just over 3% of these are working as teachers 3½ years after graduation.

Student Loans Company (SLC) and HMRC tax data (HMRC)

To understand the market for physics graduates and how this might impact on the supply of physics teachers, it is essential to have a good understanding of the earnings prospects of physics graduates. Whilst the Labour Force Survey (discussed below) provides information on a cross-sectional sample of physics graduates, sample sizes are relatively small and the data are not longitudinal. Ideally, we need information on physics graduates' trajectories through their careers. The SLC–HMRC linked administrative database, described in Britton et al. (2016), provides longitudinal data on graduates' annual earnings into mid-career and hence provides some insights.

These data consist of linked data from the Student Loans Company and from a 10% randomly selected subsample of taxpayers from HMRC's Pay As You Earn (PAYE) database, as well as data from the HMRC self-assessment (SA) database. These provide a comprehensive record of graduates' earnings and cover all individuals domiciled in England upon application to higher education who received loans from the SLC. Around 80% of UK higher education students are domiciled in England and, for recent cohorts, the SLC data set covers approximately 90% of these English-domiciled students. In addition to earnings data, this data set also includes the subject of each graduate's degree. This thus provides earnings information on physics graduates through the first 13 years of their careers. The data presented in this briefing note are the earnings observed in the 2012–13 tax record for the cohort who started university in 1999.

Labour Force Survey (LFS)

We also use the Labour Force Survey to compare the earnings of physics graduates who are working as teachers with those who are doing other jobs. The LFS is the largest household study in the UK and provides the official measures of employment and unemployment. This data set provides us with a cross-sectional sample of teachers of all ages and we use the Quarterly Labour Force Survey for each year from 1998 to 2015. We focus on graduates only and present data on annual gross earnings of graduates by subject of degree, showing those in teaching compared with graduates not in teaching. As the proportion of graduates has changed significantly across cohorts, we only examine individuals aged 22–30 to minimise the effects of compositional changes in the population of graduates. Unfortunately, sample sizes do not permit us to show how physics teachers compare with physics graduates doing other jobs. However, given that data from the School Workforce Census (discussed below) indicate that physics teachers earn a similar amount to other teachers, this is not a major issue. Percentiles are calculated within each subject group of graduates and are shown relative to the group median.

School Workforce Census (SWC)

To consider the employment and earnings of teachers who are currently working in schools, we make use of the School Workforce Census. This is an administrative data set with information on every teacher working in a state school in England. It is useful since it contains information on teacher demographics and, crucially, teachers' qualifications, enabling us to focus specifically on physics teachers. The data set has a relatively high degree of missing data[11] but, despite that, it has the advantage of providing comprehensive coverage of teachers in England.

The SWC contains information on teachers from 2010, providing a relatively long period over which to observe teacher school moves and indeed teacher quits. A school move is identified by observing a teacher in a different school in the subsequent year. A quit from the profession is recorded if a teacher is not observed in any state school in the subsequent year. Obviously, this will also capture moves to the independent school sector and hence the quit rate really refers to quits from the state school system.

The SWC data provide information on approximately half a million teachers in any given year and 19% of those teachers are recorded as working in a science department. The data then enable identification of teachers who teach science for half their timetabled hours or more and these are deemed to be active science teachers. This results in a sample of around 31,000 science teachers. Within this group, we identify physics teachers by the subject of their degree using the standard Higher Education Statistics Agency JACS code classification.[12] Physics and engineering are grouped, so any teacher with one of these degrees is included as a physics teacher in the data.

[11] See Allen and Sims (2017).

[12] JACS stands for Joint Academic Coding System.

4. Who goes into physics teaching?

An obvious starting question is who becomes a physics teacher? In this section, we explore how significant teaching is as a destination profession for those with physics degrees and who becomes a physics teacher. In particular, we ask whether those training to be physics teachers are similar to the average physics graduate or whether they are less qualified in some respects – for example, have lower classes of degree or have lower levels of attainment at A level. This would be important indicative evidence of the extent to which teaching can attract the best (or at least average) physics graduates. For this work, we rely largely on the DLHE data.

Table 1 uses DLHE data to show the percentage of graduates in each subject who are observed working or training as teachers 6 months after graduation and 3½ years after graduation (first two columns). The results are striking in that a very small proportion of physics graduates are working as teachers at both time points. The situation for maths, chemistry, modern languages and other subjects such as English is markedly different. In maths, for example, more than one in ten graduates are working as teachers at 6 months and 3½ years after graduation. Clearly, amongst maths graduates, teaching is a profession chosen by a significant proportion of students. By contrast, just 2.7% of physics graduates are working in teaching at 6 months and 3.2% at 3½ years. Similarly low percentages apply to computing and social science & law. However, the latter subjects are not compulsory at school, which has a bearing on the demand for teachers of such subjects.

The fact that a higher proportion of physics graduates are observed in teaching at 3½ years after graduating than at 6 months after leaving university does not mean that individuals who enter teaching straight after graduation are likely to still be there at 3½ years. The next set of columns in Table 1 indicate both the growth in the proportion of physics graduates working as teachers between 6 months and 3½ years after graduation (22%) and the churn into and out of teaching: 39% of the original group of physics graduates observed to be teaching at 6 months have left by 3½ years, whilst a set of new entrants has led to the net growth in those working in teaching of 22%. By and large, the proportion leaving teaching between 6 months and 3½ years is similar across different subject areas, although it is somewhat higher in computing and somewhat lower in English and geography.

What is also very clear is that the number of new physics entrants to teaching between 6 months and 3½ years is much lower than it is for other subjects. The numbers of new entrants to subjects such as history, geography, biology, English and modern languages were about the same as the total number of teachers observed at 6 months, i.e. numbers would have doubled in the absence of exits from teaching. For physics, new entrants amounted to about 60% of teachers at 6 months after graduation, similar to the figures observed for maths and computing.

The final two columns show the average Universities & Colleges Admissions Service (UCAS) tariff score[13] of those working as teachers at 6 months and 3½ years respectively. Physics teachers clearly have relatively high UCAS scores, but there is no evidence of a

[13] This allocates particular points to A-level or equivalent qualifications and is often used to determine entry into higher education. More details can be found at https://www.ucas.com/ucas/undergraduate/getting-started/ucas-undergraduate-entry-requirements.

Table 1. Teacher numbers and prior attainment, by time since graduation (pooled across graduates from 2006–07, 2008–09 and 2010–11)

Subject of undergraduate degree	Share of graduates observed as teachers		Change in numbers between 6 months and 3½ years			Average UCAS tariff score	
	6 months	3½ years	Percentage growth	*Of which:*		6 months	3½ years
				Leavers	*New teachers*		
Physics	2.7%	3.2%	22%	*–39%*	*61%*	370	374
Maths	12.4%	13.6%	15%	*–34%*	*49%*	395	386
Computing	2.9%	3.6%	6%	*–50%*	*55%*	258	244
Chemistry	7.7%	8.4%	31%	*–38%*	*69%*	342	347
Modern languages	7.2%	11.0%	52%	*–39%*	*91%*	373	382
English	12.4%	18.4%	59%	*–28%*	*87%*	332	343
History	6.6%	11.2%	87%	*–33%*	*119%*	360	361
Biology	8.4%	13.0%	54%	*–37%*	*91%*	309	312
Geography	5.8%	9.9%	61%	*–27%*	*88%*	354	348
Social science & law	1.8%	3.7%	102%	*–44%*	*146%*	339	320
Arts	4.7%	9.1%	89%	*–33%*	*122%*	305	304

Note: Teachers are defined as those in a teaching job or in training at the survey date. Growth over time is calculated as number of graduates observed as a teacher 3½ years after graduation relative to those observed as a teacher 6 months after graduation and responding to the 3½-year survey. Leavers are those who were in a teaching job or teacher training 6 months after graduation but were not after 3½ years.

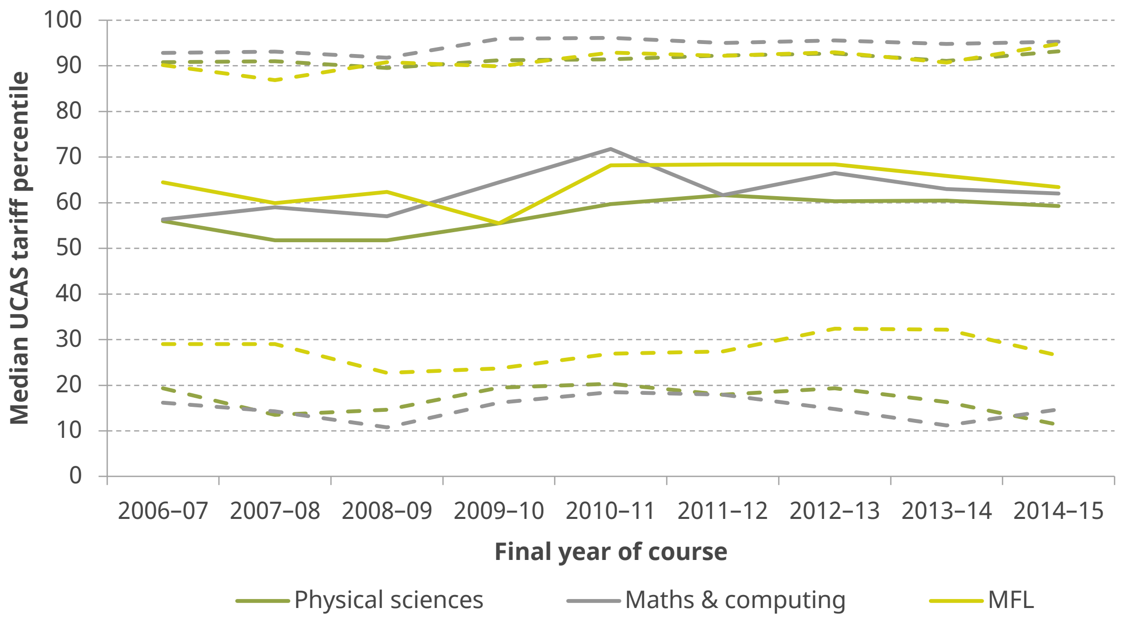
Source: Authors' calculations using HESA Destinations of Leavers from Higher Education (6 months and 3½ years after graduating from an undergraduate degree).

decline in the quality of those observed to be in teaching between 6 months and 3½ years after graduation, which is true for all subjects. We explore this issue further below by comparing the UCAS tariff scores of those entering teaching and those pursuing other occupations.

We focus on graduates enrolling in postgraduate teacher training (most commonly a PGCE). Although there has been growth in alternative routes into teaching – for example, School Direct and Teach First – provider-led postgraduate training represented the dominant form of secondary school teacher training over the period we examine in the data (even in the last year of data, 2014–15, around 65% of new entrants to secondary school teacher training were in provider-led postgraduate training).

Figure 1 shows the trends in the relative educational attainment of new teachers with a degree in physical sciences, maths & computing or modern foreign languages. For each subject area, it gives the median level of the UCAS score (defined as a percentile of all graduates taking their A-level or equivalent exams at the same time) and the 10th and 90th percentiles amongst these new teachers. Figure 2 shows a similar picture for those with arts and humanities degrees. Figure 1 indicates that those with physical science degrees have similar levels of prior achievement to those with mathematics, computing or modern foreign language (MFL) degrees. Comparing these results with Figure 2, we can also see that those with physical science degrees have marginally higher levels of prior attainment than those with English or history degrees.

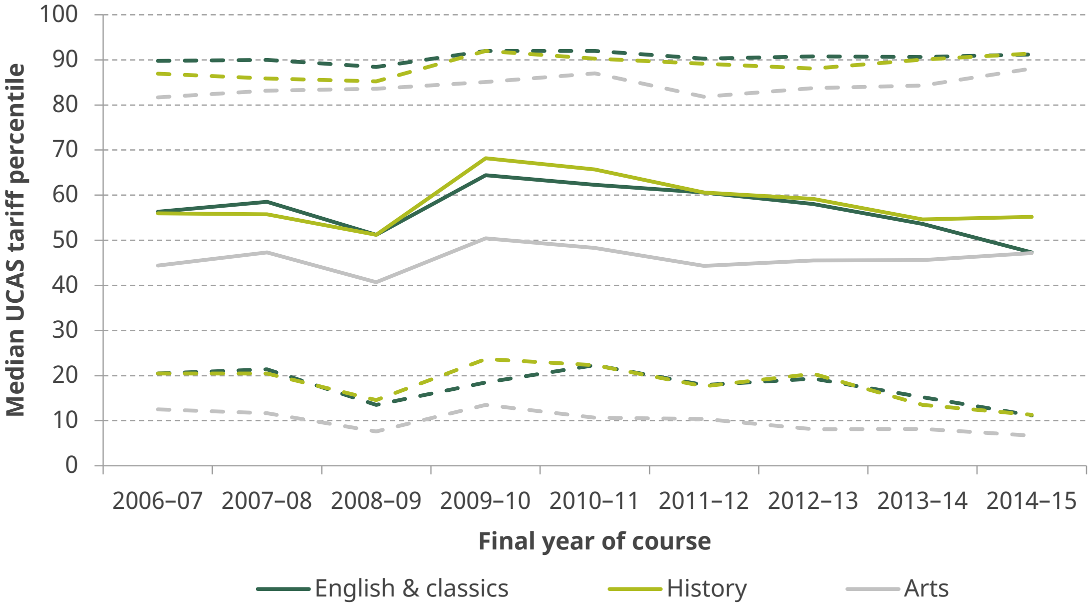
Figure 1. Relative educational attainment of new graduate teachers in high-priority subjects: average and distribution over time (dashed lines represent 10th and 90th percentiles)



Note: UCAS tariff percentiles are defined relative to all graduates who took A-level or equivalent exams at the same time. Solid lines show median and dashed lines show 10th and 90th percentiles of educational attainment within each subject area.

Source: Figure 4.2a in Amin-Smith, Greaves and Sibieta (2017), based on the DLHE survey 2006–07 to 2014–15. For degree subject groupings, see table 4.2 in Amin-Smith et al. (2017).

Figure 2. Relative educational attainment of new graduate teachers in arts and humanities subjects: average and distribution over time (dashed lines represent 10th and 90th percentiles)



Note: UCAS tariff percentiles are defined relative to all graduates who took A-level or equivalent exams at the same time. Solid lines show median and dashed lines show 10th and 90th percentiles of educational attainment within each subject area.

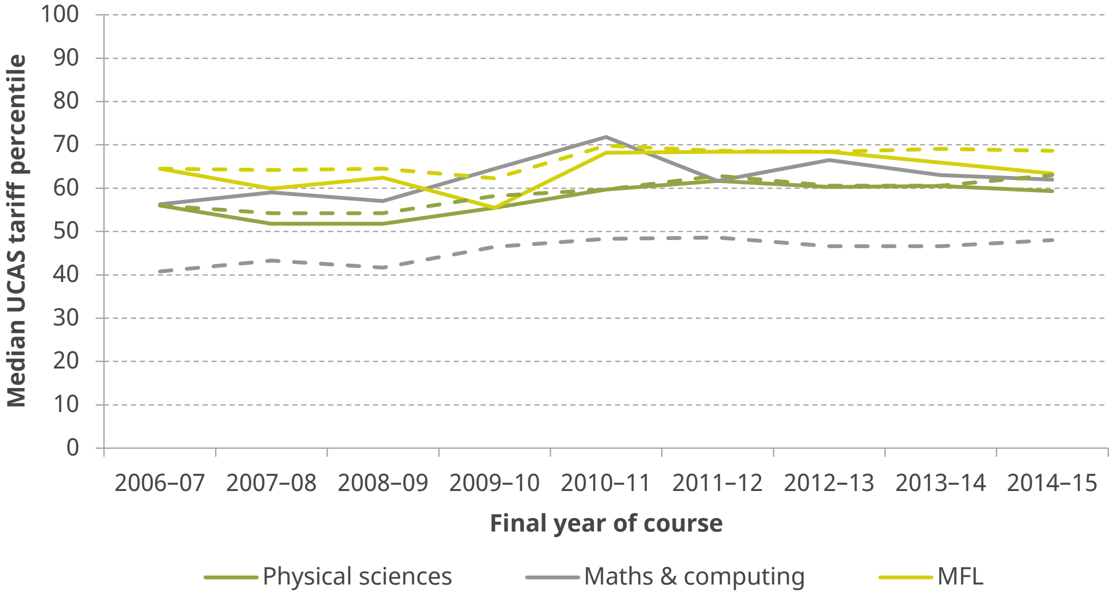
Source: Figure 4.3a in Amin-Smith, Greaves and Sibieta (2017), based on the DLHE survey 2006–07 to 2014–15. For degree subject groupings, see table 4.2 in Amin-Smith et al. (2017).

Although this is an interesting finding, perhaps the key question is not whether those wishing to become physics teachers have higher levels of prior attainment than trainees in many other subject areas, but rather whether physics trainees have lower levels of prior attainment than other physics graduates. If they have, this might imply that recruitment challenges have meant that less well-qualified physics graduates are being recruited into teaching. We explore this issue next.

Figure 3 compares the prior attainment levels of physics PGCE students and of physics undergraduate students in the final year of their course. It shows that physics PGCE trainees have similar levels of prior attainment to other physics graduates. Hence, it does not appear to be the case that less well-qualified people are being recruited into physics teaching. In the case of maths & computing, Figure 3 shows that PGCE trainees actually have higher levels of prior attainment than other maths & computing graduates. By contrast, English & classics and history PGCE students are marginally less well qualified than other graduates in these subject areas (Figure 4).

Overall, this suggests that those training to become physics teachers look much like the average physics graduate in terms of prior attainment and that this has remained true over time. It is also worth noting that, in general, physics graduates are quite high achieving. Although we may have a quantity problem, the data suggest we might not have a quality problem.

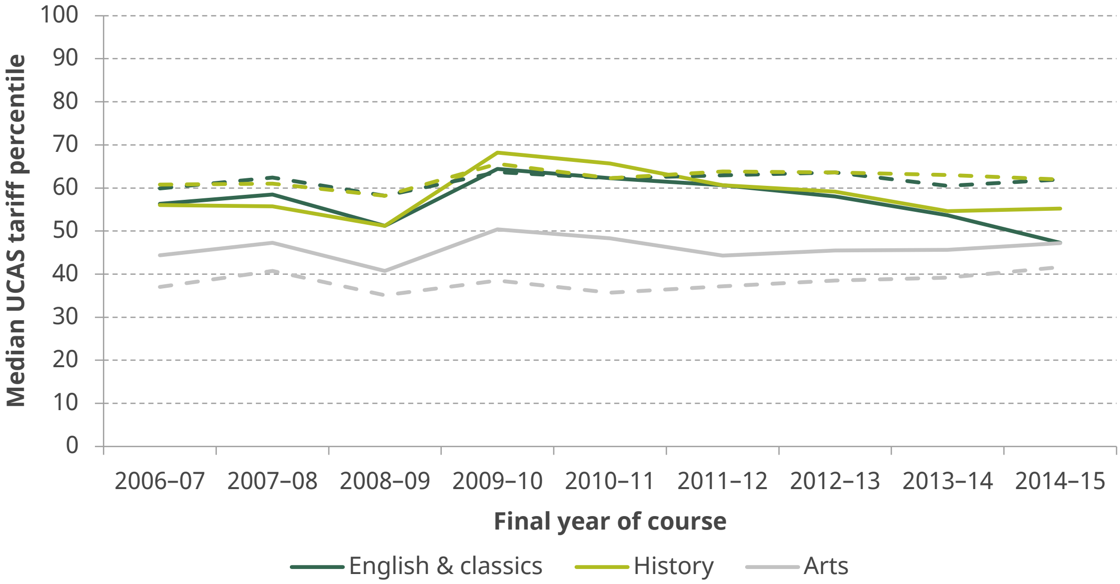
Figure 3. Relative educational attainment of new graduate teachers in high-priority subjects compared with all graduates in the subject area



Note: UCAS tariff percentiles are defined relative to all graduates who took A-level or equivalent exams at the same time. Solid lines show the level for PGCE students and dashed lines show the trend amongst all graduates in the sample in that particular subject area.

Source: Figure 4.2b in Amin-Smith, Greaves and Sibieta (2017), based on the DLHE survey 2006–07 to 2014–15. For degree subject groupings, see table 4.2 in Amin-Smith et al. (2017).

Figure 4. Relative educational attainment of new graduate teachers in arts subjects compared with all graduates in the subject area



Note: UCAS tariff percentiles are defined relative to all graduates who took A-level or equivalent exams at the same time. Solid lines show the level for PGCE students and dashed lines show the trend amongst all graduates in the sample in that particular subject area.

Source: Figure 4.3b in Amin-Smith, Greaves and Sibieta (2017), based on the DLHE survey 2006–07 to 2014–15. For degree subject groupings, see table 4.2 in Amin-Smith et al. (2017).

Another striking observation is that there is no obvious increase in the prior attainment level of physics PGCE students when the very large bursaries were introduced in 2012. We might have expected to see such an increase if these bursaries had attracted more applications to teaching from physics graduates. It is, however, early days for this policy.

There has, however, been a downward trend in the educational attainment of PGCE students in lower-priority subjects, both relative to all graduates and relative to all graduates in the subject (see Figure 4). For example, the data indicate that the mean prior attainment of English and classics PGCE entrants has fallen from the 64th to the 47th percentile between 2009–10 and 2014–15, whilst that of all English and classics graduates has remained around the 64th percentile. This might provide indicative evidence that bursaries for physics graduates have prevented a decline in quality, though this is very tentative.

As well as knowing the prior attainment levels of new entrants to teaching, we also need to know the profile for science teachers more generally. For this, we turn to the School Workforce Census. Table 2 shows the number of teachers with different types of science degrees observed in the SWC in 2010. One striking feature is that only around half of the individuals working in schools with science degrees are actually teaching science, an issue reported in Allen and Sims (2017). Further, the majority of teachers have 'other' science degrees rather than degrees in one of the sub-disciplines. Physics and engineering graduates constitute 17% of those with science degrees in schools and 15% of those who teach science as their main subject (a notable minority of physicists and engineers choose to teach maths).

Figure 5 shows the distribution of teachers by years of experience for those with physics degrees and for those with other degree subjects. Teachers with physics degrees are somewhat more experienced than other teachers in that a higher proportion have 10–20 years of experience and a lower proportion are new entrants and less experienced teachers with fewer than 10 years of teaching. This may be indicative of the difficulties in recruiting those with physics degrees in the last decade or so. When combined with the

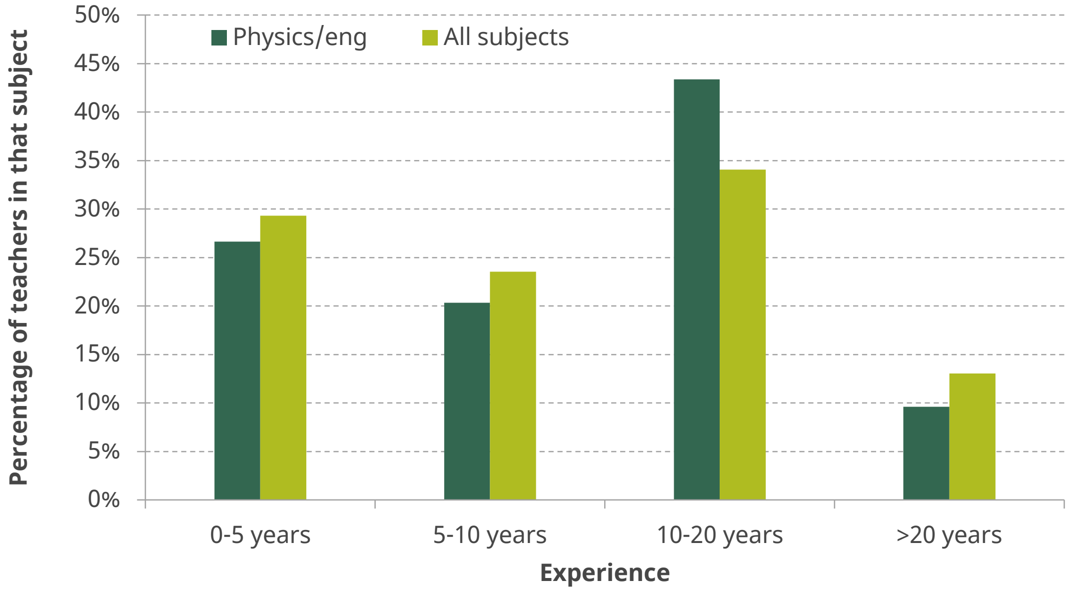
Table 2. Specific degree background of teachers with a science degree

	Frequency	%
Teachers with a science degree	36,444	-
Of which:		
Physics or engineering degree	5,864	16.6
Biology degree	4,879	13.8
Chemistry degree	4,607	13.1
Other science degree	19,907	56.5
Teaching science	17,848	50.6

Note: Teacher with a science degree is any teacher in 2010 with a science degree. 48% of teachers in 2010 have missing data on academic qualifications. %s are calculated as a percentage of the first four rows in the 'of which' group.

Source: School Workforce Census 2010.

Figure 5. Distribution of teachers' years of experience by degree subject



Note: Note that the buckets are different durations – 0–5, 5–10, 10–20 and 20+ years – and that retention rates, and thus average years of experience, are likely to be slightly understated in the SWC due to data quality.

Source: School Workforce Census 2010. All secondary school teachers in the November 2010 Census for whom we can identify their subjects taught at any point in a six-year panel of data.

data in Table 2, which indicate that around half of those with science degrees in schools have degrees in 'other science' subjects (as distinct from chemistry, biology or physics), this may suggest that schools are substituting teachers with other types of science degree for those with physical and biological science degrees.

5. How much do physics teachers earn compared with other physics graduates?

To understand the labour market for physics teachers, we ideally need to compare the earnings of physics graduates with those of physics graduates who go into teaching. With these data, we could then determine whether better outside labour market opportunities for physics graduates may drive some of the high quit rate from teaching that we observed earlier. However, data limitations mean we can only show a partial picture, though a useful one nonetheless.

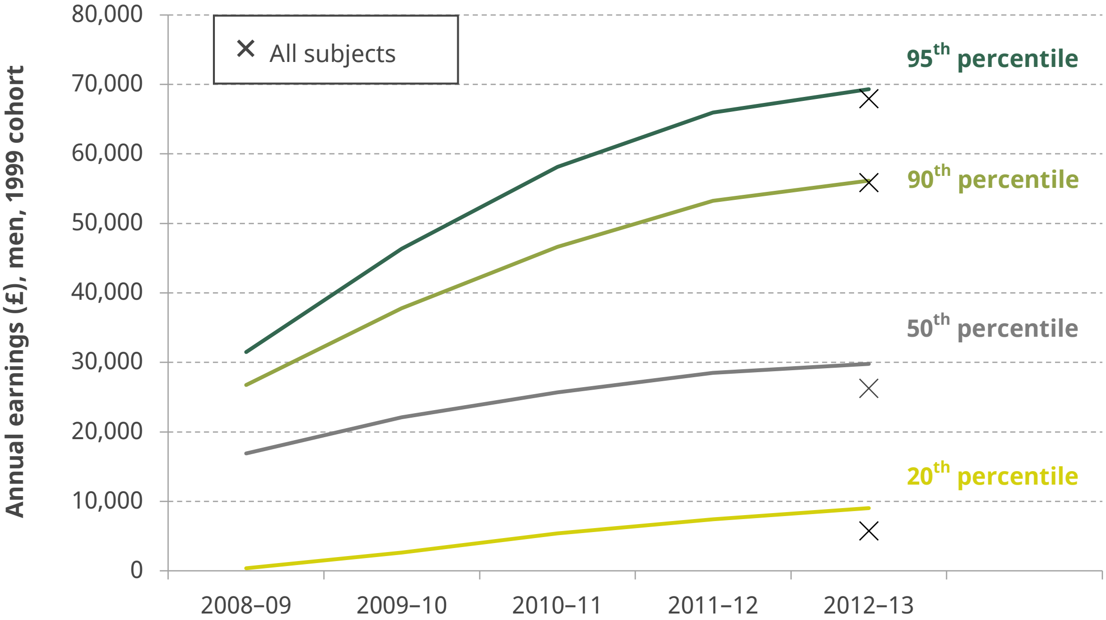
Our starting point is to present the earnings of physical science graduates using the SLC–HMRC data. Unfortunately, in these data, we cannot identify physics graduates specifically but instead have the earnings of a broader group – namely, physical science graduates.[14] Figure 6 shows the earnings trajectories of male physical science graduates over the period 2008–09 to 2012–13 for a particular cohort of students who started university in 1999 (and hence who on average graduated in 2002). These data therefore provide insight into the earnings growth that a male physical science graduate might expect and Figure 6 shows earnings at the 20th, 50th, 90th and 95th percentiles to indicate the spread of the distribution and how that changes over time. Note that individuals with zero earnings are included to give some sense of the proportion of each cohort that is not in employment – hence earnings at the 20th percentile are near zero since this is capturing the fact that only around 80% of physical science graduates are in sustained employment or full-time study some five years into their careers.[15] It is clear from Figure 6 that whilst male physical science graduates start their careers with relatively similar earnings to one another (median £18k), in the first five to ten years of their careers the distribution widens considerably and 15 years into a career physical science graduates at the 95th percentile are earning around £70k whilst the median is around £30k.

What is important, of course, is how these trajectories compare with those of other graduates. If physical science graduates have markedly better earnings prospects than other graduates, then this may explain the relatively low proportion of physics and chemistry graduates entering teaching. The crosses marked on Figure 6 indicate the 20th, 50th and 90th percentiles of earnings for all male graduates irrespective of degree subject (it was not possible to provide the 95th percentile). It is evident that, among men, physical science graduates earn somewhat more than other graduates at the 20th and 50th percentiles, though their earnings are similar to those of other graduates at the 90th percentile. The earnings premium for male physical science graduates is around £3k at the median, not taking account of the fact that those taking physical sciences have, on average, higher levels of prior attainment on entry to university. Britton et al. (2016) showed that while some subjects, such as economics, did attract a large premium over

[14] Physical science is defined using JACS codesF0 (broadly-based programmes within physical sciences), F1 (chemistry), F2 (materials science), F3 (physics), F4 (forensic & archaeological sciences), F5 (astronomy), F6 (geology), F7 (science of aquatic & terrestrial environments), F8 (physical geographical sciences) and F9 (others in physical sciences).

[15] Note that this fact is for a more recent cohort (graduating in 2008–09) than in our data and is true for both men and women. Source: Department for Education, Longitudinal Education Outcomes data, published in SFR18/2017, https://www.gov.uk/government/statistics/graduate-outcomes-for-all-subjects-by-university.

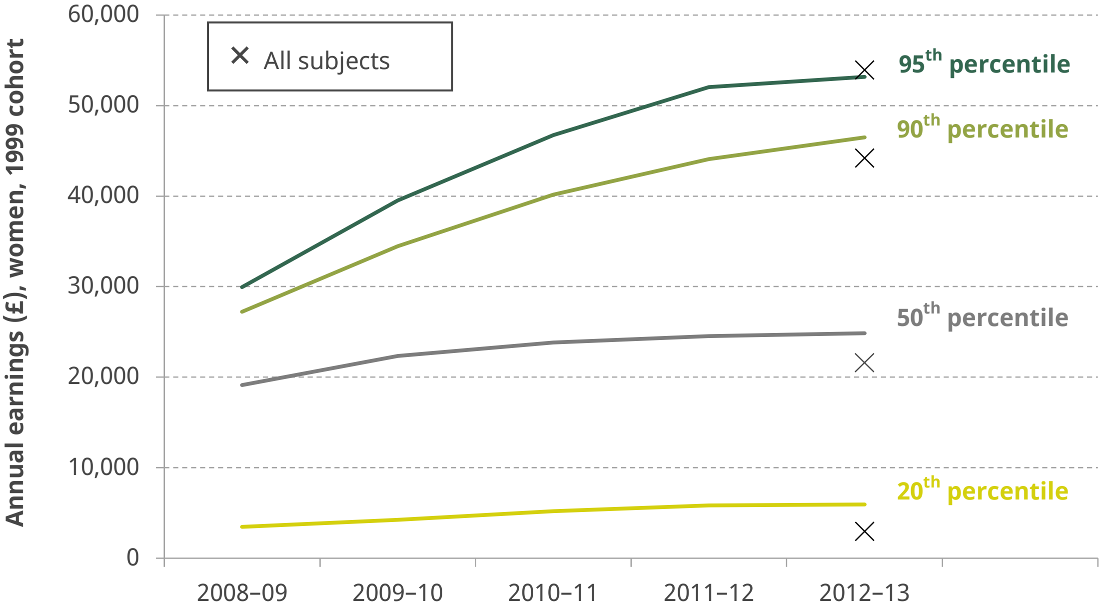
Figure 6. Earnings for male physical science graduates who entered higher education in 1999



Note: The figure shows unconditional male physical science graduate earnings for the 1999 cohort at the 20th, 50th, 90th and 95th percentiles over the period 2008–09 to 2012–13. Zeros are included.

Source: Data taken from Britton et al. (2016).

Figure 7. Earnings for female physical science graduates who entered higher education in 1999



Note: The figure shows unconditional female physical science graduate earnings for the 1999 cohort at the 20th, 50th, 90th and 95th percentiles over the period 2008–09 to 2012–13. Zeros are included.

Source: Data taken from Britton et al. (2016).

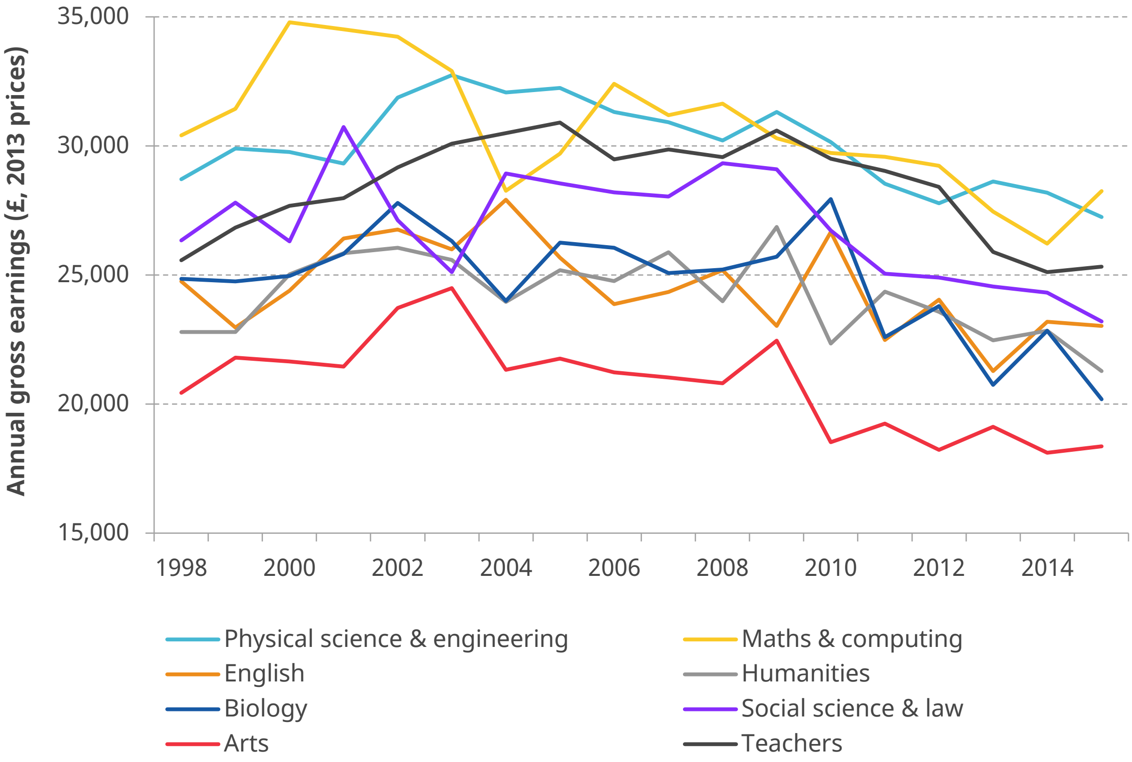
other subjects for males, this was not true for physical sciences once prior attainment was taken into account. Thus our results still imply that physical science graduates do have somewhat better earnings prospects than other graduates, on average.

Figure 7 shows that the situation for women is similar, though in this case physical science graduates do earn more than other female graduates at all points in the distribution. From these data, we conclude that male and female physical science graduates do indeed have marginally better earnings prospects than other graduates and this may have a bearing on their decision to enter teaching, which has quite rigid pay scales and in which physics graduates are likely to be paid similarly to teachers of other subjects (we return to this issue below).

As mentioned earlier, what we really need to understand is how the earnings of physics graduates who are working as teachers compare with those of physics graduates who enter other occupations. We can use the Labour Force Survey cross-sectional data to start to address this issue, though again there are data limitations. We cannot observe physics teachers specifically but rather we compare physical science graduates with all teachers, irrespective of degree subject.

Figure 8 shows the median early-career earnings of graduates by degree subject (excluding those with zero earnings) and also the median earnings of graduates who are working as teachers irrespective of the subject of their degree (black line). Perhaps the most striking observation from Figure 8 is that there has been a decline in the real wages

Figure 8. Median earnings amongst graduates aged 22–30 by subject of undergraduate degree and amongst teachers



Note: Data only include earnings amongst graduates.

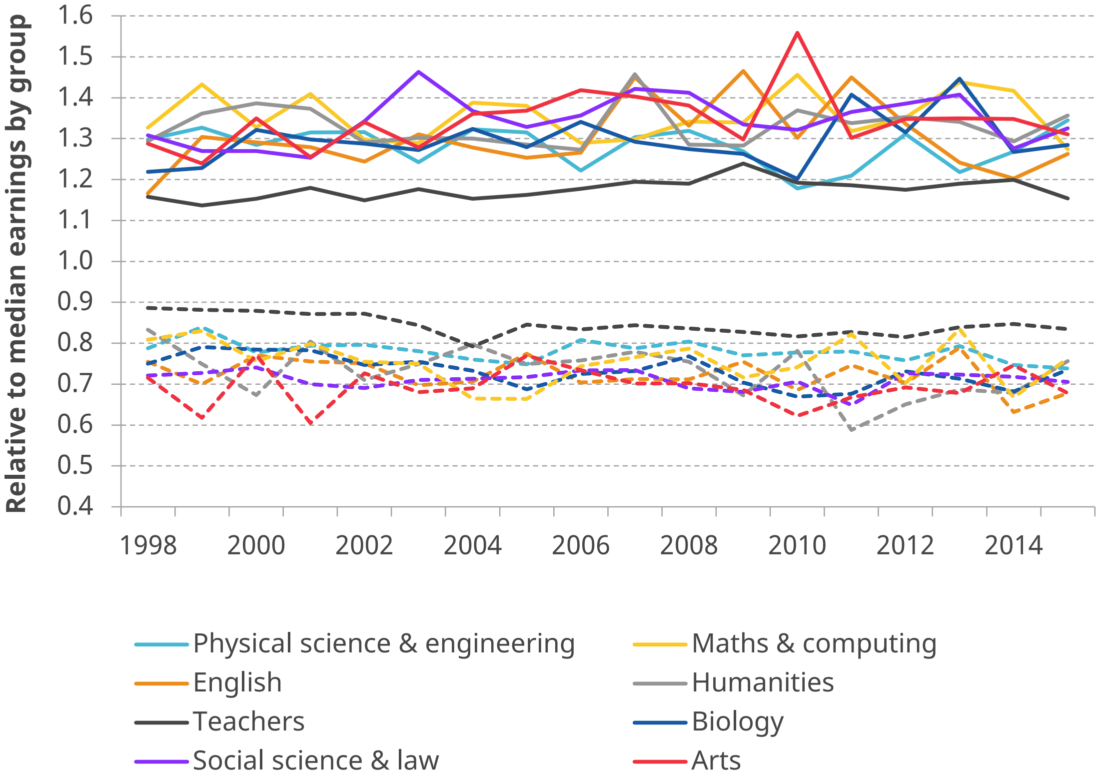
Source: Authors' calculations using Quarterly Labour Force Survey.

of graduates in the post-2009 period. Hence, for all graduates, earnings prospects have worsened in recent years. This is a result of the Great Recession and we know that the decline in wages after that was greater for private sector workers. Therefore we need to be aware that we are examining the wages of teachers at a time when public sector wages were high in comparison with wages in the private sector (although this situation is now starting to reverse).

On average, teachers fare well compared with other graduates in terms of earnings and they earn considerably more than graduates from some subjects, such as arts. However, physical science graduates earn somewhat more than teachers on average. The gap is modest but significant, at around £2k. Whilst this comparison does not take account of pension and other non-wage benefits, it does perhaps suggest that physical science graduates specifically may be less inclined to find teaching a financially attractive job than, say, arts graduates.

Figure 9 explores this in more detail by showing the spread of earnings for graduates in different subjects, again in comparison with the spread for teachers. This figure reveals an interesting but not unexpected phenomenon – namely, that teachers' earnings at the 25th and 75th percentiles are closer to the median than is the case for graduates overall. In other words, teachers' earnings are more homogeneous, reflecting the relatively rigid pay scales in teaching. This has two main implications for individuals deciding whether to

Figure 9. 75th percentile and 25th percentile relative to median earnings by group, amongst graduates aged 22–30 by subject of undergraduate degree and amongst teachers



Note: Data only include earnings amongst graduates. Percentiles are calculated within group and are all shown relative to the group median.

Source: Authors' calculations using Quarterly Labour Force Survey.

become a teacher. First, highly skilled individuals in subjects such as physics and maths might have much better wage opportunities outside of teaching, and thus might be unlikely to become teachers. On the other hand, some individuals might be attracted to teaching given the lower risk of low earnings.

These data therefore indicate that physical science graduates do indeed have marginally better outside options than graduates from other subjects and hence this may contribute to the difficulty in hiring physics teachers. The outside options might also be much better for highly skilled individuals. On the other hand, the variability in pay is less for teachers than for graduates in other jobs, and this may encourage some to go for the safer option of teaching.

We now turn to the School Workforce Census to better understand the pay of teachers with physics degrees specifically, since up to now we have only observed individuals with physical science degrees. Figure 10 shows the median earnings profile (50th percentile) for teachers with physics degrees, with earnings at the 25th and 75th percentiles also indicated. It is illustrative of the nature of pay progression in teaching, though it shows this for physics graduates only. Starting salaries for these teachers are relatively similar and the variation in pay increases over time. Even for very long-standing teachers some 10–30 years into their career, the spread of earnings is only about £10k. Data from the Labour Force Survey suggest an earnings spread for physical science graduates between the 75th and 25th percentiles of nearer £18k up to a decade into a person's career. Again, this confirms the relative homogeneity of teachers' salaries.

The distributions for teachers with other science degrees or indeed non-science degrees produce very similar pictures with almost complete overlap on the line graphs (not reproduced here). In other words, the profile in Figure 10 would look virtually identical for

Figure 10. Earnings in 2010 for teachers with degrees in physics and with different years of experience

Note: Note that the ranges of experience are of different durations and that retention rates, and thus average years of experience, are likely to be slightly understated in the SWC due to data quality.

Source: School Workforce Census. All secondary school teachers with physics degrees in the November 2010 Census for whom we can identify their subjects taught at any point in a six-year panel of data.

teachers with non-science degrees. This is because the teacher pay system is highly structured and, broadly, most teachers move up the pay scales at approximately the same rate irrespective of subject specialism.

That said, Allen and Sims (2017) have suggested that in 2010, on average, science teachers were paid marginally less than non-science teachers (around £110 per annum), allowing for other characteristics of these teachers such as years of experience. This is interesting given the general problem of recruitment into science teaching and an expectation perhaps that science teachers would be paid more as a result. However, focusing more specifically on physics teachers, the School Workforce Census suggests that in 2010, on average, teachers with physics degrees earned a similar amount to teachers with non-science degrees. Those with physics degrees actually achieved less earnings growth over the period 2010–15 (their gain in annual earnings was around £600 less than that for non-science teachers). These data certainly confirm that schools do not appear to be using the flexibility they have on pay to reward physics graduates any differently from other types of graduates.

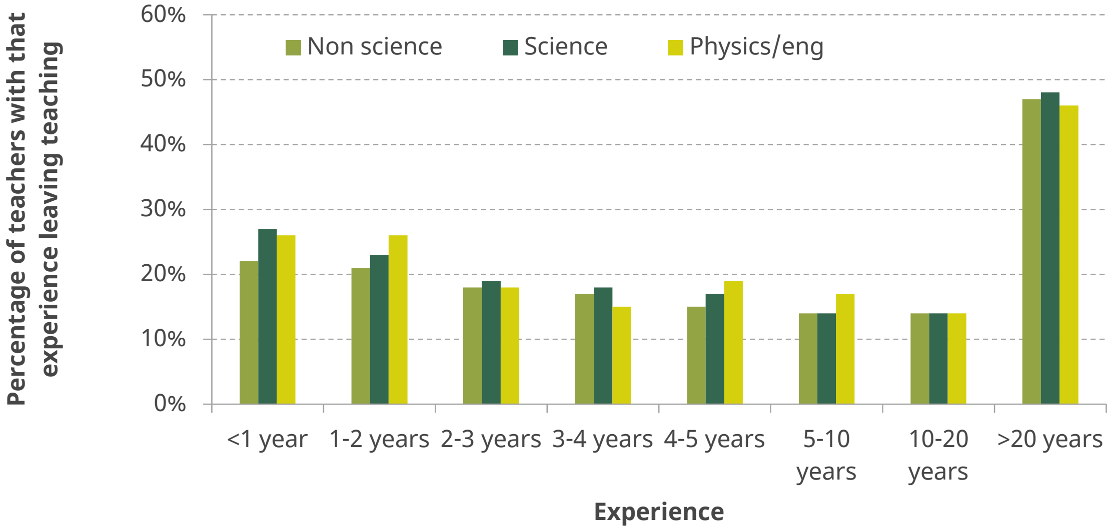
In summary, our data indicate that physics teachers are relatively well qualified before they enter higher education and take their degrees. This provides them with higher expected earnings than many other graduates. The outside options for physical science graduates look marginally better than for other subjects. Hence the challenge is how physics graduates can be recruited into teaching and then retained. Further, our analysis of the School Workforce Census implies that schools are not paying physics teachers any more nor providing them with greater earnings growth to reflect the fact that such teachers may have better outside opportunities. On the recruitment side, it is too early to say whether recruitment problems may be less acute than they might have been without bursaries. On retention, we are mindful that the earnings gaps we see here between teachers and physical scientists who are outside teaching will tend to increase further in mid-career (age 40–50) and hence this is likely to be a major issue.

6. What happens to those who train as physics teachers?

Retention is arguably as crucial an issue in teaching as retention, as evidenced in the churn figures provided in Table 1 above. Here we explore the issue in greater depth using the School Workforce Census, which is ostensibly a census of teachers in the system and should therefore provide a robust measure of turnover and quit rates. Figure 11 shows the percentage of teachers leaving the profession over the period 2010–13, according to their initial level of experience in 2010. There is an obvious retirement spike in teachers leaving the profession if they have more than 20 years of work experience. However, in general, quit rates from teaching decline with years of experience and physics & engineering graduates also follow this pattern. In other words, teachers are more prone to leave teaching early in their career but get increasingly less likely to do so as time goes by. This is partly a selection issue – those who remain presumably enjoy their jobs more – but also potentially because people who have been in teaching longer have more limited outside opportunities.

What is more striking from Figure 11 is that those with physics degrees (and science degrees more generally) have higher quit rates in the first few years of teaching than teachers with non-science degrees. Even some years into their careers, those with physics degrees remain more likely to leave the profession than other teachers. This is consistent with a retention problem in the first few years of teaching generally and a more acute issue for those with physics degrees. This may be related to the outside labour market opportunities for physics graduates, as discussed in the previous section. It could, of

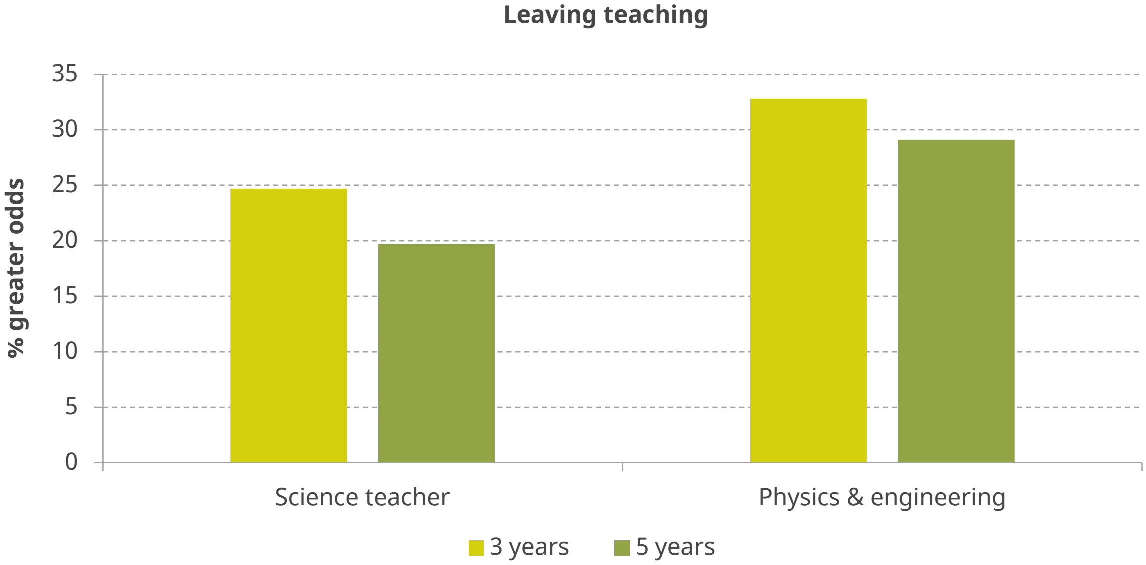
Figure 11. Percentage of teachers leaving the profession between 2010 and 2013, by years of experience



Note: Percentage of teachers leaving the profession during the period 2010–13, calculated on sample observed in 2010 and by level of experience in 2010. Note that the buckets are different durations and that retention rates, and thus average years of experience, are likely to be slightly understated in the SWC due to data quality.

Source: School Workforce Census. All secondary school teachers in the November 2010 Census for whom we can identify their subjects taught at any point in a six-year panel of data.

Figure 12. % greater odds of NQTs leaving the profession, relative to non-science teachers



Note: Percentage of teachers leaving the profession during the period 2010–15, calculated on the sample observed in 2010.

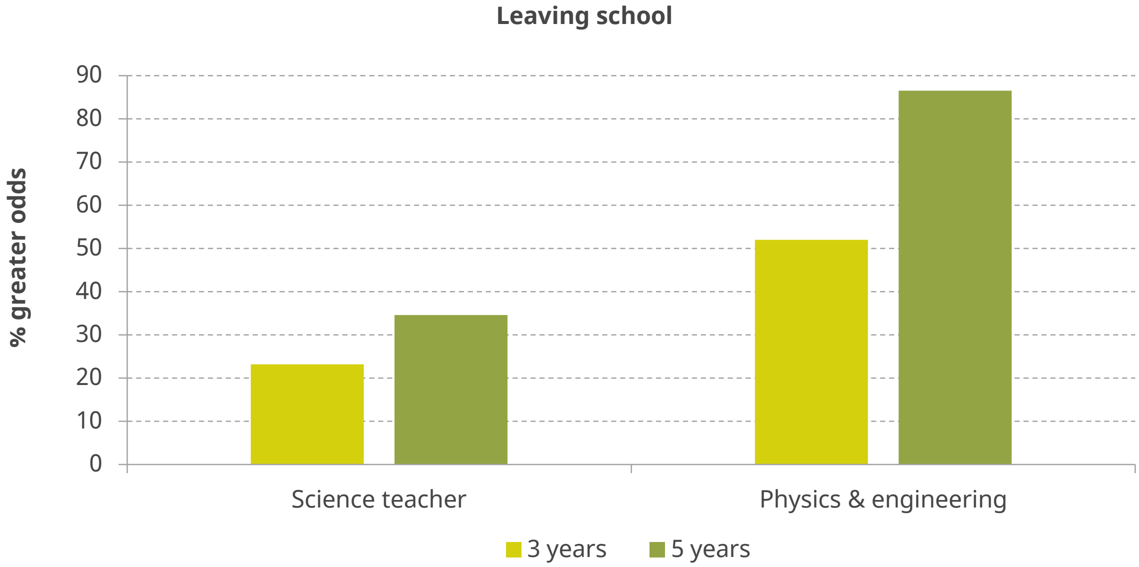
Source: Calculated from regression results reported in table 6 of Allen and Sims (2017), which used data from the School Workforce Census. All NQT secondary school teachers in the November 2010 Census for whom their subjects taught at any point in a six-year panel of data can be identified.

course, be partially caused by the fact that conditions for physics teachers are often said to be more challenging than those for other teachers, because of having to teach across all three science subjects. This holds for all science teachers and may explain some of the difference between science and non-science quit rates.

Allen and Sims (2017) have undertaken some regression modelling of teacher retention rates over the period 2010–15, allowing for other demographic factors that may influence quit rates. A summary of the results for physics teachers is shown in Figure 12. Focusing on those joining the teaching profession in 2010, the authors concluded that, in general, science teachers have a higher quit rate from the profession than other teachers. For example, over the five-year period, the odds of newly qualified teachers leaving the profession were 20% higher for science than for non-science teachers. For physics teachers, the odds of leaving the profession relative to non-science teachers were 30% greater. This is consistent with science teachers, and specifically physics teachers, being more likely to leave teaching due to better outside opportunities, as documented in Section 5. Equally, these quit rates may be influenced by non-pecuniary factors, including the fact that science teachers are expected to teach three subjects, which leads to high workloads.

What is equally striking is the variation in the school turnover rate for different types of teachers. Figure 13 shows that the odds of a newly qualified teacher leaving their current school during their first five years of teaching (2010–15) are 35% higher for science teachers than for non-science teachers (as reported in Allen and Sims (2017)). However, the odds of a teacher with a physics or engineering degree leaving their school are around 87% higher than the odds for non-science teachers, and considerably higher than those with other types of science degrees. Whilst some caution is needed since this is one cohort

Figure 13. % greater odds of NQTs leaving their school, relative to non-science teachers



Note: Percentage of teachers leaving their school during the period 2010–15, calculated on the sample observed in 2010.

Source: Calculated from regression results reported in table 6 of Allen and Sims (2017), which used data from the School Workforce Census. All NQT secondary school teachers in the November 2010 Census for whom their subjects taught at any point in a six-year panel of data can be identified.

and sample sizes are relatively small, these findings are nonetheless striking. These data are consistent with a relative shortage of physics teachers specifically and hence the potential for physics teachers to move on quickly to another school, perhaps to secure pay gains and promotion. However, since we presented data in Section 5 indicating that physics teachers do not experience more rapid earnings growth than other teachers, it may also be that physics teachers move schools more readily because they are less happy in their current roles rather than in response to pay or promotion opportunities. This might too explain their higher quit rate from the profession.

7. Conclusions and policy implications

Using an array of different data, we have deduced, a number of key findings of relevance to those trying to sustain the supply of physics teachers in the English education system. First, physics teachers are, on average, currently as well qualified as other teachers, at least as measured by their prior attainment level on entry into university. This implies that whilst there does appear to be a quantity issue, and only a tiny percentage (3%) of physics graduates become teachers in the first few years of their career, there does not appear to be a quality problem. Teaching is still attracting relatively high-quality candidates, measured by academic test scores at age 18. However, there has been a decline in the quality of teachers who have some other degree subjects, such as English and history, again as measured by their prior attainment on entry to university. The fact that such a decline has been avoided in physics may be attributable to bursaries, but at this stage there is no clear-cut evidence to support this and further research is urgently needed on this issue.

In terms of outside labour market opportunities, physics graduates do have better options outside teaching in terms of wages and generally earn more than graduates with many other degree subjects. However, despite this, we find no evidence that schools are paying physics teachers more than teachers in non-shortage subjects. Clearly, despite head teachers having the power to do so, most are choosing to stick to standard teacher salary scales and are not systematically rewarding physics teachers (and other shortage teachers) at a higher rate. This may be for fear of pay escalation, due to concerns about pay parity across schools or simply because it breaks with custom and practice.

The impact of the relatively rigid pay structures for teachers on the recruitment and retention of physics teachers cannot be proven by our descriptive analysis. However, it is nonetheless interesting that physics teachers do have a lot of churn in the early years of their career, with a higher proportion joining and then quitting teaching compared with some other subjects. Physics graduates generally have higher quit rates both from their school and from the profession as a whole. The consequence of the recruitment issues alluded to above and this relatively high quit rate is that the physics teacher workforce is older and more experienced than the workforce for other subjects. This is an unsustainable situation potentially, but it is equally clear from the data that schools are trying to get around this issue by hiring graduates with other types of science degrees (i.e. not physics, chemistry or biology). Around half of all those who are teaching science have ‘other’ science degrees and this may reflect the fact that it is easier to recruit and retain these individuals.

The implications of these findings are perhaps obvious. First, schools need to recognise that some teachers (for example, physics teachers) have higher levels of prior attainment and better labour market options. If schools are to recruit and retain such individuals, it is likely that the total reward package offered to physics teachers needs to be more attractive. This could include better non-pecuniary benefits, rather than just financial benefits. In terms of bursaries, our evidence suggests that it will not be enough to tempt physics graduates with bursaries since they have a higher quit rate. Instead, serious attention needs to be paid to understanding ways in which physics teachers can be retained: a difficult task, particularly with more limited budgets for schools.

8. Future research

In many respects, research into the labour market for physics teachers is unsatisfactory. We only have pieces of the puzzle. For example, we know who is training to be a physics teacher from Higher Education Statistics Agency data, although, with the growth of school-based routes, even this is somewhat problematic. However, having identified those training to be teachers, we cannot precisely track these trainees into specific schools (and out again). We can certainly identify graduates with physics or engineering degrees who are employed in schools through the School Workforce Census, but these data are not linked to the HESA student data and because of this we cannot find out which trainees go into which schools. As a result, understanding the effectiveness of different routes into teaching and geographic disparities in the supply of teachers is not easy. Further, the SWC has a considerable amount of missing data and we have a puzzling number of teachers with physics or engineering degrees who appear to be employed by schools and yet who do not appear to be teaching. Better understanding of this phenomenon and further investigation of the quality of the SWC are needed.

We also only have partial information on transitions into and out of teaching, and we find it difficult to separate those who are leaving for a teaching job in the independent sector and those who are leaving teaching altogether. Ideally, we would want a data set that provides us with the entire trajectory whereby we could follow pupils from school (National Pupil Database, NPD), through university and into teacher training (HESA data), then on into their schools (SWC) and in the labour market (HMRC tax data). This would enable us to better understand the pipeline into teaching, the junctures at which teachers exit or return to the profession and factors that might influence this.

Whilst a complete trajectory for teachers may be unachievable in the short run, there is some research that could be undertaken with existing data to gain a better understanding of the quality of newly recruited physics teachers. The new Longitudinal Educational Outcomes (LEO) data set, which is just coming online from the Department for Education, will provide more granular information on the prior achievement levels of physics graduates (NPD), combined with information on their degree and their postgraduate training (HESA). Our understanding is that LEO will also incorporate the HESA Destinations of Leavers from Higher Education data and hence allow identification of graduates' occupations after leaving higher education. The LEO data are also linked to earnings data from HMRC and will therefore facilitate a more direct comparison between the earnings trajectories of physics graduates who go into teaching and those who do not, enabling better comparison of those with otherwise similar educational trajectories. This project would require us to obtain permission from the Department for Education for the use of LEO. Assuming that permission were given, it would enable us to better answer questions such as:

1. What is the average quality of physics graduates entering teaching as measured by student achievement throughout their schooling? How does this compare with that of other physics graduates and that of graduates entering teaching from other subject areas? How does this change over time?

2. What is the average quality of physics graduates entering teaching as compared with those joining other parts of the public sector? Which parts, and indeed what sectors,

are continuing to attract the largest numbers of physics graduates and how does this vary regionally?

3. Has the average quality of physics graduates entering teaching changed since the introduction of bursaries for physics trainee teachers?

4. What has been the impact of the scholarships/bursaries scheme on the supply of new physics teachers? How cost effective are bursaries as a way of ensuring a supply of physics teachers in the longer run?

Whilst this briefing note has had an attempt at answering (1) and (2), we have been limited by the fact that we only have partial information on students' trajectories prior to higher education. The LEO data set would enable more precise comparisons to be made. More crucially, though, in a year or so it would also enable us to attempt to answer (3) and (4), which are critically important questions given the investment that has been made in terms of providing financial incentives to become a physics teacher.

The following are lacking in the current evidence base and merit longer-term research:

- determining why schools appear not to be using pay to retain physics teachers;
- evidence on how physics teachers are actually deployed in schools, the extent to which they teach across subjects and whether any sharing of physics teachers is really happening across the multi-academy trusts;
- better evidence on the factors that drive the higher quit rate of physics teachers;
- properly evaluated interventions that are designed to improve the retention of physics teachers.

Appendix Table 1. Description of sources of central cost of initial teacher training

Source of central cost	Academic year 2013–14	Academic year 2014–15	Academic year 2015–16	Academic year 2016–17
Scholarship	Scholarships are awarded through a competitive process by the Institute of Physics (IOP), primarily for trainees with at least a 2:1 degree class. The scholarship funding is £20,000 (tax free) per trainee, independent of region, with a 25% uplift for School Direct unsalaried trainees whose training is based in a school (more than 60 days) where more than 35% of pupils are eligible for free school meals. Trainees are not eligible for both scholarships and bursaries. Trainees on salaried routes are not eligible for scholarships or bursaries.	As for 2013–14, but: • the scholarship funding is £25,000 (tax free) per trainee.	As for 2013–14, but: • the scholarship funding is £25,000 (tax free) per trainee; • no uplift.	As for 2013–14, but: • the scholarship funding is £30,000 (tax free) per trainee; • no uplift.
Bursary	Bursaries are awarded by the National College for Teaching and Leadership (NCTL) and are tax free. The amount depends on degree class, ranging between £12,000 for those with a 2:2 degree to £20,000 for trainees with a first-class degree. There is a 25% uplift for School Direct unsalaried trainees whose training is based in a school (more than 60 days) where more than 35% of pupils are eligible for free school meals. Initial teacher training (ITT) providers can award higher bursary awards than a trainee's degree class would allow if the trainee has outstanding potential, where trainees are not currently eligible for the highest bursary award. Trainees are not eligible for both scholarships and bursaries. Trainees on salaried routes are not eligible for scholarships or bursaries.	As for 2013–14, but: • the bursary award is between £9,000 and £20,000 (tax free) per trainee; • degrees below 2:2 are eligible for bursaries.	As for 2013–14, but: • the bursary award is between £9,000 and £25,000 (tax free) per trainee; • degrees below 2:2 are eligible for bursaries; • no uplift based on pupil composition; • no discretionary uplift.	As for 2013–14, but: • the bursary award is between £9,000 and £30,000 (tax free) per trainee; • degrees below 2:2 are eligible for bursaries; • no uplift based on pupil composition; • no discretionary uplift.

Source of central cost	Academic year 2013–14	Academic year 2014–15	Academic year 2015–16	Academic year 2016–17
Tuition fee & maintenance loan	Tuition fee and maintenance loans are available to all trainees on non-salaried routes (including those eligible for a bursary or scholarship). The maximum tuition fee loan is £9,000 per annum. The maximum maintenance fee loan is £7,675 for those living away from home and training in London. Entitlement for the maintenance loan declines as the amount of maintenance grant increases (£0.50 for every £1). The cost of providing these tuition fee and maintenance loans to central government includes the long-term cost of non-repayment and the opportunity cost of the provision of loans.	As for 2013–14, but: • maximum maintenance fee loan is £7,751 for those living away from home and training in London.	As for 2013–14, but: • maximum maintenance fee loan is £8,009 for those living away from home and training in London.	As for 2013–14, but: • maximum maintenance fee loan is £10,702 for those living away from home and training in London.
Maintenance grant	Maintenance grants of £3,354 per year are available for trainees on non-salaried ITT routes with household income less than £25,000, declining at a rate of £0.1876 per £1 of household income to £50 at £42,611 and zero above this. Each £1 of maintenance grant leads to a decline in entitlement to a maintenance loan of £0.50.	As for 2013–14, but: • £3,387 per year for trainees on non-salaried ITT routes with household income less than £25,000; declining at a rate of £0.1894 per £1 of household income to £50 at £42,620 and zero above this.	As for 2013–14, but: • £3,354 per year for trainees on non-salaried ITT routes with household income less than £25,000; declining at a rate of £0.1875 per £1 of household income to £50 at £42,620 and zero above this.	No maintenance grant available.

Source of central cost	Academic year 2013–14	Academic year 2014–15	Academic year 2015–16	Academic year 2016–17
NCTL grant to schools	No direct grant for provider-led routes and School Direct unsalaried, which are funded through trainee's tuition fees. Range between £19,000 and £23,900 for School Direct salaried depending on area and whether the school is eligible for a 10% uplift (where more than 35% of pupils are eligible for free school meals and the trainee is based in the school (more than 60 days)).	As for 2013–14.	As for 2013–14, but: • range between £24,000 and £28,900 for School Direct salaried; • no uplift based on pupil composition; • £6,000 uplift where school pays the trainee a minimum salary.	As for 2013–14, but: • range between £19,000 and £23,900 for School Direct salaried; • no uplift based on pupil composition; • £6,000 uplift where school pays the trainee a minimum salary.
NCTL contract	£25,958 for Teach First (£17,652 per trainee for ITT; £8,306 per trainee for expansion grant).	Not available.	Not available.	Not available.

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