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IOP Institute of Physics

IOP Response to the House of Commons Education Committee Inquiry: Teacher Recruitment, Training and Retention

The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland. Promoting, developing and supporting excellent physics teaching is a prominent part of the IOP's work. We produce significant resources for physics teachers, teacher education providers, students and others at all levels, as well as providing funding through grants and awards, plus outreach to schools, universities and communities. Through our Limit Less campaign, we have identified barriers that underserved groups[1] face in physics and campaign to ensure that no young person is denied the opportunity to pursue a fulfilling and impactful career in the discipline. Both our own and other relevant research is presented in the following response.

The current situation regarding teacher recruitment and retention

- **What are the main factors leading to difficulties recruiting and retaining qualified teachers?**

Recruitment is a particular problem for physics; twenty-five years of under-recruitment have resulted in a severe shortage of physics teachers in the workforce. This shortage has worsened in recent years and shows no sign of improving[2].

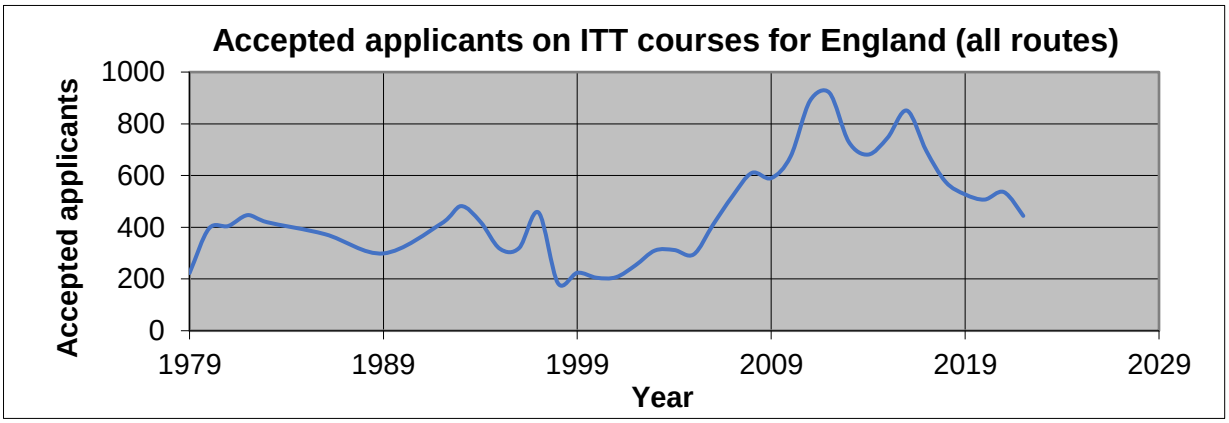

Figure 1: Accepted applicants on ITT courses in England by year[3]

[1] Girls, young people from disadvantaged backgrounds, disabled young people, LGBT+ young people, and young people of Black Caribbean descent.

[2] The latest data from the Initial Teacher Training Census shows that, after an increase in new entrants to ITT in 2020/2021 (likely due to the impact of COVID-19), numbers have now returned to the lower levels experienced over the years prior, with only 59% of the ITT target being met for secondary subjects. This target has not been met since 2012/13, except in 2020/21. [see further: https://explore-education-statistics.service.gov.uk/find-statistics/initial-teacher-training-census]

[3] Chart compiled from Department for Education statistics by year [e.g. https://www.gov.uk/government/statistics/initial-teacher-training-trainee-number-census-2014-to-2015]

At the same time, retention is also a significant problem, with almost half of teachers leaving within the first ten years[4], and physics faces particular retention problems compared to other subjects[5]. Comparatively low pay, a lack of flexible working options compared to other professions, and burnout are significant contributing factors[6]. The Migration Advisory Committee in 2017 reported[7] that median salaries of physicists within teaching were £6400 less than those outside teaching, for example. While the problems of pay and working conditions are profession-wide[8], the problem of burnout has a particular significance for physics teachers, who are often required to teach out of field and thus experience significantly elevated workloads as a result of having to learn to teach other sciences that are not their specialism. The IOP's Teacher Retention Survey[9] found that nearly half of ECT physics teachers (1 to 5 years) teach less than 67% physics and 40% of those considered leaving the profession in the previous year (twice as many as those who were teaching mostly physics). It is worth noting that the attrition rate in Scotland, where physics teachers teach largely physics, is 1% per year from the second year onwards[10]. This compares with about 8% in England (from the second year onwards). In Scotland, after five years, about 80% of physics teachers are still in the profession, whereas in England it is only 60%.

- **Which subjects are most affected?**

Physics is particularly badly affected by the difficulties in teacher recruitment and retention. In 2022, only 444 teachers started ITT on physics courses; this was just 17% of the target for recruiting new physics teachers in England, making it the worst result in 15 years[11]. The severe shortage of physics teachers has led to a self-reinforcing spiral effect, whereby the dearth of physics teachers leads to ever-increasing targets to make up the shortfall, leading to ever bigger misses and so on. Analysis by Emsi Burning Glass, commissioned by the IOP, has shown that one in 20 jobs in the UK and Ireland makes use of physics skills[12], highlighting

[4] The most recent School Workforce in England report (based on the School Workforce Census) shows that only 59.7% of teachers who qualified ten years ago are still teaching, as of 2022. [see further: https://explore-education-statistics.service.gov.uk/find-statistics/school-workforce-in-england]

[5] See figures 1 and 2 at: https://www.nfer.ac.uk/media/3784/retaining_science_mathematics_and_computing_teachers.pdf

[6] See the Department for Education's 'Factors affecting teacher retention: qualitative investigation' [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/686947/Factors_affecting_teacher_retention_-_qualitative_investigation.pdf] and a very recent National Foundation for Educational Research report [https://www.nfer.ac.uk/news-events/press-releases/teacher-vacancies-almost-twice-pre-covid-level-and-recruitment-target-likely-to-be-missed-again/]

[7] See Table 3.6 at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/585998/2017_01_26_MAC_report_teachers_SOL.pdf

[8] While this response will focus on problems and solutions specific to physics teaching, profession-wide problems with teacher recruitment, training and retention are extremely serious and require addressing at the system-wide level. For example, only a quarter of teachers surveyed by TeacherTapp would definitely choose to train to be a teacher again, if given the chance to start over, down from 42% in 2018: Laura McInerney on Twitter: https://t.co/uKx7EJzyv6" / Twitter

[9] Not yet published

[10] Sheet 15 in the spreadsheet at: https://www.gov.scot/publications/summary-statistics-for-schools-in-scotland-2022/documents/

[11] See: https://www.iop.org/about/news/iop-responds-bleak-news-teacher-recruitment-numbers

[12] See: https://www.iop.org/strategy/productivity-programme/workforce-skills-project

further the importance of physics to the UK economy and therefore the need to address these problems. The shortage of skills is already preventing businesses from realising their R&D ambitions: two thirds of physics innovators surveyed as part of the IOP's Paradigm Shift report disclosed having suspended or delayed R&D activity in past five years due to skills shortages[13].

- **What impact does this have on pupils, particularly disadvantaged pupils and those with SEND?**

There is a well-known problem with girls being underrepresented in physics in general, but the issue isn't just about girls: underrepresentation exists for those from socioeconomically disadvantaged backgrounds, disabled people, LGBT+, and minority ethnic groups – particularly those from Black Caribbean heritage[14]. Representation is worst for those who are from more than one of these groups. But this is also an issue of teacher shortage: because there are so few specialist physics teachers, they tend to congregate in schools that are in less deprived areas and therefore the most disadvantaged groups of students are hit hardest by the lack of specialist physics teachers. This is starkly illustrated by the fact that 70% of A-level physics students come from just 30% of schools[15], and that there are at least 300 schools (more likely to be in deprived areas) that send no students on to take A-level physics at all[16]. A student in the lowest SES quintile is three times less likely to take A-level physics than someone in the top quintile[17].

What action should the Department take to address the challenges in teacher recruitment and retention?

The first action the Department should take to address the challenges in teacher recruitment and retention, particularly for physics teachers, is to:

Reversing the trend of deploying physics specialists as a teacher of 'science', rather than ensuring that they can focus on their in-field subject (physics), especially in their early career.

The practice of expecting physics teachers to teach one or both of the other two sciences is both unnecessary (there are sufficient specialists in those subjects) and it has two detrimental effects: it reduces the quality of learning for young people (because they have an out-of-field teacher); and it increases the attrition rate of teachers. It does so in three ways:

- it increases their workload, especially in their early career, because they are having to learn to teach three subjects, two of which are not their specialism, and they have no repeat classes, which would normally decrease their workload by enabling the same content to be used across multiple classes;

[13] See p. 39 at https://www.iop.org/sites/default/files/2021-10/Paradigm-Shift-physics-innovation-final-oct-2021.pdf
[14] See the IOP's Limit Less report: https://www.iop.org/sites/default/files/2020-11/IOP-Limit-Less-report-2020-Nov.pdf
[15] Ibid. IOP analysis of the National Pupil Database 2017
[16] Ibid. IOP analysis of the National Pupil Database 2017
[17] Ibid. IOP analysis of the National Pupil Database 2017

- it slows the rate at which they gain expertise in their main subject (again, because they have no repeat classes);

- and it reduces their self-efficacy (increasing the chance that they will leave).

Timetabling physics teachers to teach across the sciences is a significant factor in physics teaching having the highest attrition rate. The situation would be improved by ensuring a specific entitlement for early career teachers to teach largely within their own specialism (where that is their preference), along the lines of existing entitlements early career teachers have for 10% timetable relief or access to a mentor. Taking this action now, at a national level, will improve the retention of physics teachers.

A retention payment for physics teachers is also a possibility. A pilot programme that provided targeted uplifts in pay worth 8% of gross salary for early-career maths and physics teachers resulted in a cost per additional teacher retained that was 32% lower than the cost of training an equivalent replacement teacher[18].

Further action would include:

Provide incentives to encourage ITT providers to contribute to the national recruitment target.

As things stand, although the recruitment target gets higher and higher, there is no way of managing that target or devolving the responsibility for meeting it to regional or local levels. Devolving some responsibility to providers will help to manage the national target. It will also stimulate a demand for and return to the provision of physics Subject Knowledge Enhancement courses to be provided in specific localities, building up local physics expertise in regions. The last time a specific physics target was introduced, in 2011, recruitment numbers rapidly increased to nearly 900 from a little over 600[19]. These advantages, however, have since ebbed away. An incentive could be applied through a range of different means[20] but, crucially, should be tested for both how effectively they drive provider behaviour, and the extent to which they are prone to gaming).

Retraining existing established teachers of other subjects.

An effective of way of quickly increasing the number of in-field physics teachers is to retrain existing established (i.e. ideally beyond early careers) teachers of other subjects. This is

[18] https://www.gatsby.org.uk/uploads/education/reports/pdf/the-effect-of-financial-incentives-on-the-retention-of-shortage-subject-teachers-evidence-from-england.pdf

[19] https://www.gov.uk/government/publications/initial-teacher-training-trainee-number-census-2011-to-2012

[20] Possible means through which targets could be incentivised could include:

- Seed-funding to support a physics ITT course in a way that allows providers to pay for a physics tutor if they recruit a certain number of physics trainees (for example 10);
- A per-capita uplift to providers for each physics trainee sourced;
- Support for establishing Subject Knowledge Enhancement (SKE) courses (to help providers get trainees);
- Funding for recruitment hubs – groups of providers (focused on a hub) with funding for marketing support locally for physics trainees;
- A straightforward bonus for meeting a target;
- A payment to any provider who is willing to take on a (3 year) commitment to a given number (i.e. targets that providers opt into).

Incentives could also be used for other shortage subjects and could form part of a package of measures to support ITT providers in all shortage subjects.

underway in the Subject Knowledge for Physics Teaching (SKPT) programme. By targeting schools that have a shortage of physics specialists, the programme generates new specialist teachers where they are needed – thereby reaching students who are currently denied access to a physics specialist.

Intensive retraining programmes like SKPT are both effective and efficient. As long as the programme is intensive and sustained, those who complete it will develop the substantive, disciplinary and pedagogic knowledge of physics that will enable them to qualify as an in-field teacher. Retraining existing out-of-field teachers in this way can be achieved at a fraction of the cost of recruiting a new physics teacher and, given that they are in-service, they are already experienced classroom practitioners of biology or chemistry.

We recommend that the programme is extended (to reach more teachers) and intensified (to increase the rate of course completion). In order to increase demand – and to support schools whose staff take part in the programme – we strongly recommend that the schools are funded to cover the costs of releasing staff. It is also worth considering a bursary for staff who take part in their own time.

Encourage more engineers to consider teaching.

The Engineers Teach Physics programme that the Department has initiated is a welcome development, promoting to the senior engineering community the policy of encouraging graduate engineers into physics teaching as a sound investment strategy in the future of engineering itself. There are considerably more engineers graduating each year (19,000)[21] than physicists (3500)[22]. If an additional 1% of those graduating went into physics teaching, this would represent a 30% increase in physics teacher supply. 42.6 % of engineering graduates have physics and maths A-levels[23] and experience shows that they are very well suited to becoming physics teachers. At the moment, the programme is contributing modest numbers but with continued support should make a significant contribution in time.

What has been the impact of the new bursaries and scholarships announced in October?

While the situation in physics has not yet been affected significantly by the measures announced in October relating to scholarships, it has been noted that there has been an increase in overseas applicants this year. This is partly a result of the scholarships and bursaries now being available to overseas applicants - with additional support of up to £10,000 for visa-related costs. We recommend that careful monitoring is put in place to understand how many of these overseas applicants go on to start their teaching career in England after ITT, and ensuring their relative retention over time compared to domestic applicants is understood.

How well does the current teacher training framework work to prepare new teachers and how could it be improved?

[21] Table 6a data shows there were 18680 UK domiciled engineering and technology first degree qualifiers in 2018/9: https://www.engineeringuk.com/media/196594/engineering-uk-report-2020.pdf
[22] HESA Student Record 2019/20
[23] See page 10: https://epc.ac.uk/uploads/2021/05/Engineering-opportunity_final.pdf

- **What has been the impact of the Early Career Framework implemented in September 2021?**

  It is essential that early career teachers have effective support and that this is within the context of their subject; it is in this period that they are most vulnerable to leaving the profession. The Early Career Framework provides an excellent structure for providing that support. However, some aspects of the implementation can be improved; most notably, subject-specific support needs to be at the level of the separate science disciplines; and the resources need to be more effectively subject-specific.

  In a report commissioned by Gatsby, the TeacherTapp[24] team found that most early career teachers across all subjects were allocated a mentor within their subject and found this to be useful. We recommend that further work should be carried out to determine whether physics ECTs are less likely than others to have a mentor specific to their subject, especially in the context of the unhelpful growing trend towards treating the sciences as a single subject.

  The report also found that 58% of secondary teachers thought that the ECF added too much to their workload and nearly a half said it did not meet their specific needs. Also, about half of science teachers felt that the resources should be more adapted to their subject.

  In a separate TeacherTapp report[25], as many teachers (21%) felt that the ECF would make them more likely to leave teaching as those who thought it was more likely to make them stay. And 64% felt that they had learned little or very little from the ECF.

  Improving subject-specific support (at the level of the separate science disciplines), enhanced by the other actions set out above, will improve the conditions for early career physics teachers.

- **Are there ways in which teacher training could be improved to address the challenges in recruitment and retention?**

  Physics teacher recruitment could be improved by restoring the number and duration of SKE courses provided through a targeted number of key regional centres. Historically, six-month, face-to-face SKE courses contributed significantly to physics teacher recruitment, substantially broadening the pool of eligible candidates. Changes to the way that SKE courses are administered contributed to the fall in total numbers[26]. At their inception, SKE courses were largely six months in duration and were concentrated in a few regional centres, which provided a service to the other providers in that region. This allowed for large cohort sizes which were economically viable and allowed participants to support each other. Subsequently, all providers were allowed to offer an SKE course, which led to many smaller courses, which became financially unsustainable. In addition, the ability of applicants to hold multiple offers from different ITE providers leads to a race to the bottom whereby applicants will accept an offer without the condition of having to undergo an SKE course in preference to accepting one that makes that condition. As a result of these various changes, SKE courses

[24] https://www.gatsby.org.uk/uploads/education/reports/pdf/2022-10-early-career-framework-tt-gatsby-final.pdf
[25] https://teachertapp.co.uk/articles/early-career-teachers-the-story-so-far/
[26] https://www.gatsby.org.uk/uploads/education/reports/pdf/2015-gatsby-physics-teacher-infographic.pdf

are now predominantly of eight weeks duration and do little to increase the pool. In the most recent years, physics SKE provision has halved from 286 in 2020-1[27] to 97 participants in 2021-2[28].

There is the potential to link a systematised rejuvenation of pre-ITT SKE provision to the SKPT retraining programme mentioned above. The SKPT programme – which is, in effect, a post ITT SKE course – is built on six modules. Those modules, their structure and implementation methods could be used as a basis for revitalising long-form pre-ITT SKE programmes.

Additionally, if early career physics teachers were not expected to teach the other sciences, then ITT providers would not have to dedicate at least half of their time to the other sciences and could therefore spend more time on physics. This would improve retention in ITT and would also help to improve recruitment. In discussions with ITT providers for the Engineers Teach Physics programme, we have heard that applicants to this course and to physics courses are concerned about the requirement to teach the other sciences and therefore have to learn how to teach them during their training. It is likely that allowing ITT to focus on physics would improve recruitment.

How do challenges in teacher recruitment, training and retention compare to those being faced in other professions/ sectors of the economy, and is there anything that can be learned from other professions/ sectors of the economy?

Research by the National Foundation for Educational Research (NFER) in 2018[29] found that the proportion of full-time teaching staff leaving the profession was 12.3% per year, higher than nurses (9.9%) and higher than police officers (7.7%). Teachers also had higher average weekly working hours and higher total annual working hours than nurses or police officers, and the lowest levels of satisfaction with their amount of leisure time. Though COVID-19 may have altered these proportions, the return of teacher recruitment numbers to similarly low levels as pre-COVID and recent NFER research[30] to the effect that that working hours and lack of leisure time remain significant factors in teachers leaving the profession suggest that the situation will be at least broadly similar.

Addressing the underlying factors which result in teachers experiencing such workload problems, such as enabling specialist physics teachers to focus on teaching their in-field subject, will help address this imbalance.

[27] https://www.whatdotheyknow.com/request/ske_numbers_by_provider_2021

[28] https://www.whatdotheyknow.com/request/ske_numbers_by_provider_2122

[29] See: https://www.nfer.ac.uk/teacher-retention-and-turnover-research-research-update-4-how-do-teachers-compare-to-nurses-and-police-officers

[30] https://explore-education-statistics.service.gov.uk/find-statistics/school-workforce-in-england