

Cyflwynwyd yr ymateb hwn i'r [Pwyllgor Plant, Pobl Ifanc ac Addysg](#) ar gyfer yr [ymchwiliad i recriwtio a chadw athrawon](#)

This response was submitted to the [Children, Young People and Education Committee](#) on the [Inquiry into Teacher recruitment and retention](#)

Ymateb gan: y Sefydliad Ffiseg  
Response from: Institute of Physics

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## **IOP** Institute of Physics

### **Institute of Physics' response to the Children, Young People and Education inquiry on teacher recruitment and retention.**

#### **Introduction**

The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland, representing 21,000 members. It seeks to raise public awareness and understanding of physics, inspire people to develop their knowledge, understanding and enjoyment of physics and support development of a diverse and inclusive physics community. As a charity, it has a mission to ensure that physics delivers on its exceptional potential to benefit society.

The challenges physics education in Wales faces is stark. From a serious lack of physics specialist teacher recruitment to poor attainment for learners in the sciences. Our consultation response is effectively calling for a reset in how Wales approaches teacher recruitment, retention and retraining.

Physics benefits us all. It provides essential skills and knowledge that we will depend upon ever more in years to come. Physics is not just the source of inventions and ideas, but also how the country's economic health can be secured. Wales has an established research and development base, representing both employment and growth opportunities, but likely held back by significant issues in the education and skills system.

Our response to the inquiry covers a number of policies but most of all highlights the need for policymakers to view this opportunity as a reset and a chance to reinvigorate pathways into teaching, strengthening the teaching career itself and finding new methods on attracting physics talent to take up a career teaching their subject in Wales.

#### **Policy recommendations**

## Recruitment

1. Call on the Welsh Government to increase the Subject Priority Incentive Scheme bursary from £15,000 to match England's equivalent of £29,000. Novel approaches such as reducing student debt or paying down PGCE costs tied to the number of years in teaching should be considered too.
2. Call on the Welsh Government to establish a newly created STEM Teaching Centre for Excellence. This would place a strong focus on recruiting from universities and supporting students on ITE courses with tailored tutoring.
3. Call on the Welsh Government, local authorities and schools to recruit physics specialists as Physics Teachers with the expectation that most of their teaching will be done in their specialism. Recruiting physics teachers as general Science Teachers, with the expectation that they teach across all science disciplines fails to utilise their specialism. This approach likely deters talented physics and astronomy graduates from entering the teaching profession. Demanding that teachers in the sciences teach outside of their specialism is a recurring issue identified throughout this response.
4. Call on the Welsh Government to introduce pre-ITE Subject Knowledge Enhancement courses for non-physics graduates to train as a physics specialist.

## Retraining

5. Call on the Welsh Government to introduce a retraining course for established teachers of the other sciences to become in-field physics teachers. In our response we have proposed a route such as Subject Knowledge for Physics Teacher courses.

To help with the above recommendation, the Children, Young People and Education Committee should find out more from the Dublin City University Professional Diploma in Teaching Physics (PDTP) course to understand what the potential could be for a government funded physics teacher upskilling centre.<sup>1</sup> If the Committee could visit the site, it could compare this model to the current provision in Wales. Please contact us at the Institute of Physics and we can put you in contact with PDPT lead at Dublin City University.

## Retention

6. The Committee should call on the Welsh Government and education providers to ensure that physics-specialists teach within their specialism. This would be

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<sup>1</sup> Dublin City University. 2025. [Professional Diploma in Teaching Physics](#). DCU: Online.

instead of teaching all three disciplines in the sciences, two of which they may have no specific expertise in.

7. Call on the Welsh Government to work with schools and place greater emphasis on teacher Continuous Professional Development (CPD) and the pedagogy of physics education. Ensuring that teachers have the capacity and time to access CPD is important.
8. Call on the Welsh Government to work with the school sector and introduce a greater degree of flexibility to the profession to help make it competitive with other industries and professions that physics graduates may consider entering.

### **A note on our response:**

The challenges the education sector in Wales faces are deep, diverse and complex. Issues ranging from pay, to workload, pupil behaviour, flexible working opportunities, other industries competing for talent and changing expectations placed on teachers are among a myriad of reasons affecting teacher recruitment and retention. Physics is one of the worst hit subjects in Wales in terms of teacher shortages. Our policy recommendations proposed in this consultation response could also be used to help other disciplines facing shortages. Addressing these long-standing challenges in teacher recruitment, retention and retraining, which have arisen from a series of complex systemic factors will require a holistic response requiring the use of multiple policy levers.

### **Current state of play of Wales' physics teacher workforce**

In 2024, Wales had fewer physics-trained teachers (174) than secondary schools (205).<sup>2</sup> <sup>3</sup> For 2023/24, seven specialist physics teachers qualified through Wales' Initial Teacher Education system from an intake of 10.<sup>4</sup> The intake allocation target was 67, meaning the intake fell 86% short of the target.<sup>5</sup> The intake allocation target has since been increased to 72. It is unlikely to be reached. 58% of secondary schools considered themselves understaffed for physics teachers in 2022.<sup>6</sup> This was much higher than any other nation in the UK. Wales also achieved its lowest ever

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<sup>2</sup> Education Workforce Council. 2024. [Annual Education Workforce Statistics for Wales 2024](#). Cardiff: Education Workforce Council.

<sup>3</sup> Welsh Government. 2024. [Schools' census results: January 2024](#). Cardiff: Welsh Government.

<sup>4</sup> Education Workforce Council. 2024. [Initial teacher education \(ITE\) student results](#). Cardiff: Education Workforce Council.

<sup>5</sup> Education Workforce Council. 2025. [Initial teacher education \(ITE\) intake allocations](#). Cardiff: Education Workforce Council.

<sup>6</sup> Royal Society of Chemistry. 2022. [The science teaching survey 2022](#). Online: Royal Society of Chemistry.

Programme for International Student Assessment (PISA) score in science in 2022.<sup>7</sup> In 2024, only 43.8% of those teaching physics in secondary schools were trained in the subject and available data indicate no more than 50% has trained in the subject since 2014.

From the data available, we are unable to identify which schools have specialist physics teachers and which do not. Of the teachers who deliver physics education in Wales, it is difficult to work out which are specialists in the subject, and which are not on a local authority basis. Specialism is self-reported so the number of physics teachers in Wales is higher than the number of those who are physics specialists. We have defined specialism as being trained in the subject.

#### **Number of registered school teachers employed by subject taught versus trained 2024:<sup>8</sup>**

<b>Subject</b>	<b>No. trained in subject</b>	<b>%</b>	<b>No. trained in another subject</b>	<b>%</b>	<b>No. unknown</b>	<b>%</b>
Physics	174	43.8%	215	54.2%	8	2%
Biology	310	56.8%	224	41%	12	2.2%
Chemistry	234	48.6%	235	48.9%	12	2.5%
Science	442	36.9%	727	60.7%	28	2.3%

#### **Number of registered secondary school teachers by initial teacher education subject trained 2024:**

<b>Subject</b>	<b>Number</b>
Physics	290
Biology	670
Chemistry	473
Combined/General Science	814

We do not really know why the number of teachers trained in Physics ITE (290) is higher than the number of physics teachers trained in the subject (174). The data from Education Workforce Council is gathered from the Register, which teachers self-report their profession and education into. This can generate results leading to some inconsistencies in cross comparisons.

#### **Number of registered secondary school teachers by subject taught (the number of teachers delivering education within a given subject) 2024:**

<b>Subject</b>	<b>Number</b>
Physics	397
Biology	546
Chemistry	481

<sup>7</sup> Senedd Research. 2023. [How did Wales perform in PISA 2022?](#) Cardiff. Senedd Research.

<sup>8</sup> Education Workforce Council. 2024. [Annual Education Workforce Statistics for Wales 2024](#). Cardiff: Education Workforce Council.

StatsWales also tells us that physics has one of the lowest rates of specialist teachers out of all subjects. It takes around 400 teachers to deliver the equivalent of what 155 full-time physics teachers could, meaning many of the teachers teaching physics are spread thinly across other subjects.<sup>9</sup>

## **Our response to the inquiry's terms of reference:**

### **1. Barriers to recruitment: Intake into ITE and factors impacting recruitment into post (including a focus on priority subjects, Welsh medium, secondary schools and the impact of Wales' educational reforms on teacher recruitment).**

The recruitment of physics-specialist teachers in Wales is in a downwards spiral and is driving down physics participation in education. This threatens to shrink the future physics teaching workforce and entrench a downward spiral in which fewer and fewer people participate in physics education as both students and as teachers. Our response to the committee's inquiry on *Routes into post-16 education and training* highlights the vicious cycle effect physics is experiencing in Wales.<sup>10</sup> Policy interventions are needed now to redress and then strengthen the physics teacher workforce in Wales.

Namely, more students have a low-quality experience of physics at school, which contributes to fewer students taking an active interest in physics and pursuing it at post-16. This leads to fewer physics undergraduates and therefore fewer physics graduates entering the workforce; resulting in fewer potential physics teachers causing the number of physics teachers to drop again; resulting in more students getting a low-quality experience of physics; and so on in a downward spiral.

As the number of physics roles in the UK already outnumber physics graduates, this leads to increased market competition for the few graduates that come through the system. Teaching in Wales is impacted by this negative cycle and is attracting very few physics graduates to the profession leading to fewer physics teachers overall.

Policy interventions are needed to break this cycle, and we have outlined a series of policy proposals in section 1 which we encourage the committee to endorse and propose to the Welsh Government.

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<sup>9</sup> StatsWales. 2024. [Teachers by measure \(headcount, full-person equivalent \(FPE\) and hours\) and subjects taught](#). Cardiff: Welsh Government.

<sup>10</sup> Institute of Physics. 2025. [Routes into post-16 education and training: Written evidence to the Senedd](#). Senedd: Online. p. 2.

## Education Quality

Whilst the numbers in teacher recruitment are particularly poor, the IOP is also concerned that without improving the ITE experience and better supporting prospective teachers to be the best they can be, the benefits of any improvement in teacher recruitment will be short lived. Without a strong pool of candidates to choose from schools cannot be expected to address issues in recruitment. The efforts to improve teaching quality begin when ITE centres recruit their intake and continue for the duration of a teachers' career. It does not just begin and end in a single year of ITE. The IOP has a series of policy proposals designed to improve teaching quality from ITE level through to teachers who are in their early career and beyond.

The issue of teaching quality – arising in large part due to systemic failings across the education system - may be a contributory factor to Wales' poor science PISA results. These results sit below the rest of the UK and OECD average. The Institute for Fiscal Studies said that “the lower scores in Wales cannot be explained by higher levels of poverty. In PISA, disadvantaged children in England score about 30 points higher on average, than disadvantaged children in Wales. Even more remarkably, the performance of disadvantaged children in England is either above or similar to the average for all children in Wales.”<sup>11</sup> This suggests there are factors beyond socio-economic explanations affecting outcomes and educational participation in Wales.<sup>12</sup>

Secondary schools across Wales are struggling to recruit teachers, especially into shortage subjects such as physics (although, schools are increasingly recruiting 'science teachers' rather than 'physics teachers'). Estyn has noted that whilst teacher retention can always be improved, it is relatively stable in Wales across the board. However, even a stable attrition rate is an issue for a shortage subject like physics. Teacher recruitment is in a very poor place. Since 2014, the number of students on secondary ITE programmes has declined by nearly a half. Whereas for physics, the number of students on ITE physics programmes has generally been low since 2014.<sup>13</sup>

For recruitment into schools, the average number of applicants per vacancy across all subjects has more than halved since 2011. For physics it has dropped from around 10 applicants per vacancy in 2011 to 3 in 2023. For science, it has dropped from 12.5 in 2011 to 3.9 in 2023.<sup>14</sup> <sup>15</sup> As this is an average, some schools may even be getting no applicants. From the data it appears that since 2011, schools have placed an increased emphasis on recruiting into science rather than physics, most likely because

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<sup>11</sup> Institute for Fiscal Studies. 2024. [Major challenges for education in Wales](#). Institute for Fiscal Studies: Education Policy Institute. P. 3

<sup>12</sup> Education Policy Institute. 2024. [Post-16 education across the UK nations: Participation and attainment](#). EPI: Online. p. 92.

<sup>13</sup> Education Workforce Council. 2025. [Initial teacher education student results](#). EWC: Online.

<sup>14</sup> Welsh Government. 2024. [Teacher recruitment: number of applications received by subject and year](#). StatsWales: Online.

<sup>15</sup> Welsh Government. 2024. [Teacher recruitment: number of posts advertised by subject and year](#). StatsWales: Online.

of the shortage of candidates. Recruiting into science widens the potential pool of candidates for schools despite this having a likely negative impact on the quality of students' learning of physics and also on recruitment in the long-term.<sup>16</sup>

Estyn said that headteachers in secondary schools told them that in recent times, the quality of candidates is too often not up to the required standard.<sup>17</sup> This is particularly concerning. Even when people have successfully completed their ITE and become NQTs, not all go on to successfully secure actual teaching roles, despite the huge shortages. This points to a wider issue in the teacher training system where time and money is being spent on training a teaching workforce, some of which are then unable to enter the workforce (or even if they do, they are not equipped to provide the quality of teaching that young people deserve).

Considering this, schools face the choice of either not recruiting into shortage subjects or recruiting candidates who may not have the knowledge or skills they need to provide a high quality of education to their pupils. This issue of quality must be addressed alongside policies to increase recruitment to give learners the highest quality of education. High-quality teaching boosts attainment and can inspire learners to progress into post-16 study in the sciences.<sup>18</sup> At GCSE level this boost in attainment, even if only small, can have dramatic effects on an individual's lifetime earnings.<sup>19</sup>

## **The cycle of physics-specialist teacher shortages and its systemic impact**

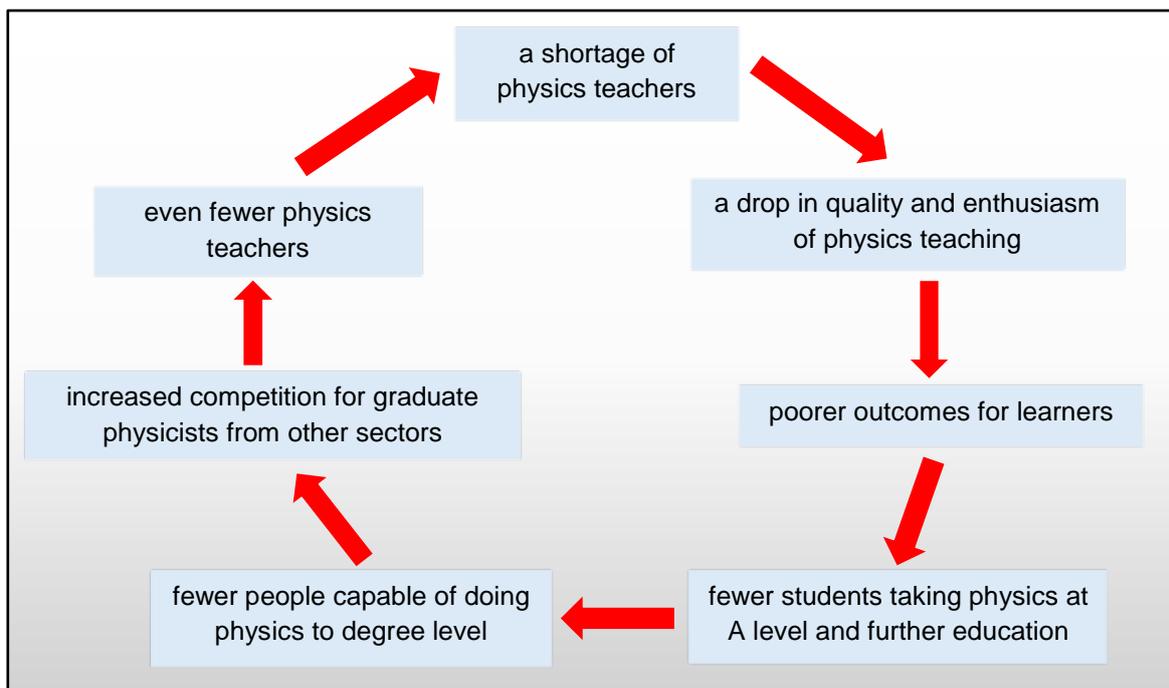
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<sup>16</sup> See section on: Recruit into specialism.

<sup>17</sup> Estyn. 2024. [Cross-cutting themes: recruitment and retention](#). Estyn Annual Report 2023–2024: Online.

<sup>18</sup> Van den Brande, J and Zuccollo, J. 2021. [The effects of high-quality professional development on teachers and students: A cost-benefit analysis](#). Wellcome: Education Policy Institute.

<sup>19</sup> Hodge, L et al. 2021. [GCSE attainment and lifetime earnings research report](#). UK Government: Department for Education.



## The bursary

**Policy recommendation:** The Committee should call on the Welsh Government to match the existing ITE Priority Subject Incentive Scheme bursary of £15,000 to England’s £29,000 with a no detriment policy, matching the Welsh Government’s approach to teacher pay rises. In addition, it could look to pilot novel financial schemes focussing on teacher retention – such as student loan debt repayments. Consideration should also be given to the development of a subject priority scholarship scheme similar to what is run by the Department for Education.<sup>20</sup>

Research in England found that bursary increases are associated with increases in recruitment into ITE.<sup>21</sup> The report found that bursary increases tend to lead to more people entering teaching training, staying on as teachers beyond their fifth year and that this extra supply of teachers tend to take places in schools in disadvantaged communities.

However, the report is for England only where the bursary payments are at a much higher level than Wales’ ITE Priority Subject Incentive Scheme. All things being equal, a physics student who, unless is eligible for the Ethnic Minority Initial Teacher Education bursary or the Welsh medium in ITE bursary (who are eligible for additional payments) could expect to receive a £29,000 bursary in England compared to £15,000

<sup>20</sup> Department for Education. 2024. [Funding: initial teacher training \(ITT\), academic year 2024 to 2025](#). GOV.UK: Online.

<sup>21</sup> Dawson, S., Tang, S. and Worth, J. 2023. [The impact of training bursaries on teacher recruitment and retention: an evaluation of impact and value for money](#). Slough: NFER

in Wales.<sup>22 23</sup> The bursary in England has also increased in recent years whereas the bursary in Wales has remained static at £15,000 since 2022 (however it has been at a similar level since its introduction in 2017).<sup>24</sup> It would be interesting to understand any impact the bursary in England has on students in Wales doing their teacher training in England – particularly amongst border areas such as Newport and Wrexham where commuting to a university in England is relatively easy.

In Wales 3 students passed their physics ITE course in 2022/23 (with 1 deferring) which suggests the intake was 93% short of the intake allocation target of 58.<sup>25</sup> For 2023/24, 7 students passed their physics ITE (with 3 not passing), falling 85% short of the intake allocation target of 67.<sup>26</sup> ITE data is not available for 2024/25, but the intake allocation is 67 and for 2025/26 the intake allocation target is 72.<sup>27</sup> Both are unlikely to be met.

England's more generous bursary is likely to be a contributory factor to the level of recruitment they are able to achieve, albeit, still falling well short of their target. Broadly speaking, the greater the bursary, the higher the response, within reasonable limits.<sup>28</sup> Bringing Wales' bursary in line with England's could help mitigate some of the potential cross border impact that a higher bursary in England may currently have on Wales.

Crucially, bursary spending is targeted at priority subjects, so offers better value for money compared to undifferentiated spending on all phases and subjects, such as across-the-board pay. Bursary spending is also targeted at prospective teachers, whose behaviour tends to be more responsive to financial incentives compared to experienced teachers. Bursaries can be cost effective compared to other targeted policy measures such as early career payments.

However, we do know that new teachers are not driven principally by financial incentives. Financial incentives are one of many levers that can help boost recruitment. We also know that teachers are often driven by intrinsic motivations such as making a difference, having a passion for their subject and viewing teaching as a vocation. Welsh Government-commissioned research supports this view, but it also recognised that well-calibrated bursaries could play a valuable role in boosting ITE recruitment.<sup>29</sup>

Whilst evidence shows that bursary payments play a role in ITE recruitment, it is also understood to play a lesser role in teacher retention. Beyond bursary payments, the

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<sup>22</sup> Department for Education. 2024. [Funding: initial teacher training \(ITT\), academic year 2025 to 2026](#). Online: UK Government.

<sup>23</sup> Welsh Government. 2024. [Initial Teacher Education \(ITE\) Priority Subject Incentive: guidance for students 2024 to 2025](#). Online: Welsh Government.

<sup>24</sup> Welsh Government. 2024. [Initial Teacher Education \(ITE\) Priority Subject Incentive Scheme: guidance for students](#). Welsh Government: Online.

<sup>25</sup> Education Workforce Council. 2023. [ITE student results 2022-2023](#). EWC: Online. p. 5.

<sup>26</sup> Education Workforce Council. 2024. [ITE student results 2023-2024](#). EWC: Online. p. 7.

<sup>27</sup> Education Workforce Council. 2025. [Initial teacher education \(ITE\) intake allocations](#). EWC: Online.

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<sup>29</sup> Beaufort Research and National Foundation for Educational Research. 2019. [Research Study on the Attractiveness of Teaching, and Retention of Teachers](#). Cardiff: Welsh Government.

Welsh Government could test novel financial incentives that could encourage newly qualified teachers to remain in the teaching profession.

The teacher shortage means that, while the state is struggling to fill teacher roles in shortage subjects, it is wider society that is suffering as a result. However, the costs attached to filling this gap in the states' capacity are more or less placed on the individuals most qualified and willing to do so. Individuals will graduate with a degree in physics, most likely with a debt through Student Finance, and are then expected to take on further debt to do a PGCE. Therefore, policy and financial interventions to reduce the costs of either or both of these debts could prove beneficial – especially if down payments of the debts are linked to length of service as a teacher.

### **STEM Teaching Centre for Excellence**

**Policy recommendation:** The Committee should call on the Welsh Government to establish a STEM Teaching Centre for Excellence, led by a full-time funded Chair and embedded within an existing ITE institution, to help boost the quality of ITE in Wales. The STEM Teaching Centre for Excellence would have cross-curricula impact and would also run off-site activity to support recruitment and tuition in all ITE centres in Wales.

The Initial Teacher Education (ITE) system is not recruiting or producing enough high-quality teachers for recruitment and is therefore unable to fill the shortages schools are facing.<sup>30</sup> The policy proposal also addresses the importance of fostering cross-curricular working through STEM amongst teachers throughout their careers, whilst also supporting them to encourage their pupils to develop an understanding of the distinctive nature of the subject disciplines. For example, a students' maths skills would help them in physics, but learners must also be aware of the distinctive nature of disciplines in STEM, such as the distinction between biology, chemistry and physics.

In addition, some physics graduates may not perceive becoming a physics teacher as a high-quality profession compared with other industries they could enter.<sup>31</sup> Addressing this issue, combined with a series of other policy proposals, could help increase the number of quality candidates on offer to schools. This would help boost recruitment and raise standards in physics education for learners.

Wales does not have a national body of this scale focussed on STEM in education. The current offer compared to elsewhere across the UK and Ireland is poor. Physics graduates will want to join a profession that is cutting-edge, well respected and well compensated. Sadly, Wales loses out to the rest of the UK on this basis. For example, a prospective teacher from Wales may have a choice between accepting a £15,000

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<sup>30</sup> Estyn. 2024. [Cross-cutting themes: recruitment and retention](#). Estyn Annual Report 2023–2024: Online.

<sup>31</sup> Institute for Fiscal Studies. 2018. [The characteristics of and earnings and outcomes for physics teachers](#). Gatsby: Online.

bursary and a part-time PGCE tutor in Wales, or a £29,000 bursary and a physics PGCE course led by leading subject academics in England.

A recent OECD report said teachers need a strong foundation in training and early-career induction through a solid foundation in ITE. It said this would give teaching a professional identity, making the career more attractive.<sup>32</sup> The STEM Teaching Centre for Excellence could be a practical way to deliver this vision.

Failing to make teaching attractive as a career reduces the number of prospective teachers which, in turn drives, down the quality of education learners experience.

To address this, the IOP proposes that the Welsh Government should establish a STEM Teaching Centre for Excellence. This Centre would aim to:

- enhance the quality of ITE and therefore the teaching of STEM subjects at secondary school.
- support the professionalisation of teaching through quality tutoring, mentoring and ITE course content.
- take a lead role in working with undergraduate departments of physics, astronomy and engineering (and other STEM subjects) in Wales and universities across the UK with Welsh domiciled students to market teaching to prospective students.
- as a centre for excellence, demonstrate to Welsh domiciled students that teaching in Wales is valued and draws investment.
- increase the number of prospective teachers in secondary schools and further education through increasing the number of ITE students. This would be done through linking up with undergraduate courses.

The Centre, whilst not an awarding body itself, would support Postgraduate Certificate in Education (PGCE) and Post-Compulsory Education and Training (PCET). The delivery mechanism is important. It needs to be funded with full-time roles with activity and content delivered from within the centre, rather than relying on ad-hoc participation from external organisations.

A STEM Teaching Centre for Excellence would:

- Act as a standalone institution and contain two core functions:
  - Research – into STEM pedagogy and the STEM teacher workforce pipeline.
  - Off-site activity – staff members would help embed the Centre’s research into practice, both through establishing links with

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<sup>32</sup> OECD. 2025. [Constructing Scenarios for the Future of Teaching in Wales](#). OECD: Online. pp. 76-84.

undergraduates to working across ITE institutions across Wales and helping with tutoring, school induction and mentoring.

The Centre would be unique in that it would carry out both functions. Notably, its outreach work forms a core part of the offer. It should be a delivery mechanism in and of itself which makes it distinct compared to organisations which may specialise in education research only. The fact the Centre would work alongside the ITE system makes it uniquely capable in supporting ITE institutions and helping solve their problems.

- Be led by a funded full-time, internationally recognised, Chair (senior academic) who would lead on pedagogy research into improving STEM teaching across the new curriculum. The Centre would then have an important role in translating its own and international research into practice by supporting ITE tutors, schools, teachers and students.
- The Chair would be supported by a team to ensure high quality PGCE courses in Wales, high quality retraining courses in Wales, support (through professional learning) to implement the new curriculum. Such resourcing is essential to ensure this is a fully functional and effective delivery arm.
- Assist in collaboration across Wales' education sector, linking up undergraduate students to ITE courses and ironing out the patchy provision of tutoring, mentoring and the induction process into schools.
- Provide targeted support for ITE centres, ensuring that its students are supported by quality tutoring and research into STEM pedagogy.
- Enhance teacher retention and professional development by offering structured tutoring, pedagogical training, and career guidance.
- Professionalise physics teaching and offer an intellectually challenging career to physics graduates through supporting physics specialist teaching which allows individuals to grapple with the 'big ideas' in physics education and the methods that can be used to teach this.
- Encourage discussions and debate around the teaching of topics such as energy, for example, and how learners may conceptualise and understand it. The Centre would play an important role in allowing teachers to specialise in their field and engage in the questions and debates in their subject. Supporting teachers in these discussions on areas such as energy would enhance Wales' reputation as an innovative green economy where more opportunities are available to individuals.
- Be able to play a further role if implementation is successful, such as supporting summer school placements for prospective ITE students/NQTs.

Additional benefits if implementation is successful:

- Act as a funding hub for programmes such as Subject Knowledge Enhancement (SKE) courses (both pre-ITE and in-service). The Centre could convene courses and training (continuous professional development) for teachers in the workforce, particularly those who are newly qualified teachers and within their first five years in the profession. This would provide professional training beyond the one-year ITE course and act as a core retention policy.

## Welsh language provision

We know that recruiting for Welsh language teachers is a challenge for schools and the shortages in physics teaching compounds the problem for Welsh language schools. Recruitment is a significant challenge for Welsh medium physics provision. To make matters worse, only 2 of the 4 ITE centres that provide physics ITE have a Welsh language tutor.

As of 2023/24 there are 205 secondary schools in Wales. 55 are Welsh medium or bilingual, 8 are English medium with significant use of Welsh and the remaining 142 are English medium.<sup>33</sup>

The STEM Centre for Teaching Excellence should aim to function alongside and in cooperation with Welsh Government policy. This includes working with the National Institute for Learning Welsh as set out in the Welsh Language and Education (Wales) Bill and the new national professional learning and leadership body.<sup>34 35</sup> This should be done to address the shortages in Welsh medium provision and assist with developing the language skills of physics teachers who wish to teach in Welsh.

## Recruit into specialism

**Policy recommendation:** The Committee should recommend to Welsh Government, local authorities and schools to recruit physics specialists as Physics Teachers and not Science Teachers (likewise for biology and chemistry). Ensure that timetabling in schools splits subjects by biology, chemistry and physics rather than retaining them under the science header. Similarly, physics specialists may instead be more interested in teaching physics + maths, physics + ICT, physics + DT rather than physics, biology and chemistry.

Recruit physics specialists as Physics Teachers with the expectation that most of their teaching will be done in their specialism. Recruiting physics teachers as science teachers with the expectation they teach across the sciences and in other subjects does not utilise their specialism and skills and squanders valuable resources.

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<sup>33</sup> StatsWales. 2024. [Schools by Assembly constituency and Welsh medium type](#). Welsh Government: Online.

<sup>34</sup> Welsh Government. 2025. [Welsh Language and Education \(Wales\) Bill: Explanatory Memorandum](#). Cardiff: Senedd Cymru. Part 5.

<sup>35</sup> Welsh Government. 2025. [Written Statement: School Improvement Partnership Programme – Progress Update](#). Welsh Government: Online.

Physics specialists are often recruited by schools as ‘science teachers’ with an expectation to teach across the sciences in all disciplines: biology, chemistry and physics. This adds to their workload: they have no repeat lessons in a week so have to prepare many distinct lesson plans; and they have to prepare for three subjects, two of which they may not have studied since they were 16 and are outside of their specialism. This approach does not utilise the strengths of physics specialists for the benefit of learners. Allowing physics specialists to stay within their specialism could help both with retention and driving up the quality of education learners receive.

This would also help improve the data on the teacher workforce. Currently, any teacher who teaches physics at secondary school can report themselves as a physics teacher, regardless of whether they are trained in the subject beyond post-16 or not. This makes it extremely difficult to identify which schools have physics specialists and which do not. A move away from science and towards recognising biology, chemistry and physics as distinct disciplines could help with data collection and a better understanding of Wales’ teaching workforce.

## **2. Factors affecting retention: (including a focus on priority subjects, Welsh medium, secondary schools and the effectiveness of early career support).**

### **Coaching and CPD**

The Welsh Government has made significant steps to support the retention of teachers of priority subjects. The IOP welcomes the Welsh Government’s move to fund the Institute of Physics’ coaching work to teachers on a three-year basis.<sup>36 37 38</sup> This forms part of the Boosting Science Education in Wales fund from Welsh Government and will be delivered in partnership with the Royal Society of Chemistry and Science Made Simple, focussing on the provision of continuous professional development (CPD). This fund will help boost practitioners’ pedagogical and subject knowledge, as well as build confidence. Coaching and CPD play a vital role in upskilling teachers, helping with lesson and curriculum plans and providing a network for teachers of the sciences in Wales to exchange knowledge and ideas – such as through the IOP’s annual teacher conference delivered online and in Brecon.

CPD supports teachers who are already in the education system with enhanced training to upskill their science pedagogical methods. CPD can help ameliorate teacher attrition rates by helping teachers feel supported in schools. However, we know many teachers struggle to access the CPD on offer as they are unable to take time out of school to go on these training days. Teachers should not be expected to

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<sup>36</sup> Welsh Government. 2025. [Written Statement: Awarding of Curriculum for Wales grant support programme](#). Welsh Government: Online.

<sup>37</sup> Welsh Government. 2025. [The Curriculum for Wales grant support programme: grant awards: Boosting science education in Wales](#). Welsh Government: Online.

<sup>38</sup> Institute of Physics. 2025. [Boosting science education in Wales](#). IOP: Online.

do CPD out of work hours so time and funding should be made available to schools for their teachers to attend CPD sessions.

The IOP's coaching work has had a considerable positive impact on the sciences more broadly as many teachers in the sciences are expected to teach across the specialisms of biology, chemistry and physics. For example, a biology teacher may have studied biology at degree level but may have stopped studying physics after GCSE. This could mean GCSE students are learning physics from someone who only studied physics up to GCSE level. This has obvious implications on the potential impact of physics teaching quality compared a teacher who is a physics specialist.

Ensuring that new physics teachers are supported in their early career, have access to CPD within work hours, have support in curriculum design and are able to teach within their specialism as much as possible will help with job satisfaction and retain physics-specialist teachers in their roles.<sup>39</sup> Ensuring that teachers are given the opportunity to train and upskill all throughout their career is extremely important. We cannot expect all teacher training to take place within a single year of ITE alone. The report *A Future Teaching Profession for Wales* highlighted this point well.<sup>40</sup> The report also highlighted key issues such as job flexibility and the ability to work from home and/or part time.

### **Subject Knowledge Enhancement and retraining**

**Policy recommendation i:** For recruitment, the Committee should call on the Welsh Government to provide pathways and funding for non-specialist physics teachers to take accredited and fully funded Subject Knowledge Enhancement (before their PGCE).

**Policy recommendation ii:** On retraining, the Committee should call on the Welsh Government to provide pathways into Subject Knowledge for Physics Teacher courses (for in-service teachers). Upon completion, they should be recognised as physics specialist teachers.

To support the recommendation ii, the Children, Young People and Education Committee should find out more from the Dublin City University Professional Diploma in Teaching Physics (PDTP) course to understand what the potential could be for a government funded physics/STEM teacher pedagogical and subject knowledge centre.<sup>41</sup>

Many graduates, who do not have any post-18 experience of physics, can make excellent physics teachers. However, giving them the pedagogical content knowledge

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<sup>39</sup> Whalley, M. and Horsewell, I. 2024. [Should I stay or should I go? Exploring the experiences of physics teachers in their first five years](#). SSR in Depth, 105(391), pp, 7.

<sup>40</sup> Egan, D et al. 2025. [A Future Teaching Profession for Wales](#). Cardiff Metropolitan University: Online.

<sup>41</sup> Dublin City University. 2025. [Professional Diploma in Teaching Physics](#). DCU: Online.

(the 'know how' of teaching a subject) and the subject content knowledge (the what to teach related to syllabus etc), does require some form of retraining. Graduates could undertake a Pre-ITE Subject Knowledge Enhancement training course – preferably 24 weeks long. Or new physics teachers could be developed by retraining an in-service teacher of one of the other sciences.

Subject Knowledge Enhancement (SKE) courses have historically helped graduates in other subjects gain the necessary subject knowledge and pedagogical skills.<sup>42</sup> These programmes were highly valued for their structured, long-term approach and the support they provided through peer networks and expert facilitators.

Another effective solution is the use of intensive in-service retraining courses such as a Subject Knowledge for Physics Teaching (SKPT) course (which comprises 20 days of instruction across a year). Retraining an existing teacher is more cost efficient than training and recruiting new teachers – however, both levers should be used. IOP calculations for England suggests retraining a teacher for physics is a quarter of the cost of training and recruiting a new specialist teacher.

This retraining service could borrow elements of the SKPT course in England that was piloted by IOP and is currently delivered by The Ogden Trust.<sup>43</sup> In addition, it could utilise the current Welsh Government funded IOP coaching network, other learned societies such as the Royal Society of Chemistry and the STEM Teaching Centre for Excellence for course design and delivery. SKPT needs to be targeted at schools that do not currently have a sufficiency of specialist physics teachers – thereby generating a new physics teacher exactly where they are most needed. It must be fully funded to allow schools to release teachers for some time every week over a whole year. IOP's coaching network is well placed to identify which schools would benefit from this.

The funding needs to cover the re-training cost itself and to include sufficient financial incentive to schools and/or teachers to participate, or for teachers to complete all of the modules of the course (using their own time or the school's time and supported through the provision of a bursary to participants and/or their schools).

The proposal above focusses on re-training established teachers up to GCSE, where the need is greatest. An extended programme would be required to re-train teachers up to A level. The IOP is developing a certification framework which could be used to help certify participants in appropriate retraining provision as 'specialist physics teachers (up to GCSE in this instance)'.

## **Workload**

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<sup>42</sup> E, Perry et al. 2024. [A Scoping Study into the Long-term Impacts of Additional Subject Specialism Professional Development](#). Sheffield Hallam University Research Archive: Online.

<sup>43</sup> The Ogden Trust. 2025. [Subject Knowledge for Physics Teaching](#). The Ogden Trust: Online.

**Policy recommendation:** The Committee should call on the Welsh Government and education providers to ensure that physics-specialists teach within their specialism. This would be instead of teaching all three disciplines in the sciences, two of which they may have no specific expertise in. However, we know there are serious teacher shortages across subjects in many schools. Subject flexibility, where physics specialists can teach other subjects they may prefer, such as maths, in their second subject. Many physics specialists may have a stronger background in maths (due to the use of maths in physics) instead of biology and chemistry.

Efforts should be made to support schools and timetablers in deploying staff and especially NQTs to teach timetables that more closely match their expertise and preferences. In this context this would mean that, if their expertise is mainly within one of the sciences and that is the subject they are most confident teaching, effort should be made to match their timetable with that science as much as possible. In addition, if unmatched timetables are inevitable, many physics teachers may be more comfortable teaching physics and mathematics, rather than biology and chemistry. Many engineering graduates may also be more comfortable teaching physics and mathematics which could also widen the potential pool of physics teacher candidates.

High teacher workload has an impact on both teachers' teaching and learning in school and teachers' ability to take up continuous professional development opportunities. Evidence shows that physics teachers in the first five years of their teaching career (in England) note workload as a main barrier to staying in the job. For Wales this situation is likely worse as many new physics teachers starting their career are most likely the only physics specialist in their school. This places a significant workload and pressure on them in the first years of their career.

High workload is noted as a significant factor in attrition across subjects in secondary schools. It also creates a negative view of teaching amongst those who may otherwise have considered the career. Teaching out of specialism, particularly in the early stages of a teaching career, exacerbates this through increasing the amount of time teachers have to spend on preparing for lessons (including potentially making sure they feel sufficiently comfortable with the subject matter themselves).

This approach is not making the best use of physics-specialist teachers and fails to provide students with the best possible teaching in each of the sciences.

It contributes to factors that we know drive attrition:

- it adds to their workload: they have to prepare many more distinct lesson plans; and they may have to prepare for up to three subjects (biology, chemistry and physics), two of which they may not have studied since they were 16 and are likely to be outside their comfort zone.
- it reduces their job satisfaction because they are being taken away from the subject for which they originally had a passion.

- it slows the rate at which they become good: without enough repeat classes, they lose the opportunity to reflect and improve within a week of teaching a given lesson; and it will take them up to three years to have taught, for example, year 9 forces, 3 times.
- it reduces their sense of self-efficacy, adds to their stress, and contributes to the general sense that the profession might not be for them.

### **3. School Leaders: specific factors affecting recruitment and retention of school leaders.**

### **4. Diversity of the workforce: whether the current and future workforce reflects the diversity of the Welsh population including gender, race and ethnicity and disability.**

#### **Gender gap**

Around 75% of Wales' overall teaching workforce are female.<sup>44</sup> However, currently only about 41% of those delivering physics education in Wales are female. Negative stereotypes around the types of people who do physics must be broken to help ensure girls have the opportunity to continue studying physics at post-16. Increasing the number of people studying physics post-16 could widen the pool of people who may choose to become physics teachers.

The Wales wide data suggests women are more likely to become teachers than men, by 3:1. However, men are more likely than women to deliver physics education in schools. This is in part because the supply of physics graduates (who could then go on to do a PGCE and become teachers) is heavily skewed towards men. Women are underrepresented on physics undergraduate courses at university, thereby restricting the supply of potential teachers.

For Wales domiciled students studying physics at university in the UK for 2021/22, 75% were male and 24% were female. This aligns similarly with physics A level data where generally, around 20-24% of the cohort in Wales are girls. Most recent data for 2024 showed that 22.4% of those who took physics exams in Wales were girls.<sup>45</sup> Physics is the 2nd most popular A level subject for boys, but the 16th for girls. This is an issue for the future supply of the physics teacher workforce.

This gender gap limits girls' options through no fault of their own and their chances of pursuing physics at post-16. Girls at a young age face barriers to physics education that may be denying them opportunities. Known factors affecting girls' progression in physics may include access to a specialist physics teacher; quality of physics teaching;

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<sup>44</sup> Education Workforce Council. 2024. [Annual Education Workforce Statistics for Wales 2024](#). EWC: Online. p. 12.

<sup>45</sup> Joint Council for Qualifications JCQ. 2024. [AS and A Level results summer 2024](#). JCQ: Online. p. 42.

family support; socio-economic background of students in the cohort or negative stereotypes faced from an early age.<sup>46</sup>

These factors are likely restricting the number of girls pursuing physics education to a university level and therefore restricting the number of potential teachers (following the assumption that women are more likely to become teachers than men).

## **5. Impact on learners: of the current position on and the delivery of education and on wider support for learners.**

### **GCSE reform and learner attainment in the sciences**

**Policy recommendation:** The committee should call on Welsh Government and Qualifications Wales to ensure that most learners in school are offered a single pathway through the sciences at GCSE which will play a significant role in opening post-16 routes. We are currently at risk of seeing a system where schools decide which routes learners can progress on, limiting their options when they come to make their post-16 choices.

We are concerned that the current plan for GCSEs in the sciences and the learner entitlement risks seeing fewer learners take a GCSE in the sciences that leads to post-16 study. The Institute of Physics advocated for a single route for all learners through the sciences as Wales moved away from the old model of separate routes which has poor implications for equity for learners. We are now at risk of reverting to this inequitable path with the introduction of different tiers of science education (Foundation, Single GCSE and the Double Award GCSE), limiting students' options.

This risks placing a downwards pressure on A level physics uptake which then knocks on through to fewer students doing physics at university and reduces the available cohort who could go on to teaching – thus worsening the cycle.

As referenced earlier in this response, Wales achieved its lowest ever PISA results for science in 2022.<sup>47</sup> Wales performed below both UK and OECD average. Disadvantaged children in England scored about 30 points higher, on average, than disadvantaged children in Wales. Most shockingly, the performance of disadvantaged children in England was either above or similar to the average for all children in Wales.<sup>48</sup> This points to an urgent need to get the delivery of science education in Wales right. Ensuring that learners have access to a specialist teacher in the three science disciplines will go a long way to delivering better outcome for learners.

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<sup>46</sup> Institute of Physics. 2017. [Improving Gender Balance: Reflections on the impact of interventions in schools](#). IOP: Online.

<sup>47</sup> Senedd Research. 2023. [How did Wales perform in PISA 2022?](#) Cardiff. Senedd Research.

<sup>48</sup> Institute for Fiscal Studies. 2024. [Major challenges for education in Wales](#). Institute for Fiscal Studies: Education Policy Institute. p. 3

Even small improvements in GCSE grades can have dramatic effects on an individual's lifetime earnings.<sup>49</sup> IOP calculations suggest that the existence of a specialist physics teacher, even under modest assumptions, has significant potential benefits for boosting a learners' attainment, potential to go on to A level and a significant boost in lifetime earnings with compounded benefits for the economy and physics' contribution to Wales' GVA, which stood at £7.3bn in 2019.<sup>50</sup> Even small changes in the contribution physics-powered industries make to the economy would be significant. If physics education in Wales is done right, the potential is huge.

- 6. Impact on delivering educational reforms: including the Curriculum for Wales. Additional Learning Needs and Education Tribunal (Wales) Act 2018 and the Welsh Language and Education (Wales) Bill.**
- 7. Impact on teachers and wider workforce: including impact on use of teaching assistants and support staff, effect on use of supply teachers.**
- 8. Addressing recruitment and retention: What actions should be taken, and by whom, to ensure the sustainability of the education workforce and how such actions should be prioritised.**

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<sup>49</sup> Hodge, L et al. 2021. [GCSE attainment and lifetime earnings research report](#). UK Government: Department for Education.

<sup>50</sup> Institute of Physics. 2022. [The contribution of physics to the Welsh economy](#). IOP: Online.