

Cyflwynwyd yr ymateb hwn i ymgynghoriad y [Pwyllgor Plant, Pobl Ifanc ac Addysg](#) ar [Flaenoriaethau'r Chweched Senedd](#)

This response was submitted to the [Children, Young People and Education Committee](#) consultation on [Sixth Senedd Priorities](#)

CYPE SP 12

Ymateb gan: Eluned Parrott, Pennaeth Cymru, y Sefydliad Ffiseg

Response from: Eluned Parrott, Head of Wales, Institute of Physics

Beth yn eich barn chi yw'r prif flaenoriaethau neu'r materion y dylai'r Pwyllgor eu hystyried yn ystod y Chweched Senedd? Os oes modd, nodwch eich barn o ran sut y gallai'r Pwyllgor fynd i'r afael â hyn.

What do you consider to be the main priorities or issues that the Committee should consider during the Sixth Senedd? Where possible, please set out your view about how the Committee could address them.

Thema 1: Addysg oedran ysgol | Theme 1: School-age education

As the learned society and professional body for Physics across the nations of the UK and Ireland, the Institute of Physics (IoP) conducts a wide range of research that may be of assistance to you. As a membership organisation, we are also able to consult our membership on areas that may be of interest to you, and act as a link between yourselves and our professional community. Our membership is drawn from a wide range of professional backgrounds, including private and third sectors R&D, teaching, and further and higher education researchers, lecturers and students.

As part of our regular programme of UK-wide and Wales-focused research, we have identified a number of areas that the Committee may wish to consider as part of its future work-programme.

The Curriculum for Wales

The introduction of a radical new interdisciplinary curriculum for Wales provides an opportunity to transform the way in which learners build skills across portfolios of subjects. As the Welsh Government seeks to deliver that ambitious agenda, we would encourage the Committee to consider the following issues:

- How the content within the curriculum prepares students for their next steps, whether that be in sixth form, further education, vocational education and training or university,



- How teachers can be supported to deliver engaging interdisciplinary projects with confidence and flair, and
- How assessment will be developed that is appropriate to the new approach and gains the confidence of universities, employers and other stakeholders in Wales and beyond.

Curriculum content

For education to be a ladder to a better future, it is vital that our curriculum adequately prepares students for a range of future pathways. This is particularly important when looking at the transitions between different levels of education and education to work, and recognising that not all of those transitions will happen within Wales. For example, we note that large numbers of young people progress from schools in Powys and other border counties to further education colleges in England, and so it is essential that their qualifications at GCSE level enable them equal access to those opportunities in future.

We would like to suggest that the Committee look at how it is ensured that the underpinning principles of subjects such as physics are covered to an appropriate level within a flexible curriculum to enable progression to A levels, apprenticeships and other routes.

Teacher support and CPD

The success of the curriculum will be dependent on the ability for Wales' teaching profession to deliver on a programme of radical reform. The new curriculum presents the opportunity for teachers to shape their own work in a way which will be inspiring, but also challenging for individuals. It is essential that teachers receive a high standard of CPD and ongoing support to help them build new approaches to pedagogy and to ensure that they have the necessary subject level knowledge to deliver engaging lessons in a broader curriculum than they may have trained in. This theme is developed separately below.

Assessment as a passport

Assessing the new curriculum fairly and robustly will require a careful consideration of methods to ensure that the qualifications that students attain are a fair reflection of each student's own personal learning journey, and are recognised and understood nationally and internationally. The IoP believes that it is necessary for individual subject titles and subject grades such as physics, biology and chemistry to be retained. This is to enable students to use their qualifications as a recognised and respected passport to future study and work beyond Wales, as well as to be able to choose future study routes wisely with the knowledge of which subjects within a group they excelled in.



The critical role of assessment for the individual is to demonstrate their learning in whatever future pathway they choose to follow. For this reason, it is of crucial importance that we deliver a system of assessment that is fair, credible and valued by apprenticeship providers, further education colleges, universities and employers in Wales and around the world. We welcome Curriculum Wales' recent consultation on assessment for the new curriculum, and hope that the Committee will make this part of their future work programme.

Equality and Diversity

Equality of opportunity is a foundational principle of comprehensive education, and we would encourage the Committee to investigate the barriers to progression and success that face people on the basis of gender, gender orientation, sexual orientation, faith, ethnicity, disability, language and economic and social background. While diversity legislation protects specific characteristics from overt discrimination, many social and cultural barriers remain.

The IoP sees nurturing an inclusive physics ecosystem as being a critical part of our work. We have launched a major public campaign, *Limit Less*¹, to help identify and tackle some of these barriers at all levels of our society. The campaign is working with young people, their parents, advisors and teachers, policy makers and the wider public to help challenge preconceived ideas about physics and overcome barriers to inclusion within our community.

The IoP is very proud to have delivered an Improving Gender Balance² project on behalf of the Welsh Government, and are currently rolling-out its successor Whole School Equity and Inclusion project, supporting schools in Wales to identify and address imbalances across a range of protected characteristics. We are also the awarding body for the Project Juno award³, a gender equality award for university physics departments and related institutions. We would be happy to share our learning on these or any other projects with the Committee, but we are also aware of a number of other organisations working in this field who might be able to offer the Committee a rich insight into this area of work.

The Teaching Profession

The delivery of a high-quality education system is absolutely predicated on the existence of a knowledgeable, motivated and well-supported teaching profession. The IoP believes that with such high ambitions for our education workforce for the future, that increased investment in support for the profession will be necessary at a number of levels. We would like to suggest that the Committee investigate:

¹ [Support young people to change the world | Institute of Physics \(iop.org\)](https://www.iop.org/support-young-people-to-change-the-world)

² [What we're doing to address gender imbalance in physics | Institute of Physics \(iop.org\)](https://www.iop.org/what-we-re-doing-to-address-gender-imbalance-in-physics)

³ [Project Juno | Institute of Physics \(iop.org\)](https://www.iop.org/project-juno)



- Initial Teacher Training, with particular reference to a chronic shortage of teachers in specific areas including Physics, and
- Subject-specific learning and pedagogical CPD, to give teachers access to the latest knowledge in their subject area, improving both the student and the teacher's experience.

Initial Teacher Training and recruitment

In recent years, the number of qualified teachers in state schools has failed to keep up with the growth in pupil numbers. Wales is training less than 60% of the secondary school teachers it needs: and only around 20 physics teachers every year.

The IoP believes that EVERY secondary school pupil should have access to a physics-qualified physics teacher. While rates of students wishing to study physics at GCSE and A level are increasing, the number of physics-qualified teachers has fallen. There is now a critical shortage of subject-qualified physics teachers, with fewer degree-qualified physicists registered with the Education Workforce Skills Council than there are Secondary Schools in Wales. Only 43% of those teaching physics in Wales' schools trained as physics teachers. Please see the attached appendix for further information.

The IoP in Wales is proud to deliver a Stimulating Physics Network on behalf of the Welsh Government which aims to provide support and inspiration to non-specialist physics teachers across Wales. While this is an essential project in helping teachers who are delivering lessons outside their area of specialism, we believe that a two-pronged approach is vital; supporting those who are teaching now, whilst simultaneously recruiting more specialists in shortage areas.

The IoP has undertaken some research into the challenge and would be glad to share our data and some suggestions for tackling the issue. One early consideration might be the bursary for physics teacher training, which is up to £20,000 less in Wales compared with England. Additional investment in supporting early career teachers through mentoring and professional support might help to ensure the best possible return for such an investment.

Inspiring and supporting the profession

As discussed previously, new approaches to teaching through the new curriculum will require investment in pedagogical CPD for teachers. We'd encourage the Committee to take evidence on the level of investment – in money and teacher time – being directed to supporting the profession to meet the curriculum's changed needs.



Further, evidence from the IoP's *Subjects Matter*⁴ report of 2021 shows that subject-specific CPD not only has a direct impact on teaching quality, but can further contribute to improved educational outcomes by keeping experienced teachers in the profession for longer.

Investment in teachers' own learning will therefore help to ensure that the Curriculum for Wales is a success and help to tackle the ongoing recruitment and retention challenge. The UK and Ireland *Subjects Matter* report is appended for your information, and additional research is ongoing to investigate Wales' specific opportunities and challenges which we will provide for the Committee when available.

Data tables

Demand for Physics at GCSE and A Level

GCSE Entries: Physics Wales⁵

2019/20 = 7,327

2018/19 = 6,796

2017/18 = 6,671

2016/17 = 5,986

2015/16 = 5,733

An increase of 27.8% over five years.

A Level Entries: Physics Wales⁶

2019/20 = 995

2018/19 = 975

2017/18 = 891

2016/17 = 923

2015/16 = 884

An increase of 12.6% over five years.

⁴ [Subjects Matter | Institute of Physics \(iop.org\)](https://www.iop.org/subjects-matter)

⁵ <https://statswales.gov.wales/Catalogue/Education-and-Skills/Schools-and-Teachers/Examinations-and-Assessments/Key-Stage-4/gcseentriesandresultspupilsaged15only-by-subjectgroup>

⁶ <https://statswales.gov.wales/v/JTw7>



Supply of core subject specialist teachers in Wales

According to StatsWales, there are 1,480 Schools in Wales, of which 22 are middle schools and 183 are secondary schools⁷.

According to the Education Workforce Council there were 162 teachers trained in physics registered in Wales (although not all of those will be working in schools).

Thema 2: Addysg bellach ac addysg uwch | Theme 2: Further and higher education

Skills for the workforce

A strong education system underpins Wales' economic effectiveness, and the IoP is currently undertaking research in this area which we hope may be of interest to the Committee. We are currently undertaking a *Workforce Skills*⁸ project looks at the use of physics-related skills in the UK and Irish economies and predicted changes in demand for physics-related skills driven by future technological change.

Our research to date indicates that the UK economy faces critical skills shortages. We are conducting labour market research to examine at which occupations and sectors currently utilise physics skills, what that means for each nation of the UK and Ireland, and whether employers' current needs for physics skills are being met.

Separate research conducted by the CBI on behalf of the IOP reveals that two thirds of physics-based businesses in the UK and Ireland suspended or delayed R&D/innovation activities in the past five years due to skills shortages. With this detailed picture of physics-related skills requirements, we are working with experts across industry and education to develop recommendations that will effectively strengthen the supply of physics-related skills and ensure employers have access to the skills they need to innovate and grow.

This research is due to be published later in the year, but we would be happy to share key findings with the Committee prior to this.

The second part of our Workforce Skills project will analyse future technology-driven skills needs, looking at the anticipated changes in the demand for skills in areas that make significant use of physics-related technologies, and how any new or changing skills requirements can be met. This work is due to be completed in early 2022. We would welcome the Committee's advice as to areas that might be of specific interest

⁷ <https://statswales.gov.wales/Catalogue/Education-and-Skills/Schools-and-Teachers/Schools-Census/Pupil-Level-Annual-School-Census/Schools/schools-by-localauthorityregion-type>

⁸ [Workforce Skills Project | Institute of Physics \(iop.org\)](https://www.iop.org/workforce-skills-project)



to Wales, and again, would be happy to share key findings with the Committee once available.

Thema 3: Iechyd a lles, gan gynnwys gofal cymdeithasol (i'r graddau y maent yn ymwneud â phlant a phobl ifanc) | Theme 3: Health and well-being, including social care (as they relate to children and young people)

Thema 4: Plant a phobl Ifanc | Theme 4: Children and young people



