

Solving skills:

Powering growth through
physics-related apprenticeships



Now is the time to set a course for economic growth. Physics-related apprenticeships can be a solution – if we unleash their potential.

The Institute of Physics (IOP) has commissioned a first of its kind report, built on interviews with apprentices, their employers and training providers across the UK and Ireland, to set out the challenges and opportunities for physics-related apprenticeships. Using this report as a launch pad, the IOP will host national and regional conversations with employers, educators and governments to enhance our understanding of the challenges, develop impactful policy and support the building of more targeted interventions in nations and regions.

Physics-related apprenticeships are uniquely positioned to tackle the skills gap but bold solutions are needed.

Apprentices can work – and are needed – at the forefront of the new economy, from the green energy and nuclear industries to electrical engineering, construction and digital. Apprenticeships are a viable solution: more than 1 million [>50%] of physics-related roles typically don't require a degree.

But this is not widely known by young people considering their post-16 options or those influencing their decisions. This lack of awareness – underpinned by challenges facing apprenticeship training providers and employers in the UK and Ireland – mean not enough young people are successfully engaging with this rewarding and much-needed route.

This can change. Encouragingly, data shows the number of physics-related apprenticeships starts increased in 2021 in England and Scotland (where data is available). But in a severe skills shortage, this is not enough, and the number of those who go on to finish their apprenticeship is worryingly low.

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Physics-related apprenticeships offer a path to economic growth and to rewarding careers for young people from all backgrounds.

Nations around the world are grappling with the demands of the new industrial and tech economy: how to upskill the current and future workforce, drive innovation, boost productivity and arm young people with the knowledge and skills needed to better their life chances in the coming decades.

Falling behind in the global race is not an option – and yet we risk doing just that if we can't urgently address the technical skills gap. This is particularly acute for jobs needing physics-related skills, and is holding back our businesses.

Physics-related skills support nearly 2 million jobs – but two thirds of physics-related businesses have been forced to suspend or delay R&D and innovation between 2016 and 2021 due to a lack of skilled workers. Meanwhile, we've recently found that almost 9,000 physics-related jobs remained hard to fill.

To exploit the true potential of physics-related apprenticeships we need a partnership approach.

The IOP is calling on governments, education and training providers, and employers to act now to revitalise physics-related apprenticeships and the ecosystems that underpin them. Coordinated action to address the issues identified in this report has the potential to unlock life-changing opportunities for a generation of young people and re-skillers, and deliver vital skills for future economic growth in the UK and Ireland. This report launches a series of crucial conversations driving towards solutions.



‘Falling behind in the global race is not an option’

Key findings



**The voice of employers
must be heard**



**Local needs must
be met**



**Financial pressures
create barriers**



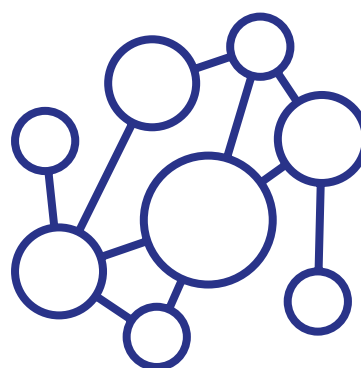
**Diversity is a work
in progress**



The voice of employers must be heard

As we tackle the skills gap facing our economy, we heard from physics-related employers and training providers that:

- Employers are facing the twin challenges of an ageing workforce and lack of skilled labour to achieve green economy aspirations. Yet, there is insufficient employer voice in shaping the content of apprenticeship provision and in supporting training providers to deliver it. Better engagement would strengthen apprenticeships' value to employers and stimulate an increase in employment.
- Apprentice employers are concerned about the administrative burden associated with apprenticeships. SME engagement was seen to be particularly stifled by this, yet these businesses are often well placed to provide a quality experience in the workplace.
- Citing low sector pay, training providers also told us that there is a shortage of skilled educators to deliver physics-related apprenticeships, creating barriers to meeting local needs.



Local needs must be met

Physics-related industries poised for future growth, such as green energy and tech, are often concentrated in specific geographical areas, so a place-based lens must be considered when looking at industry-level skills gaps.

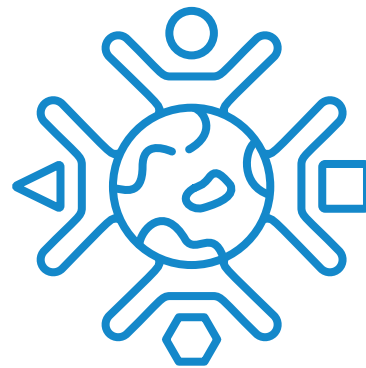
- Apprenticeship options are strongly driven by local industry needs. Yet it seems young people are insufficiently exposed to local employers in order to understand that they are viable and valuable education and career opportunities.
- Completion rates of physics-related apprenticeships vary significantly across different nations. In England and Northern Ireland, more than four out of ten physics apprentices dropped out in 2020/2021 (41% and 45% respectively), but in Scotland, dropout rates were lower than 20%.



Financial pressures create barriers

Although there is evidence to show that jobs requiring physics and physics-related skills are relatively well paid, this fails to be a meaningful incentive if not considered when weighing up the cost of apprenticeships routes. Apprentices told us that:

- More than a quarter (26%) of them have or expect to have financial issues relating to their apprenticeship and are aware that alternative employment options may be better paid. Employers and training providers also saw inflation adding pressure.
- They are committed to their learning and their employers but face logistical challenges. More than a third of our sample have concerns related to transport to their employer, with 34% having to travel more than 20 miles to their training provider – while having to grapple with poor transport infrastructure and lack of locally affordable housing.



Diversity is a work in progress

Despite some physics-related employers having diversity recruitment targets, they still have concerns about the diversity of physics-related apprenticeships cohorts. Shockingly, in 2021/22, only just over a fifth (21%) of new physics apprentices in England were women. In Wales, women made up just 6% of new starts, and in Scotland, only 4%.

Apprentice employers and training providers told us that:

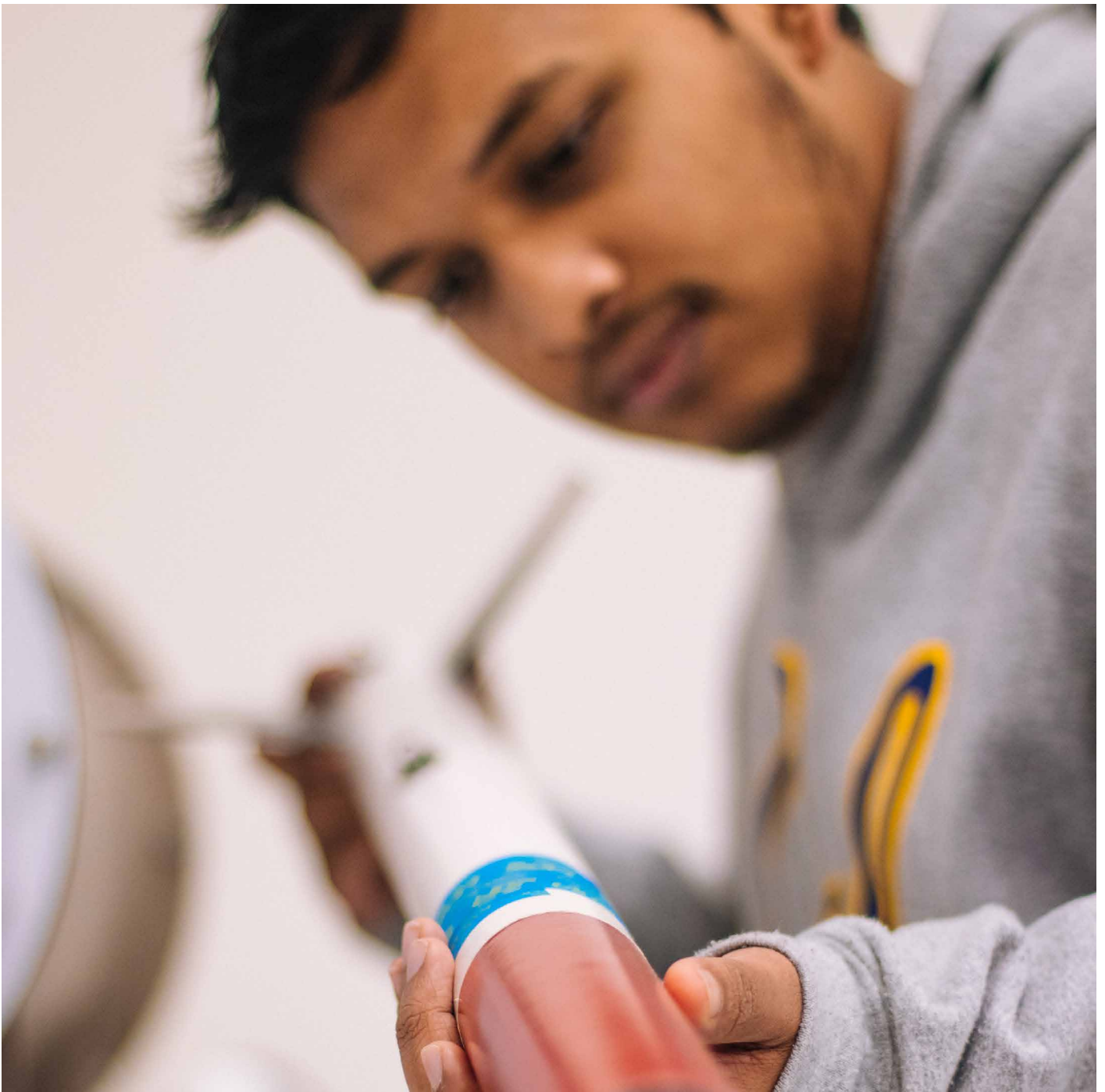
- Stereotypes about apprenticeships leading to 'low status' jobs compound wider stereotypes about who can do physics, as well as a lack of understanding about the wide range of careers physics can lead to. These misconceptions take hold at a very young age, and together they are significant barriers to uptake by underrepresented groups.
- School teachers and parents/carers, who are known to play an important role in shaping perceptions, were also seen to encourage university as a more esteemed and valued route while schools are given financial incentives to promote traditional academic routes over technical study post-16.
- To make things more complicated, insufficient data capture about starts, progression and completion of physics-related apprenticeships, particularly through the lens of diversity characteristics, makes it difficult to design systemic interventions for underrepresented and underserved groups.

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Taking action

Our research suggests that a partnership approach is needed to boost physics-related apprenticeships uptake and value – and consequently fill the skills gap. Governments, education and training providers, employers and the physics community all have a part to play.



UK and Ireland governments

In partnership with stakeholders from across the apprenticeship landscape, governments have an opportunity to address systemic issues that are holding back the growth of STEM apprenticeships as a whole and work towards genuine parity of esteem with other routes. Areas of opportunity are likely to include:

- Ensuring a broad and genuinely representative cross-section of industry is involved in shaping apprenticeships to the benefit of national and regional economies, with a particular emphasis on proactively supporting the engagement of underrepresented SMEs in sectors poised for future growth.
- Ensuring young people in pre-16 education are meaningfully exposed to local employers and technical education providers so that apprenticeships are better understood as a viable route into jobs and have parity with university routes. In England, provider access legislation will need sufficient enforcement, and there is a potential case for equivalent measures in the rest of UK and Ireland.
- Ensuring parity of esteem by reviewing the ways in which technical routes are disadvantaged where there are incentives for schools to promote A levels.
- Tackling the shortage of skilled apprenticeships educators to ensure quality apprenticeships provision and addressing the severe shortage of physics teachers in schools.
- Taking decisive action to break down stereotypes about physics, science and apprenticeships, including making whole school equity plans mandatory in all schools and nurseries.
- Improving data collection on the progression and destination of apprentices, to ensure the systems are genuinely inclusive and open to all, and to inform policy and action.

Apprentice employers and providers of education and training

Apprenticeships are significantly shaped by local industry and employment needs, with notable regional variation in the extent to which apprenticeships are matched with local demand. Employers and training and education providers can play a significant role in tackling some of the challenges in this area. Areas of opportunity are likely to include:

- Partnering in their localities to devise meaningful solutions to skills shortages and create fit for purpose apprenticeships qualifications and support their success. This could potentially include a greater role for local or regional coalitions of smaller businesses working together to share the associated operating overheads.
- Employers proactively engaging with local schools to raise awareness of local apprenticeships opportunities and career paths, targeting potential apprentices and those that influence their decision-making.



The IOP

As the professional body and learned society for physics in the UK and Ireland, we have an important role to play in helping make physics and physics-related pathways accessible to everyone. We are well placed to harness this position alongside our networks and reach to help tackle many of these issues. We currently:

- Work through our Limit Less campaign to tackle misconceptions about physics, and stereotypes about who can do physics, that put off young people from groups that are underrepresented and underserved in the physics community.
- Champion informed choices about academic and technical routes and advocate for physics-related careers as well-paid and rewarding, via our funding of the Planet Possibility careers initiative.
- As highlighted in our R&D Blueprint, we back the critical importance of welcoming and inclusive places for learning and working as crucial to building a thriving, diverse physics R&D workforce and unlocking economic growth and prosperity.
- Work tirelessly to increase the number of specialist physics teachers and the access to high quality specialist teaching – instilling students with a passion for physics and physics-related routes post 16.

This report launch will kick off a series of national summits around the UK and Ireland to begin a conversation with governments, education providers and employers about developing a new vision for physics-related apprenticeships, in partnership and with renewed energy. It will also allow the IOP to build a rich evidence base for further policy and activity. Going forward the IOP will:

- Harness our own convening power and that of our partners, to strengthen links between physics-powered business and regional place-based stakeholders with a key role in driving demand, championing quality and supporting provision of physics-related apprenticeships and other technical routes.
- Build partnerships with allied bodies that work in STEM and specifically physics-rich sectors (including engineering and advanced manufacturing), to tackle the systemic challenges holding back these apprenticeships.
- Work with national and regional authorities to ensure the contribution of physics and in particular, physics-related technical pathways, is acknowledged in regional and national skills strategies and statutory plans.





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The Institute of Physics is a charity registered in England and Wales (no. 293851) and Scotland (no. SC040092).

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The IOP is the professional body and learned society for physics in the UK and Ireland, with an active role in promoting cooperation in physics around the world. We strive to make physics accessible to people from all backgrounds. Our 22,000 members demonstrate their professional expertise in physics in settings ranging from schools, universities and national research facilities, to businesses of all sizes, and in roles as varied as teacher, researcher, apprentice, technician, engineer and product developer.

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