

Diversity and Inclusion in STEM report – IOP

assessment

Introduction

The Institute of Physics (IOP) is pleased to see the House of Commons' Science and Technology Committee making such a strong commitment to diversity and inclusion in STEM and to action that "truly moves the dial". The IOP was pleased to contribute both written and oral evidence to the Inquiry and welcomes the good aspects of this report, as well as noting some significant missed opportunities.

In summary, IOP's written submission our key asks were:

1. Improve the quality, quantity and consistency of data on STEM employee.
2. Publish and improve transparency of data on employee awards, pay and benefits within STEM.
3. Implement the recommendations from the IOP's Limit Less campaign.
4. Develop implementable codes of conduct to reduce professional misconduct.

From the Inquiry's report, we welcome the following recommendations:

1. Improvements to data collection and using this to address issues in underrepresentation in STEM.
2. The committee's recommendations on (a) reviewing and updating curricula and examinations to include more diverse examples of scientists, and (b) ensuring that children can benefit from improved and regularly updated STEM careers advice.
3. Increasing the emphasis on inclusive teaching within relevant inspection frameworks across all UK nations by gathering data and reporting on subject take-up and attainment among students from underrepresented groups.
4. That the Government should set a target for every child to be taught STEM subjects by teachers with qualifications or experience in that subject by 2030.

However, the IOP believes that the following are significant missed opportunities and concerns:

1. Lack of a bolder recommendation for a deep dive government review into the extent to which quantitative data is collected across both STEM education and the STEM workforce.
2. No recommendations for teachers to be trained in inclusivity and tackling injustice.
3. The committee potentially misunderstanding the link between students taking triple award science and progress on to science A-levels.

4. No mention of whole school equity plans which are a proven solution to tackling inclusivity.
5. The lack of a greater focus on the improved working environment for teaching and research staff.

The nature and extent of underrepresentation

The IOP is pleased to see the report adopting the IOP recommendation to improve the quality, quantity and consistency of data on STEM employees, focusing on improved data collection and applying lessons from it. We also welcome the recommendation for an action plan, to demonstrate how the government plans to make the Research and Innovation workforce survey meaningfully useful across different departments, non-departmental bodies and the wider STEM sector, with the ability to undertake analysis by STEM occupation built in.

However, the importance of improving the collection of data on demographics in STEM cannot be overstated. There is still a lack of comprehensive quantitative data on the picture of UK STEM, which makes change in the sector difficult to track and benchmark, meaning improvements to diversity and the effectiveness of interventions cannot be measured. In our submission, the IOP called for a deep dive government review of the extent to which quantitative data is collected across both STEM education and the STEM workforce, and we would have liked to see a bolder recommendation by the committee to achieve this.

We strongly support the comment that this is 'not simply a legacy problem that will fade as society becomes more diverse'. Action must be taken that truly moves the dial and supports the government in improving diversity and inclusion in STEM making it a central part of its day-to-day activities and future agenda.

We await the government's response to how the newly-created Department for Science, Innovation and Technology intends to drive greater levels of diversity and inclusion across the UK's STEM sectors.

We are also pleased to see the spotlight focus on our partners from the Blakett Lab Family, with specific reference to Dr Mark Richards, who spoke of the significant barriers that UK-based Black physicists face in the studying and working environments, including the lack of role models and representation within the curriculum.

STEM education in schools

The IOP aims to build a thriving and diverse physics community, and in our submission to the Inquiry we highlighted the critical importance of representation in STEM. Too many young people from

underrepresented groups do not pursue physics as they are told it is not for them, feel they don't fit in, or don't see a viable career in the sector.

We therefore welcome the committee's recommendations on (a) reviewing and updating curricula and examinations to include more diverse examples of scientists, and (b) ensuring that children can benefit from improved and regularly updated STEM careers advice that facilitates access to diverse role models across a range of industries.

We also welcome the committee's recommendation on increasing the emphasis on inclusive teaching within relevant inspection frameworks across all UK nations by gathering data and reporting on subject take-up and attainment among students from underrepresented groups. This is one of the IOP's key asks of the government as part of the [Limit Less](#) campaign; school inspections must assess evidence that equity plans are in place and working whilst ensuring that progress is being made towards genuinely inclusive environments.

The IOP has previously set out the significant importance of teaching provision by individuals with strong subject knowledge and experience as part of its [Subjects Matter](#) report. Teachers with excellent subject and subject-specific pedagogical knowledge are crucial in enabling students to excel both at school and in their careers, and by extension fuelling economic growth and nurturing the industries of tomorrow.

We are therefore pleased to see that the committee has recommended that the government should set a target for every child to be taught STEM subjects by teachers with qualifications or experience in that subject by 2030, albeit how the sufficiency of qualifications or experience is defined will be key to such a target being meaningful. We also welcome the call for broadening the base from which initial teacher trainees are recruited, and the IOP is pleased to be involved in the UK Department for Education pilot to recruit more engineers into physics teaching. We also welcome that this is accompanied by a call to ensure teachers are given access to improved, mandatory continuous professional development to ensure their knowledge (which should specifically include subject specific pedagogical knowledge) remains up to date.

However, we are concerned that the committee has misunderstood the link between students taking triple award science, and progress on to science A-levels.

Evidence shows that it is the very existence of two parallel routes at GCSE that is the cause of inequities. It has effectively resulted in a streamed approach to teaching the sciences with one of the routes (triple award science) being seen as superior. It also sends an unhelpful message about the

difficulty of science subjects and results in the triple science route being favoured in the way that it is timetabled and taught.

Students who are chosen to follow triple award science are more likely to be taught by a subject specialist; and they experience the science subjects as identifiably different disciplines – with separate timetable slots and a separate grade at the end of year 11. By contrast, students who study double award science get a merged grade (masking any subject-specific strengths), will often be taught “science” instead of biology, chemistry and physics and are much more likely to be taught by an out-of-field teacher. Indeed, in many schools, double award science is given two teachers to teach the three disciplines – ensuring that at least one of the subjects is shared between two non-specialists. In short, these students get a lower quality experience of, and are in effect steered away from, the sciences from 14.

Therefore, we strongly recommend that there should be a single route through the sciences at GCSE. This would give equal access to high quality experiences for all students and would avoid sending a message that the sciences are difficult or that you have to be on the triple science route to progress to A-level. This single route should retain these advantageous features of triple science whilst taking up the time of two GCSE subjects.

Two of the main asks of our written submission centred around the government ensuring that all teachers are trained in inclusivity and tackling injustice, and we are concerned to see that there are no recommendations from the committee in this area. It is important that there is an expectation within the school environment that injustice such as sexism, racism, homophobia, ableism and classism is actively dismantled.

Students who choose to study physics should feel encouraged and supported by inclusive school environments, regardless of their background or circumstances. IOP outlined in both its written and oral evidence that to achieve supportive and inclusive school environments, a simple and effective solution is to implement the tried and tested approach of whole school equity plans and for these to be mandated. Given the proven success of whole school equity plans in addressing many of the problems identified by the inquiry, the absence of a recommendation for them to be mandated is a missed opportunity.

STEM research institutions

The IOP welcomes the recommendation to ensure that education and research sectors follow the government’s lead and take a systemic approach to the challenge, making the STEM ecosystem in the UK a beacon of good practice when it comes to addressing underrepresentation. We welcome this

holistic approach to EDI as the IOP embarks on designing and delivering a new inclusion model in collaboration with the physics community¹. The new model will go beyond gender equality and look at equality, diversity and inclusion more widely to encompass the broader range of challenges now facing the physics community within higher education.

However, we are concerned to not see a greater focus on the improved working environment for teaching and research staff. Whilst a small reference is given to STEM researchers facing a discriminatory working environment, there are no clear calls to action to address wide-spread misconduct, bullying and harassment as noted in our written submission. Our evidence demonstrates clear and compelling evidence of the problem, ranging from our Membership Diversity Survey² 2019, our Exploring the Workplace for LGBT+ Scientists³ and Principle six of 'Project Juno' our gender equality award⁴. We recommend developing implementable codes of conduct to reduce professional misconduct to start to address bullying and harassing behaviours that currently drives exceptional diverse talent out of physics.

We are pleased to read the recommendations for UKRI and other funding bodies to promote EDI across the research sector, with the introduction, monitoring, reporting and meeting of targets to reduce underrepresentation in funding awards and decision-making bodies. We welcome UKRI's EDI strategy published, that sets out a fully inclusive research system with an ambition to 'Transform tomorrow together'⁵. We are keen to see research funders make funding available for research facilities undertaking reasonable adjustments to ensure they are fully accessible. We know from our HESA data⁶ and our Limit Less campaign⁷, that disabled physicists face significant challenges and barriers to disclosure and access that prevent career development, and eventually lead to leaving the sector. Allocating funding to address this will go some way to addressing the problem, although more still needs to be done to address outdated stereotypes and attitudes.

We strongly support a vital and urgent focus on the prolific use of short-term contracts in academia and their failure to provide career stability and continuous personal development (CPD) and cause significant retention challenges within academia, something that project Juno and Athena SWAN both currently focus on and that our new inclusion model will take action to address. We also welcome the

¹ [A new inclusion model for the physics community | Institute of Physics \(iop.org\)](#)

² [Our latest members' diversity snapshot survey | Institute of Physics \(iop.org\)](#)

³ [Exploring the workplace for LGBT+ physical scientists | Institute of Physics \(iop.org\)](#)

⁴ [Project Juno | Institute of Physics \(iop.org\)](#)

⁵ [UKRI publishes equality, diversity and inclusion strategy – UKRI](#)

⁶ [Equity, diversity and inclusion | Institute of Physics \(iop.org\)](#)

⁷ [Limit Less: Siena's story | Institute of Physics \(iop.org\)](#)

move towards alternative and more inclusive processes such as narrative CVs and push for them to become the norm in STEM research funding calls, subject to evaluation, and ensuring guidance for representative committees that recognise and appoint on potential, rather than past achievement. Finally, we support the notion that STEM-related roles are an important part of the UK labour market, and the benefits of improved diversity and inclusion are clear for employers and employees alike. Research commissioned by the IOP⁸ shows that demand for physics skills is high, as they underpin productive employment and industries in every part of the UK. In addition, physics is often viewed as the preserve of university graduates. But our evidence shows this isn't the case – significant numbers of opportunities exist at all qualification levels. In fact, more than half (53%) of physics-demanding jobs do not typically require a degree.

Conclusion

Overall, this report from the House of Commons Science and Technology Committee represents a positive step towards improving equality, diversity and inclusion in STEM. The IOP is pleased to see many recommendations from the committee that align with our asks in this area, including improved data collection of demographics in STEM, the promotion of diversity and inclusion by UKRI, and a more inclusive curriculum.

We are, however, concerned to see no mention of whole-school equity action plans, as well as a lack of focus on improving the working environment of members of the STEM community such as students, teachers, technicians and researchers.

The IOP appreciates the opportunity to contribute to this inquiry, and we will continue to work with the committee and government, to tackle harmful stereotypes and barriers in STEM and ultimately create educational environments and workplaces that are inclusive, nurture talent and move society forward.

⁸ [IOP Workforce Skills project](#)