

## Institute of Physics submission to the Ofsted consultation on the education inspection framework 2019: inspecting the substance of education

5 April 2019

### Introduction

Physics offers huge benefits to individuals and to society – opening doors, broadening horizons and driving innovation. It provides powerful and striking explanations about the workings of the world – explanations that have value and are applicable in a wide range of industries and research communities. Furthermore, it develops ways of thinking and reasoning that are rewarding and highly valued by employers in many sectors.

Increasing the number of people studying physics would be one step towards alleviating the reported STEM skills shortage and may have a positive bearing on many of the challenges identified by the Government. For example, many of the growth areas identified in the industrial strategy – such as agri-tech, aerospace, clean growth and artificial intelligence – will require a supply of physics-based skills and expertise.

However, the teaching of physics in England currently faces several challenges which Ofsted can and should play an important role in addressing.

As a part of this review, we recommend that inspectors be trained to recognise the different ways in which the sciences are timetabled and taught, and the impacts that these can have on student outcomes. Inspectors should take account of:

- whether there are teachers with demonstrable disciplinary expertise in each of the sciences;
- whether there is enough time allocated to their science courses; and
- whether each of the sciences has its own identity within the timetable.

It is also important that schools monitor and address any imbalances in the proportions of boys and girls choosing A-level physics (and other subjects). It is a stark fact that nearly half of schools in England still do not send any girls on to study physics at A level.<sup>1</sup>

The IOP's work with schools<sup>2</sup> has found that subtle, unconscious biases within schools contribute to conditioning and navigating students towards choices based on gender expectations rather than on their desires and attainment, specifically, many girls think that physics is 'not for them'.

Inspectors should look for excessive gender imbalances in the uptake of physics and other A levels as evidence of a non-inclusive learning environment. The existence of such imbalances are likely to be an indicator of a deeper underlying problem with gender stereotyping in general in the school, and in the advice to students and the expectations placed on them. We also recommend that inspectors should then determine what the school is doing to address the underlying causes that lead to those imbalances.

### **Proposal 1: To what extent do you agree or disagree with the proposal to introduce a 'quality of education' judgement?**

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<sup>1</sup> Institute of Physics, Why not Physics? A snapshot of girls' uptake at A-level. May 2018

<sup>2</sup> Ibid.

## AGREE

1. The IOP welcomes the idea of the Quality of Education judgement and a more holistic approach to the curriculum and school inspections. By ensuring the curriculum is defined by the substance of what is taught, Ofsted can focus more on how to improve learners' knowledge and understanding.
2. We also support ending the separation between assessing the leadership and teaching of the curriculum; all teaching staff at all levels should be responsible for effective curriculum delivery. This will allow schools to move away from being driven solely by performance data. Based on our interactions with teachers, we understand that internal performance data is resulting in excessive administrative workloads for teaching staff.
3. However, 'quality of education' cannot be separated from teachers' knowledge and expertise of their subjects. Paragraphs 168 and 211 of the draft proposed School Inspection Handbook<sup>3</sup> state that ensuring teachers have and develop expert knowledge of their subject, and are given relevant CPD to improve this knowledge, is vital to any successful implementation of the curriculum. As such, it is critical that this new Quality of Education judgement be closely tied to the identifiable disciplinary expertise and knowledge of teaching staff.
4. A recent survey<sup>4</sup> commissioned by the IOP in partnership with the Royal Society, the Royal Society of Biology, the Royal Society of Chemistry and the Association for Science Education shows that just 29% of schools over the past two years employed subject-specific physics, chemistry or biology teachers as opposed to general "science" teachers. Further, 76% of teachers surveyed indicated they were expected to teach outside their main area of discipline. Inspections should take into account both the disciplinary expertise of staff and how the leadership of the school deploys them.
5. The survey also shows that the sciences at key stage 4 are often timetabled in ways that undermine the chances of providing the best possible curriculum experience. Of 513 schools surveyed most schools that taught both double and triple science selected students for 'triple' based on prior attainment, and most taught GCSEs across 3 years. In double science, 40% of schools allocated only two teachers to the three sciences, reducing students' likelihood of having a physics teacher to teach them physics. 19% of schools timetable triple science as "science", so students might not be aware which subject will be which in a particular class. Only 9% of schools allocate three times as much time to triple science as they do to another option i.e. most schools compress triple science, hence their need to select by prior attainment.
6. Around half of the schools surveyed that taught GCSE combined science did not teach them with separate timetabling for each discipline. Based on qualitative interviews, students in these merged classes, often struggled to fully differentiate between the different disciplines. As such, they become less likely to go on to study science subjects at A level and beyond. These schools were also more likely to allocate teachers to teach outside their specialism with combined science, and tended to select students by prior attainment for triple science. In effect, the schools are assuming that those in the combined science groups will not progress to A level and so are sending a message (to all students but especially those taking combined science) that the sciences are the preserve of the high achievers. This approach to timetabling does not allow all learners to achieve their potential in physics, or other sciences.

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<sup>3</sup> Ofsted, Draft maintained schools and academies inspection handbook, January 2019.

<sup>4</sup> This piece of research is currently set to be published later in the year. We are happy to share findings on request.

7. While the survey showed that the situation is better in this regard for GCSE triple science, 91% of schools reported timetabling fewer than three times the number of lessons for a single subject. In other words, pupils are expected to study for each science GCSE in less time than they are given for any other subject – even though the amount of content will be the same. So, whilst ‘triple science’ is no ‘harder’ than double science or any other subject at GCSE, it is made to seem so by reducing the time available to teach it. These timetabling issues also appear to conflict with paragraphs 168 and 211 of the draft School Inspection Handbook.<sup>5</sup>

8. Over three quarters of schools surveyed began teaching combined and/or triple science in Year 9, largely due to pressures on school time. Shortening Key Stage 3 in this way, directly contradicts paragraphs 161 and 162 of the draft Inspection Handbook.<sup>6</sup>

9. We strongly recommend that inspectors consider the approach to timetabling the sciences taken by schools as part of their observations. Schools that do not correctly timetable lessons in this way are effectively prioritising scheduling over the proper teaching of science lessons.

**Proposal 2: To what extent do you agree or disagree with the proposed separation of inspection judgements about learners’ personal development and learners’ behaviour and attitudes?**

N/A

The IOP does not have a view on this proposal.

**Proposal 3: Early Years inspections proposals**

N/A

The IOP does not have a view on this proposal.

**Proposal 4: To what extent do you agree or disagree with the proposed focus of section 8 inspections of good schools and non-exempt outstanding schools and the proposal to increase the length of these inspections from the current one day to two days?**

AGREE

10. To ensure high quality education for all, inspectors need to assess a much wider array of measures in schools. Ofsted should explore considerable increases in staffing, resources or inspection length to enable this.

11. In line with our response to Proposal 1, inspectors should investigate whether science lessons are timetabled properly and that teachers have relevant disciplinary expertise. Therefore every inspection team should have science teaching experts in their ranks or at least be trained to understand and identify timetabling issues.

12. Diversity is a key issue for physics. 50% of schools in England do not send any girls to A-level physics.<sup>7</sup> Physics is the 2<sup>nd</sup> most popular A level choice for boys but only the 16<sup>th</sup> for girls<sup>8</sup>. IOP studies have found that these imbalances (and imbalances in the uptake of all

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<sup>5</sup> Ofsted, Draft maintained schools and academies inspection handbook, January 2019.

<sup>6</sup> Ibid.

<sup>7</sup> Institute of Physics, Why not Physics? A snapshot of girls’ uptake at A level. May 2018

<sup>8</sup> Ibid.

A-level subjects) are the result of the different ways in which girls and boys are treated throughout their schooling and navigated at important choice points. These differences in treatment (from the age of about 4) arise from unconscious biases and the resulting stereotyping that takes place. By the time they are 16, girls' and boys' choices have been affected by their conditioned views of gendered expectations.

13. Inspection teams should have the expertise, resources, time and training to properly investigate the consequences of such biases (including the degree of gender imbalance across all A-level subjects) and to identify the existence of these biases, and other forms of gender-based discrimination and should explore the connection between these issues and relative up-take of physics at A level.

14. Addressing these imbalances are stated priorities for the Government.<sup>9</sup> A school should not be 'outstanding' if it has such measurable and obvious gender imbalance issues.

**Proposal 5: To what extent do you agree or disagree with the proposed introduction of on-site preparation for all section 5 inspections, and for section 8 inspections of good schools, on the afternoon prior to the inspection?**

N/A

The IOP does not have a view on this proposal.

**Proposal 6: To what extent do you agree or disagree with our proposal not to look at non-statutory internal progress and attainment data and our reasons why?**

STRONGLY AGREE

15. The IOP supports this proposal as it would allow the additional measures outlined in our response to proposal 4 to be more effectively recorded, as opposed to internal data which may not account for these important considerations.

16. In particular, data related to gender imbalances in A level science choices should be made statutory.

**Proposal 7: To what extent do you agree or disagree with the proposal that inspectors should normally use the non-specialist curriculum as their primary source of evidence in assessing the extent to which the school meets the quality of education criteria?**

N/A

The IOP does not have a view on this proposal.

**Proposal 8: To what extent do you agree or disagree that where non-association independent schools have been found to improve or decline at an additional inspection, Ofsted should provide up-to-date judgements about the school's current performance?**

N/A

The IOP does not have a view on this proposal.

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<sup>9</sup> Department for Education, Press release: "Minister calls to dispel girls' misconceptions of STEM subjects", February 2019.

**Proposal 9: To what extent do you agree or disagree that the proposal to reduce the types of provision we grade and specifically report on will make our inspection reports more coherent and inclusive?**

N/A

The IOP does not have a view on this proposal.

**Proposal 10: To what extent do you agree or disagree with the proposed model for short inspections?**

N/A

The IOP does not have a view on this proposal.

**Proposal 11: To what extent do you agree or disagree that the timescale within which providers that are judged to require improvement receive their next full inspection should be extended from '12 to 24 months' to '12 to 30' months'?**

N/A

The IOP does not have a view on this proposal.

**Proposal 12: Additional comments on FE inspections**

N/A

The IOP does not have a view on this proposal.

### **About the Institute of Physics**

The Institute of Physics is a leading scientific membership society working to advance physics for the benefit of all. We have a worldwide membership from enthusiastic amateurs to those at the top of their fields in academia, business, education and government. Our purpose is to gather, inspire, guide, represent and celebrate all who share a passion for physics. And, in our role as a charity, we're here to ensure that physics delivers on its exceptional potential to benefit society. Alongside professional support for our members, we engage with policymakers and the public to increase awareness and understanding of the value that physics holds for all of us. Our subsidiary company, IOP Publishing, is a world leader in scientific communications, publishing journals, ebooks, magazines and websites globally.

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