

It's Different for Girls

How can senior leaders in schools support the take-up of A-level physics by girls?

A
briefing
sheet



This briefing sheet makes recommendations for good practice in managing the teaching of physics and in managing school culture so that girls enjoy good opportunities to study physics.

20%
of physics A-level students are girls; a figure unchanged for 25 years

The Institute of Physics has published a report: *It's Different for Girls: the influence of schools*, in which we look at how the proportions of girls and boys going into physics A-level vary between different kinds of schools, using data from the National Pupil Database. The report compares schools with higher academic achievement, higher FSM (free school meals), and types of schools, for example independent and maintained, single-sex and co-ed. It is apparent in most of the instances that as well as being an effect for all pupils, the size of that effect is different for girls. This sheet should be read in conjunction with the report.

The current context

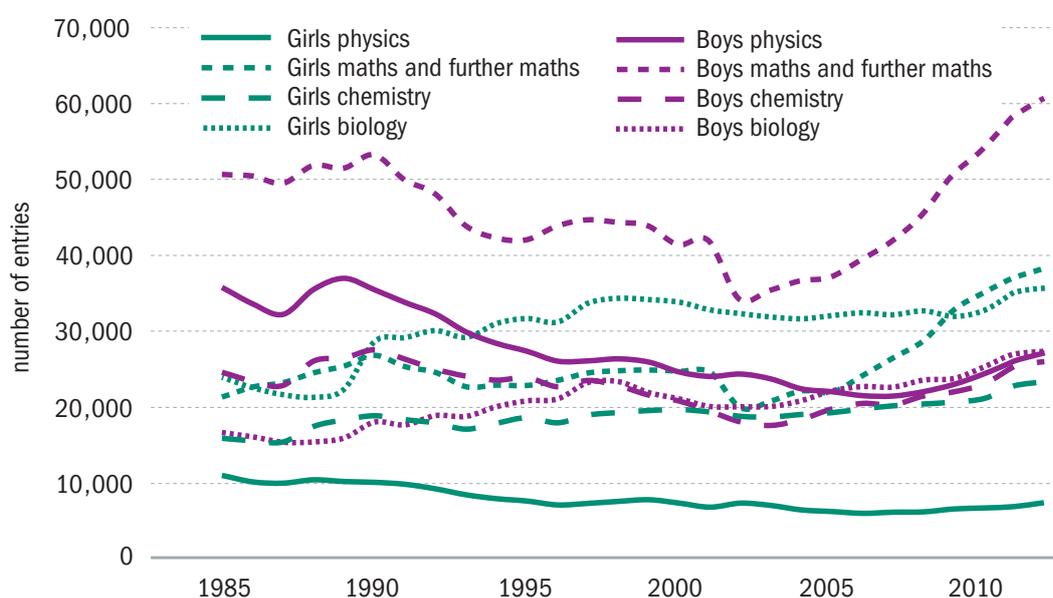
- The government is placing a stronger emphasis on science and technology
- There are an increasing number of science-related jobs at all levels
- University education is getting more expensive
- University entrance is getting more competitive

Girls are being denied access to an A-level that:

- is highly regarded by higher education and employers
- is intellectually rewarding
- develops unique and valued ways of thinking
- opens doors to degrees
- is a route to satisfying and socially valuable careers

Figure 1 shows the number of A-level entries in mathematics and the three sciences, broken down by gender, over the last 27 years. The significant difference between the number of boys and girls taking A-level physics has not changed over time and is not replicated in any of the other sciences.

Figure 1: Number of A-level entries for girls and boys in mathematics and the sciences against the year (Joint Council for Qualifications).



ISSUES TO CONSIDER

challenge
gender
stereotyping

Head teachers and senior leadership teams

- Does gender stereotyping – in which teachers in any department think or suggest that physics is just for boys – go unchallenged in your school?
- Is there any specialist physics teaching at KS3 in your school?
- Do pupils and parents have a clear idea of the pathways to career choices or aspirations?
- If GCSE choices are now made at the end of year 8, what impact does this have on choice between triple science and double science?
- Are students encouraged to progress to AS-level physics from the double-award science route?
- What is the “right” number of girls/boys doing physics in the sixth form for your school?
- Are there gender issues in other subjects as well?

Key factors in embedding and extending good practice

An IOP report on the longer-term impact of the 2008 *Girls into Physics* (GiP) action research project aimed to identify any changes in uptake of physics among participating schools, as well as the reasons for those changes. The following key factors were identified as being helpful to embedding and extending good practice in gender-aware teaching of physics within the schools investigated:

- Leadership and inspiration provided by existing staff;
- Senior position of project teacher ensured dissemination;
- Teaching and learning strategies in class that engaged students in physics ideas, supported by active learning;
- Commitment to improving science and/or specifically physics achievement etc across the school;
- Good environment for teaching and learning physics (new labs, good equipment, science block, support for staff development);
- Specific curricular or topic aspects, such as the introduction of triple science at GCSE, 21st-century science, modules such as maths with mechanics, medical physics.

IOP work in this area

Earlier work by the Institute found that key influences on students’ attitudes to physics are:

- self-concept – that is, students’ sense of themselves in relation to the subject; the value they place on the subject and their willingness to engage with it;
- views of physics – that is, how students experience physics at school;
- teacher–student relationships – that is, how personally supportive students find their physics teacher.

Visit www.iop.org/girlsinphysics for more information.

The lack of any pressure between boys and girls to behave stereotypically seems to filter into physics teaching, where boys and girls respond equally well to practical work and teaching that contextualises physics concepts in historical terms or contemporary uses.

Head of physics, selective co-ed grammar school

FURTHER INFORMATION

19th

Physics was the 19th most popular A-level subject for girls in 2011

Girls Career Aspirations: OFSTED report (April 2011)

This small-scale survey looked at the choices of courses and careers made by girls and young women at various stages in their education and training.

Almost all the girls and young women who took part in the survey were open to the possibility of pursuing a career that challenged gender stereotypes, if the career interested them sufficiently. Their awareness of this potential, however, did not always translate into practice. The key findings include:

- The programmes of careers education and work-related learning, and the provision of information, advice and guidance were not focused sufficiently on the knowledge, understanding and skills that girls need in order to deal with factors such as career breaks and the role that they might wish to play as future parents.
- A narrow range of gender-stereotypical work placements dominated choices in almost all of the settings seen.
- The girls and young women had limited knowledge and understanding of how choices about courses and careers influence pay and progression routes.

Russell group guide to post-16 subject choices (March 2012)

This guide is aimed at all students considering A-level and equivalent options.

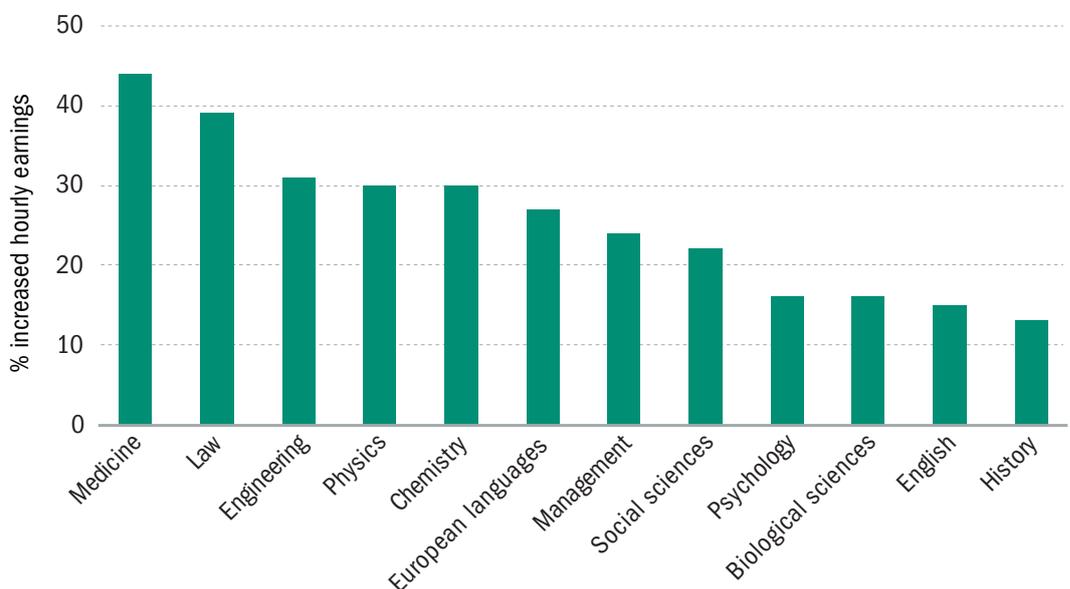
It includes advice on the best subject combinations for a wide range of university courses and recommends studying at least two of the following A-levels:

- Maths/further maths
- Physics
- Chemistry
- Biology
- Languages
- English
- History
- Geography

The economic benefits of higher education qualifications (January 2005)

Using established econometric methodology and data from the Quarterly Labour Force Surveys, the economic costs and benefits associated with education to first degree standard were calculated. Among the findings was the following: chemistry and physics graduates will earn on average over 30% more during their working lifetimes than A-level holders.

Figure 2: Increased hourly earnings by degree subject (for 21–60 year olds, compared to those holding two or more A-levels). (Labour force surveys 2000–04 pooled.)



RECOMMENDATIONS

6.5%

In 2011, 6.5% of all male entries to A-level were in physics

To head teachers

- Gender equity and access to all subjects is an issue that should be actively considered in all schools. Schools should meet targets for the numbers and gender balance recruited to physics A-level. Targets should be set to exceed national figures given in the report, *It's Different for Girls*, for each type of school.
- Gender stereotyping by both teachers and pupils needs to be actively challenged both in and out of lessons and across all subjects (see *The gender equality duty and schools – guidance for public authorities in England*, EOC, 2007). In science, the attitude that “physics is for boys” should be discouraged amongst students and teachers.
- Common misconceptions about girls’ abilities in the subject are challenged by academic results and these must be recognised. Equally, differences between girls and boys and the teaching practices that suit each should be recognised and followed.

1.5%

In 2011, only 1.5% of female entries to A-level were in physics

To senior leadership teams

- Pupils need to have the opportunity to understand the differences between the sciences at Key Stage 3 and 4, so that choices post-16 can be made on an accurate understanding of the different identities of the sciences. The triple science award at GCSE is one way of achieving this aim.
- Embed careers information into the teaching of the sciences and technology from primary school onwards and ensure that pupils and parents have access to accurate information about the demand for science, technology, engineering and mathematics (STEM) skills and qualifications and the commercial value of such qualifications.
- Ask your science teachers to use the IOP checklist on gender-aware teaching practices as a self-assessment tool and as a first step to considering how physics is represented to students in your school.

When it comes to good teaching, one must look at the children you are going to teach and know what will appeal. This means knowing your students and understanding why they are studying physics.

Head of physics, non-selective girls' school

REFERENCES AND FURTHER RESOURCES

- **Girls' career aspirations, OFSTED 2011**
www.ofsted.gov.uk/resources/girls-career-aspirations
- **Informed Choices: a Russell Group guide to making decisions about post-16 education**
www.russellgroup.ac.uk/informed-choices.aspx (revised March 2012)
- **The economic benefits of higher education qualifications – a report produced for The Royal Society of Chemistry and the Institute of Physics, January 2005**
www.iop.org/publications/iop/archive/page_52049.html
- **Girls into physics – looking back and looking forward, Clare Thomson, School Science Review June 2011, 92(341) pp95–100.** A review of the work done by the Institute of Physics
www.ase.org.uk/journals/school-science-review/2011
- **Engaging with Girls: increasing the participation of girls in physics – an action pack for teachers 2010.**
This includes: **Grant, Bultitude and Daly 2010 Girls into Physics: Action Research – a practical guide to developing and embedding good classroom practice**
www.iop.org/girlsinphysics
- **Women into Science, Engineering and Construction works to help schools, employers and other organisations to inspire girls and to enable women to progress in STEM careers. Their website has sections for teachers and students**
www.theukrc.org/wise
- **The Equality and Diversity Toolkit.** This toolkit is aimed at anyone who is in a position to influence or advise young people aged 11–18 including parents and carers, teachers, careers coordinators and others
www.stem-e-and-d-toolkit.co.uk
- **The gender equality duty and schools: guidance for public authorities in England, EOC , 2007**
www.epm.co.uk/schools/Gender_Equality_Duty_and_Schools_Guidance.pdf

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