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Review of 'It's Different for Girls' Workshop Institute of Physics, London

Reviewed by

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The U.K. Institute of Physics (IOP) recently launched its latest report (Institute of Physics 2012) on the participation of girls in physics. The report, 'It's Different for Girls', analysed data from the National Pupil Database for pupils taking A-level[1] physics in England in 2011 to reveal the startling fact that as many as 49% of maintained (government-funded) co-ed schools in England did not produce any girls who went on to take physics at A-level in 2011. The report received widespread publicity nationally in the media via the BBC's Today programme and 'World at One' news on Radio 4, BBC1 television's Breakfast Show and News 24, several local radio stations, newspaper reports and the IOP website. The report was officially launched by the Institute's president, Sir Peter Knight at the Institute's annual Awards dinner that took place at the Intercontinental Hotel in London on 3rd October 2012.

This report builds on a number of earlier reports on girls and physics, produced by the IOP since 2006 so provides a substantial literature concerned with the issue. This literature includes a critical literature review of research (Murphy and Whitelegg 2006), which was followed by an action research project with 100 schools (Daly et al. 2009) and led to the development of a resource pack of good practice strategies for teachers to use in the physics classroom (Grant et al. 2010). The results from the action research project show that working with teachers alone will not result in a sustainable increase in the numbers of girls taking post-16 physics courses (which remain at around 20%), if the school culture does not promote change or when the teacher promoting good gender-inclusive practice moves elsewhere.

This is where girls-only schools have an advantage. The report, 'It's Different for Girls', revealed that girls attending single-sex schools were almost two and a half times more likely to do A-level physics than girls attending co-ed schools. This positive effect isn't replicated in the other sciences, so it appears that single-sex education is particularly beneficial for girls doing physics, but it doesn't make a significant difference for girls studying chemistry or biology. Research suggests (Spiehofer, et al. 2002) that single-sex girls' schools can counter traditional stereotyping so the notion that certain subjects are gendered is less apparent than it may be within co-ed schools. However, the UK is unlikely to return to an educational system that educates boys and girls in separate schools purely for the benefit of physics, so we must look elsewhere for solutions.

At the workshop, which took place at the IOP's headquarters in London in the week following the report's launch, key messages and recommendations of the report were presented by the IOP Director of Education, Professor Peter Main. More personal perspectives on the participation of girls in physics were delivered by Professor Dame Julia King, Vice-Chancellor of Aston University and a past Chief Executive of the IOP, and Keeley McConachie, Head of Science at Sir John Gleed School, Spalding, who had received an award at the previous week's ceremony for outstanding practice in the physics classroom. Professor King referred back to her own experience of learning physics and engineering by highlighting the importance of making connections between her interests and physics concepts she was taught. Using an interest in fashion as an example, she drew comparisons between the design of an aircraft's wing and the cut of a lab coat (both can be cut on the bias) to illustrate the importance of making learning meaningful to students by connecting it to their own interests.

Keeley McConachie spoke about the students at her school and illustrated how good practice in the classroom was so important in motivating them. She reminded us of the stereotypical representations of physics that students bring to the classroom and introduced some of the strategies that she employs to turn these to positive advantage in her lessons. She also illustrated her talk with the now infamous video 'It's a girl thing' produced by the European Commission (European Commission: Women in Innovation 2012) and told us about some of her girls' negative responses to this.

These presentations were followed by a panel discussion of the issues raised by the report. Sitting on the panel were Ruth Merrett, Corporate Affairs Consultant at Intel; Clare Thomson, Curriculum and Diversity Manager at the Institute; Helen Wollason Director of UKRC-WISE and Keeley McConachie. There was excellent engagement from the audience with time allowing for detailed discussion of the issues and recommendations advocated by the report.

The 'girls and physics problem,' as it has become known, has been an intractable one for over 30 years and is mirrored in many other countries, particularly those with comparable education systems such as the USA, Australia and northern Europe. In some southern and eastern European counties there has been a higher take up of physics in school by girls, but this is often related to local circumstances, political and cultural differences which are difficult and possibly undesirable to replicate. The action research project involving 100 schools (Daly et al. 2009) pointed to the importance of a positive school culture to increase girls' participation in physics. The development of inclusive practice in physics classrooms by individual teachers is necessary, but not sufficient, to ensure the sustainability of change. The school culture must enable all students to have access to physics by creating an ethos that promotes access to

physics for all rather than a suggestion that it is only suitable for a few. It is not acceptable for any teacher to convey a message to students that suggests that physics is only suitable for boys of moderate to high ability, when the evidence says otherwise. In 2012 physics GCSE[2] results showed boys and girls achieving equally and at A-level girls performed better than boys (JCQ, 2012). Single sex selective schools that send high numbers of girls to do A-level physics are able to do so not only because they have high ability students, but also because they inspire confidence amongst their students that no subject is unsuitable or not appropriate for girls.

Changing the culture requires both top down and bottom up approaches. The Institute's good practice guides based on the action research projects contain advice and guidance for teachers to use in their classrooms. This new report takes a top down approach by aiming its recommendations at government, head teachers and parents. Among its recommendations are for co-ed schools in particular to be given a target to exceed the 20% average number of girls studying A-level physics, leading to physics A-level increasing its popularity with girls from 18th most popular choice to nearer the boys' level of third most popular A level. In order to encourage schools to meet and exceed this target, the report also recommends that Ofsted[3] should monitor progress towards this target so that: 'Gender equity [becomes] part of the Ofsted inspection criteria, so that a school cannot be judged outstanding if there are clear participation issues that are not being actively addressed' (Institute of Physics, 2012, p.8). Government may be persuaded to listen to such recommendations by the sort of evidence that was provided by a recent report on the contribution of physics to the UK economy. The report (Institute of Physics 2012) undertaken by Deloitte reported that physics contributed '8.5% to the UK's economic output, and 4% of UK jobs are in physics-related sectors – a greater proportion than finance, banking and insurance (3.94%) and construction (3.98%)' (Pinnell, 2012, p.1). Since 2005 the size of the physics-based industry has grown by 30% and this trend is likely to continue, so employment of those with a physics training is predicted to remain healthy into the future (Institute of Physics 2012). The low number of girls taking A level physics suggests that some girls are being denied the opportunity to contribute to the UK economy in an area where there is a wide range of available jobs for those suitably qualified.

The report also suggests that initial teacher training institutions have an important role to play by including instruction on the differing learning styles of girls and boys in physics classrooms to ensure that both are catered for. Head teachers are asked to challenge gender stereotyping in their school and their attention is drawn to common misconceptions about girls' abilities in physics. Parents' attitudes are also known to have a great influence on their children's subject choice in science (Tenenbaum and Leaper 2003; Zohar and Bronshtein 2005). So the report asks parents to discuss gender stereotyping with their children to help them understand how stereotypical representations of physics and physicists used by the media can be challenged and why it is important to do so.

Discussions of the 'girls and physics problem' can sometime be rather jaded and pessimistic because it has been discussed so many times - over the past three decades without significant change. But this workshop had a much more positive feel because the Institute hasn't backed away from making some strong challenges to government and to head teachers. The new IOP Chief Executive's endorsement of the report was also most welcome especially when it was followed by an invitation to re-convene in 12 month's time to report on progress made.

ENDNOTES

[1] An examination taken by 18+ students before they leave education or apply for university
[2] The General Certificate of Education. These are national examinations taken in a range of subjects at 16+
[3] The Office for Standards in Education – a government appointed school inspection service

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