



Think Physics: Using Physics to Inspire Young People

thinkphysics.org



The project

- HEFCE Catalyst funded, 3 year project.
- Main outcomes with partner schools:
 - Extensive project interventions (20 000 children and young people)
 - Increased numbers studying A-level physics (inc. girls and low participation neighbourhoods)
 - Increased numbers studying physics and related undergraduate degrees (inc. girls and low participation neighbourhoods)

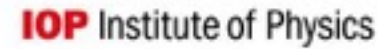


Working with...

- 30 partner schools – preschool to post-16
- Linked schools
- Teachers
- Parents and carers
- General public



Partners in the project



What are the issues in STEM?

March 16, 2014 2:34 pm

Lack of engineers threatens UK recovery, say industrialists

By Brian Groom, Business and Employment Editor

Financial Times, March 2014

Demand for engineers remains high but employers struggle to find staff

31 July 2014

IET Press release

Lack of women at the top is damaging the energy sector

Female leaders warn industry is 'missing 50% of the talent' in struggle to solve UK's energy challenges



Tim Smedley

theguardian.com, Friday 25 July 2014 09:59 BST

 Jump to comments (3)

Country faces biggest skill gap and needs 60,000 engineers and scientists, claims EngineeringUK

11-August-2014 by The Bristol Post

1 December 2014 Last updated at 00:29

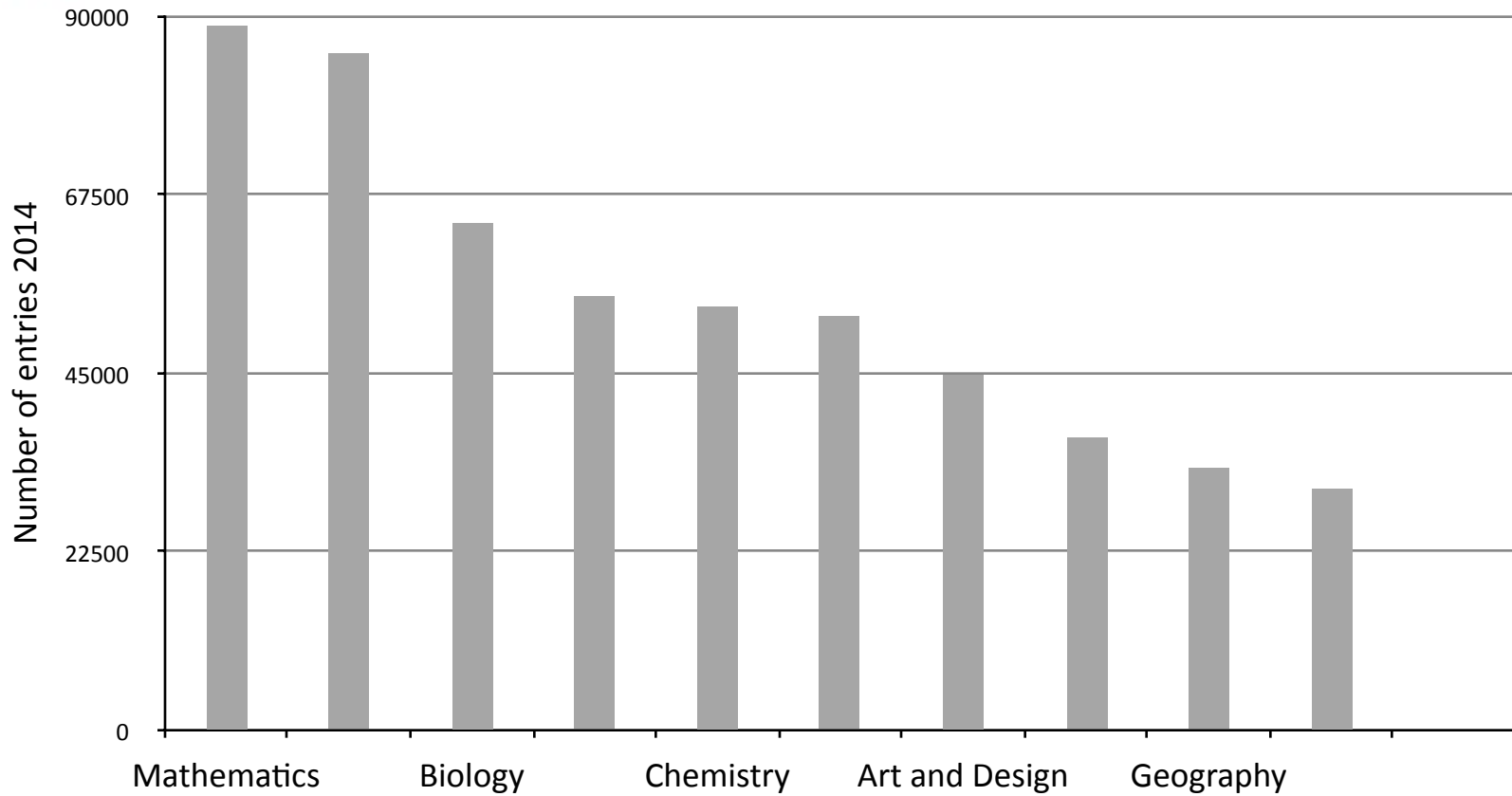


Skills shortages holding back the UK's economic recovery

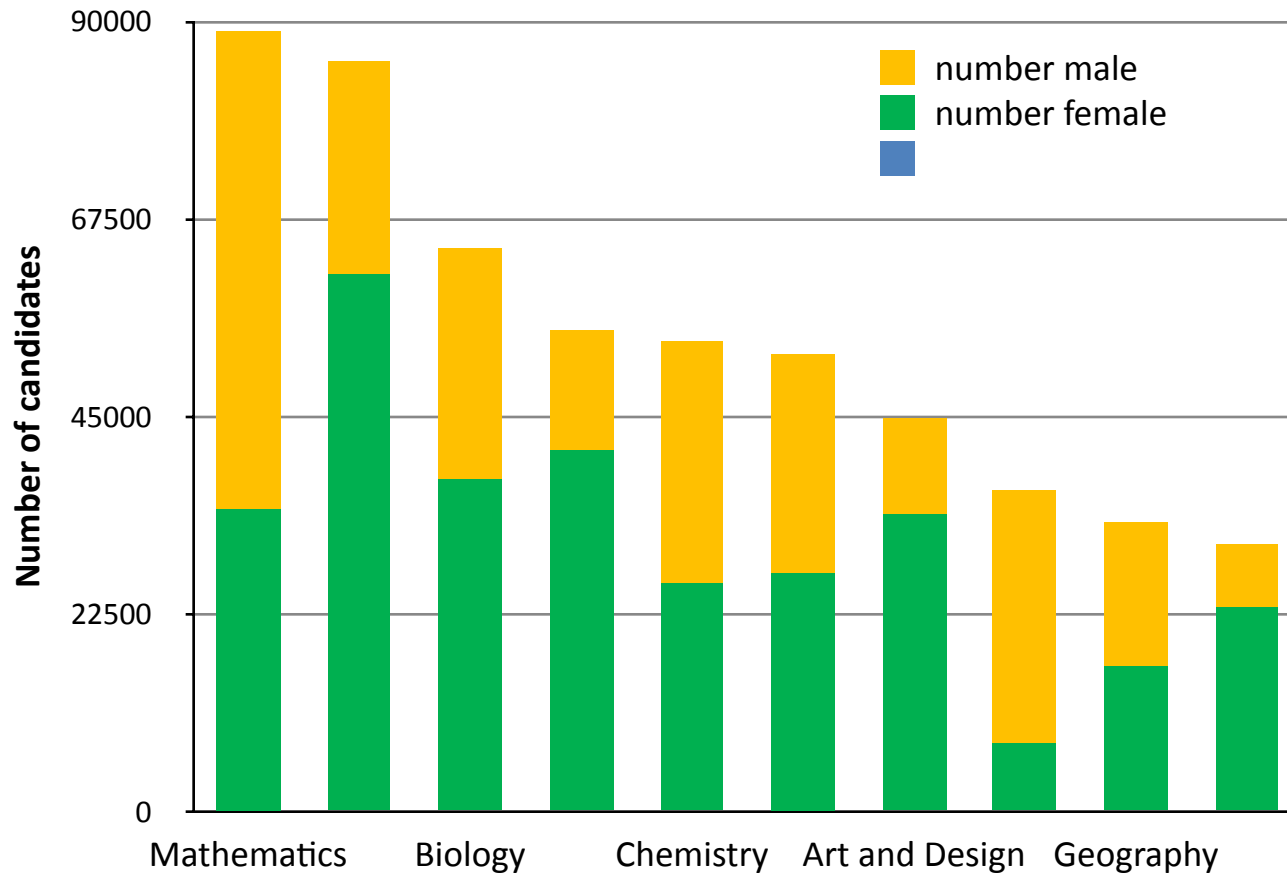
By Matthew Wall

Business reporter, BBC News

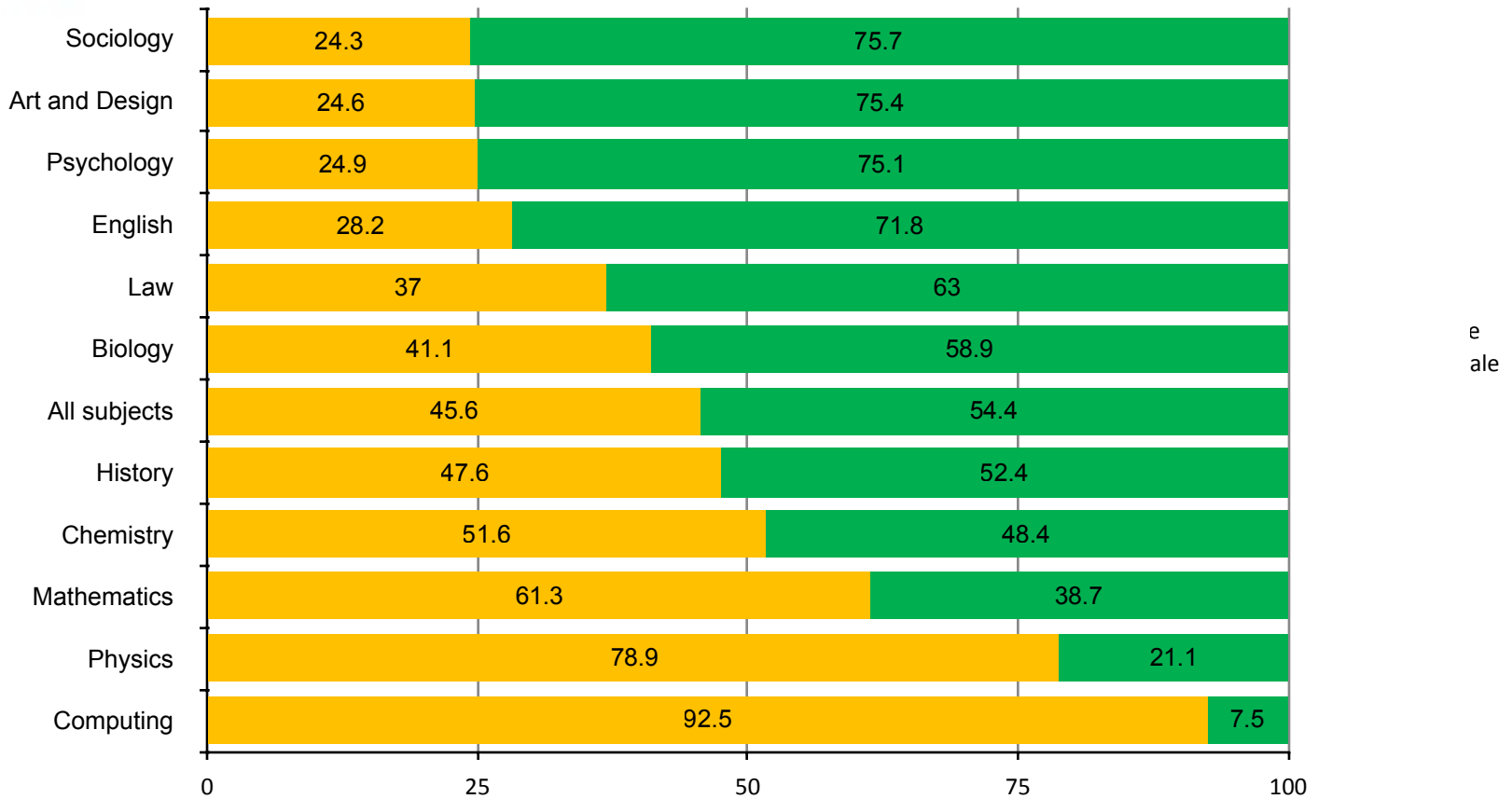
Number of students taking different A-levels



Studying A-levels by gender



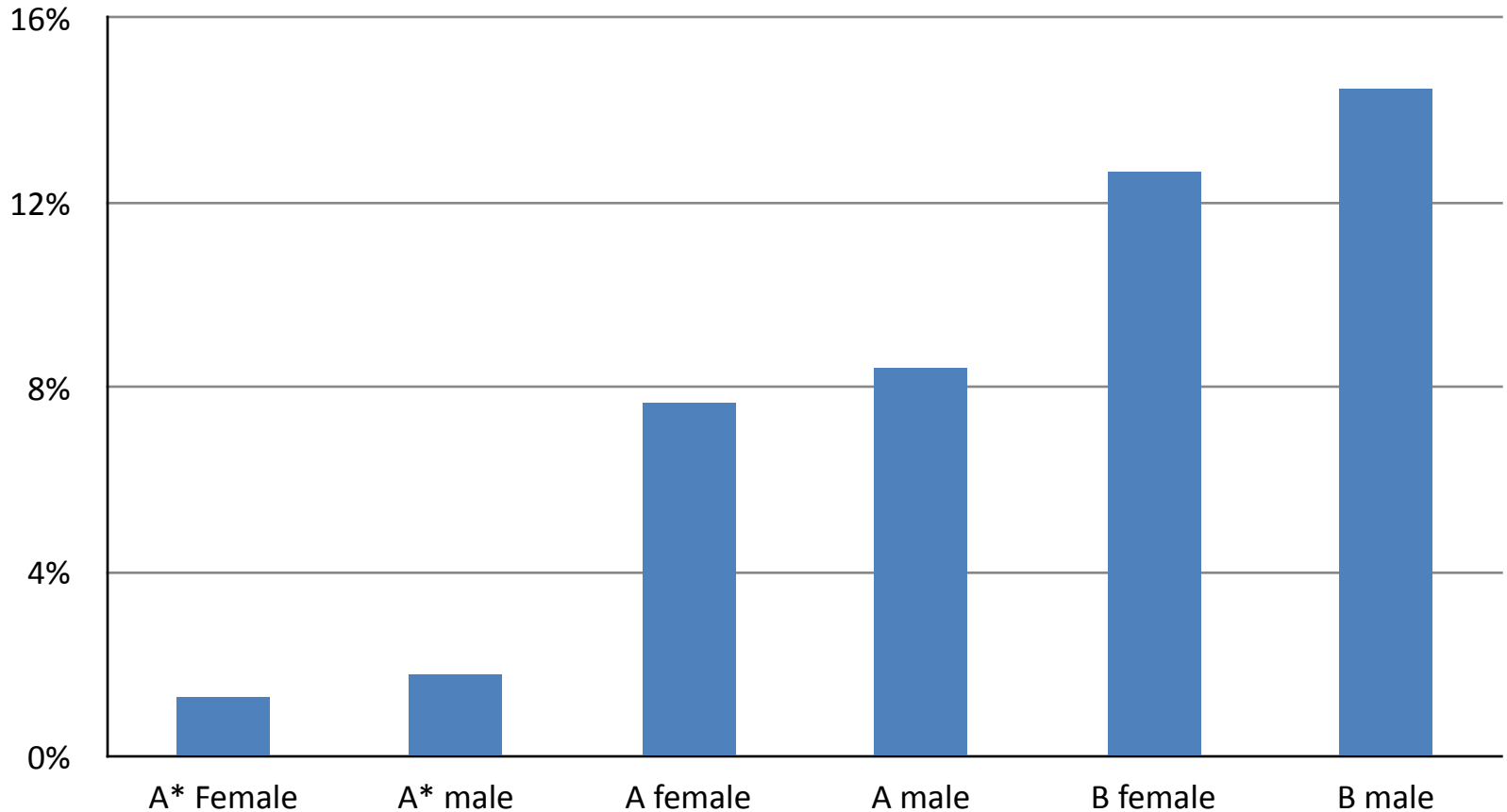
Gender equality at A-level?



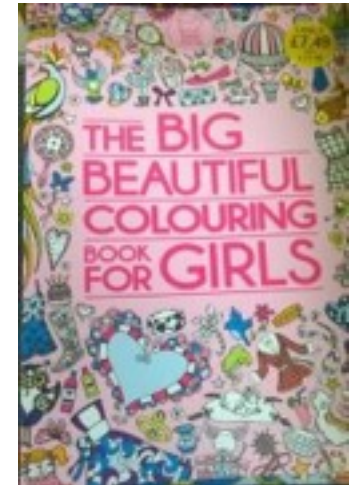
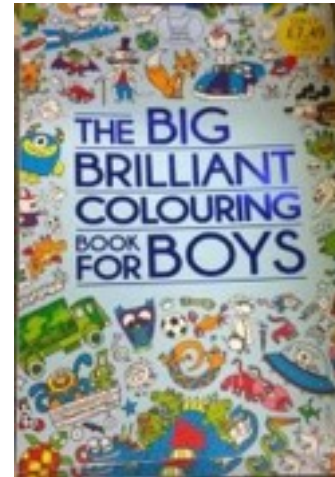
- 157,377 students did GCSE physics in 2012
 - 73,401 female (46.6%), 83,976 male (53.4%)
- 36701 students did A-level physics in 2014
 - 7743 female (21.1%), 28,958 male (78.9%)
- Of the boys who did GCSE physics 34.5% went on to do A-level physics.
- The same figure for girls is just 10.5%

Was the gender split due to ability?

Grades achieved as a percentage of total GCSE Physics entries in 2012.



Why the gender split?



JOB CENTRE OUR GUIDE TO WHO DOES WHAT IN F1, WITH A LITTLE HELP FROM A TEAM IN GREEN...

 TEAM OWNER	 COSMO	 TEAM PRINCIPAL	 TECHNICAL DIRECTOR/CHIEF DESIGNER	 CHIEF FINANCIAL OFFICER	 HEAD OF HR	 HEAD OF NEWS	 HEAD OF OTO
 HEAD OF ENGINE	 HEAD OF AERODYNAMICS	 HEAD OF COMPOSITES	 HEAD OF F1&D	 HEAD OF SIMULATOR	 HEAD OF ELECTRONICS	 HEAD OF VEHICLE DYNAMICS	 HEAD OF PRODUCTION
 HEAD OF COMMUNICATIONS	 PRESS OFFICER	 TEAM MANAGER	 CHIEF ENGINEER	 RACE ENGINEER	 CHIEF MECHANIC	 MECHANIC	 TYRE TECHNICIAN
 RADIO TECHNICIAN	 DRIVER	 PHYSIO	 TRUCK DRIVER	 TEAM KIT MANAGER	 TRAVEL CO-ORDINATOR	 HEAD OF HOSPITALITY	 HOSPITALITY STAFF
 CHEF	 KITCHEN ASSISTANT	 FACTORY MANAGER	 LOGISTICS MANAGER	 GRAPHIC DESIGNER	 HEAD OF MERCHANDISING	 SPONSORSHIP MANAGER	 LAWYER

What proportion of girls in Physics should schools be aiming for?

Figure 2: Percentages of girls and boys who went on to take physics A-level in 2011 by type of school



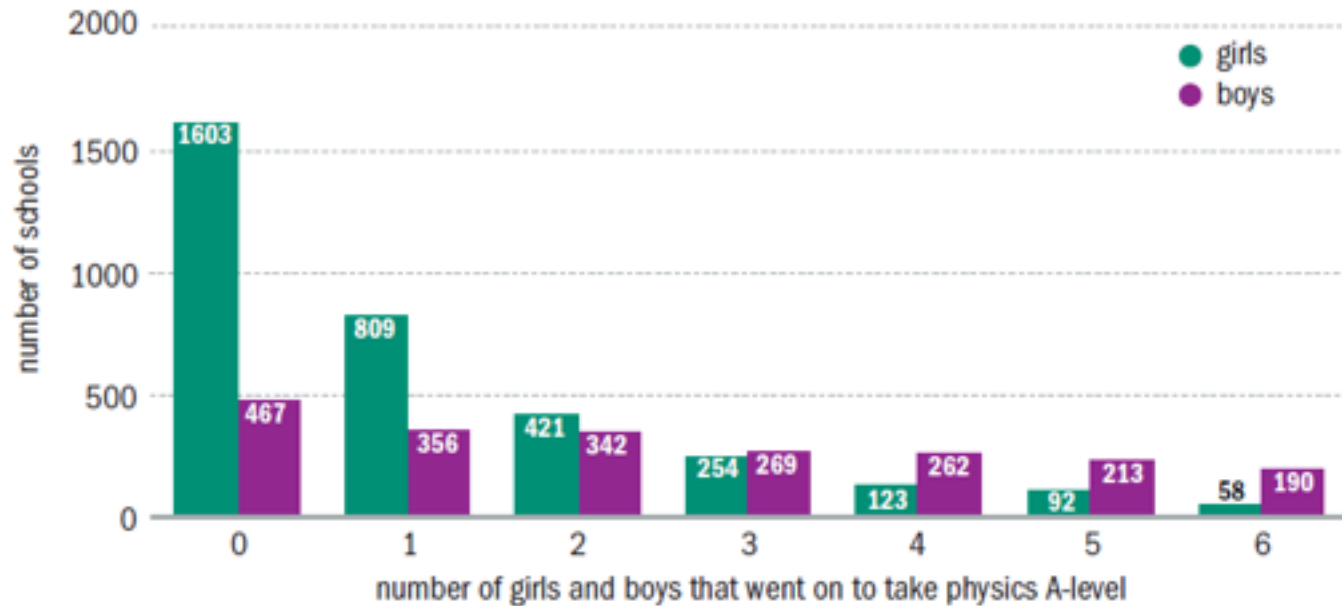
IOP, 2012, It's different for girls.

What would that look like in a typical school?

- A secondary school with 160 students in year 11 (80 boys, 80 girls)
- If they do as well as the 'best' schools for progression to A-level Physics, then they will have a class of 20 doing A-level physics
- 5 girls and 15 boys.

And how are schools doing?

Figure 1a: Number of schools against the numbers of girls and boys progressing to A-level physics in 2011



3510 schools with girls, 3316 schools with boys

1603 (46%) sent NO girls on to complete A-level physics in 2011

The answers...?



Girls, Start on the path to a career in Engineering

If you enjoy science, technology, engineering or maths then an engineering apprenticeship could be for you.

Apprenticeships for Girls
You will earn money whilst you get a qualification as well as gaining lots of practical experience. This will make you desirable to employers which would lead you to a high paying job. The government is currently investing money to encourage more girls into engineering so now is the time to make the most of these great opportunities. You don't need perfect grades and you don't need any experience. So please do not be put off and don't think engineering is just for boys!

Become a Girls Allowed Apprenticeship Partner and secure engineering for the future!
[Interested in becoming a Partner? Click here](#)

Apprentice Vacancies
Check out these current Apprenticeship vacancies!
[Read more](#)

Did you Know?

- ✓ Average of 1 million registrations per month for each partner across the world
- ✓ Page 1 position in Google for a range of keywords including 'apprenticeships for girls'
- ✓ Over 5,000 page impressions per month on Facebook
- ✓ Facebook Box and Twitter Infobox getting month on month

Career Advice
What's your dream job?
There are hundreds of exciting opportunities available. Imagine working in one of these areas:

Civil Engineering	Renewable Energy
Motorcycle Maintenance	Electrical Engineering
Carpentry	Airline Groundstaff
Veterinary and Animal Care	Welding
Environmental Conservation	Plumbing
Jewellery & Silversmithing	Accountancy

Start on the path to a new career here. Contact our friendly team:

SCIENCE GIRL

Because science is for everyone

Welcome to ScienceGirl!
We are a group of people who are passionate about celebrating women in science and pointing out our love of science to the next generation. Find out more about who we are and what we are doing.

Through Both Eyes
Read the new ScienceGirl report on STEM skill shortages and the lack of female representation in these fields.
"Through Both Eyes: the case for a Gender lens in STEM"

Latest Tweets
@ScienceGirl to you too!

Events

"She blinded me with science"
Find out more about ScienceGirl's latest collaboration and why it was made.

‘Sticking bananas in liquid nitrogen doesn’t work’



news | Published in TES magazine on 2 January, 2015 | By: Stephen Exley

Comment:

Last Updated: 4 January, 2015

Section: news

Diversity advocates dismayed by efforts to get girls into physics

Initiatives to attract more girls to study physics have only succeeded in scaring them off, a leading scientist has claimed.

Schools have been getting it “horribly wrong” for three decades, according to Averil Macdonald, a professor at the University of Southampton who leads on diversity for the South East Physics Network. Teachers needed to do more to dispel stereotypes about scientists and explain to pupils and parents about the different opportunities available, she said.

Campaigns based on inspiring female role models, national competitions and “spectacular” experiments had done more harm than good, the former secondary physics teacher argued.

Although physics was the second most popular A-level among boys last year, it ranked 16th among their female classmates. Just 9 per cent of UK jobs in science, technology, engineering and maths (Stem) are occupied by women – a smaller proportion than any other country in Europe.

Last month, the government announced a £67 million scheme to train 17,500 additional physics and maths teachers, targeting postgraduates, researchers and career-changers. “If children [are going to] compete and get the best jobs, you need mathematicians and scientists – pure and simple,” said prime minister David Cameron.

But Professor Macdonald, a board member for the Women into Science and Engineering campaign, warned that a more fundamental issue of gender equality in the classroom needed to be addressed, arguing that work to promote physics among female learners had made “no difference whatsoever”.



“It’s not about one-off events, it’s about a **commitment to tackling gender inequality** in schools,

“We need to increase girls’ confidence so they are less likely to make stereotyped subject choices.

We need to have more **interactions with students and parental influencers to tell them about the doors physics can open.**

“Rather than just teaching standalone abstract concepts, **we need to tell students what having this knowledge could lead to a job in.**”

Jessica Hamer, quoted in <https://www.tes.co.uk/article.aspx?storyCode=6455183>

It's not about 'girlifying' physics



Workshops for Scouts
Learn about tons of science topics, satisfy badge requirements, and bond with friends.
Cost: £20/session unless otherwise noted

BOY SCOUTS

Oct. 25	Chemistry: 9 am – noon Cub Scouts Science: 1 – 4 pm
Nov. 1	Webelos Scientist: 9 am – noon Webelos Engineering: 1 – 4 pm
Nov. 8	Engineering: 1 – 4 pm
Nov. 9	Astronomy: noon – 3 pm
Nov. 22	Cub Scout Weather: 9 am – noon
Dec. 6	Webelos Scientist: 1 – 4 pm

Oct. 11–12 Robotics: 10 am – 3 pm
Cost: \$45 for both days

GIRL SCOUTS

Oct. 11	Science with a Sparkle: 1 – 4 pm (ages 8–12)
---------	---



What can schools and teachers do?

IOP recommendations:

- Gender equity and access to all subjects ... should be actively considered in all schools
- Gender stereotyping by both teachers and pupils needs to be actively challenged both in and out of lessons and across all subjects.
- Common misconceptions about girls' abilities in the subject ...must be recognised.

IOP, 2012. It's different for girls

In the classroom

Do

- Use age-relevant, gender inclusive metaphors and examples.
- Use everyday language initially, then define physics specific meanings deliberately
- Put things into context, give examples for everyday life including applications and careers.

Don't

- Use metaphors or examples which may consistently exclude one group of pupils.
- Use scientific language (and equations) too early in the introduction of a concept.
- Assume students automatically understand the big picture.

Activity:

Choose one of the following topics and discuss:

- What examples do you usually use in class when teaching this topic?
- Are your examples excluding any particular group?
- What other examples could you use?



- Electric current
- Speed and acceleration
- Pressure

But what about gender equality for boys?

Why do we worry that few girls take physics, but not that boys make up just 29% of English A-level students?

There is concern over female participation rates in science, but gender disparities need to be addressed in many subjects



Laura McInerney

The Guardian, Tuesday 18 March 2014

[Jump to comments \(517\)](#)



Where are the boys? An English A-level class. Photograph: Martin Argles for the Guardian

We have to tackle the gender imbalance in careers such as teaching and nursing

I have struggled to find a male carer for my mum – we need to break the stereotype of female-dominated professions



Alex Andreou

theguardian.com, Friday 15 August 2014 12.47 BST

[Jump to comments \(472\)](#)



'Focusing on education as a mere path to the highest pay cheque rather than a way of exploring talent, aptitude and unlocking potential does not help.' Photograph: Dan Atkin/Alamy

ASPIRES

5 year longitudinal study into why children choose (or don't choose) science.

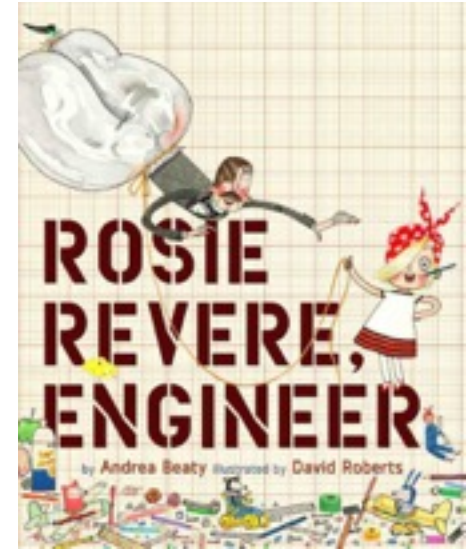
Some implications:

- Earlier intervention – from primary school
- Break the 'science = scientists' link
- Embed STEM careers awareness in science lessons
- Bust the 'brainy' image of science/science careers
- Build science capital with students and families

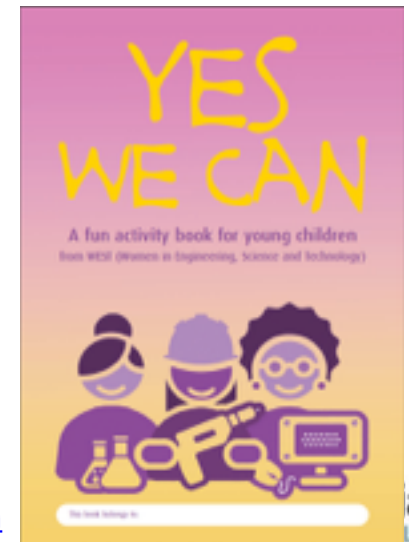


Embedding careers in class

- Start early



http://www.rif.org/documents/us/Rosie_Revere_Engineer.pdf



<http://www.westskills.org.uk/yeswecan>

It doesn't have to be a careers lesson

- Use images which link your current topic to 'real life' examples
- Highlight the jobs which might need a knowledge of this topic – go beyond the obvious

Gateshead Millennium Bridge

Relevant areas of Science:

Forces

Moments

Material properties

Friction and slope of the
bridge

Potential career links:

Architect

Designer

Materials scientist

Lighting designer

Steel fabrication

Construction

Structural engineer

Electrical engineer

Accountants

Public Relations



Premature baby in incubator

Relevant areas of Science:

- Homeostasis
- Life cycles
- Health and Disease
- Electric circuits
- Sensors
- Computing
- Thermal properties of materials
- Drug design
- Analytical chemistry

Relevant careers:

- Electrical engineers
- Computer programmers
- Hardware engineers
- Material scientists
- Analytical chemists
- Pharmaceutical chemists
- Environmental engineer



Relevant careers:

- Doctor
- Nurse
- Pharmacist
- Radiographer
- Physiotherapist
- Phlebotomist

Show STEM as a springboard, not a straightjacket



http://commons.wikimedia.org/wiki/File:Kasse_og_brett.JPG



What jobs/degrees will studying
A-level physics STOP students
doing?

The logo for 'think physics' features the word 'think' in a light green, lowercase, sans-serif font, positioned above the word 'physics' in a dark green, lowercase, sans-serif font. To the right of the text, there are three green circles of varying sizes arranged in a triangular pattern, with the largest circle at the top and two smaller circles below it.

think
physics



Think Physics

Strong careers link – we will be working with local NE employers to develop case studies

Videos

Curriculum links

Female role models

These will be available on our website thinkphysics.org

@ThinkPhysicsNE

@DrDav

carol.davenport@northumbria.ac.uk

Sources of information

- Futuremorph <http://www.futuremorph.org/>
- NHS careers <http://www.nhscareers.nhs.uk/>
- This is what a scientist looks like. <http://looklikescience.tumblr.com/>
- Talent 2030 <http://www.talent2030.org/heroes/>
- Stemminist <http://www.steminist.com/>
- Science: It's a girl thing <http://science-girl-thing.eu/en>
- Once a physicist http://www.iop.org/careers/working-life/profiles/page_57833.html
- Girl friendly Physics <http://www.girlfriendlyphysics.co.uk/>
- Resources on National STEM centre eLibrary
<http://www.nationalstemcentre.org.uk/elibrary/careers/>



Thank you for listening

Any questions?

Think Physics Partners

