



# Making STEM for everyone

**Resources for supporting people from under-represented groups to engage with Science, Technology, Mathematics and Engineering**

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## A resource compilation

This document provides a compilation of resources for supporting people from under-represented groups to study STEM subjects, enter STEM careers and see that STEM subjects can be 'for them'.

The list is arranged in a series of sections designed to make the wide range of resources in this area easier to navigate:

### **Background**

General information on under-represented groups in STEM and what influences participation in STEM

### **Science capital**

Understanding the term 'science capital' and its application

### **Diversity in science, positive role models and case studies**

Examples of people from under-represented groups in STEM, and resources to support the concept of 'STEM for all'

### **What could a STEM career look like?**

Examples of roles using STEM

### **Engineering in a different light**

Engineering might not be what you think it is...

### **Inclusion in the classroom**

Inclusive STEM teaching support

### **Breaking the mould**

Challenges to stereotypes in popular culture

### **Encouraging people into STEM**

Resources to support interests in STEM

## Under-represented groups in STEM

There are many groups of people who are under-represented in STEM. This can be for entry into STEM study and careers, access to informal learning opportunities and for retention and progression once working in STEM related jobs.

For example:

- Only 11% of the UK engineering workforce and 5% of registered engineers and technicians are female<sup>1</sup>
- Only 20% of A level Physics students are girls; this hasn't changed in over 30 years<sup>2</sup>
- Black children and children from low socioeconomic status backgrounds are less likely to have 'science capital' and go on to choose STEM study and careers<sup>3</sup>
- Black and minority ethnic students are less likely to progress to scientific jobs after graduating than white students<sup>4</sup>
- Women are under-represented in senior roles in STEM<sup>4</sup>
- People from low income, minority ethnic communities can perceive science centres as 'not for them'<sup>5</sup>

<sup>1</sup>WES (2017) <https://www.wes.org.uk/content/wesstatistics>

<sup>2</sup>WISE (2014) [http://www.wisecampaign.org.uk/uploads/wise/files/not\\_for\\_people\\_like\\_me.pdf](http://www.wisecampaign.org.uk/uploads/wise/files/not_for_people_like_me.pdf)

<sup>3</sup>Archer et al. (2014) <https://doi.org/10.1002/tea.21122>

<sup>4</sup>Royal Society (2014) <https://royalsociety.org/topics-policy/diversity-in-science/uk-scientific-workforce-report/>

<sup>5</sup>Dawson (2014) <https://doi.org/10.1002/sce.21133>

# Background information

Not for people like me? The WISE report on under-represented groups in STEM

[https://www.wisecampaign.org.uk/uploads/wise/files/not\\_for\\_people\\_like\\_me.pdf](https://www.wisecampaign.org.uk/uploads/wise/files/not_for_people_like_me.pdf)

What influences participation in science and mathematics?

<https://www.sciencecentres.org.uk/resources/academic-research/tisme-publications-including-what-influence-participation-science-and-mathematics-report/>

State of the nation report of UK primary science education

<https://wellcome.ac.uk/sites/default/files/state-of-the-nation-report-of-uk-science-education.pdf>

Informal science learning overview

<https://wellcome.ac.uk/what-we-do/our-work/increasing-informal-science-learning>

Review of informal science learning in the UK

<https://wellcomelibrary.org/item/b21247213#?c=0&m=0&s=0&cv=0>

How do the public really feel about science and research?

<https://blog.wellcome.ac.uk/2016/04/12/how-do-the-public-really-feel-about-science-and-research/>

Engineering UK State of Engineering research

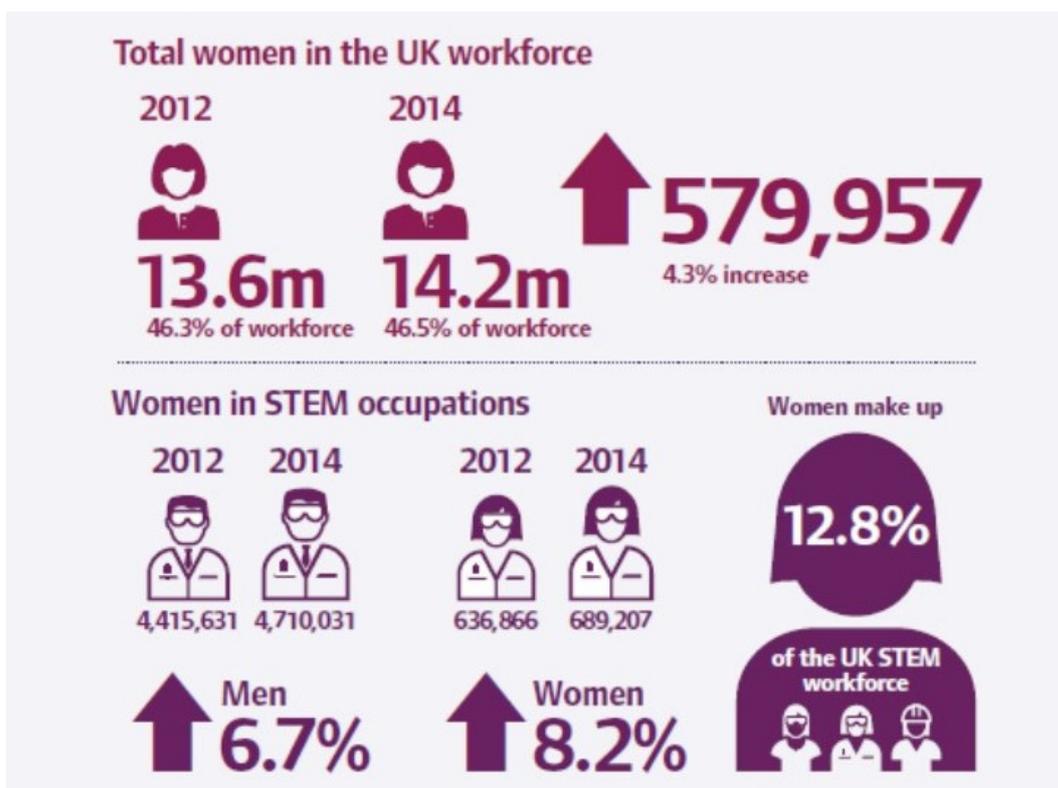
<https://www.engineeringuk.com/research/>

Public Attitudes to Science surveys

<https://www.gov.uk/government/collections/public-attitudes-to-science>

Public Attitudes to Chemistry

<http://www.rsc.org/campaigning-outreach/campaigning/public-attitudes-chemistry/>



MacDonald 2014. Not for people like me? WISE Campaign

# Science capital

Science capital made clear

[https://group.sciencemuseum.org.uk/wp-content/uploads/2017/06/science\\_capital\\_made\\_clear.pdf](https://group.sciencemuseum.org.uk/wp-content/uploads/2017/06/science_capital_made_clear.pdf)

Science capital transforming practice report

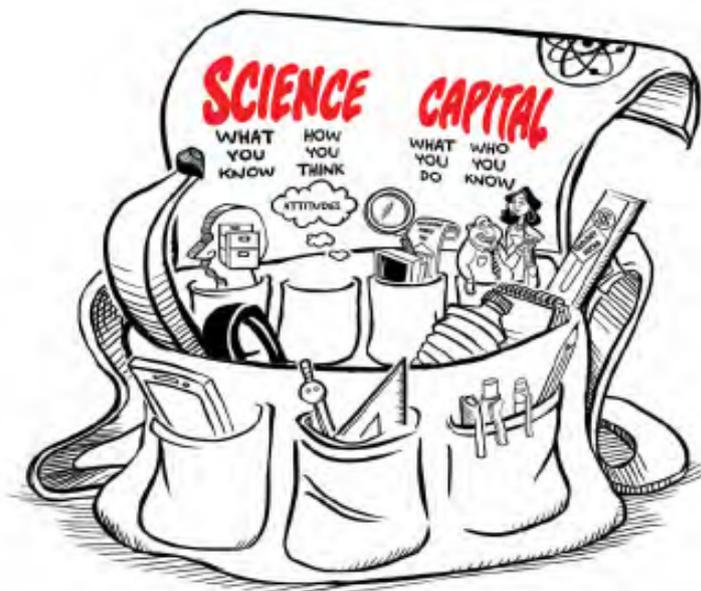
<https://group.sciencemuseum.org.uk/wp-content/uploads/2017/07/transforming-practice-conference-report.pdf>

Science capital teaching approach

<http://www.ucl.ac.uk/ioe/departments-centres/departments/education-practice-and-society/science-capital-research/science-capital-teaching-approach-pack>

Science capital original research

<https://www.kcl.ac.uk/sspp/departments/education/research/Research-Centres/cpr/Research/currentpro/Enterprising-Science/03Research-Outputs.aspx>



The Science Capital Holdall (Godec, S., King, H. & Archer, L. (2017) The Science Capital Teaching Approach: engaging students with science, promoting social justice. London: University College London)

## Diversity in STEM, positive role models and case studies

Royal Society diversity in science resources

<https://royalsociety.org/topics-policy/diversity-in-science/>

WISE People Like Me resources

<https://www.wisecampaign.org.uk/resources/2016/04/people-like-me-resource-pack>

WISE role models

<https://www.wisecampaign.org.uk/inspiration/tag/role-models>

Women's Engineering Society role models

<https://www.wes.org.uk/role-models#>

Card Geotechnics Female Face of Civil Engineering publication

<http://my.page-flip.co.uk/00000013/00012513/00094393/>

Engineer case studies

<https://www.raeng.org.uk/education/what-is-engineering/engineer-case-studies>

IEEE Women in Engineering apps and e-book

<http://wie.ieee.org/ieee-wie-apps-and-ebooks/>

IEEE Women in Engineering posters  
<http://wie.ieee.org/ieee-wie-poster-series/>

Telegraph Women in Engineering  
<https://www.telegraph.co.uk/business/women-in-engineering/>

Prospects Women in Engineering  
<https://www.prospects.ac.uk/jobs-and-work-experience/job-sectors/engineering-and-manufacturing/opportunities-for-women-in-engineering>

Engineer Girl resources and case studies  
<https://www.engineergirl.org/>

BAE Systems celebrating women in engineering  
<https://www.baesystems.com/en-uk/feature/celebrating-women-in-engineering>

Shell Women in Engineering and Technology video  
<https://youtu.be/ribBP7gAvvg>

Bam Nuttall gender inequality video  
<https://www.youtube.com/watch?v=70pD7eG6T9k>

Profiles of women in science  
<https://science-girl-thing.eu/en/profiles-of-women-in-science>

Girls in the Physics Classroom report  
[http://www.iop.org/education/teacher/support/girls\\_physics/review/page\\_41597.html](http://www.iop.org/education/teacher/support/girls_physics/review/page_41597.html)

Girls in Physics videos  
[http://www.iop.org/education/teacher/support/girls\\_physics/videos/page\\_41607.html](http://www.iop.org/education/teacher/support/girls_physics/videos/page_41607.html)

EDF Pretty Curious resources  
<https://www.edfenergy.com/prettycurious>



# What could a STEM career look like?

Dream jobs in science <https://science-girl-thing.eu/en/jobs>

Reasons science needs you <https://science-girl-thing.eu/en/6-reasons-science-needs-you>

BP employee profiles (including some marked "Women in Technology")  
<https://www.bp.com/en/global/bp-careers/hot-topics/hot-topics-profiles.html>

Centrica career profiles  
<https://www.centrica.com/careers/graduates-apprentices/graduate-roles/our-people>

BAE Systems featured roles  
<https://www.baesystems.com/en-uk/careers/careers-in-the-uk/featured-roles>

Shell careers <https://www.shell.co.uk/careers/students-and-graduates.html>

Bam Nuttall careers (including diversity information) <http://www.bamnuttall.co.uk/pg/careers>

Bam Nuttall apprenticeship information  
<http://www.bamnuttall.co.uk/images/editor/Apprenticeship%20further%20programme%20information.pdf>

Rolls Royce A day in the life of...profiles <http://www.rolls-royce.com/media/insights.aspx>

Working for Airbus <http://company.airbus.com/careers/Working-for-Airbus.html#chapter-06>

Jaguar Land Rover career pathways  
<http://www.jaguarlandrovercareers.com/working-here/#career-pathways>

## Engineering in a different light

Royal Academy of Engineering –  
Engineering Is posters  
<https://www.raeng.org.uk/education/schools/teaching-and-learning-resources/engineering-is-posters>

This is Engineering  
<http://www.thisisengineering.org.uk/>

Year of Engineering  
<https://www.yearofengineering.gov.uk/>

Tomorrow's Engineers  
<http://www.tomorrowsengineers.org.uk/>



# Inclusion in the classroom

Royal Society briefing on unconscious bias

<https://www.sciencecentres.org.uk/resources/academic-research/report-unconscious-bias-workplace/>

Implicit association (unconscious bias) test

<https://implicit.harvard.edu/implicit/uk/>

Unconscious bias test

<http://www.the-twist-project.eu/en/iat/intro/?embed>

University of Bath Women in Engineering Teachers' Toolkit

<http://www.bath.ac.uk/publications/women-in-engineering-teachers-toolkit/>

10 steps towards gender equity in science

[http://www.the-twist-project.eu/media/dyn/TWIST\\_Guidelines\\_light.pdf](http://www.the-twist-project.eu/media/dyn/TWIST_Guidelines_light.pdf)

One Size Fits All? Enhancing gender awareness in teaching

[http://www.the-twist-project.eu/media/dyn/TWIST-Onze\\_size\\_fits\\_all.pdf](http://www.the-twist-project.eu/media/dyn/TWIST-Onze_size_fits_all.pdf)

Gender Balance

[www.iop.org/genderbalance](http://www.iop.org/genderbalance)

Inclusive Science Teaching Tips For Teachers

[http://www.iop.org/education/teacher/support/girls\\_physics/resources-and-guidance-for-teachers/file\\_68643.pdf](http://www.iop.org/education/teacher/support/girls_physics/resources-and-guidance-for-teachers/file_68643.pdf)

Inclusive physics classroom learning checklist

[http://www.iop.org/education/teacher/support/girls\\_physics/resources-and-guidance-for-teachers/file\\_68642.pdf](http://www.iop.org/education/teacher/support/girls_physics/resources-and-guidance-for-teachers/file_68642.pdf)

Science: it's a people thing, workshop for KS3-4 female students

[http://www.iop.org/education/teacher/support/girls\\_physics/people-thing/page\\_61998.html](http://www.iop.org/education/teacher/support/girls_physics/people-thing/page_61998.html)

Engaging with girls teacher action pack

[http://www.iop.org/education/teacher/support/girls\\_physics/action\\_pack/page\\_41739.html](http://www.iop.org/education/teacher/support/girls_physics/action_pack/page_41739.html)

Girls in the Physics classroom teacher action guide

[http://www.iop.org/education/teacher/support/girls\\_physics/action/page\\_41602.html](http://www.iop.org/education/teacher/support/girls_physics/action/page_41602.html)

Opening doors countering gender stereotypes good practice guide

[http://www.iop.org/education/teacher/support/girls\\_physics/reports-and-research/opening-doors/page\\_66438.html](http://www.iop.org/education/teacher/support/girls_physics/reports-and-research/opening-doors/page_66438.html)



# Breaking the mould

A Mighty Girl science and technology books

<https://www.amightygirl.com/books/general-interest/science-technology>

Bitz and Bob (BBC) <http://www.bbc.co.uk/mediacentre/proginfo/2018/11/bitz-and-bob>

<https://www.bbc.co.uk/cbeebies/shows/bitz-and-bob>

Do You Know? (BBC) <https://www.bbc.co.uk/cbeebies/shows/do-you-know>

Goodnight Stories for Rebel Girls – quotes from rebel women

<https://www.penguin.co.uk/articles/features/2017/mar/amazing-quotes-from-7-rebel-women/>

Science Grr! <http://sciencegrrl.co.uk/>

Women in Science: 50 fearless pioneers who changed the world

<https://www.rachelignotofskydesign.com/women-in-science/>

WISE Top 10 science gift suggestions <https://www.wisecampaign.org.uk/inspiration/2016/11/top-10-christmas-science-gifts-for-girls>

12 inspiring STEM books for girls (and great for boys to read too!)

<https://www.edutopia.org/article/12-inspiring-stem-books-girls-emelina-minero>

Female STEM role models in film

<https://www.siliconrepublic.com/people/female-stem-role-models-film>

## Encouraging people into STEM

Hypatia Project full toolkit (aimed at teenagers, to be used by schools, informal learning organisations, researchers and industry)

[http://www.expecteverything.eu/file/2017/03/Hypatia\\_Toolkit\\_EN.pdf](http://www.expecteverything.eu/file/2017/03/Hypatia_Toolkit_EN.pdf)

WISE Ten steps for maintaining the female talent pipeline

<https://www.wisecampaign.org.uk/consultancy/industry-led-ten-steps/10-steps>

Year of Engineering schools resources <https://www.yearofengineering.gov.uk/school>

Women Like Us career advice packs for women <https://www.womenlikeus.org.uk/advicepacks/>

How to encourage women into science, engineering and construction

<https://www.theukrc.org/wise/>

Learning to be an engineer

<https://www.raeng.org.uk/ltbae>

CPD for teachers

<https://www.yearofengineering.gov.uk/cpd>

Lesson ideas

<https://www.yearofengineering.gov.uk/lesson-ideas>

[www.uwe.ac.uk/research/sciencecommunicationunit](http://www.uwe.ac.uk/research/sciencecommunicationunit)

