Royal Society Scientists in Schools

Association for Science Education
2016 Conference, Birmingham UK

Laura Fogg-Rogers @laurafoggrogers
laura.foggrogers@uwe.ac.uk

Dr Emma Weitkamp and Dr Clare Wilkinson

UWE BRISTOL University of the West of England

THE ROYAL SOCIETY

Science education outreach

- Relationship between scientists and schools
- Teachers' perceptions and drivers
- Scientists' perceptions and drivers
- Training needs for scientists
- Recommendations for future education outreach

Education outreach training

Three 2-day courses held during 2014-2015.
Organised by the Training Group for the Royal Society.

Aim: Inspire Research Fellows to engage with schools, teachers and young people by equipping them with relevant skills, connections, and resources and providing the support to develop their own activities.

Education outreach training

- Pre and post questionnaires with course participants *N=37*
- Qualitative interviews with course participants *N=7*
- Questionnaire with teachers at the Summer Science Exhibition and from Associate Schools and Colleges scheme *N=45*

SCU | science communication unit

UWE BRISTOL University of the West of England


T. PEAKE
T. ПИК

Outreach as public engagement

Obligation – Research Councils, UK 2010

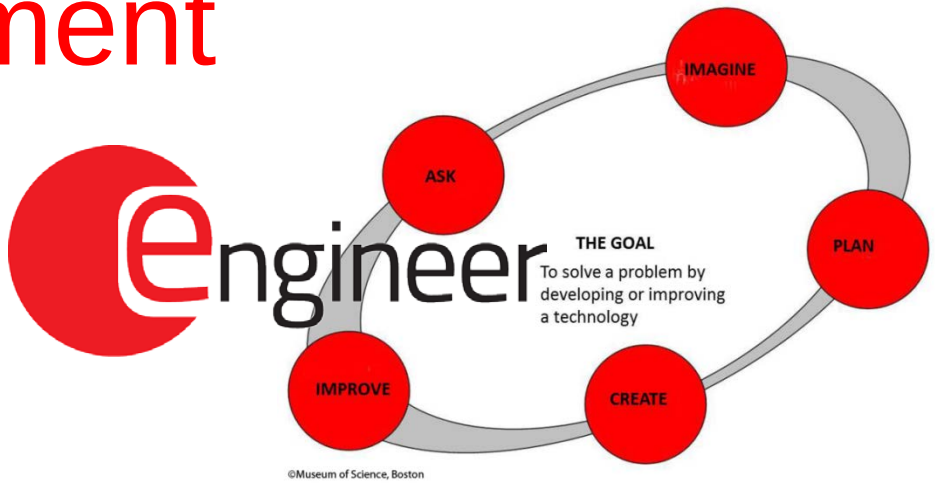
Enthusiasm – Royal Society, 2006

Informal learning – Fogg-Rogers *et al.*, 2015

Wider context – Stocklmayer *et al.*, 2010
Wilkinson & Sardo, 2013

Public engagement

UWE BOXED



BRISTOL FESTIVAL OF NATURE

ROBOTS VS ANIMALS

BRISTOL 2015 EUROPEAN GREEN CAPITAL
STRATEGIC PARTNER

Public engagement

The Royal Institution
Science Lives Here

ROYAL ACADEMY OF ENGINEERING

THE ROYAL SOCIETY

British Science Week 2016
11-20 March

I'm a Scientist Get me out of here

STEMNET
Science, Technology, Engineering and Mathematics Network

UWE BRISTOL
University of the West of England

Public engagement

- **In Person vs Digital**

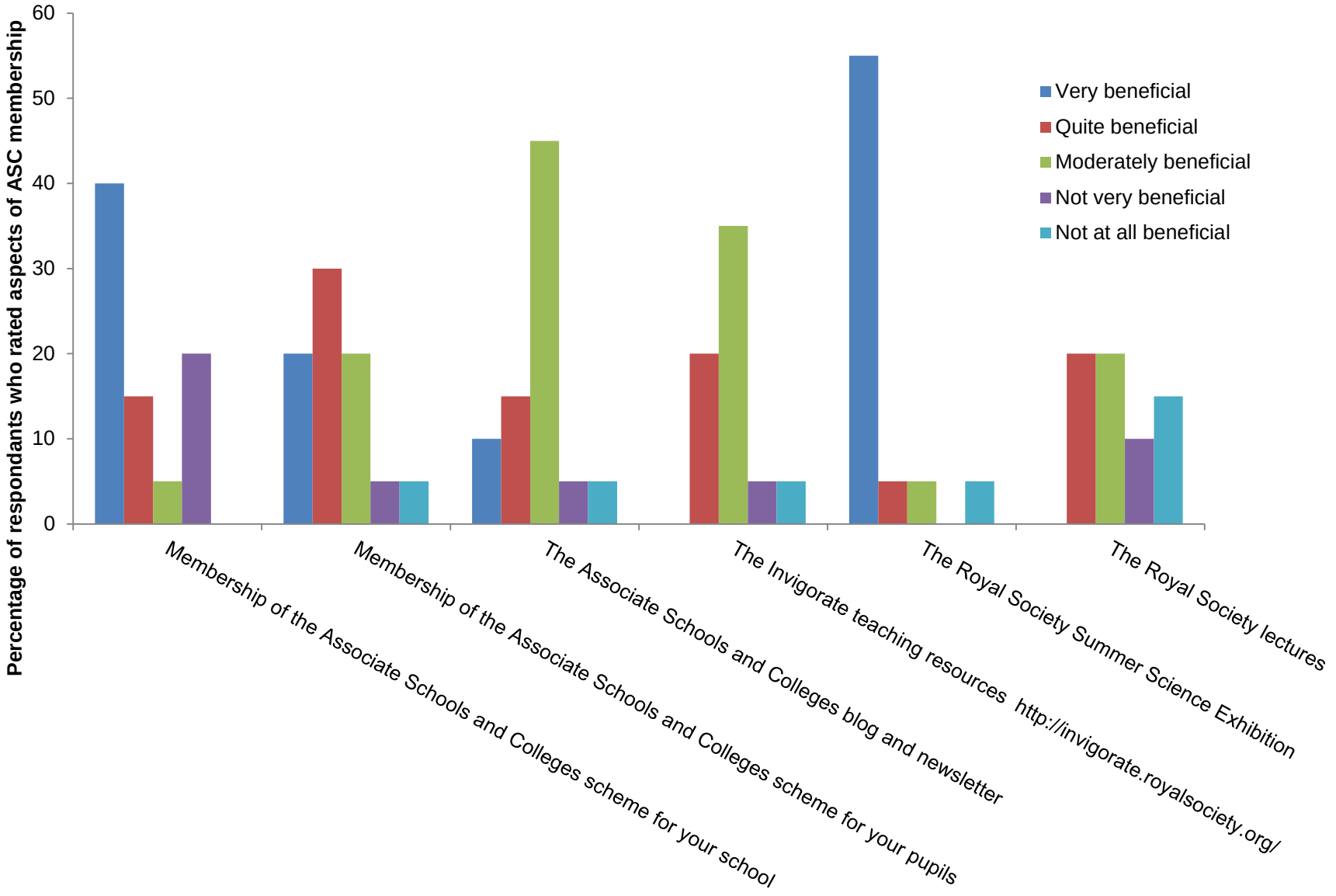
- Discuss your experiences and motivations participating in education outreach

- Explain your likes and dislikes

Education outreach

- Royal Society:
  - Associate Schools and Colleges Scheme
  - Invigorate teaching resources
  - Royal Society Summer Science Exhibition and lectures
  - Grants
  - Vision for science and mathematics education https://royalsociety.org/topics-policy/projects/vision/

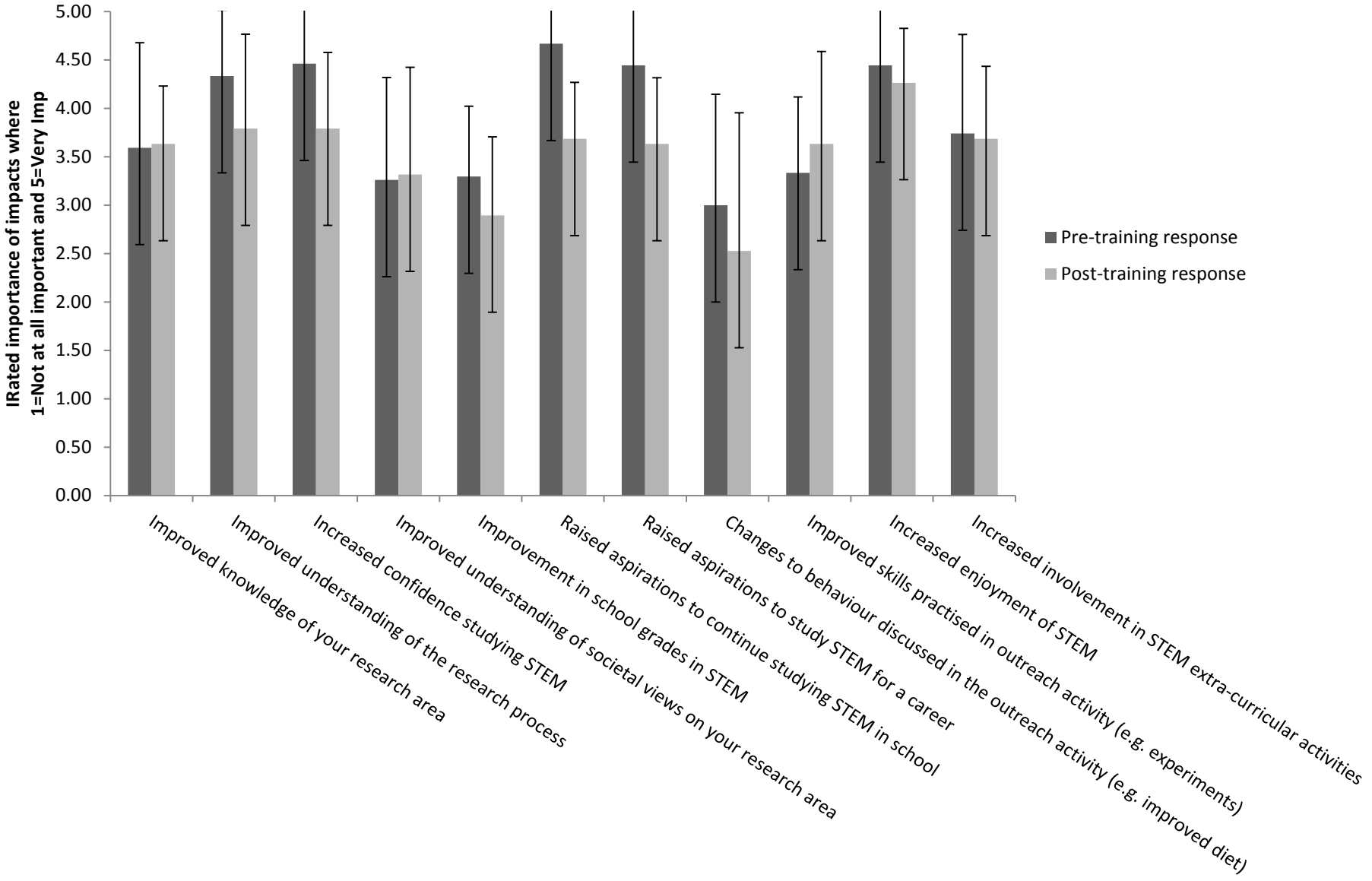
Teachers' perceptions of RS outreach



Teachers' perceptions of RS outreach

- *Bringing the world of science to our pupils in more, different and real ways. (Male, Secondary School Teacher, ASC member)*
- *My college has strong links with [a local university] – showing students possibilities and potentials for future science study. (Secondary School Teacher, ASC member)*
- *A lot of girls are keen on science, and trying to connect to scientists is important for careers in science. (Secondary School Teacher, ASC member)*

Scientists' perceptions of outreach



Scientists' perceptions of outreach

- *Not everyone can become a scientist, but we need people who have an understanding of what science is, what scientists do, the scientific way of thinking.*
- *My main interest is that children learn the advantages in understanding STEM - or the scientific method, and decide that sticking with STEM will help them navigate day-to-day life in the future.*
- *My ultimate aim is to get across the idea that science is for everyone who is interested in it. So to break down the barriers that this is an elite subject, or it's something that girls don't do, or it's something that you have to go to a private school to do, or any of those stereotypes that people might have.*

Scientists' perceptions of outreach

- *I think the problem tends to be that it's not really regarded as something that counts towards your CV by the University. It's very clear that the money you bring in and the papers you get out are going to be more important until the Government decides to base something on outreach, and how it funds [research].*
- *Education outreach should be supported more openly and concretely by universities (time should be allowed and support funds provided).*
- *I think the most important thing for the Royal Society is that they can influence the policy makers. I know in America every researcher has to do outreach, but the UK has an optional one [system].*

Teachers and scientists

- How do these perceptions match up?

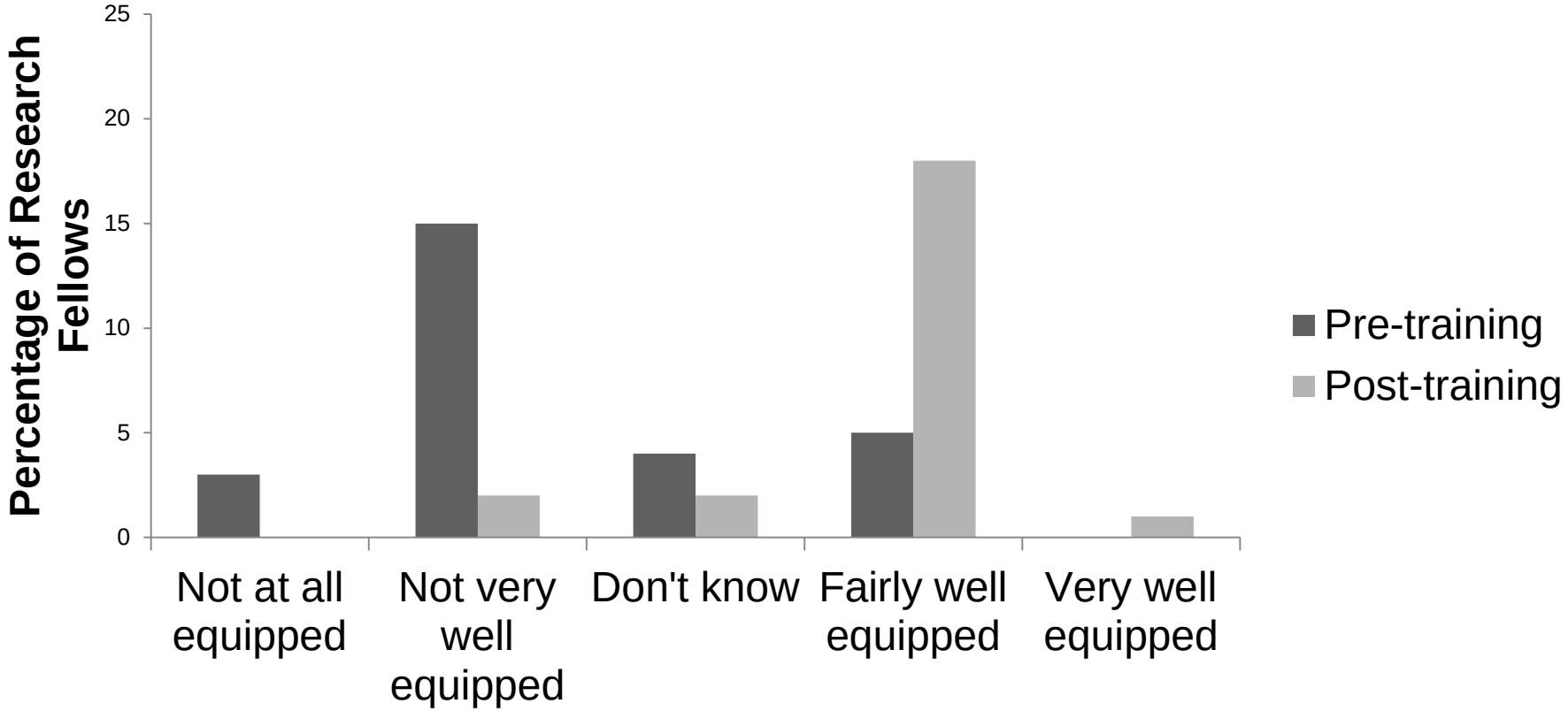
- What training should scientists receive about education outreach?

Education outreach training

Aims:

- to develop an understanding of the school and college environment and structure, including the National Curriculum and pupil progression routes
- to share good practice of working with schools and young people, including child protection responsibilities
- to develop greater confidence and skills for use during engagement activities
- to consider a range of methods for engaging primary, secondary and tertiary students with contemporary research

Education outreach training impact

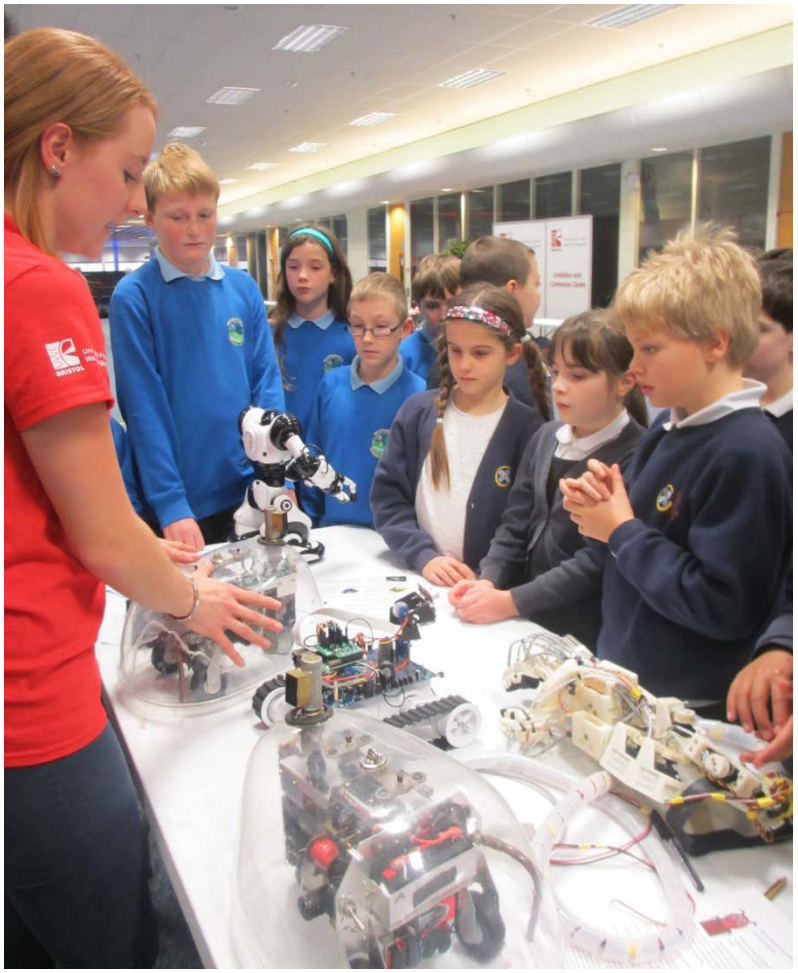


Designing activities

Didactic teaching → Inquiry-led science education

Topic	Format	Personal Learning and Thinking Skills
Genetic modification	Debate/Role play	Creative thinking Teamwork etc
Space exploration	Game show	Effective participation Reflective learning etc

Hands-on



Girls do better when they see female role models (boys don't do worse)

Same applies to BME students: The "Obama effect"

Use historical examples, case studies, photographs, name checks…

Role models in STEM

Improve the impact of your outreach activities

activities should motivate re the audience, as well te them.

rse mix of activity leaders in gy, Engineering and Maths s a proven impact. Female increa f they are offered female role models. Male a ations are not reduced by being offered female role models [1]. Female students get better grades when they are exposed to successful female role models or competent female demonstrators [2,3]. The same applies to Black and Minority Ethnic (BME) students, coined as 'the Obama effect' [4].

Selecting more diverse e models brings benefits without negati ecting the achievement of e students [1, 5].

1. **Choose a demographic mix when selecting outreach leaders**
   The more diversity (gender, ethnicities, physical abilities or class backgrounds) you put in the room impacts how many students are seeing 'their future selves' as STEM participants and higher education achievers.

2. **Think about your case studies**
   Where can historical examples or real-life case studies include underrepresented g ps? It might seem small but giving r le models makes a difference.

1. Lockwood, P. (2006). "Someone like me can be succes models? *Psychology of Women Quarterly*, 30, 36–46.
2. Marx, D. M., & Roman, J. S. (2002). Female Role Mode *Personality and Social Psychology Bulletin*, 28(9), 1183
3. McIntyre, R. B., Paulson, M., & Lord, C. G. (2003). Alle through salience of group achievements. *Journal of Ex*
4. Marx, D. M., Ko, S. J., & Friedman, R. A. (2009). The " race-based performance differences. *Journal of Experi*
5. Lockwood, P., & Kunda, Z. (1997). Superstars and me: *Journal of Personality and Social Psychology*, 73(1), 91–10

Reflecting the demographics of the audience when choosing outreach leaders is recommended as best practice by the Royal Academy of Engineering, the Engineering Professors' Council, the EU Commission and Women In Science and Engineering among others. Produced by the Science Communication Unit at UWE. For more information contact corra.boushel@uwe.ac.uk.

University of the West of England

University of the West of England

Royal Society recommendations

- Further training in education outreach
- Advocate and lobby for the value of education outreach
- More grants to buy time for teachers and scientists
- Match-make scientists and teachers through Associate Schools and Colleges Scheme, and STEMNET

References

- Fogg-Rogers, L. A., Weitkamp, E. and Wilkinson, C. (2015) *Royal Society education outreach training course evaluation.* Project Report. Royal Society. Available from: http://eprints.uwe.ac.uk/25834Research Councils UK. (2010b). *Engaging Young People with Cutting-Edge Research: a guide for researchers and teachers*.
- Royal Society. (2006). *Science communication excellence in science: Survey of factors affecting science communication by scientists and engineers.* London.
- Stocklmayer, S. M., Rennie, L. J., & Gilbert, J. K. (2010). The roles of the formal and informal sectors in the provision of effective science education. *Studies in Science Education*. doi:10.1080/03057260903562284
- Wilkinson, C., & Sardo, M. (2013). *Killer Facts for Informal Learning*. Retrieved from http://www.wellcome.ac.uk/Education-resources/Education-and-learning/News/2013/WTP053966.htm