



advancing gender equality and diversity
from classroom to boardroom
in science, engineering
and technology

Engaging girls in science, technology, engineering and maths: What works?

Summary findings from a research review for WISE, sponsored by BAE Systems

Introduction

This is a summary of key points from a research review commissioned by Women into Science & Engineering (WISE), to inform the future strategy of our campaign. The research review was written as an internal report, but we have published key findings and recommendations as a useful tool for the many other organisations working to attract more women and girls to study science, technology, engineering and mathematics (STEM) subjects as a route to a wide range of exciting and rewarding careers.

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Key findings

1. Despite the economic downturn, 43% of UK STEM employers report difficulty recruiting staff and more than half (52%) are expecting difficulty over the next three years. (*CBI, 2011*). Yet there is still a lack of women in STEM careers across Europe, particularly Western Europe. While a few (mainly ex-Soviet) countries have around 20% women in STEM, Western European countries such as France and Spain (17% each), Denmark (16%), Germany (15%), Finland (15%), and UK (9% - the lowest) all bring the European average down to 17%. (*Engineering UK/Association of German Engineers*)
2. The impact of programmes based on games and activities to demonstrate what STEM careers are about has yet to be shown. Much of the recent research finds that demonstrating the range of actual jobs available is more effective in actually attracting girls and other groups into these careers, combined with inspirational and good quality teaching (*Aspire Facts & Fiction/Institute of Physics*).
3. Careers advice still does not seem to be providing young people with the information they need. Almost half (43%) of 16-18 year olds feel they received poor advice or none at all from a careers service (*CBI Survey 2011*), and careers information, advice and guidance continue to reinforce gender stereotypes (*Engineering UK; Institute of Physics*). The 2011 Girlguiding UK survey found that 43% of girls said they were put off science and engineering careers because they did not know enough about the kind of careers available. 60% said they also were put off by a lack of female role models. While there are a number of praiseworthy employers and initiatives showing what careers are available, there are gaps in terms of number and range of the jobs being promoted to girls, combined with a lack of female role models in sufficiently senior positions to convince girls they are welcome.

4. Girls are being turned away from STEM careers by a perception of greater sexism in the workplace. For example, the 2011 Girlguiding UK survey found that 30% of girls thought that worries about sexism in the workplace put girls off a career in science or engineering.
5. Gaps in job profiles and female role models have been identified particularly within technology, computer programming, chemistry, energy and power, food, materials (such as the wide range of careers involved in production and use of aluminium), advanced manufacturing and engineering (such as defence and aerospace) and the built environment (*Science Council 2011*).
6. Employers want the image of high quality vocational routes into engineering and technology careers given as much profile in promoting STEM careers to girls and other groups as higher education routes (*CBI May 2011*). There appear to be very few technician and apprentice job profiles given as case studies in careers material; the large majority are based on a higher education route (*Science Council 2011*).
7. Parents and the wider family remain a key influence in career choice for many under-represented groups including girls, ethnic minorities and young people from low income families (*Institute of Physics; Science Council*).
8. Much of the research concludes that greater collaboration between organisations and initiatives promoting STEM study and careers would make a bigger overall impact.

Recommendations from the evidence on what works

1. Use information about the demand for STEM skills and qualifications, particularly the commercial value of mathematics and science qualifications, so that young people and their parents understand that taking these subjects will improve future job prospects. For example, not everyone understands that you can go from taking science at school to an exciting career in broadcast engineering, advanced manufacturing, covert surveillance, robotics, or computer gaming.
2. Use role models from diverse backgrounds to appeal to the whole spectrum of the student population. Show women working with diverse groups of colleagues, rather than a single talking head, because most girls do not want to be the odd one out.
3. Girls respond to female role models plus an explanation of the range of different careers available, using real jobs and current job titles. Role models should be promoted from primary school age and at key decision points such as Year 9 when they chose GCSE subjects and Year 11 when they choose whether to continue in education.
4. Show that there are vocational routes leading to technician and apprenticeship jobs as a positive alternative or stepping stone into higher education.
5. Use social media such as YouTube, Facebook and online forums to promote role models to girls, their parents, relatives and carers, making use of blogs, podcasts and Twitter.
6. Focus on sectors where there are fewer job profiles and case studies available: technology; computer programming; chemistry; energy and power; food; materials; advanced manufacturing and the built environment.

7. Actively promote examples of how employers are making real changes to the working environment, supply chain and partnerships in order to ensure that women, men and women with families, and other under-represented groups are welcome and will progress on merit.
8. Collaborate with other organisations in order to make a bigger impact.

References used for this set of key findings and recommendations

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