

Encouraging equality & diversity

Working towards equal opportunities
in STEM subjects and careers

STEM Subject Choice and Careers

The STEM Subject Choice and Careers Project has been part of a substantial national investment by the Government to combat the decline in numbers of students choosing subjects, courses and careers in the STEM field. The key message of the campaign is that a decision to study STEM subjects leads to a very wide range of interesting and well-paid jobs, both inside and outside the STEM arena. Two¹ of the main elements of the STEM Subject Choice and Careers Project have been to:

- lead and coordinate a campaign to promote STEM careers awareness among students, parents, teachers, and information, advice and guidance (IAG) professionals, led by the National STEM Careers Coordinator Kate Bellingham;
- make available high-quality information and resources about STEM careers, linked to subject and qualification choice, and deliver associated CPD from the beginning of Key Stage 3, through a variety of agents including subject teachers.

The Centre for Science Education (CSE) in partnership with Babcock (see p.13) has brought together the UK's largest university-based team working on STEM education projects with one of the country's leaders in Careers IAG practice and policy to manage these elements of the project.

¹ Other parts of the Action Programme include Future Morph, a website resource for young people hosted by the Science Council; a three-year communication campaign 'Science and Maths, see where they can take you'; and a research 'Timeline Project' to audit in-school provision of STEM careers and encourage planning and collaboration between STEM departments and careers services, led by the Centre for Education and Industry, University of Warwick.

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Jill set up the STEM Careers Equality and Diversity Advisory Group and has led the development of the Equality and Diversity toolkit (www.stem-e-and-d-toolkit.co.uk; see p.17) as part of the Government-funded STEM Subject Choice and Careers Project.

Since joining CSE she has worked collaboratively on many projects to promote equality and diversity in STEM to support numerous organisations, including WISE and the UKRC, and schools, colleges, work-experience providers and many STEM organisations and businesses.

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Executive summary

Foreword

It has been well documented that there is a shortage of appropriately qualified entrants into the Science, Technology, Engineering and Maths (STEM) sector. Under-representation of certain groups suggests that some young people are not choosing STEM because of factors beyond their control. Barriers to progression are varied and may include stereotyping, a lack of positive role models, a fear of failure or a lack of information to support career decisions. In practice this means that too many young people are giving up on STEM at 16. According to CASE¹, while the desirability of a more diverse science and engineering workforce is generally accepted, progress is very slow. The STEM Subject Choice and Careers project has drawn together a broad collective of expertise to develop the STEM Careers Equality and Diversity online toolkit, a resource that can really help schools and colleges to address the barriers faced by young people. This publication is designed to capture some of the current good work going on to widen access to STEM subjects and careers, but more than this it provides some clear suggestions about how the STEM community should continue to make progress in achieving a diverse STEM workforce.

I have personally been involved in the promotion of STEM opportunities for many years, yet this project has reminded me how even small changes of practice can have a major impact on young peoples' aspirations, and I have been inspired to incorporate these changes in my day-to-day work. As a teacher, a parent, a female engineer and a patron of WISE, I would encourage everyone to make use of this resource.



Kate Bellingham
National STEM Careers
Coordinator

- The aim of the STEM Careers project, as part of the Government-funded STEM programme, has been to make all young people in schools and colleges aware of STEM careers, and to inform their choice of subjects to study. The project team adopted the promotion of equality and diversity as an integral part of their approach. Involving stakeholders, including equality and diversity specialists, has underpinned that approach.
- Within the STEM sector there is a broad continuum of equality and diversity awareness – some still do not even recognise the issue, while others are passionate and committed to promote equality and diversity in schools or colleges. We have to be able to reach the whole of the awareness spectrum if we are to be successful in reaching all young people with the message about the value of STEM.
- The STEM Careers project team established an Equality and Diversity Advisory Group at the beginning of the project in 2008, drawing together external individuals and organisations with expertise both to ensure a comprehensive coverage of equality and diversity issues, as well as to create a group of 'critical friends' with an objective view of the project.
- The online Equality and Diversity toolkit was a key resource development for the project, and provided a focal point for discussion within the Equality and Diversity Advisory Group – not just about purpose, style and usage, but to try to achieve a sustainable resource with a life beyond the project duration of three years.
- This publication draws together the findings from an event in March 2011 that brought together equality and diversity leads from more than 40 organisations in STEM and beyond to discuss ways to take equality and diversity in STEM careers forward beyond the life of the project, while celebrating the creation of the toolkit.
- The publication includes four case studies that showcase examples where equality and diversity is not simply a box-ticking exercise and where a commitment to reach the widest possible range of young people has become an established way of doing STEM.
- The delegates felt strongly about getting the toolkit more widely known and used in schools and colleges and they were concerned that the toolkit as a resource should continue to grow and be kept up to date, in order to maintain its value.
- Collaborations and partnerships to share ideas and practices across the strands of equality and diversity are going to be essential in keeping the momentum going in a time of shifting policy priorities and uncertain economics.
- Equality and diversity in STEM education and careers must remain high on the agenda for all if we are to achieve the professed long-term goal to increase the participation in STEM subjects and careers.

¹ Campaign for Science and Engineering, policy document 8, May 2008

Introduction

An integral part of the STEM Careers Project was the promotion of equality and diversity, with a specific intention to produce an equality and diversity 'toolkit'. The aim of the toolkit was to assist anyone involved in the creation of STEM careers resources for young people. We had noticed an absence of such a resource in other parts of the STEM programme and wanted explicit acknowledgement of the barriers that exist for different groups. We also wanted to address the fact that groups are not homogenous and that some individuals fall into several categories of equality and diversity, so have several layers of 'disadvantage'. Understanding the intersectionality of different strands of equality is now recognised as an important aspect of how individuals experience disadvantage and we wanted to try to acknowledge this within the toolkit.

The first stage of the process was to enlist the help of individuals we felt could contribute both because they already had equality and diversity expertise and because they were already involved in creating STEM materials. We formed an Equality and Diversity Advisory Group, with the aim of encouraging feedback and support from individuals whom we felt would act as 'critical friends' throughout the project. Having external representation was essential to support the objective view of the project and the resources produced within it. Representatives from the following organisations were invited to join the Group:

- Equality & Human Rights Commission
- National Union of Teachers
- RA Eng/London Engineering Project
- UKRC
- WISE
- QCDA
- Lantra
- e-skills
- Prospect
- University of Wolverhampton
- Sheffield Hallam University
- SKILL
- Shaw Trust
- Department for Education
- Babcock
- CaSE
- MyPlus Consulting
- Windsor Fellowship
- Barnardo's
- NACRO

From the outset our intention was to consult with the Group whenever possible. However, the volume of resources created across the project, and the range of those resources, at times made consultation difficult. At equality and diversity meetings we discussed key pieces of work; and there were also interim communications when we sought specific advice or when members of the Group wanted to bring certain issues to our attention. The Group's focus was largely to support the development of the Equality and Diversity toolkit and, in this role, the honesty and advice of its members has proved invaluable. We hope that the Group can extend its life beyond the end of the project, so that the knowledge we've gained and expertise we've built up so far can support STEM in the future, and that the momentum we've created continues to gather pace.



The event

22 March 2011 at the Royal Society in London

The STEM Careers Project team wanted to ensure that the lessons learned from the Project were properly disseminated and used as a base from which to move forward. We also wanted to celebrate the STEM Equality and Diversity toolkit – we are very proud of its contribution to STEM and it has been important to us to make sure that people access and use the resource. We worked closely with the Equality and Diversity Advisory Group to draw on its members' expertise to develop the right questions to pose at the event and to ensure that the debate took us forward. We wanted to gather an informed audience to take part in a round-table discussion to help identify ways to take the STEM equality agenda forward beyond March 2011. Together, we drew up an invitation list of equality and diversity leads from STEM and beyond, including education and careers experts, academics and researchers, and industry equality and diversity champions.



Active participation and key questions

Representatives from more than 40 organisations were involved in the event. We asked organisations that show an inclusive approach to STEM to provide some case studies to help stimulate debate, and we developed a number of questions that we asked each of the five round-table groups to respond to. The questions covered the following issues:

- How do we build on what we have achieved in STEM careers on equality and diversity?
- How can we encourage wider use of the STEM Equality and Diversity toolkit?
- The policy agenda is changing quickly (for example, the socio-economic strand of the Equality Act will not become part of legislation, yet the issues remain and social mobility is an often-mentioned aim), so we need a flexible approach. How can we keep equality and diversity on the agenda and encourage wider use of the toolkit beyond March 2011 when funding ends?
- We know that equality and diversity is not often acknowledged as a key issue by a number of STEM stakeholders. Equality and diversity has not had a high profile within the STEM framework and it could be an unwitting casualty of decisions made amid shortage of public funds. Measured on our developmental framework, awareness and interest of STEM in schools ranges from zero to a whole-school approach (see Lessons Learned, Part One¹). How do you manage such a wide continuum of interest and recognition – and provide useful advice for all?
- We need to encourage STEM organisations promoting equality and diversity to share issues, ideas and practices across all strands so that we move towards a more inclusive approach. Expertise may be in a single strand, such as gender, but there is a need to take into account the breadth of identities within gender, including socio-economic, ethnicity, faith and disability. How do we encourage those with expertise in one single strand to be inclusive and develop a wider focus in partnership with other groups?
- The Science for Careers Report (BIS, 2010) acknowledges that it is important to do much more to tackle equality and diversity in science – our community can contribute by building on the toolkit and the work of the Equality and Diversity Advisory Group, both as a legacy and to aid sustainability in the schools and colleges sector.

Thanks to those involved

The STEM Careers project team and the Equality and Diversity Advisory Group value the contributions of all those who attended the event on 22 March 2011. The ideas and suggestions discussed on the day have fed directly in to this publication. Our aim is for the proposals in this publication to support our STEM community in taking the equality and diversity agenda forward within schools and colleges.



A changing landscape

The policy landscape has changed since the STEM Careers project began, with the global banking crisis and then with the Coalition Government bringing in a new set of policy priorities. During the transition to new policies in education and careers, regardless of what emerges from these shifts in policy direction, it is important to ensure that the learning from this project informs and supports future STEM subject choice and careers interventions. We believe that the focus on equality and diversity in STEM education and careers must remain high on the agenda, if as a society we are to achieve the long-term goal of widening participation in STEM subjects and careers.

Event findings

How do we build on what we have achieved in the STEM Careers Project with regard to equality and diversity?

The project and its partners have built up a head of steam that we must keep fuelled in order to build continuing commitment. We can do this in a number of different ways, but one key way is to promote knowledge and awareness of our existing resources among a wide range of audiences and stakeholders. These groups include head teachers, STEM Ambassadors, the Careers Task Force, subject associations and professional societies – and more.



The event raised a number of other suggestions to keep equality and diversity high on the agenda:

- integrating STEM equality and diversity into initial teacher training;
- integrating STEM equality and diversity into the qualification in career guidance;
- investing in STEM Ambassador training;
- investing in training for union representatives in schools and colleges;
- creating publicity through written articles in a range of journals.

Delegates showed a strong view that it was important to get the toolkit more widely known by those in schools and colleges, using a range of networks to reach a broader audience.

How do we keep equality and diversity issues on the STEM agenda?

Equality and diversity should be in everything. As participants on table 1 said, 'Complain when it is not... and keep on complaining till it is.'

Delegates highlighted how crucial it is to keep the toolkit up to date. Achieving this could in itself provide an opportunity to maintain a reasonably high profile for the issues. By publicising the fact that elements of the toolkit have been updated, we can, in effect, keep the issues alive.

The changing political landscape may provide other 'drivers' for updating the toolkit and increasing publicity, and the conference highlighted the need to engage with the 'widening participation' programmes that universities are working on at the moment.

Hard data and publicly available statistics can be an incredibly useful source of support for those promoting equality and diversity. Everyone with an interest should try to ensure that they collect and use data, including making equality impact assessments to keep track of progress. However, we also know that amassing feedback – and so compiling data – should be real and not just involve ticking a box!

There is a clear need to link to identified priorities where an inclusive approach can support the national agenda. For example, we might suggest strategies to address the recognised drop-off in confidence in students studying science and maths between primary and secondary school.

It is important that we take the long-term view, and persuade people about the future. Equality and diversity is a collective responsibility that we need to keep on the agenda at all levels, from early years right through to the workplace.

Table 2 said, 'If you want to know if equality and diversity is being taken seriously – ask for the stats. Don't get fobbed off – drill down and argue if the data is poor or the progress is ineffective.'

Case study 1: Marilyn Pilkington Training 2000

Equality and Diversity Champion 14 to 19 – working across the strands in a region

Training 2000 is a large work-based learning provider in Blackburn, Lancashire, with 300 staff at four sites. The organisation has approximately 2,500 learners, 1,500 of whom are apprentices. Marilyn and Training 2000 have developed interventions that challenge gender and ethnic stereotyping in non-traditional occupational areas, including engineering.

In many sectors, the demand for engineering employees is growing, while the existing population is ageing. The engineering sector recognises the need to attract high-achieving young people from atypical backgrounds, remove barriers, reduce stereotypical behaviours, and generate more interest from black and minority ethnic (BME) learners into apprenticeships. At 20% the proportion of South Asians in Blackburn and Darwen is higher than the national average; the region also has a high proportion of families from low socio-economic backgrounds. Marilyn and her team have taken on the challenge – they have been working with a group of top-set maths students, all girls aged 12 to 13, who would not normally

get the chance to consider engineering apprenticeships. The majority are from BME backgrounds. A programme of hands-on activities helps to show the apprentices that girls are 'allowed' in engineering, and that female apprentices are already on the path.

Pre- and post-evaluations of the programme show a dramatic change in attitude among the girls. At the beginning of the interventions, 51% believed they could not do these jobs because of their gender. By the end of the programme, 100% felt differently about engineering



and 85% wanted more information about so-called 'male-dominated' careers. Their subject choices at Year 9 confirmed their change of heart.

Training 2000 also recognised a need to catch younger girls before the stereotype barriers are too entrenched. This has led to the WISE Monkeys programme for girls in Year 6.

The organisation's consistent commitment to tackling equality and diversity through its vocational schemes has shown that an inclusive approach that is sensitive to different needs can break down barriers. Marilyn and Training 2000 are committed to working right across the different strands of equality and diversity.

Girls Allowed! A hands-on approach to engineering at Training 2000.

How do we encourage wider use of the toolkit?

'We need to get some people to realise there is a problem in the first place.' This observation reminded us that there is a broad spectrum of equality and diversity awareness – ranging from no awareness at all to those who are passionately committed to the cause. We have to be able to reach all those on the awareness spectrum. In addition, there may be people who are aware of the issues

or individuals. The toolkit should be practical. The business case for equality and diversity will continue to be important, even in a recession, so we must try to embed the hints and tips into advice and materials that teachers and employers already use and read.

The toolkit could be developed to provide a resource for additional target groups beyond schools and colleges to meet the needs of the wider youth market, as well as parents and carers. We want to encourage a shift in attitude towards more collaborative ventures, to ensure that awareness



WE NEED TO GET SOME PEOPLE TO REALISE THERE IS A PROBLEM IN THE FIRST PLACE.

Disability is invisible in STEM!



facing young people with regard to equality and diversity, but who don't have the knowledge or skills to know how to help. For example, teachers may be aware of the problems their students face, but lack the tools or the confidence to advise them on how to tackle those issues. The toolkit has to reach these people, too.

Delegates felt strongly that we should keep the toolkit real, expand it for use by a diverse range of groups (from teachers to employers), and make it more generic to link with other resources so that it does not become a silo in itself. On the other hand, people also believed it shouldn't be so generic as to become meaningless or less useful to specific audiences.

We need to provide a 'creative application of the toolkit' and to give examples of how people might use it. In addition, we must target specific groups

keeps on growing. The toolkit can support this collaboration.

Essentially, we must look to provide 'a toolkit of solutions' – in other words, the toolkit has to be available and useful on different levels to a variety of different audiences.

How do we encourage those with expertise in one single strand (such as gender or disability) to be inclusive and develop a wider focus?

Some groups in STEM have developed expertise entirely on one aspect of equality and diversity – often gender. However, focusing on only gender does not always take into account the breadth of identities within that strand – socio-economic, ethnicity, faith, disability and so on. There are certain

Case study 2: Gordon Mizner EDT and the Industrial trust

An equality and diversity approach to enrichment programmes

Established 20 years ago, the EDT is an education charity that has developed a wide range of interventions designed to appeal to different groups of young people. The charity has also become a leading provider of STEM work-related learning programmes delivered to 12 to 21 year olds in the UK. The different groups targeted include a range of age groups, girls, ethnic minorities, and 'first in family' to apply to university (see table, below). The charity has reached a large number of students – some 25,000 students every year experience enrichment hands-on activity days. With 500 companies participating alongside 45 universities, EDT can clearly show that its approach to equality and diversity is deeply embedded.

	Girls	Ethnic minority
First Edition*	53%	31%
Go4SET	49%	14%
EES	30%	19%
Headstart	31%	19%
YINI	20%	15%

*Promoted at 'first in family'

All the programmes the charity offers have been adjusted to ensure they include a careers element, and because the programmes are aimed at different age groups, the progressive nature of each programme can be tracked. Evaluating and monitoring impact is a key feature of each programme – just as it is at Training 2000 (see Case Study 1, p.9). The table below illustrates some of the common engineering stereotypes that are challenged

Q In your opinion, which of the five terms below best describes an engineer? (Girls 49%)

Perception	Pre	Post
Dirty Hands	43%	21%
Clever	47%	60%
Well paid	19%	32%
Professional	36%	47%
Sweaty	23%	6%
Repairs Cars	40%	22%
Experiments	15%	19%
Male	22%	14%
Female	2%	3%
Wears overalls	30%	12%
Has a degree	29%	35%
Gets things done	60%	59%
Logical	39%	50%
Solves problems	55%	56%



and mapped within each programme.

The charity tries to recognise new challenges, and to adapt to meet them. As Gordon says, there is always more to do, but that is subject to the charity's funding. Ongoing challenges are the so-called 'hard-to-reach' schools and their students. The impact of schemes such as those offered by EDT is significant on those who take part both in changing attitudes towards STEM and in encouraging students to progress to STEM subjects at all levels. How is this success achieved? There is a clear commitment from Gordon as CEO and through the whole team to widen access to STEM and, as the mission statement says, 'to encourage young people to fulfil their potential through science, engineering and technology'.

groups or interests, for example those that relate to non-academic STEM careers such as vocational or technician routes, which can be invisible in STEM. We need to build a continuum of expertise that opens eyes to the potential for achieving more. The Equality Act style has been followed in the toolkit – we encourage readers to remove unnecessary barriers wherever they occur. The message in the toolkit is that ‘For some young people, socio-economic background, ethnicity, gender or disability

What are the priorities for STEM careers equality and diversity?

Different groups may become priorities for the future. While the target for the STEM Careers Project has been raising awareness among careers professionals and teachers in schools, it is also necessary to work with parents and carers. We need to reach these groups in different ways and through different communities. For example, we may be able to more effectively access some groups



IF THESE BARRIERS ARE NOT ADDRESSED, A YOUNG PERSON'S ASPIRATIONS CAN BE LIMITED, AFFECTING THEIR LIFE CHANCES, INCLUDING THEIR FUTURE EARNING POTENTIAL.



can mean they face particular barriers which may prevent them from considering a career in STEM. These barriers include stereotyping, a lack of positive role models, a fear of failure, and a lack of information on the range of learning options. If these barriers are not addressed, a young person's aspirations can be limited, affecting their life chances, including their future earning potential.'

Some equality strands have developed a strong presence in STEM, while expertise for dealing with other strands is scarce. For example, disability has not had a strong STEM presence, but, with support from non-STEM groups such as the Shaw Trust, there is a continuum of change. Some strands will have to grow with new priorities – such as the new fees regime in universities.

Single issue groups must come together to share their expertise and build a wider recognition of inter-sectionality in STEM.

online, although this will inevitably rule out access to others, who might need an alternative form of communication. Universities provide another group in which we need to strengthen participation interventions in order to meet the requirements of Government funding. While we call for earlier interventions to tackle stereotypes that become embedded at a young age, the barriers at 16 and beyond are just as important if we are to make meaningful progress.

We should try to encourage people to undertake impact assessments in their schools, colleges and organisations (and delegates noted that 'to be effective, these assessments need to be honest and realistic as well as aspirational').

The toolkit must continue to meet a range of needs, from those who want something immediate and practical to those who want to update or advance their expertise and wider knowledge.

Case study 3: Claire Nix & Anthony Barnes Babcock

A 'whole school' approach to equality and diversity in STEM careers

Collingwood College is a large 11-to-18 school in northwest Surrey, with more than 2,000 students, including 450 in the sixth form. The school has been a test-bed school within the STEM Careers Project and has had support from the Project team in developing its STEM careers activities. From the beginning, the school leadership team was heavily involved in the programme and identified three key issues it wanted to address during the Project:

- to boost numbers progressing to post-16 in STEM subjects;
- to address the gender imbalance in STEM subjects;
- to support strengthening of design and technology.



Claire Nix addresses delegates.

The school's very active Careers Coordinator, Lorette Parker, worked closely with a science teacher to create a committed partnership that, with support from the leadership team, introduced initiatives and activities to target key issues. They established:

- a commitment to tackle gender imbalance on work experience placements, based on the belief that work experience can show the potential of STEM careers, but unsupported it can also limit potential;
- a drama group to inspire Year 7s about technology;
- work with GCSE groups to widen choice and break down stereotypes;
- a careers contact in each STEM subject;
- a STEM careers club.

The team have monitored data and collected a range of quantitative and qualitative evidence of progress. The statistics contribute to the Equality Impact Assessment in the school to make it real. Widening the horizons and potential of the students had to be more than just showing



or informing; it needed to be progressive. As Anthony explained, many young people rule themselves out of STEM subjects, and so STEM careers, at an early age. This disconnection remains an obstacle on a number of levels: first, young people need the interest, then they need to feel capable, and finally they need to have an identity that aligns with STEM – and many young people need help to achieve all three.



The STEM Careers framework for development (see Lessons Learned Report, p.6) recognises that practitioners, schools and colleges will be at different levels of awareness and encourages a developmental approach.

Organisations across education sectors and from different parts of STEM should try to collaborate more and share information on equality and diversity. To make progress, we need collaboration, coordination and coherence.

Teachers need a strategy (use the toolkit) to address the negative experiences of students.



or celebrated. Equally, many organisations lack awareness of or interest in equality and diversity issues. There were some examples of collaboration: Platform 51 has worked with British Gas and Summit Skills; the IOP have approached the Shaw Trust. Furthermore, the STEM Careers Equality and Diversity Advisory Group is a prime example of collaboration, but there is scope for so much more.

Using the STEM Equality and Diversity toolkit to provide a clear signpost to a wide range of

practical and creative examples, offering a resource that grows and adapts, could make a significant contribution to equality and diversity in STEM education and careers.

How can we make the toolkit sustainable?

The toolkit must be updated regularly, because we know that wrong information can be more harmful than no information at all. While we can sustain the toolkit in the short term, we need more funding to be able to expand its audience and its resources.

What could be done to encourage collaboration and sharing of knowledge and practice?

It is essential that we have Government and other high-level support of and involvement in a strategy to tackle equality and diversity issues. Who will be the conscience of STEM? With the AimHigher programme ending, there is a real urgency for someone to take the lead and ensure that we continue to share knowledge on how to widen the participation in STEM subjects across groups. However, any coordinator must have the right expertise. The event at the Royal Society illustrated that sometimes good practice happens at a local level, driven by those committed to an inclusive approach, but that often this is not shared

Case study 4: Squadron Leader Glyn Dean RAF

An employer-led partnership for equality and diversity in STEM

Aware that it needed to expand its candidate pool beyond white males, the RAF developed strategies to increase its recruitment of females and, separately, of BME entrants.

The approach to widen the choice for girls was a longer-term action plan. As Glyn explained, the RAF knew it needed to reach girls while they were still suggestible, but it was not used to interventions with young people aged 13 – it became clear that it would take more than a ‘silver bullet’ to tackle gendered occupational segregation. Realising that it would need a range of approaches, the RAF began to work with organisations –

such as the UKRC, WISE and WiSET at Sheffield Hallam University – that had the expertise to develop its approach, while also aligning itself with STEM interventions such as the CREST awards. Importantly, the RAF has developed a work-experience scheme. Glyn explained that good work experience gives young people a unique career-related learning opportunity. The RAF’s scheme offers 24 Year 10 girls a week at RAF

Cosford linked to the CREST awards. The initiative is now in its third year.

However, the RAF has not only created new schemes, it has also wanted to show management commitment and to adjust existing schemes to make them more inclusive. The RAF has had to plan and structure its engineering activities, create a comprehensive workbook, think through the logistics of having teenage girls on the base, and organise celebrations to include families, parents and teachers to ensure the girls receive a high standard of instruction and attention that inspires them.

In partnership with Generating Genius, the RAF



has also developed a work-experience scheme focused specifically on attracting black Afro-Caribbean boys from low socio-economic backgrounds.

The RAF wanted to achieve a sound model, so the research, knowledge and expertise of others is vital to ensure a joined-up approach, ‘a model with legs’. Under current fiscal circumstances, such activities suffer, but, as Glyn said, ‘Can we afford not to invest in this?’



Hands-on, girl-friendly engineering work experience at RAF Cosford.

An online video about the RAF placement scheme is available via: www.wisecampaign.org.uk

The way forward: what should happen next to keep and grow STEM equality and diversity?

We asked the delegates how we could progress the equality and diversity in STEM agenda. What needs to happen and who should be involved?

These were their suggestions:

- We must grow and expand the 'head of steam' that has built up within the STEM community that is reflected in the STEM Careers Project and others, including the work illustrated in the case studies.



- Participants identified the significant role that data monitoring has in keeping equality and diversity on the agenda for STEM. There is a need for an information-sharing mechanism for this data. The basic participation data across the strands can be used to prioritise and help decisions on suitable interventions, which in turn can be followed by impact assessment. We need an organisation to collect, hold and interpret this data from schools and colleges – but who should that be? What will happen to the AimHigher data? Will the Office for Fair Access (OFFA) be doing this for HE? Could EHRC or OFSTED be involved? This needs further debate.

- Equality and diversity needs to be clearly embedded in all teacher training, in the continuing professional development of STEM subject teachers and within teacher appraisal systems. As one participant explained – instead of being mentioned at the end of teacher training, equality and diversity awareness is required intravenously from the beginning. If new teachers can learn a positive approach to implementing equality and diversity from the start, they will see the benefits and react positively.
- As a range of schemes lose funding, it is vital to maintain collaboration within the STEM school and college education and careers equality and diversity community. But it is also essential that we do more to connect with other equality and diversity interest groups outside STEM, as well as taking a life-long approach to equality and diversity. We are at a risk of fragmentation, which we must do all we can to counter.

The Centre for Science Education at Sheffield Hallam University will continue to host the toolkit and will actively seek ways to fund the resource to maintain and grow it. The STEM Subject Choice and Careers Advisory Group will continue beyond the life of the project – to maintain the links across organisations and build collaboration – with support from member organisations (to host meetings and allow time for participants to attend) and others who want to promote the equality and diversity agenda. The group will help to keep the toolkit up to date. However, this is only an interim solution. We must look for better long-term investment in equality and diversity within STEM education and careers. As Glyn Dean (see p.15) said, there is no 'silver bullet' – this is a long-term project.

KEEP E&D VISIBLE –
ASK QUESTIONS!



What is the toolkit?

The STEM Equality and Diversity online toolkit is designed to help promote an inclusive approach to Science, Technology, Engineering and Mathematics (STEM) careers and education for young people from a range of backgrounds and with a range of needs.

The toolkit is aimed at anyone who is in a position to influence or advise young people aged 11 to 16, including parents and carers, teachers, careers coordinators, work-related learning coordinators, Connexions/careers advisors and anyone involved in developing resources related to STEM subjects. We hope to be able to expand the toolkit to become relevant for other age groups in the future.

You can use the toolkit as a:

- prompt – to remind you of things you can take into account when considering activities relating to STEM careers;
- resource – to give you ideas about where to look for particular information regarding equality and diversity specific to STEM, as well as some more general points (see table, p.18).

The barriers to individuals can be multi-layered as acknowledged by Trevor Phillips (Chair of the Equality and Human Rights Commission):

'People's incomes and life-chances may be influenced by disadvantages arising from individual characteristics such as race or gender. But we know very well that this is not enough to capture their whole experience – what is often called the "strand-based" approach to equality. We have to look at people as a whole and modernise the equalities argument to keep up with society. Whether you are a carer of an elderly parent, a disabled young worker starting out on your career or a white working class boy at a struggling school, everyone should have the right to flourish and make the most of their talents.'

A New Contract with the Public,
July 2008

www.stem-e-and-d-toolkit.co.uk



The toolkit – a guided tour

www.stem-e-and-d-toolkit.co.uk



Who is it for?

- Anyone developing teaching resources
- Teachers and parents/guardians
- Anyone working in careers education, information, advice and guidance
- Work experience placement providers
- STEM enrichment providers and employers

Elements

Purpose

Background and strands	These provide a context and reason for the toolkit, as well as basic information to provide a baseline for individuals using the toolkit.
Encourages reflective practice	The style and tone of the toolkit deliberately aim to be non-prescriptive, with suggestions for how individuals creating resources can consider the barriers different groups might encounter in relation to STEM.
Case studies with web links	These give some scenarios with examples of how teachers, advisors, employers, parents and others can build equality and diversity into different STEM situations.
Resources and signposting	These highlight where users can find more information, according to strand (for example, disability or socio-economic status). A website list breaks down information by type and source, such as those materials provided by the Government, unions, and guidance or careers bodies.
Quick reference or in depth	The site offers the option of quickly going to resources or case studies to answer specific queries, as well as the option to find more in-depth background information that highlights the issues for those who are interested to learn more.
Self-assessment health check	This provides an opportunity for individuals to ask themselves some quick questions and assess their existing knowledge, with suggestions for finding out more.
Top Tips	These summarise ways in which people can make their resources and activities more inclusive, such as ensuring STEM clubs are not just offered after school because this might exclude some young people (such as young carers, pupils who need to catch buses to rural areas or those attending Qu'ran or other faith-based study groups, and so on).
Feedback and keeping up to date	These offer the option of completing an online feedback form.
Maintaining standards	A template has been created with input from the Equality and Diversity Advisory Group to assess whether materials sent to be included in the toolkit are suitable and appropriate.

Welcome page

The toolkit is designed so that our users can recognise there are some 'rights and wrongs', but that the best way to make their practice more inclusive is to reflect on how they plan and deliver materials. We hope to show them how to remove as many barriers as possible, rather than focus on problems they may encounter and then create a checklist of 'dos and don'ts'. The Welcome page can take you straight into the hands-on Resources and Tools or Top Tips, but we wanted to provide more in-depth information for users who needed it – so the Background Information pages provide detail about legislation and individual strands of equality, along with references to relevant research.

Strands of Equality and Diversity

On these pages, the toolkit sets out each of the seven main strands of equality, what they are, the background information about them, elements of the law, useful links and a 'what you can do' section.

- **Gender** focuses on encouraging girls into STEM but acknowledges that some areas, such as physics and engineering, present a particular problem.
- **Disability** pulls together information about how barriers might exist in relation to disability and STEM subjects and careers and how to overcome them.
- **Race and ethnicity** highlights where certain groups are under-represented, while others are very evident in STEM environments, and provides signposts to activities that may help address this.
- **Age** has information about how young people might be affected by stereotyping and over-protective measures in STEM and gives suggestions for more inclusive practice.
- **LGBT** describes how young people who are lesbian, gay, bisexual and transgender may face discrimination in the workplace and what can be done to make resources and activities less stereotypical.
- **Religion and Belief** covers some of the issues that may affect people of different faiths and beliefs, highlighting things to take into account when planning or delivering STEM activities.
- **Socio-economic** pulls together information on some of the barriers faced by young people from low socio-economic backgrounds and explains how these barriers disadvantage young people on a number of levels from being able to progress in STEM subjects and careers.

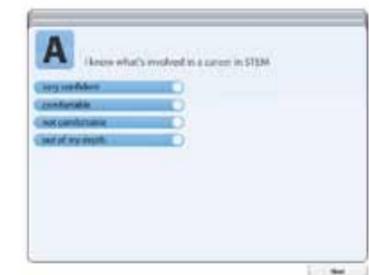
Top tips

The toolkit also includes a firefighting list of top tips that can make immediate impact on the working or learning environment. We often find that these tips are the only impetus users need to see how small changes in day-to-day activity or approach can lead to big changes for equality and diversity in STEM careers.

Resources and tools

This section highlights the resources and tools that are tried and tested from a wide range of sources. We have included only resources that can demonstrate a proactive approach to inclusive practice. The Case Studies illustrate some real-life common examples of issues that might come up in schools and colleges, together with solutions that work.

Self-assessment health check – where are you now?



The health check is an interactive tool that enables users to establish what they already know about equality and diversity in their business, industry, school or

college, and what they still need to know. They can use the findings of the assessment to plan future equality and diversity training and recruitment, or to establish where they can find help to improve equality and diversity in the environment they work in, including evaluating which aspects of the toolkit will be useful to them.

Note: We welcome contributions of more inclusive resources to add to the toolkit and we need feedback to help us to improve the toolkit – so please get in touch.

Useful contacts

Government links

Equality and Human Rights Commission is the main site for information and up-to-date legislative requirements across all strands of equality and diversity – www.equalityhumanrights.com

UK Government Equalities Office – www.equalities.gov.uk

Department for Education's pages on equality and diversity – www.education.gov.uk/schools/pupilsupport/inclusionandlearnersupport/inclusion/equalityanddiversity

Unions

Trades Union Council – www.tuc.org.uk/equality/index.cfm?mins=24&minors=24&majorsubjectID=6

NUT have a range of resources for teachers – www.teachers.org.uk/taxonomy/term/1651

NASUWT have a range of resources for teachers – www.nasuwt.org.uk/index.htm

ACAS
www.acas.org.uk/index.aspx?articleid=1461
www.acas.org.uk/index.aspx?articleid=1363

STEM multi strand

Campaign for Science and Engineering (CASE) Policy Document, Delivering Diversity, May 2008 – www.sciencecampaign.org.uk/documents/2008/CaSE0608.pdf

The London Engineering Project was a partnership HEFCE-funded project led by the Royal Academy of Engineering to encourage under-represented groups of young people to consider engineering as a career – www.thelep.org.uk/about

The HE STEM project brought the different HEFCE widening participation projects together – www.hestem.ac.uk

The LSIS STEM programme has equality and diversity activities and resources and regional STEM champions that can help – www.nationalstemcentre.org.uk/stem-programme/lsis-stem-programme

The STEM Ambassador Programme provides volunteers from STEM as visitors to schools. The regional STEM contract holder will locate role models from different backgrounds at request. Currently (April 2011) 40% of STEM Ambassadors are female and more than 10% identify themselves as Black, Asian or Minority Ethnic (BAME) – www.stemnet.org.uk

Careers/Guidance/Education

Cegnet is a site sponsored by ACEG, ICG and Babcock with resources for careers professionals, including STEM careers documents and resources – www.cegnet.co.uk

The Institute of Careers Guidance hosts a STEM online community forum – www.icg-uk.org/iqs/cpti.173/dbitemid.33/sfa.view/stem.html

The Association for Careers Education and Guidance is a member site with STEM Careers equality and diversity links and resources – www.aceg.org.uk

NHS site with a toolkit for arranging inclusive work-experience placements – www.nhscareers.nhs.uk/workexperience.shtml

Equality Challenge Unit (ECU) promoting equality and diversity in higher education – www.ecu.ac.uk

Gender

WISE – www.wisecampaign.org.uk

UKRC is the main provider of gender equality resources and information about women in SET – www.theukrc.org

Platform 51 (formerly YWCA) supports girls and women in deprived areas – www.platform51.org

Geri Project produce equality and diversity resources for careers advisors and schools – www.geriproject.org

The Women's Engineering Society – www.wes.org.uk

Women in Technology – www.womenintechnology.co.uk

Women and Manual Trades – www.wamt.org

Paywizard focuses on the gender gap – www.paywizard.co.uk/main/what-she-earns

Posters and other resources from the JIVE project – www.jivepartners.org.uk/products/posters.html

Girls in Physics provides project resources developed and hosted by IOP – www.iop.org/publications/iop/2010/page_44459.html

Disability

SKILL – National Bureau for Students with Disability (has closed due to funding problems, but resources are still available) – www.skill.org.uk

RADAR is the largest disability campaigning group – www.radar.org.uk

Shaw Trust support disabled and disadvantaged people into work – www.shaw-trust.org.uk

Treloar helps young disabled people take control of their own lives – www.treloar.org.uk

Professor Stephen Hawking – www.hawking.org.uk

Dyslexia Style Guide to aid accessibility – www.bdadyslexia.org.uk/about-dyslexia/further-information/dyslexia-style-guide.html

Race and Ethnicity

Windsor Fellowship helps young people from black and minority ethnic backgrounds to navigate pathways to success – www.windsor-fellowship.org

Stephen Lawrence Trust is an educational charity based in London supporting disadvantaged young people to progress in their education and careers – www.stephenlawrence.org.uk

Geri Project produce equality and diversity resources for careers advisors and schools – www.geriproject.org

Generating Genius is an out-of-school programme to develop talent in boys from under-represented backgrounds into higher education – www.generatinggenius.org.uk

LGBT

Stonewall is a lesbian, gay and bisexual charity – www.stonewall.org.uk

Terence Higgins Trust is the largest HIV and sexual health charity – www.tht.org.uk

Mermaids supports children and teenagers with gender identity problems – www.mermaidsuk.co.uk

The Gender Trust helps all those with gender identity problems – www.genderttrust.org.uk

Age

The Royal Society for the Protection of Accidents (RoSPA) has an advice site covering young people at work – www.youngworker.co.uk

Religion and Belief

Inter Faith Network for the UK – www.interfaith.org.uk

Socio-economic

Sutton Trust – www.suttontrust.com

Fair Access to the Professions report related resources – www.totalprofessions.com/home

The Brightside Trust – www.thebrightsidetrust.org

The Joseph Rowntree Foundation – www.jrf.org.uk

General Inclusion

Rathbone are a charity that help young people re-engage with learning – www.rathboneuk.org/default.aspx

Leeds Animation Workshop – www.leedsanimation.org.uk

EHRC: Young People Know Your Rights – www.equalityhumanrights.com/your-rights/young-people-know-your-rights

DCSF Single Equality Scheme – www.education.gov.uk/schools/pupilsupport/inclusionandlearnersupport/inclusion/equalityanddiversity/a0069463/ses-2010

Princes Trust – www.princes-trust.org.uk

EDGE foundation aims to raise the status of practical and vocational education – www.edge.co.uk

Barnardos – www.barnardos.org.uk/index.htm

Family-related Issues

Campaign for Learning
www.campaign-for-learning.org.uk/cfl/index.asp

Family Learning – www.familylearning.org.uk/

National Children's Bureau – www.ncb.org.uk

Our Case Studies

Engineering Development Trust are an independent charity that aims to inspire young people into STEM through enrichment opportunities – www.etrust.org.uk

Training 2000 are the largest training provider in the northwest of England – www.training2000.co.uk

Collingwood College, Surrey – www.collingwoodcollege.com

RAF careers – www.raf.mod.uk/careers or find out more about the work experience in the Work Experience good examples on www.cegnet.co.uk or on www.wisecampaign.org.uk

STEM Careers (E&D specific)

Physics Key stage 4 STEM Careers Resources to encourage girls to choose physics post-16 – www.wiset.org.uk

Teachers TV programme promoting equality and diversity in STEM careers – www.teachers.tv/series/stem-subject-choice-and-careers

Chapter Four of STEM Choices pack: Equality and Diversity – www.futuremorph.org/careers_staff/ceiag_resource_pack.cfm

Quick Guide to work experience and good practice examples – www.cegnet.co.uk

Guide to mentoring schemes – www.wiset.org.uk

STEM Careers Training for STEM Ambassadors and Teachers TV programme on role models and work placements – www.stemnet.org.uk
www.teachers.tv/series/stem-subject-choice-and-careers

and the toolkit www.stem-e-and-d-toolkit.co.uk

Access the full STEM Subject Choice and Careers Collection at the National STEM Centre at <http://stem.org.uk/cx8h>

Centre for Science Education
www.shu.ac.uk/research/cse/stem-careers.html

Future Morph – www.futuremorph.org

Maths Careers – www.mathscareers.org.uk

Collect and use data wherever you can...



Organisations that contributed to or attended the Equality and Diversity event: 22 March 2011

- Athena SWAN
- Babcock
- Bloodhound
- British Science Association
- Campaign for Science & Engineering
- Careers Consultant / Chris Johnson
- Department for Education
- e-skills
- Engineering Development Trust
- Equality and Human Rights Commission
- Gender Consultant / Rachel Epton
- Generating Genius
- Institute of Physics
- King's College London
- Lantra
- LSIS
- Manchester Metropolitan University
- My Plus Consulting
- National Centre of Excellence in Teaching Maths
- National Science Learning Centre
- National STEM Careers Coordinator
- National Union of Teachers
- Newstead Wood School
- Oxford Research & Policy
- Platform 51
- Prospect
- RAF
- Research Councils UK
- Royal Society of Chemistry
- Shaw Trust
- Sheffield Hallam University
- SKILL
- Society of Biology
- Specialist Schools and Academies Trust
- STEMNET
- The Royal Academy of Engineering
- The Royal Society
- The Science Council
- Training 2000 Ltd
- Training and Development Agency for Schools
- UKRC
- University of Derby
- University of Plymouth
- University of Reading
- University of Warwick
- University of Wolverhampton
- Windsor Fellowship
- WISE