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## INTRODUCTION TO SECTION 6

### Encouraging young people to study science: External Initiatives

**Aim:** To investigate the wide range of external agencies that can support science teachers and encourage young people towards the study of scientific subjects.

**Contents:** Introduction to Section 6  
Report  
Evaluations: Head of Academic Studies (FEC)  
Regional STEMNET Co-ordinator

**Methodology:** This study explores the range of initiatives that can support science teachers and inspire students with the study of science. The report explains that the number of young people studying sciences has increased over the past ten years, and the proportion of female students is showing a particularly pleasing improvement. The report then discusses the range of external agencies that have contributed towards this improvement and how they can further help the practising physics teacher.

The role of the Science Learning Centres is discussed, outlining how they are primarily intended to support practising classroom teachers, rather than students. The report also discusses the role of STEMNET and the Institute of Physics, which has several branches of the organisation that can help physics teachers. Through conducting this research, I have met with, and subsequently worked with one of their Stimulating Physics Network consultants and joined the Talk Physics forum. In order to find out about WISE, secondary sources (website and literature) have been used, as well as making contact with the national office of WISE directly and exchanging emails with the national co-ordinators.

**Conclusions:** The report recognised the valuable contribution of these agencies, particularly those which had a strong focus upon encouraging more girls to study science. Despite asking these organisations if they had any evaluations of their impact or influence upon student decisions, I was told that it was difficult to assess due to the range of other influences upon the decisions made by young people.

Apart from enjoying a subject, and appreciating relevance for a future career, there are many other external influences such as family, role models and the media. However, opening young people up to the possibilities of science, outside of the confines of the classroom, can sometimes offer a fresh approach and inspire enthusiasm for the subject.

**Dissemination of this study:** After completing this study, I shared my findings with the Head of Academic Studies at the FEC as well as the regional STEMNET co-ordinator. I have made contact with representatives from WISE, the Institute of Physics and the Science Learning Centres. Through these contacts, we have been able to take up more opportunities which benefit our students, and ultimately encourage them to achieve high grades.

# Encouraging Young People to Study Science: External Initiatives

Marianne Hill

## Introduction

In recent years, there have been a number of reports and documents that have expressed a need to increase the number of young people who study science. *SET for Success* was published in 2002 (HM Treasury)<sup>1</sup> followed by the *STEM Programme Report* (DfES, 2006)<sup>2</sup> and the *STEM Review* (CIHE, 2006), all of which made recommendations to encourage more young people to study science, whether at GCSE, A level or degree level.

*Taking Stock: the CBI Education and Skills Survey* (2008) stated that the UK could face a potential skills shortage within the next ten years, as there are not enough scientifically-trained young people to meet the demands of the future employment market. A later CBI report: *SET for Growth* (2011) states:

‘This new policy brief sets out the importance of improving the number of those qualifying with SET skills. Though the new government has recognised the importance of science, engineering and technology, action must be taken now to promote SET study - this starts with ensuring that those who are capable study triple science at GCSE, and ensuring that there are enough specialist teachers to make this possible. Young people also need better information about career choices, so that the value of studying SET subjects is not overlooked.’

(CBI website, 2011)

The ‘SET for Growth’ report claims that 59% of employers will find difficulties recruiting staff with science, engineering, technology or mathematics backgrounds. (p2) Considering the current economic climate, it would seem wise to encourage students to study subjects that lead to employment. Whilst education does not necessarily need to be solely for

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<sup>1</sup> SET in this context represents Science, Engineering and Technology

<sup>2</sup> STEM represents Science, Technology, Engineering and Mathematics

the purpose of employment, in the north east of England, future employment prospects are a particular concern. The study of science at GCSE and at A level does not necessarily lead to a career as a scientist, but it can develop transferable skills that can be applied to a wide variety of other careers. The report claims that teachers, school leaders and businesses need to work together in order to 'raise young people's interest and enthusiasm' for science. (p.2)

There are many factors that influence the choice of subjects for GCSE, A level and degree level study. Some of these factors are shaped within the classroom, such as interest in the subject, enthusiasm of the teacher and perceptions of ability. There are also some very strong factors outside of the classroom that contribute towards the decisions made by young people. These include subject relevance for a future career as well as the influence of family, friends and the media.

Over the past thirty years, several organisations have been developed with the purpose of encouraging more young people to study science. For some of the organisations, this is their exclusive aim (STEMNET), or the agenda may only be one aspect of a much larger organisation or professional body (e.g. the Institute of Physics).

This report will present an overview of the range of external initiatives and supporting agencies that have been developed in order to encourage and inspire more young people to study science. The report will be divided into the following sections:

Part 1: The National Curriculum

Part 2: Science Learning Centres

Part 3: STEMNET

Part 4: Professional Organisations (IOP, The Royal Society, RSC, ASE)

Part 5: Initiatives to encourage more girls to study science (WISE, CC4G, WES and the 'Girl' Geek societies etc.)

Part 6: Other agencies ([scienceandmaths.net](http://scienceandmaths.net))

Some of the initiatives are specifically aimed at encouraging more girls to study science (e.g. WISE), however it is important to include these

agencies in order to present a comprehensive review of all of the external support available.

## **PART 1: The National Curriculum**

The National Curriculum was introduced in 1988, which encouraged all pupils in the state sector of education to study a balanced science course. Rather than study individual science GCSE subjects, pupils were given the choice of single science, double science or triple science, the latter being another term for the three separate sciences. In 2008, the single and double science award GCSE courses were replaced by Core Science (for single award) and the Core plus Additional Science (for the double award).

One of the advantages of the National Curriculum is that it made the study of science compulsory for all young people up to the age of sixteen. It is believed that that the National Curriculum has been the single most influential factor for increasing the number of girls who study science up to GCSE (Wellcome Trust, 2011).

**Table 1: The number of candidates for GCSE Science courses in 2010**

GCSE SUBJECT	Total	Girls	Boys
Science (Core)	449,697	226,957 (50%)	222,740 (50%)
Science (Additional)	352,469	179,359 (51%)	173,110 (49%)
Biology	129,464	60,416 (47%)	69,048 (53%)
Chemistry	121,988	55,450 (45%)	66,533 (55%)
Physics	120,455	53,933 (45%)	66,522 (55%)
Mathematics	762,792	384,487 (50%)	378,305 (50%)

(JCQ, 2011)

Whilst balanced science courses are still largely supported in state schools, the data indicates that the numbers of candidates for each of the separate sciences differ. This is partly due to the fact that independent schools do not have to follow the National Curriculum, but also includes all of the candidates who have been entered for the examinations who are in post-compulsory education.

From Table 1, it can be seen that the 'double award' course (Additional plus Core Science) is the most popular option for young people, with only 97,228 candidates taking the single science option (Core without Additional). The number of candidates taking the separate sciences has increased over the past ten years, but the SET for Growth Report indicates that we need to encourage even more young people to study the separate sciences at GCSE level (p.6). It claims that in 2011, only 45% of state schools can offer the three separate sciences at GCSE but recommends that by 2015, two thirds of all state maintained schools should offer separate sciences at GCSE. The report claims that by encouraging more young people to study separate sciences will then increase the number of A level science students.

For each of the GCSE science courses, as well as mathematics, there are healthy proportions of female candidates, which indicate that considerable improvements have been made in order to increase the number of girls who study science. The data for A levels show that physics is the least popular of the three sciences, however this is partly due to the low ratio of female candidates in this subject (see Table 2 below).

As a physics teacher myself, I am surprised by the low number of physics A level students, particularly as this subject can lead to a wide range of exciting careers including engineering, technology and medicine. Despite the excellent foundations laid by the National Curriculum, providing a balanced science course for all young people in the UK, is it really firing young people with the enthusiasm to study science at A level?

**Table 2: The number of candidates for A level Science courses in 2010**

SUBJECT	A level Total	A level Girls	A Level Boys
Biology	57,854	32,635 (56%)	25,219 (44%)
Chemistry	44,051	21,057 (48%)	22,994 (52%)
Physics	30,976	6,668 (22%)	24,308 (78%)
Mathematics	77,001	31,264 (41%)	45,737 (59%)

(JCQ, 2011)

## **PART 2: Science Learning Centres**

The House of Lords Science and Technology Select Committee Report (2001) 'Science Teaching in Schools' proposed that teachers of STEM subjects required ongoing Continuous Professional Development. The Department for Education and Skills and the Wellcome Trust worked together to create a network of Science Learning Centres.

The Wellcome Trust was established from the will of Sir Henry Wellcome in 1936, with the intention of financing medical research. It is the largest charity in the UK, spending over £600 million per year on science research. The Trust has donated £51 million towards the establishment of the Science Learning Centres. (Wellcome Trust, 2011)

The first SLC opened in October 2004 and there are now 10 centres, nine of which are regional (the North East Science Learning Centre is based in Durham) and one national centre (based at the University of York). Courses are designed to promote science at all levels, from primary age to further education. Each SLC is operated by a consortium, comprising local councils, universities, schools and partners from industry. A variety of courses are available to enable classroom practitioners keep up to date with new developments in their subject area,



try innovative new teaching methods and meet other teachers with similar interests. Uptake has not been as successful as anticipated and it is believed that the cost of supplying cover for school teachers has been problematic.

The website for the regional SLC provides extensive information about the support available as well as news of recent events and activities. On the home page, there is the facility to take a virtual tour of the centre and also to find out about professional development programmes (for teachers, technicians and teaching assistants, from primary school to further education). There is information explaining how the centre can support science teachers by providing science kits along with prepared teachers' notes. There are links with the Association for Science Education and recent news items. Information about the SLC is regularly sent to the college, via email and hard copies. However, we find that the number of opportunities for the post 16 sector is less than for the other sectors of education.

The SLC site has a further section entitled 'Inspiring Science' which includes information on:

- a) **Science Teacher Network** – this is an initiative that enables practising teachers to be paired with scientists.
  - b) **Scientists@work** – providing the opportunity for secondary pupils to work alongside scientists and appreciate the skills necessary for a career in science. This presents a valuable opportunity for students to observe role models.
  - c) **Science in the Spotlight** – a project of creative workshops involving scientists and artists, again aimed at secondary school pupils.
- (SLC, 2011)

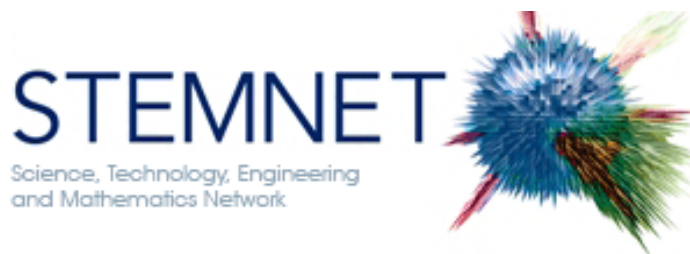
The regional SLC organises a wide range of activities and training programmes that meets the initial aims of its inception. The majority of the courses tend to concentrate upon the compulsory phases of education, which is where, it could be argued, that young people need most encouragement to pursue science. The list of courses on the website covers all branches of science, allowing practising teachers the opportunity

to develop their own knowledge and enthusiasm for teaching particular topics.

During the academic year 2009/10, I participated in a Physics Action Research Project with the regional Science Learning Centre. The project was for physics teachers to explore factors relating to the engagement and achievement of young people with physics. The area that I chose to explore was the use of blogs and wikis in order to engage students outside of the classroom. This work has subsequently been written into a report and uploaded onto the Science Learning Centre portal.

My experiences with the Science Learning Centre have enabled me to meet practicing physics teachers from other establishments, share ideas and discuss our concerns about physics education. The facilitators of the courses are enthusiastic and encouraging, providing a very positive and supportive environment for science teachers to update or learn new skills, as well as contribute towards education with our own research projects.

### **PART 3: STEMNET**



**Logo from the STEMNET website (2011)**

**SETNET** was created in 1996 (it later changed its name to STEMNET) in order to encourage more young people to pursue careers in science. It was created to raise awareness of the applications of science towards industry, business and the community. Activities are designed to enhance the school or college curriculum and promote the partnership of education with industry. One of its main aims is to raise the aspirations of young people in order to pursue careers in STEM subjects. The scheme was originally funded by the Department of Trade and Industry. It is now largely

supported by DIUS (Department of Innovation, Universities and Skills) and DCSF (Department of Children, Schools and Families).

The vision of STEMNET is 'To increase young people's choice and chances through science, technology, engineering, and mathematics.' (STEMNET, 2010) Some of the current initiatives that are being encouraged are the STEM Ambassadors, which now have over 24,000 volunteers. STEMNET is a national organisation but has local contacts called STEMPOINTS. According to the website, they provide a 'brokerage of Enhancement and Enrichment (E&E) to all schools and colleges for Tyne and Wear.' The regional website contains a vast range of activities from key stage 1 to 5, aimed specifically at the young people, whereas the SLC events were for teachers.

Through STEMNET, we have encouraged students from the College to apply for Nuffield Bursaries in engineering. In recent years, there has been only one female student from the college who has participated in the scheme, undertaking a six week placement with an engineering firm in Newcastle Upon Tyne. This particular student provided a short evaluation of the skills that she had acquired, including the health and safety induction, tensile test training and metallurgy. During the placement, she attended meetings, carried out tests and produced reports. This particular student had been interested in engineering prior to the placement, but was unsure of what the daily life of an engineer would entail. The placement provided a valuable insight into the profession and encouraged this young lady to apply to university to study for a degree in engineering.



**Photograph of a student on an engineering work placement with an engineering company, Newcastle**

STEMNET also arranged for two members of the Institution of Civil Engineers to make a presentation on engineering as a career. The talk was extremely interesting, based upon the problems of constructing bridges and motorways, but there was a strong emphasis upon the mathematics of engineering, which had a rather adverse effect upon the students concerned.

## **PART 4: Professional Organisations**

### **4.1) The Institute of Physics**

The Institute of Physics (IOP) is the main organisation for developing the practice, understanding and application of physics in the UK. Known originally as the Physical Society when it was founded in 1874, it now has over 40,000 members and is the main professional body for physicists. The **Education Section** of the website provides extensive support for practising physics teachers. The site contains three valuable subgroups:

- 1) **Stimulating Physics Network** (A DCSF project aimed at 'improving the number take-up of A level physics'.)

The aim of the Stimulating Physics Network 'is to provide an inspiring, coherent and sustainable programme of lessons, activities and continuing professional development (CPD) to achieve a step change in the teaching of physics in England'.

(IOP, 2011)



**The Stimulating Physics logo, taken from the Institute of Physics website (2011)**

The network consists of 39 Physics Network co-ordinators and 23 Teaching and Learning Coaches – all knowledgeable, experienced and enthusiastic specialists who are supported by the IOP's Education Department. In September 2009, the IOP claimed that it had won a contract from the Department for Children, Schools and Families (DCSF) to provide funding of over two million pounds to further support this programme.

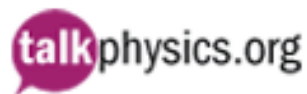
One of the North East Co-ordinators is a retired physics teacher, who explained that the IOP Network Co-ordinators work half a day per week in order to support teachers, although this is mainly through newsletters and regional meetings. He admitted that a considerable amount of his work has been with primary school teachers, many of whom have very little physics background education

The national co-ordinator of the teacher network scheme explained (9/3/09) that the regional co-ordinator scheme does not exist to encourage young people directly into physics but to support the teachers, who are the most important factor: 'If we can help teachers improve the learning in their classrooms, we've had a bigger effect than targeting students'. He went on to explain that as this initiative is funded by the IOP, they do not have to worry about achieving targets but can set a focus towards longer term initiatives.

During 2011, I have had the pleasure of working with another consultant from the Institute of Physics, who has been assigned to work with one of our partner schools. Through some valuable training sessions, this consultant has shown the vast range of resources available to practicing physics teachers, through a series of individual coaching sessions. We are currently working together (June 2011) to prepare a one day physics event for our partner schools (Ashfield Music Festival).

2) **Talkphysics.org** which is a community for physics teachers: 'Linking Teachers of Physics'. The site was created on the 15<sup>th</sup> of February 2010 and in one year has gained 3,500 members. I have recently joined this site as it provides an excellent forum for contacting physics teachers

from other institutions, with numerous discussion strands about all aspects of physics.



**The talk physics logo taken from the institute of Physics website (2011)**

3) **Teaching Advanced Physics (TAP)** which provides a wealth of resources for teaching A level physics, such as problems sheets with answers provided, suggested experiments for students to conduct, as well as general advice about the teaching of each A level topic.



**The TAP logo from the Institute of Physics website (2011)**

**Physics.org** is another splendid section on the IOP website, which has been created by the Physics in Society team. The aim is to inspire people of all ages with a love for physics. The website has links to over 4,000 websites, games, fun physics for children (Marvin and Milo experiments) as well as information about careers in physics.



**Logo from the Institute of Physics website (2011)**

**Girls in Physics** - This section outlines the IOPs commitment towards encouraging more girls to pursue careers in physics. The web page states:

‘Girls are under-represented in physics post-16. They continue to make up only 22% of those taking A level physics, despite huge changes in the educational system over the last 20 years. Physics is only the 19th most popular A level with girls, compared with the 6th most popular for boys.’

(IOP, 2011)

The **Careers Section** contains helpful advice for physicists of all ages, with a section for school and colleges that contains posters, publications and talks (the ‘physics in person’ scheme). The **Support and Grants Section** contains information about the IOP undergraduate physics bursary scheme, where students can receive up to £1,000 per year in order to study physics.

## 4.2) The Royal Society

This society claims to be the ‘oldest scientific academy in continuous existence’. Its aims are to ‘expand the frontiers of knowledge by championing the development and use of science, mathematics, engineering and medicine for the benefit of humanity and the good of the planet (RS, 2011). The Society has a strong interest in education:

‘Science and mathematics are important for an individual's success in life, and a high-quality science and mathematics education is central to sustaining a thriving economy. Our education policy work is therefore geared to providing strategic and independent advice to government, its agencies and other opinion-formers to improve science and mathematics education in UK schools and colleges.’

(Royal Society, 2011)

Education, whilst important to the society, is only one small aspect of the organisation as a whole. The education division has implemented some projects with schools, although these are all currently based in London. The society is producing a Summer Science Exhibition (Summer 2011) and is developing the ‘working with scientists’ scheme, where young people can gain first hand experience of what it is like to work as a

scientist. Clearly, they appreciate the value of role models as being important influences upon young people. The main interests of the society are to influence policy rather than provide practical support for teachers.

### 4.3) The Royal Society of Chemistry

This is another professional organisation which claims to be the largest non-government supporter of chemistry education in the UK. They provide a wealth of resources for chemistry teachers of all ages, and provide advice to the government on chemistry education policy

### 4.4) The Association for Science Education

The Association for Science Education (ASE) was created in 1900, when it was originally called the Association of Public School Science Masters. The society provides a range of Continuous Professional Development opportunities for practising science teachers, as well as a range of resources for young people. The resource section is clearly aimed for the younger student with text-speak terminology for the titles of the groups: '**upd8**' has a series of activities 'written in a punchy and innovative way to engage right across the ability range'. The material is not available unless you register for the site.

'**wikid**' consists of a scheme of work for key stage 3 science courses. The website claims that it 'uses the 7E's to grab students' attention: Engage, Elicit, Explore, Explain, Evaluate, Elaborate and Extend.

'**Segue**' provides a transition phase from key stage 3 to 4, introducing GCSE material.

'**Elixir**' is aimed at pupils who are studying GCSE science.

There was very little information on the ASE website that related to students in the post-compulsory sector of education.

(ASE, 2011)



## **PART 5: Initiatives to encourage more girls to study science**

### **5.1) WISE - Women into Science Engineering and Construction**

In January 1984, the EOC and the Engineering Council launched the Women into Science and Engineering (WISE) Campaign. It was launched by the Prime Minister, Margaret Thatcher with a WISE bus starting its mission from Downing Street. Through this initiative, many activities, workshops, projects and exhibitions were developed to raise awareness of this issue. Since 1984, WISE has continued to support and encourage young women to consider careers in science and engineering. The website claims that it has helped to double the percentage of female engineering graduates from 7% in 1984 to 15% today. WISE is sponsored by the CIBT (Construction Industry Training Board), the EEF (the Engineering Employer's Federation), the ETB (the Engineering and Technology Board), the Royal Academy of Engineering, SEMTA - the Sector Skills Council for Science, Engineering and Manufacturing Technologies, and STEMNET - the Science, Technology, Engineering and Mathematics Network. (WISE, 2010)

Alison Phipps claims that WISE is 'arguably the best known and the best funded initiative focused on girls' experience of, and participation in SECT.' (2008, P.54). She claims that because of the substantial funding from the contributing agencies, it is more employment driven than educationally focused. WISE has been a significant influence due to its range of activities, such as political lobbying, materials and resources produced, as well as producing a yearly directory of initiatives. Information available on the WISE website is clearly divided into sections with one section for girls and another for 'education and community'. Under this latter heading are sections for employers, teachers, parents and partners.

The information for girls is colourful, interesting and easy to navigate. There is a section entitled The Latest Thing, which is presented in a style that is similar to teenage girls' magazines, using language and

headings designed to attract its target audience. It opens with the following image:



Image taken from 'The Latest Thing' (WISE, 2010)

Underneath this image are the following headings:

*Find out what "The Latest Thing" is with this WISE-Vodafone co-production  
DISCOVER the latest techno-mania to hit the high streets...*

*MEET the girls who are proving that geek is indeed the new chic....*

*and CHECK OUT advice from our resident careers coach... (WISE 2010)*

It was initially very perplexing to see that the WISE website promoted the expression of 'girl-geek'. At first, it was unclear if this would have a positive or negative effect upon attracting girls towards careers in science or engineering, however there seems to be growing interest in the culture of the 'girl-geek'. There are various other online communities that use this label, such as the [girlgeekchic.com](http://girlgeekchic.com) website that promotes gadgets which may be appealing for girls, as well as the Girl Geek Dinner phenomenon which will be discussed in a later section of this report. The WISE site also contains the following information:

- a) Girls – This section contains information about challenging stereotypes, myths about girls and science, and role models.
- b) Activities, games and videos (including the Values game)

- c) Our inspirational women – using the valuable tool of role models in order to encourage more girls to visualise real life scientists and engineers.
- d) Past events
- e) Future events (such as Enterprise Day)
- f) Courses and opportunities (Insight Courses, Headstart Initiative, F1 team CAD/CAM Challenge)
- g) Key facts
- h) Work experience opportunities (RAF, Navy and construction)
- i) Email/contact
- j) Publications and useful resources.

(WISE, 2010)

It is interesting to observe that the WISE campaign seems to be emphasising those aspects of science, engineering and technology which may have, in the past, deterred girls from such career paths. The positive projection of the Girl Geek is a making a strong statement that girls can have fun with science, as can be seen from the image below:



**Caption taken from WISE website 'Geek Chic'**

It appears that the WISE website is using the concept of role models so that girls can relate to the profession in a more personal manner. The section for parents is particularly good offering a selection of booklets, encouraging fun science activities that can be conducted at home, how to

choose children's toys, suggested books for children, wall charts and posters. There is also a Parents' Survival Pack on the National Curriculum. This section also suggests family outings to places of interest (the Newcastle region mentions the Centre for Life and the Discovery Museum)

From these initiatives, the Head Start courses are the most appropriate for students at a state sixth form. This programme enables students who are at the end of their first year of sixth form to attend a week-long summer school in Science, Mathematics or Engineering. The courses range in cost from £210 to £240, however students may be subsidised due to funding from the Aim Higher initiative.

Many of the projects on offer are most commendable, but would require time spent on projects outside of lesson time, such as an engineering club. They would also require more sophisticated equipment than available in a normal science laboratory. There is a range of courses for students who are at undergraduate level who are already committed to a career in science or engineering.

The WISE Directory provides a list of sponsorships, awards, competitions, courses, visits and other initiatives designed to encourage girls (and women) to consider careers in science, engineering, technology and construction. It provides a list of initiatives in different regions, with the North East providing basic internet courses, bridging schemes, and other initiatives aimed at the younger school pupil. The sections for girls and parents were excellent, providing sound information and links to a range of external sites.

**5.2) CC4G** is a site that has been developed to encourage more young people (target age is between 10 and 14) to consider careers in technology and IT. The project started in 2002 (the internet site developed in 2005) to address the gender imbalance of these subjects and encourage more girls to take up careers in these fields. The website was redesigned in 2008 to make it 'gender neutral' and suitable for use by girls and boys, whether in school or at home. The project was funded by DCSF but as it develops, it is hoped that more employers become involved and sponsor the initiative.

The CC4G site is written in an informal style that allegedly suits students and claims: ‘turns boring ICT lessons into brilliant ones’ with sections ranging from National Curriculum topics to personalised pages that can connect with other members (including your specially created avatar for the system). It seems to be deliberately aimed at connecting with students who are perhaps not so engaged with schools and learning.



**Image taken from CC4G website**

An evaluation of the CC4G project was conducted in 2005 and reported that 8611 girls were registered from 314 schools. However, whilst it raised the awareness of IT, it was thought that it did not connect with the mainstream curriculum (Phipps, 2008, p.54).

### **5.3) Women's Engineering Society**

This society is aimed at the professional woman who is already working within the field of engineering. ‘Working in partnership, we campaign to encourage women to participate and achieve as engineers, scientists and as leaders.’ (WES, 2010) The group was founded in 1919, in order to support, encourage and develop the careers of those women who had worked as engineers during World War I, yet were under pressure to give up their jobs for the men returning from the war. A group of women engineers founded the WES to promote engineering as a rewarding career for women as well as men. WES works with STEMNET to promote school based activities and also encourages members of WES to become Science Ambassadors. A current initiative that is being developed is that of Science Sisters, which at present is being operated only in the South West

of England, but this project is aimed at providing more positive female role models for young people.

#### **5.4) Girl Geeks**

Having seen how the WISE website actively promotes the culture of the girl-geek, and initial doubts as to the extent that this would be productive in the attraction of women towards science, it was surprising to find that there were several other online communities that embraced the phenomenon of the girl-geek. One of the most interesting developments in recent years in the Girl Geek Network, with the Girl Geek Dinners being their main social activity:

‘The aim of Girl Geeks is to bring professional women from across the North East together through fun and friendly networking events, developing strong community for women working and managing businesses in the region's tech/digital/science/business sectors.’

(Girl Geek Dinners, 2010)

The Girl Geek dinners began in London (August 2005) and have now spread around the world. The growing interest in these societies was discussed in an article by Jamillah Knowles for the BBC online website (7/5/2010), where she analyses the term ‘girl-geek’ and how women feel about this label. One of members (Julie Roads) was quoted:

‘It's Geek Girl, not Geek Woman, it's alliterative and it's meant to be fun. Our logos are all pink and that is meant to be tongue-in-cheek. It's friendly but it walks the line between the serious issues and gathering to have fun.’

(BBC online, May 2010)

In the past, the term ‘girl geek’ may have had extremely negative connotations with an adverse effect upon attracting girls towards science, however in recent years, the term has become really popular with young people. The ‘you-tube’ website features 4,980 video clips for girl geeks

(December, 2010), including several clips from Girl Geek Dinners and tours of Girl Geek bedrooms.

It is interesting to see this culture having mass appeal with young people, whereas other efforts to encourage girls into science have failed. Perhaps educationalists have tried too hard to show that being a female scientist is not 'geeky'? Perhaps it is simply that twenty first century girls embrace technology, with the growing range of electronic gadgets that are desirable to own and encourage social networking. The Girl Geek culture is not a radical feminist movement but offers girls (and women) an opportunity to enjoy science and technology in a fun, confident and celebratory manner.

## **PART 6: Other initiatives**

### **Scienceandmaths.net**

In 2008, the DCSF launched a national campaign that was specifically aimed at young people in order to raise the profile of science and maths. The campaign's main slogan was 'Science and Maths: See where they can take you' and was broadcast on radio and television, as well as in cinemas. The advertisements promoted the website 'scienceandmaths.net' that is actually part of the 'bebo' social networking domain.



**Image taken from scienceandmaths.net website that is used prominently in their advertising campaign**

The initial webpage offers the personal profiles of 12 scientists and then offers the reader the opportunity to go to 'futuremorph'. The latter is an extremely colourful and interactive website that can be used by young

people, parents and teachers, and which promotes careers and opportunities in science.

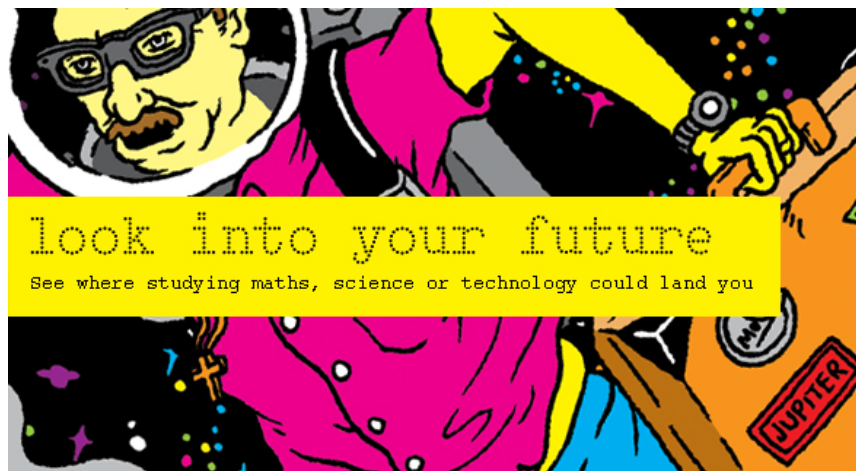


Image taken from the Futuremorph website (2011)

## Conclusion

This report has evaluated the range of national and local organisations which provide external support for practising science teachers, whether in the form of Continuous Professional Development for themselves or activities and encouragement for young people.

Clearly, the government funded initiatives such as STEMNET, the Science Learning Centres and WISE show that there is a serious need to increase the number of scientists in the United Kingdom, and girls are an important subset that can contribute towards the future economy of the country.

There are many factors which influence students' choice of A level subjects, with only some of the reasons being concerned with issues within the classroom. There are many wider factors which shape the decisions made by young people, for example; the influence of family, peers, role models and the media. Employment opportunities within a particular region also affect the choices made by young people, particularly if they are reluctant to move away due to financial concerns or family commitments.

Whilst society can take a long time to change its attitudes, we can make changes in our classrooms to make sure that all students achieve



their full potential. We can provide information, guidance and support for students but we must do more than that - we must inspire and enthuse the next generation through our teachings so that we can encourage more students to study science in the future.

## References

Association for Science Education [Online] Available at: <http://www.ase.org.uk/home/> (Accessed: 20 December 2010)

CBI (2010) SET for Growth [Online] Available at: [http://educationandskills.cbi.org.uk/uploaded/SET\\_for\\_growth.pdf](http://educationandskills.cbi.org.uk/uploaded/SET_for_growth.pdf) (Accessed: 20 January 2011)

CBI (2008) *Taking Stock: CBI Education and Skills Survey 2008* [Online] Available at: <http://www.cbi.org.uk/pdf/eduskills0408.pdf> (Accessed: 3 December 2010)

CC4G (2010) [Online] Available at: <http://www.cc4g.net/> (Accessed: 20 December 2010)

DfES (2006) *The STEM Programme Report* [Online] Available at: <http://www.ima.org.uk/Education/stemprogrammereportoct2006.pdf> (Accessed: 15 December 2010)

Duckett, C.N, Klein, L.C. and Leshko, C. *Girl Geeks: my story* (2010) [Online] Available at: <http://sciencewomen.rutgers.edu/pdf/Duckett%20Girl%20Geeks%20presentation%20Final.pdf> (Accessed: 20 December 2010)

Girl Geek Dinners (2010) [Online] Available at: <http://girlgeekdinners.com/> (Accessed: 20 December 2010)

HM Treasury. (2002) *SET for Success: The supply of people with science, technology, engineering and mathematics skills (The Report of Sir Gareth Roberts' Review)* [Online] Available at: <http://www.hm-treasury.gov.uk/roberts> (Accessed: 25 November 2010)

Institute of Physics (2011) [Online] Available at: <http://www.iop.org/> (Accessed: 5 February 2011)

JCQ A (2010) *A level results* [Online] Available at: <http://www.jcq.org.uk/attachments/published/1317/JCQ%20Results%2024-08-10.pdf>

(Accessed: 5 February 2011)

Knowles J., (2010) 'Girl Geek Appeal: Women's movement online BBC' [Online] Available at: <http://news.bbc.co.uk/1/hi/technology/8663593.stm> (Accessed: 20 December 2010)

Nuffield Foundation (2011) *Nuffield Bursaries for Schools and Colleges* [Online] Available at: [http://www.nuffieldfoundation.org/go/grants/nsbsc/page\\_394.html](http://www.nuffieldfoundation.org/go/grants/nsbsc/page_394.html) (Accessed: 15 January 2011)

Parliament.UK (2006) *Select Committee on Science and Technology, Tenth Report: Science Teaching in Schools* [Online] Available at: <http://www.publications.parliament.uk/pa/ld200506/ldselect/ldsctech/257/25704.htm#n1> (Accessed: 28 December 2010)

Phipps A., (2008) *Women in Science, Engineering and Technology; Three decades of UK initiatives*, Stoke-on-Trent: Trentham Books.

Royal Society of Chemistry (2010) [Online] Available at: <http://www.rsc.org/> (Accessed: 20 December 2010)

Scienceandmaths.net (2010) *See where they can take you* [Online] Available at: <http://www.futuremorph.org/scienceandmaths/#/intro> (Accessed: 15 December 2010)

Science Learning Centre (2011) [Online] Available at: <https://www.sciencelearningcentres.org.uk/centres/north-east/courses-and-events> (Accessed: 5 February 2011)

Smith, H (2007) *STEM Review: The Science, Technology, Engineering, Maths Supply Chain*, London: The Council for Industry and Higher Education, UK

STEMNET (2010) *Vision and Purpose* [Online] Available at: <http://www.stemnet.org.uk/content/vision> (Accessed: 20 December 2010)

The Wellcome Trust (2011) *Science Learning Centres* [Online] Available at: <http://www.wellcome.ac.uk/Professional-resources/Education-resources/Science-learning-centres/index.htm> (Accessed: 20 January 2011)

WISE (2010) [Online] Available at: [http://www.wisecampaign.org.uk/about\\_us/overview.cfm](http://www.wisecampaign.org.uk/about_us/overview.cfm) (Accessed 20 December 2010)

The Women's Engineering Society (2010) [Online] Available at: <http://www.wes.org.uk/?q=content/about-wes-who-we-are> (Accessed: 20 December 2010)

## Report Evaluation Form

**EPORT:**

Engaging Young People to Study Science: External Initiatives

**Reviewer:**

**Regional STEMNET Co-ordinator**

**Comments on the report:**

I enjoyed reading your report. You've definitely covered a wide range of organisations making up the STEM educational landscape and particularly those focused on increasing female participation in STEM.

The regional development agency used to have some reports which might add to the North East picture of STEM (if that interests you). They highlight specific growth areas for the North East (such as renewables, health etc) I think much of it is on their website (<http://www.onenortheast.co.uk>)

They also spawned Newcastle Science City and Sunderland Software City who have their own Educational branches of activity designed to support Teachers and Schools up here. Also the Local Authorities role in supporting STEM Teaching could be mentioned (LA Science Advisors, small scale "Business Ambassador" programmes, and LA organised events).

**Are there things that could be added or removed to improve it?**

The only alteration I really spotted was that "STEMNET" used to be called "SETNET" and not "SETPOINT". Before 2008 the regional contractors were referred to as "Setpoints" but are now merely termed "Regional Contract Holders."

**In what way could the contents of this report influence the wider profession?**
**Signature:**

**Supplied**

## Report Evaluation Form

**REPORT:**

**Encouraging young people to study science:  
External Initiatives**

**REVIEWER:**

**Head of Academic Studies**

**Organisation: FEC**

**Comments on the report:**

This is a well-structured report which is readily understandable by teachers from both a scientific and non-scientific background. Marianne has presented her findings in a logical and well structured way and has included relevant examples and has included data and examples from a wide range of sources.

To support the research that Marianne has carried out she has been involved in a variety of activities, including inviting speakers in to the College to talk to the students and also to engage them in practical activities which have enabled them to make informed decisions about future area of study and/or careers.

Specifically Marianne has established strong links with Durham University Physics Department. Dr Pete Edwards has been the main point of contact and through him Marianne has taken students to the University for talks and following this a physics workshop was arranged in college where PhD students brought in university experiments using lasers. This generated a lot of interest and enthusiasm among the students and it was followed up by the visit to the College by three PhD students for a day to do workshops with our students. This was an invaluable experience for the students where they were able to talk first hand with students who were near enough in age to them to be able to relate to them easily.

Marianne has also facilitated visits from Sunderland Astronomical Society where they have presented talks and conducted workshops on telescopes. Again the practical element of these workshops has had an impact on the students' interest in this branch of science.

Close links have also been established with STEMNET and via their ambassador scheme she had brought in engineers to work with the students.

In addition to inviting in professional people in to College Marianne has

also recognised the value of taking students out to different environments to see these professional in their working environment, To this end, visits have been arranged to Sunderland Royal Hospital Medical Physics Department, as one of the College's former students has a high profile job at the hospital. Again this is a valuable way of adding credibility to the value of studying science as a career.

Students also regularly take part in mathematical challenge competitions, they have been to maths inspiration events in Newcastle, and have spent at day at the Centre for Life. This is yet another opportunity in which they can meet other students who have an interest in science and can even make friendships based on their common interests.

**Are there things that could be added or removed to improve it?**

A comprehensive report that covers the main points.

**In what way could the contents of this report influence the wider profession?**

This report re-enforces the impact of their influence on the choices and paths that students will follow. It also illustrates how by collaborating with Colleges, students can be inspired to pursue a scientific career.

**Signature:**

**Supplied**