

# The All Party Parliamentary Engineering Group

## ‘Where does engineering fit into the school curriculum?’

Report of the discussion over lunch held on 20 March 2013 in the Cholmondeley Room, House of Lords

### Chairman

Professor the Lord Broers

### Speakers

Baroness Perry of Southwark

Shaun McInerney, Head of Engineering at BAE Systems

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### *Introduction*

Lord Broers welcomed guests and stated how the past two weeks had been particularly important in the field of engineering, referencing four events in particular. He firstly spoke of the gathering of the Chinese, US and UK Royal Academies of Engineering to discuss the future of the industry, and the fourteen challenges the industry faces. Lord Broers then went on to mention the ‘Big Bang Fair’; the Queen Elizabeth Prize for engineering awarding five people who had made major contributions to the internet and world wide web with £1million; and the Engineering lunch itself being the fourth of the group.

The speakers were then introduced.

### **Baroness Perry of Southwark**

Baroness Perry declared herself to be a “*great fan of engineering*”, mentioning that when she was at Southbank University, they had the largest number of young engineers in the EU. She spoke of how she believes that engineers are the future but expressed concerns surrounding the news from the Social Market Foundation that the level of engineers is down 40% on what it should be.

Baroness Perry then went on to discuss the need for engineering to be targeted at children at a young age, and for it to be explained properly, as she believes this to be when attitudes and ideas are formulated. She also outlined her views on what she believes is needed in the final years of school as preparation for an engineering degree: inspiring physics, maths and engineering education including practical work broader education as A-Levels are currently fairly narrow the need for more emphasis on humanities and communication skills getting used to working in a team to share ideas- something she believes to be crucial in engineering.

Baroness Perry said that she believes that improving these factors will produce the extra engineers needed and hopefully also encourage more women into the field.

### **Shaun McInerney**

Shaun explained his responsibility as one of the biggest engineering employers in the UK for the capability, skills and management of engineers. Shaun spoke of how BAE Systems seek to ensure that they recruit the right engineers for their challenging projects such as their Nuclear Submariner programme, and stated that BAE Systems had recruited 331 apprentices and 361 graduates in 2013. BAE currently have over 1,000 apprentices, and have almost 19,000 young engineers working on projects at any one time.

Shaun expressed his beliefs that to be a good young engineer, you need both the ability and the opportunity. It requires the appropriate behaviour and skills (such as analytical and communication skills and the ability to influence and apply knowledge to an actual project), and the young engineers must not only be talented but also diverse.

Shaun talked about what motivates young engineers, mentioning that practical application is important- "*seeing the theory come to life*". He said that this was crucial to be integrated into school curriculum to inspire young engineers of the future.

### **Questions and comments**

Lord Broers asked the guests to contribute any questions or comments they had.

### **Baroness Gardner of Parkes**

Baroness Gardner asked if there was progress in the field in regards to the number of female engineers, asking if women were no longer looking at engineering as a "*man's field*". She also asked Shaun about the number of female apprentices at BAE. Baroness Perry responded by citing a study of 16 year olds in schools, which showed that less than 5% of girls said they were interested in engineering as a career. Baroness Perry mentioned that a solution to this was to make engineering exciting and interesting from an early age.

Shaun replied that he believes that diversity is the key, and that the number of female engineers may have increased over recent years but recruiting women is still a struggle. He mentioned that 10-12% of engineering graduates are female, and BAE currently recruit 15% female engineers but aim to increase this to 20%. He also said that all of the sponsors of the event are aiming to improve their intake of females.

### **Lord Davies of Coity**

Lord Davies spoke of his own experience of being an apprentice for five years and coming out as a craftsman. He mentioned that since then manufacturing has decreased and asked if this meant that apprentices are now more educationally trained. Shaun replied that this was not true and that the vast majority of apprentices are still trained in a manufacturing environment as they require practical skills.

Baroness Perry continued that there is a desperate need for innovation, and a need for an element that draws apprentices back to the classroom to produce young engineers.

### **Anna Davis, Arup**

Anna stated that she believes manufacturing to be as important as theory. She then asked a question on the debate of female engineers, asking if the efforts to recruit more women are overlooking the principal of recruiting the person best for the job.

Shaun said that BAE Systems spent a long time debating this question and the outcome was that overall the best talent is what is needed, but employing 50% men, 50% women should give a more accurate representation of the best talent.

Lord Broers briefly spoke of the Cambridge Advisory Committee which is proactive in going into schools to promote engineering to young girls.

**Annaliese Thomas, GE Aviation**

Annaliese questioned the age at which children (especially girls) should be targeted to encourage careers in engineering.

Baroness Perry stated that she believes that there is a lot that schools can do to encourage girls to pursue careers in engineering, saying that it's all about the atmosphere created surrounding the subject as workshops often feel masculine. She also said that children should be targeted early on- at primary school age.

**Baroness Warnock**

Baroness Warnock spoke of the shortage of technicians in the UK. She then asked what those involved in schools thought about drawing the difference between technicians and engineers.

Baroness Perry said that there is a need for technicians and praised Lord Baker of Dorking and the late Lord Dearing for the work they did with university technology colleges. She also mentioned that young people with technical skills need to be catered for.

Shaun added that he thinks it is about getting the right balance between the demands for technicians now and in the future.

**Dr Maria Pavlidou, Cleeve School**

Maria detailed how physics departments often struggle to recruit technicians as they are badly paid in schools and so they are unable to recruit those with the best skills to help with the experiments for students.

Lord Broers mentioned that the SBT committee found the same thing.

**Professor Roger Ainsworth, St Catherine's College, Oxford University**

Roger outlined the benefits of physics A-Level for those who don't like maths. He asked for guests' views on the A Level Physics syllabus and introduced an A-Level student to give her opinions.

**Charlotte Levett, Young Engineers**

Charlotte spoke of how at her school most physics students do maths and are unlikely to pick one of the two subjects without the other. She mentioned her personal experience of physics at school and pointed out that she finds experiments and coursework particularly useful in encouraging practical skills.

**Baroness Walmsley**

Baroness Walmsley responded to the earlier point of how early young engineers should be engaged. She pointed out that she believes that children should be targeted before the age of 11, and highlighted a problem with modern-day toys: children don't tend to make things anymore as toys are too sophisticated. She then emphasised that this creates an avenue for engineers to design and create appropriate toys to fill this void.

**Professor Matthew Harrison, Royal Academy of Engineering**

Matthew expressed his opinion that young children need to be given the opportunity to be young engineers and that this avenue needs to be pointed out to them at a young age. He pointed out that children pretend to be teachers and doctors but not engineers. He compared this to the successes in the computer industry and said that the same is needed for the science and technology industries.

**Henry Ayres, Young Engineers**

Henry told guests that he does a mechanics course as part of his physics A Level syllabus and that there is a similar course in maths. He also said that the careers advice available did not inform students about engineering opportunities before they chose their GCSEs, and that this needs to change.

Shaun responded that schools need to encourage students to look at engineering as a career, and that as an industry more needs to be done.

**Rebecca Taylor, Cleeve School**

Rebecca spoke about a scheme run at the Cleeve School called 'Launch Pad' which offers a practical and theory engineering course, which she believes to be a good programme.

**Lord Davies of Oldham**

Lord Davies expressed his concerns that schools are too narrow when focusing on the world of work, and that changes to the pattern of education are needed.

Shaun added that he believes that it is not just about recruiting highly qualified candidates, but life skills are also important in the industry.

Baroness Perry pointed out that the industry is now more conscious of this, and went on to speak about the need for more engineers to enter into teaching as a second career as they will have gained a lot of knowledge that is useful to pass on and share.

**Dougal Goodman, Foundation for Science and Technology**

Dougal stated his opinion that more school trips are needed to inspire students, giving the 36 engineering institutions as an example.

Shaun replied that what the institutions do to encourage interest in the sector could be better co-ordinated.

**Lord Jenkin of Roding**

Lord Jenkin spoke about the recent British competition held for research at which the engineering prize was won by a woman. He also mentioned the importance of interesting youngsters in engineering early, and pointed out that teacher training colleges play an important role in this, for example hardly any primary school teachers are well-informed about engineering.

Baroness Perry added that the industry needs to get involved in schools, and emphasised again that ex-engineers need to become teachers.

**Geraldine Davies, University College London**

Geraldine stated her belief that parliament needs to influence and develop the curriculum and make it more exciting for students.

Baroness Perry responded that 60% of secondary schools now have academy status meaning that they have freedom with the curriculum. She said that this needs to be used in order to gain and encourage practical skills in pupils.

**Philip Deakin, Ogden Trust**

Philip recounted his personal experience, telling of how he was an engineer who ventured into teaching. He mentioned that he went into the independent sector so that he would not have to take a year out to train and fund his own course- a factor which he believes is a barrier for many engineers.

Baroness Perry highlighted that this is no longer the case thanks to Michael Gove as the Teach First scheme means people are able to go straight into schools.

**Paul Jackson, Engineering UK**

Paul said that the dip in interest in maths and science appears between ages 11-14 as children still enjoy these subjects in primary school. Paul went on to say that the biggest policy issue is broadening the curriculum.

Shaun drew attention to the need for better coordination, and spoke of how not only should teachers be encouraging children in the direction of engineering, but should also be encouraging the parents. He added that the interaction between parents and teachers is weaker than it should be.

**Anna Harrison, Royal Academy of Engineering**

Anna spoke of her belief that the media is important when targeting young people as they are impressionable and need role models. She believes that it would be powerful if the industry linked up with the media.

**Lord Drayson**

Lord Drayson said that young people need to understand the professional lives of young engineers, and that engineering needs to be opened up to provide opportunities for young people to see what engineering is actually about. He mentioned that young people need to be given real life examples to relate to such as the iPod. Regarding the media, he also said that 'Dragons Den' type programmes are useful.

**Neil Ridley, Transport Knowledge Transfer Network**

Neil talked about his experience as a STEM ambassador and pointed out that as an engineer you are easily able to become a STEM ambassador and get the opportunity to go into schools. Neil asked why this programme wasn't more widely known about.

Shaun responded by mentioning that there are 190 STEM ambassadors working at BAE and they are "trying to do more".

**Klara Hunt, Bromsgrove School**

Klara said that students often don't know about all the different types of engineering, and said that highlighting the variety was likely to make students much more interested.

Shaun countered that although engineering is diverse, this can also bring problems as there are over 1,000 different disciplines within engineering. He said that this is being attempted to be broken down into just 50 groups. He said that he thinks the key is to get a better 'language' which better helps to communicate about engineering and its different forms.

**Professor Matthew Harrison, Royal Academy of Engineering**

Matthew added that engineering is both an activity and an identity which can migrate through different varieties. He said that it is central to how modern societies work, and also allows you to migrate from one area to another.

**Ken Sanders**

Ken referred back to the topic of the curriculum. He spoke of the recent plans to change the science and technology curriculums which in his opinion would weaken the system. He said that this change needs to be resisted.

Baroness Perry pointed out that the curriculum was now out for consultation and that people are able to have an input.

Shaun added that industry has a role to play in this.

**Douglas Chisholm, Atkins**

Douglas mentioned his role as a school governor at a primary school, and mentioned that engineers should seek opportunities to become school governors to influence the curriculum.

**Conclusion**

Lord Broers said that “*we are preaching to the choir*” and that members need to go out and talk about all of these subjects. He summed up the key issues that arose during the discussion as:

- The need for more women in the industry
- The need for better practical engineering education in schools
- Broadening of the curriculum
- The need for the inputs of parents
- The need for role models in the field
- The need for good careers advice
- Getting engineers into schools

Lord Broers then concluded by thanking Jennifer Bryant-Pearson and her team, the sponsors and the speakers.