Primary Engineer Programmes 2013

Introduction:

Primary Engineer was established in 2005 as a not-for-profit company with the vision to encourage girls and boys from a very young age to become designers and makers, the engineers of the future.

The programme now extends from the first year in primary school through to undergraduate study and industry.

Primary Engineer is funded by the Institution of Mechanical Engineers, Engineering UK, The Royal Academy of Engineers, councils, Universities, colleges and industry to work in specific regions or in curriculum areas.

Background:

Primary Engineer was founded by Susan Scurlock and Dr David Jinks in response to a call for projects to develop more engineers in the UK by the then Department for Trade and Industry.

The premise was simple - the reason there was a deficit of engineers in the UK was that primary teachers did not have the skills to deliver design technology alongside practical maths and science in lesson time so as to inspire children from a young age into engineering. It was also clear that teachers had little understanding of what engineering was, however, the enthusiasm from teachers to participate in the programme has demonstrated the worth of engineering in the classroom as an exciting vehicle for learning.

Currently:

Primary Engineer is based in Bolton at Smithills High School employing 10 full-time members of staff and a number of consultants. Scottish Office is based at Scottish Engineering Glasgow. Programmes are delivered across England, Wales and Scotland at 19 regional venues involving 2500+ schools.

Chief Executive: Susan Scurlock:

Governing Board: Chair: Dr Peter Hughes OBE FREng, former Chief Executive of Scottish Engineering, Members: Professor David Nash, Stuart Cameron MBE FREng, Ginny Stead Engineering Capability Manager Babcock International Group, Alec Cottrill Headteacher Smithills High School and Professor Fred Maillardet.

Aims:

Since 2005 Primary Engineer has identified and serviced a growing enthusiasm and interest in engineering projects for primary schools. Our aims are to build on this by:

- Developing new projects which map to the curriculum and offer teachers alternative topics that explore the wider world of engineering.
- Expanding the mechanisms by which engineers can engage with schools, teachers and students in a mutually productive and informative manner.
- Becoming a voice for engineering in primary schools, highlighting the achievements of primary children and teachers.

Programmes:

Primary Engineer as an individual programme works across all year groups in primary school. It is mapped to the Curriculum for Excellence and England's National Curriculum. It tracks practical maths, science and design technology, with the project having a positive impact on the literacy and communication skills of the pupils demonstrating the cross-curricular nature of engineering.

The programme is designed to be a sustainable long term engagement with engineering. To enable this, teachers attend training sessions which are practical in nature; meet engineers who will work alongside them to inspire pupils and use resources designed for whole class use. Courseware is provided so that teachers can share the content during in-service training days within their primary schools.

Many schools use the project in each year group to enable the development of the pupils' skills and understanding by building on their work from previous years. Schools are divided into different levels recognised as Apprentice Levels 1 and 2 for lower primary/key stage 1 and Engineering Levels 1 and 2 at upper primary/key stage 2.

Throughout the programme design specifications are open-ended to encourage pupils to investigate and experiment with their project. This will ultimately lead to multiple solutions and therefore a variety of outcomes for which the pros and cons will have to be weighed by the pupil and described to engineers. This flexibility enables the school to adapt the project to a wider school context linking to other areas of study.

We supply interactive whiteboard resources which provide a useful scaffold for teaching in the classroom. These resources provide a colourful and informative way of learning incorporating storytelling, animations and illustrations to engage even the disengaged. The resources cover 6 lessons (at both lower and upper primary, KS1/2) containing starter activities, focused practical tasks and plenaries, adaptable lesson plans, children's and teacher workbooks and pupil digital portfolios.

The class based activities form part of a national competition where pupils can progress from school finals, to local finals and ultimately to regional finals. These competitions allow pupils to test their designs and meet professional engineers to explain their work whilst also allowing parents at the public events to engage with the project and support their children. In 2012, 19 regional events fed into the National Final.

Secondary Engineer has been developed to address the transition from primary through to secondary school. Primary pupils, after engaging with Primary Engineer, are demonstrating high levels of understanding and application in the sciences, maths and design technology during primary school. It is vital that secondary schools build on this primary experience.

Secondary Engineer looks to utilise the expertise of specialist secondary teachers by providing them with two 'Engineering Maths and Engineering Science Master Class Activities' aimed at primary children. It also provides a whole class S1 / year 7 cross-curricular project that builds and extends the skills of Primary Engineer by extending the engineering theme into secondary.

New projects covering the themes of Aerospace, Marine, Bio-medical and Energy sit alongside the well established Automotive project undertaken at primary. The rationale of these additional projects is to extend the engineering content and provide pupils and teachers with a wider experience of engineering in a modern context. All the project themes utilise and enhance the same core skills developed at primary and therefore do not require the secondary school to use the same theme as the primary school thus giving pupils and teachers variety within the scheme. It also provides opportunity to link the theme to local industry and engineers.

Leaders Award for STEM grew from a need to provide accurate careers information whilst celebrating the secondary students who were previously Primary Engineers now working with local primary pupils. This initial focus developed into the programme that celebrates STEM careers and students who help others with STEM projects.

Engineering and Science careers are such a broad church it is often difficult to explain; we believe that if children are to aspire to becoming an engineer or scientist they must first be able to define what it is to be them. The most productive way to do this is to meet engineers and scientists and ask them questions – interview them!

This programme is open to pupils and students between the ages of 5 and 19 and is grouped into three age sets, primary (5-11) secondary (11-16) and advanced (16-19). Students write letters of application outlining their aspirations, engagement with STEM and how they are helping or looking to help others. To complete the award they must submit at least one interview with a STEM professional.

The ripple effects of this award are many - engineers and scientists develop their engagement skills; young people target industries they wish to work in and industry meet motivated students. Throughout all, and essentially, teachers gather more information about career paths and STEM careers with which to provide pupils more to discover and aim for.

Engineers, STEM professionals and industry:

Primary Engineer Programmes have linked engineers and STEM professionals to all of the projects in recognition of the importance of the context and inspiration they can provide.

Many companies and institutions use the programmes as part of the professional development of their employees to develop skills associated with public engagement. It is also used with apprentices looking to evidence core and functional skills and engineers looking to complete their section D and E competences for chartership. Throughout all, companies and institutions publicise their activities and career paths.

Currently

England:

Primary Engineer works across England using 19 regional venues to deliver training courses to local primary schools. This has developed to see more involvement from local industry for example in Bristol 84 graduate engineers from the MOD worked with 15 primary schools as part of their graduate development programme. Both teachers and engineers attended the training course and we worked directly with the graduates supporting both their activities with the schools and organising the celebration event.

In Basildon we have worked with The Basildon BEST programme which aims to raise the attainment and aspirations of local students. We have worked with 30 schools linking them to local FORD employees and in Reading local schools are linked to Thales employees. These are on-going engagements which see more schools added to the programme annually.

Manchester College has been the first college to become a hub for local primary and secondary schools through Primary Engineer and the Leaders Award. Feeding into their programmes for older students and providing a continuum into the college from primary.

New hubs (20+ primary schools) over the next academic year are Bolton, Blackburn, Oldham, Derby, Newcastle, Tyneside, Teesside and Manchester. Links to the EEF Manufacturing Organisation have resulted in groups of companies combining to work with a large number of local schools such as in the North East and North West.

More students are joining the Leaders Award programme and a number of councils are promoting it as part of work experience and more Universities are using it as part of their outreach.

Scotland:

Primary Engineer is increasing its engagement with schools and industry dramatically in Scotland. In 2012, the initial pilot saw 42 primary schools across Glasgow, Edinburgh and Aberdeen, attend 3 training events and 15 more schools will be added in 2013. Over 150 engineers and university students in these regions have offered to support schools.

To date all the 45 primary schools in South Ayrshire, sponsored by Spirit AeroSystems and South Ayrshire Council will join the programme in 2013, in North Ayrshire 53 primary schools are funded by the Economic Development Department of North Ayrshire Council, Allied Vehicles are supporting 12 primary schools in Glasgow, Babcock International 20 primary schools, Tomorrows Engineers an additional 32 schools.

Of all the engagement undertaken in 2013 by far the most ambitious is with East Ayrshire Council the objective to deliver a 3 year engineering education plan which will impact on every nursery (49), primary (45), secondary STEM department (9) and 3 special schools. This programme will begin in 2013 delivering a series of sequential skills training, teaching resources and through the support of TMS Cad Centre primary and secondary pupils will have access to Solid Works as part of the programme.

With the support of Scottish Engineering and Dr Peter Hughes we launched the 'Scottish Engineering: Primary Special Leaders Award for STEM'. This Special Award is only available to primary schools in Scotland and aims to encourage primary pupils to research engineering in Scotland and interview engineers about their work so that they can interpret the answer to 'What would you do if you could be an engineer in Scotland?' by drawing or writing a response. The Scottish Government website STEM Central has advertised the challenge 59 primary schools entered with 1617 pupils entering, interviewing 145 engineers. The resources available to schools to research engineering in Scotland were downloaded 3400 times. On the 15th December MSP Mike Russell and Sir Jim MacDonald presented the awards at the Barony Hall at Strathclyde University. 300 visitors attended the exhibition on the 2 public days. This year the awards will be presented in the Banqueting Hall Glasgow Council Offices on the 20th December by Dr Alasdair Allan, the Minister for Learning, Science and Scotland's Languages and Principal and Vice Chancellor Sir Jim McDonald of Strathclyde University. This year the programme has been extended to Secondary schools with 85 schools to date engaged.

Our links to industry in Scotland are also increasing as engineers and HR directors are recognising this is a perfect way to marry CSR and staff development to local schools, providing clear links to the industries looking to increase the number of local students going into STEM careers.

Strathclyde University and the engineering department have provided venues for training and forthcoming celebration days. PhD students from the engineering department are also supporting local schools. Other centres are: Score Training in Aberdeen, Linlithgow Academy West Lothian, Ayr College in South Ayrshire, and Kilmarnock College in East Ayrshire.

A Virtual Learning Environment will be piloted with schools in the Highlands and Islands in 2013.

Wales:

Primary Engineer began working in Wales in 2010 with Dinas Bran in North Wales. The first year saw a primary school in special measures specifically for design technology join the programme and win the Primary Engineer Apprentice level in 2011. The impact on the school was pronounced and we gained the support of Careers Wales and the Local Education Authority.

In 2012 Careers Wales sponsored the translation into Welsh of the resources which will be used with schools over the forthcoming academic years.

Future Aims and Objectives: Primary and Secondary Engineer

- Increase the number of Primary and Secondary schools engaged with the programme through sponsored hubs.
- Address the skills pipeline by building the links to local industry through engineers working with schools.
- Develop recognised accreditation for our teacher courses initially through the GTC Scotland.
- Launch in 2013 the Primary Engineer Virtual Learning Environment (VLE) for teachers, children, apprentices and engineers which will also hold resources for the Leaders Award.
- Launch the Institution of Primary Engineers in 2013/14 and the Institution of Secondary Engineers in 2014/15

Industry and Institutions:

Develop strong mutually supportive links to industry, educational establishments and institutions to create a holistic approach to inspiring children with and into engineering.

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