Children as Engineers
Paired Peer Mentors in Primary Schools

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Paired Peer Mentors

Year 2 student Engineers
BEng/MEng

Engineering knowledge

Public Engagement skills

Year 2 Initial Teaching Education students

Inquiry-based science education

Engineering Design Process

Children as Engineers

Key Stage 2 Primary School Children
**Research Evidence**

<table>
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<th>Year 2 student Engineers BEng/MEng</th>
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<tr>
<td>Improving public engagement skills is a key aim for engineering professional bodies (EPC, 2014)</td>
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<td>Recruitment into engineering is needed to meet the employment gap</td>
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<th>Year 2 Initial Teaching Education students</th>
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<tr>
<td>50% of primary school teachers identify low confidence and subject knowledge in engineering (ENGINEER, 2014)</td>
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<td>Initial Teacher Education is key opportunity to embed experience in curriculum</td>
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<td>Evaluation of the ENGINEER programme indicates that children are able to apply the process to novel situations (Cunningham 2012).</td>
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<td>Girls particularly liked connecting STEM disciplines with relevant real-world problems (High Level Group on Science Education, 2007).</td>
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<tr>
<th>Key Stage 2 Primary School Children</th>
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Engineering Design Process challenges

- Force and Balance
- High Flyers
- Mechanics
- Sinking and Floating
- Electricity
## Project timetable

<table>
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<th>Timeline</th>
<th>Project</th>
<th>Resources</th>
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| June 2014     | • Development of programme  
                • Preparation of public engagement training  
                • Development of evaluation materials  
                • Recruitment and DBS checking of students | • 11 engineering students  
                • 11 teaching students |
| October 2014  | • Pre-evaluation of students  
                • Co-creation and adaptation of case study materials by students | • ENGINEER materials |
| November 2014 | • Delivery of hands-on practical challenges to schoolchildren  
                • Schoolchildren develop projects and present to community | • 4 schools  
                • 300 children |
| December 2014 | • Post-evaluation of students  
                • Researching conference for pupils, teachers and community of practice | • University outreach stands (UWE BoxED) |
| Jan-June 2015 | • Evaluation, report writing and dissemination                           |                                |
Engineer and teacher training
Researching conference
Researching conference
Researching conference
Researching conference
Children’s responses

Pre responses

- They solve problems/make life easier: 2%
- Design: 21%
- They improve things: 1%
- Has ideas/make discoveries/invent: 3%
- Fix things/make things work again: 29%
- Build/create things: 35%
- Make technology: 9%

Post responses

- They solve problems/make life easier: 22%
- Design: 26%
- They improve things: 1%
- Has ideas/make discoveries/invent: 10%
- Fix things: 5%
- Build/create things: 24%
- Make technology: 4%

What do engineers do?
How useful did you find the initial training?
How useful was it to work with a student partner?
How useful did you find the ENGINEER materials?
How easy was it to organise your activity with your student partner?
How easy was it to organise your activity with the school?
How easy was it for you to engage with the pupils?
How much did you enjoy the project?
How well did this project meet your needs and expectations?
How much would you recommend this project to other students?
Evaluation

Confidence in ability, where 1 is Not at All and 10 is Completely

- Engineering subject knowledge: Pre mean P<0.00, Post mean P<0.00
- Engineering teaching self-efficacy: Pre mean, Post mean P<0.00
- Science teaching self-efficacy: Pre mean, Post mean P<0.00

Legend:
- Blue: Pre mean
- Red: Post mean
### Evaluation

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<td>Children’s enjoyment</td>
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<td>Reflections on the project</td>
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<td>Comments on the partnership</td>
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<td>Comments on the teachers</td>
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Evaluation

**Engineer:** I've really enjoyed this project because not only did I feel like I was teaching a class, I felt like I was teaching a generation.

**Teacher:** It was interesting working with someone different, it meant we could divide up the planning work into individual strengths, for example I did planning the structure of the day and extra resources and they experimented with how best to make the product (a Super Sucker) with the resources we had.
**Evaluation**

**Engineer:** The pupils enjoyed the whole designing and creating process. They also seemed to enjoy the teaching through an activity instead of just talking. I had one pupil say it was their favourite lesson they have done. The teachers were pleased with how much the children enjoyed the activities.

**Teacher:** They loved the idea that they were engineers and one child wrote on the poster: “I love Science now because it is very fun and not that difficult but my science has improve.” Another, “I thought it was epic I gonna be a engineer. Thanks” and many more lovely comments. They enjoyed the idea of having the engineer there as well which inspired some of them to aspire becoming an engineer.
Dissemination of model

Dissemination of model
• EPC Community of Practice
• Primary Engineer
• Cambridge Primary Review Trust

Research impact
• Journals
• Education Community
• Science Communication Community

Any questions?