



RAiSE

Raising Aspirations in Science Education

Rosie Revere
Engineer project
Forgue School
Aberdeenshire

Case study

The Rosie Revere, Engineer project is a series of engineering lessons inspired by a popular children's storybook. It aligns with a number of E&Os in technologies for early and second level primary school pupils.

Rationale

This project was developed in response to Aberdeenshire teachers requesting support with ideas and meaningful activities to fit STEM into the curriculum and to teach engineering.

Guidance on the progression and development of skills is more limited in relation to other STEM areas. The project offers opportunities to introduce the engineering habits of mind and design process, with pupils thinking and acting like engineers.

Approach

The suggested learning activities align with the 'craft, design, engineering and graphics' part of the technologies Es&Os, specifically 'design and construct models/product', 'exploring uses of materials' and 'application of engineering' organisers. The projects also align with literacy and numeracy development, as well as science outcomes.

An online professional learning session was delivered by RAiSE PSDOs and Education Scotland about the engineering design process and habits of mind.

PSDOs then further developed guidance to bring these to life through the Rosie Revere, Engineer project.

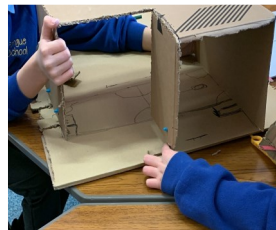
These are available here:

[Engineering Habits of Mind – STEM Nation \(glowscotland.org.uk\)](https://www.glowscotland.org.uk/stemnation/engineering-habits-of-mind/)

Delivery

This case study focusses on the delivery of the project in a rural school, Forgue in Huntly, Aberdeenshire which has 18 pupils in total.

The engineering design process and habits of mind were introduced to children and followed up by a more in-depth session to explore what these meant in the context of the project, considering the skills they needed and the design cycle.



Is it for me?

This case study will be of interest to practitioners delivering STEM (particularly Engineering) at early and second levels.

What does it cost?

The main resources required are recycled cardboard, resources to make simple electric circuits and micro:bits. Other possible resources include Lego, construction kits and *makedo* (open-ended system of tools for creative cardboard construction)

Where can I find out more?

[ROSIE REVERE, ENGINEER by Andrea Beaty and David Roberts - Children's Books Read Aloud - YouTube](https://www.youtube.com/watch?v=1Ty3MIDPZ3s)

[What's an Engineer? Crash Course Kids #12.1- YouTube](https://www.youtube.com/watch?v=1Ty3MIDPZ3s)

<https://blogs.glowscotland.org.uk/glowblogs/stemnation/engineering-habits-of-mind/>

[Engineering Design Process- YouTube](https://www.youtube.com/watch?v=1Ty3MIDPZ3s)

Bill Lucas Webinar: Engineering Habits of Mind: <https://www.youtube.com/watch?v=1Ty3MIDPZ3s>

[thinking-like-an-engineer-full-report.pdf \(raeng.org.uk\)](https://www.raeng.org.uk/thinking-like-an-engineer-full-report.pdf)

[ltbae_report_final_web-min.pdf \(raeng.org.uk\)](https://www.raeng.org.uk/ltbae_report_final_web-min.pdf)

[makedo UK](https://www.makedo.co.uk/)

The class was introduced to 'makedo' (an open-ended system of tools for creative cardboard construction) which was used in the models that the children made.

The children worked in groups of mixed ages and stages and worked through the suggested activities in the project resource book, using the engineering design process for each activity. The children worked on the project once a week over approximately four months.

The initial task was for each group to come up with an invention using recycled materials. This was a short task that familiarised the children with using the steps of the engineering design process cycle. The next activity was a challenge to design and create a hat for the zookeepers who work with Rosie's Uncle Fred. The design brief specified that the hat must be functional and incorporate a design feature specifically for a particular zookeeper. The project culminated in a big build task which was to design and make an enclosure for the chimpanzees in the zoo which was sustainable and environmentally friendly. After some research, the children included elements such as wind turbines. The big build task also had to include a door with an alarm system. Younger pupils constructed circuits incorporating a buzzer, whilst older pupils coded micro:bits to act as a movement or light sensor.



Benefits

The project provided a rich learning context where children learnt by doing, creating and experimenting, with a focus on the exploration and development of the skills associated with engineering.

The project was easily adaptable for all learners and not reliant on expensive resources or equipment.

The children were engaged and enthusiastic, able to recognise and articulate the skills they had developed and what they had learnt. The project provided opportunities for pupils to lead the learning and learn both from and with each other.

The book addresses gender equality in STEM. There would also be opportunities to work with STEM Ambassadors to further link it to the world of work.

Impact

Mrs Matthew, the school's Head Teacher, said children had clearly developed engineering skills including teamwork, problem-finding and solving, creativity (ability to come up with lots of ideas), resilience and learning from each other. All these skills are transferable within the curriculum and their ongoing learning.

The older pupils were well engaged with micro:bits, more so than previous coding opportunities with improved resilience and determination.

The Pupil Support Assistant said children quickly embraced creativity and showed problem-solving and resilience when they realised initial ideas wouldn't succeed. They worked together as a team to try new ideas and learn from one another.

Pupils said:

"We had fun and enjoyed the challenge! We felt proud if we managed to solve the problems!"

"The circuits were hard – it was a challenge to get the buzzer to go off and we had to adapt it to get it to work!"

"I loved this project – I love engineering!"

"I liked constructing the models – there were lots of problems to solve!"

"Our teamwork has definitely got better! I liked the challenges and want to do it again."

"We learnt a lot – we had to use creativity and our teamwork improved. I would like to do it again! I liked that we didn't have to use a textbook!"

"I liked everything! It challenged us!"

"We had fun while we were learning!"



This case study has been prepared by one of the Primary Science Development Officers for Aberdeenshire, Kim Aplin.