



Pre-school and reception

ICE STEM activities workbook for 3-6 year olds

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Introduction

This ideas booklet was created for volunteers who would like to run fun engineering activities for children in pre-school, nursery or reception class. It could also be used for families to do at home.

Rather than offering detailed lesson plans, it outlines an underpinning philosophy of how to engage with young children and offers suggestions for fun activities based on four topics that are related to civil engineering.

We hope those suggestions will help when agreeing and planning an activity with class or nursery teachers. They are the professionals in this context and volunteers should be guided by them.

Underpinning philosophy

ICE hopes that the children at this very young age will enjoy the activities in a safe and friendly environment and learn through games and play.

Early years

As a benchmark, the early years foundation stage (EYFS)¹ curriculum sets standards for the learning, development and care of children from birth to 5 years old. It identifies the main areas of learning as:

- communication and language
- physical development
- personal, social and emotional development
- literacy
- mathematics
- understanding the world
- expressive arts and design

Engineering activities can provide great ways for children to explore all these areas and therefore we encourage you to think creatively about how to engage these very young children in engineering experiences.

¹ See <https://www.gov.uk/early-years-foundation-stage> for EYFS in England. There are different standards in Scotland and Wales which are linked from this page.

Structuring the activities

The ideas presented below use a story, nursery rhyme or song as the starting point for the children to discover, learn and play about the topic in question.

Each activity is presented as a sequence of learning experiences so that the time can be adapted to reflect the needs of the children and the resources at the nursery:

- Introduce
- Explore
- Discover
- Share
- Follow-up

Please note the activity ideas in this booklet are *suggestions* rather than instructions. Discuss them with the nursery to agree what would work best for them.

Planning and preparation

We recommend you discuss the activity with the nursery or school in advance and agree the details with them. They should advise on:

- the children's abilities and development;
- how to engage appropriately with the children;
- how to structure the time;
- whether any of their resources and materials that could be used with your activity.

In addition, they will take responsibility for staffing ratios, risk assessments and, if appropriate, permissions for off-site visits.

Running the activity

The following pages present suggestions for activities centered on four different civil engineering related topics.

Topic 1: Bridges

Introduce

Use a story or nursery rhyme to introduce the idea of bridges to the children. There are many options but one classic is **London Bridge is Falling Down**² (if you're not confident in singing yourself then why not use a recording).



Explore

Ask the children about bridges.

What is a bridge? Have they seen any? Have they been across one?

What did they look like? What did it cross over?

Was it strong? How long was it?

Get them to look at pictures of bridges in books or from a presentation (rope bridges, wooden bridges, stepping stones over rivers, arch bridges, suspension bridges, etc.)

Then ask them about what goes under bridges and what goes over them. Ask them where they would like a bridge to take them.

Discover

Ask the children to build a bridge from Lego, wooden blocks, straws or whatever is readily available. The discovery element could include exploring the room or play area to find the materials themselves. While they are building them, ask what makes a bridge strong (stable) and what makes it fall down.

Share

Ask the children to tell you and each other about their bridges

Ask them to draw their bridge to show their parents

Follow-up

Take the class to see a nearby bridge.

Get them to act the story (dress-up as an engineer, be the boat captain sailing through, be the car / bus drivers stopping when the deck of Tower Bridge lifts up, etc.).

² <https://www.bbc.co.uk/programmes/p0389hx0>

Topic 2: Getting around

Introduce

Use a story or nursery rhyme to introduce the idea of transport to the children. There are many options³ but **'Going on a Bear Hunt'** by Michael Rosen and Helen Oxenbury which has the refrain "*Can't get over it, can't get round it, can't go through it, have to go over it*" is a great way to explore ideas about getting around.



Explore

Ask the children about getting around:

What do they have to go over, under, round, through?

How do they go over, under, round, through?

Get them to look at pictures of transport (roads, tunnels, bridges, etc.) in books or from a presentation.

Show flashcards or a presentation and ask them whether each picture shows going under / over / through / around the obstacle.

Discover

Ask the children to explore and act getting around. Crawling under a table can be a tunnel or alternatively a table can be an obstacle to go around. Ask if they mind getting wet feet (going through it) or do they want to build a bridge (going over it) and stay dry?

Share

Ask the children to tell you and each other about how they get around.

Ask them to draw a picture to show their parents.

Follow-up

Get them to act the story.

³ See <https://www.booktrust.org.uk/books-and-reading/> for some examples

Topic 3: Buildings

Introduce

Use a story or nursery rhyme to introduce the idea of building to the children. There are many options but one classic is the story of the **Three Little Pigs**⁴.



Explore

Ask the children about homes and buildings. What is their house built of? Ask about the walls, doors, windows and the roof.

Get them to look at pictures of buildings in books or from a presentation – or even better, look at buildings near the nursery. Ask them about staying warm, dry, different rooms in their house, etc.

Discover

Ask the children to build a house – first from straw (or cotton wool), then twigs (or lolly sticks) and bricks (or wooden blocks or Duplo). The discovery element could include exploring outside to collect twigs themselves. While they are building them, ask which house stays up the best and ask why.

Share

Ask the children to tell you and each other about their houses

Ask them to draw their house to show their parents

Follow-up

Take the class outside to look at their building and others nearby.

Get them to act the story of the Three Little Pigs.

⁴ <http://www.earlylearninghq.org.uk/stories/three-little-pigs/>

Topic 4: Water

Introduce

Use a story or nursery rhyme to introduce the idea of water and drainage. One option is **Incy Wincy Spider**⁵.



Explore

Ask the children about water and rain:

What they use water for (washing, drinking, etc.)

Where the water goes when it rains (puddles, lakes, rivers, the sea, down the drain, etc.)

Discover

If there is an area for water play, use that to explore how water flows. If not, take a plastic drain pipe and bucket into the nursery (readily available at all good DIY stores) and explore pouring water from one end of the pipe to the other (if dry play is essential, then tennis balls or marbles could substitute for water).

Ask whether water flows uphill or downhill? What makes it flow faster? What happens if too much is poured in at once (i.e. floods).

Share

Ask the children to tell you and each other about their water spouts.

Ask them to draw where the water goes when it rains.

Follow-up

Take the class outside to look at any nearby water features (ponds, fountains, outside taps, rivers, drainpipes etc) nearby.

⁵ http://www.bbc.co.uk/learning/schoolradio/subjects/earlylearning/nurserysongs/F-J/incy_wincy_spider

After the event

We would like to hear from you if you have tried any of these activities in this booklet or if you have any suggestions for improvements or new activities. Please email careers@ice.org.uk. We look forward to hearing from you.

If you're an ICE Ambassador, you can also help us measure the reach of education work taking place by filling out this short survey after your engagement event:

www.surveymonkey.co.uk/r/ICEambassadors

Contact us

If you have any questions please contact:

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