Royal Academy of Engineering

MANCHESTER 1824
The University of Manchester

Create – Adapting

Showing how something could be used in a different way

Download the full report:
Bianchi, L. and Wiskow, J. (2023) Progressing to be an Engineer – The Approach. Royal Academy of Engineering.

Informed by work from project schools:
Archway School, All Saints' Primary School, Beech Hill Primary School, Ince Church of England Primary School, Ribblesdale High School, Salusbury Primary School, St Bartholomew's CofE Primary School, St Charles RC Primary, St Edmund's Primary School, St Wulstan's Primary School

The Progressing to be an Engineer Cycle

Overview

Create – Systems Thinking is the process of making something new by taking a mechanism or component from an existing product or service and using it in a new product suitable for different customers or uses. Adapting is an example of using creative problem solving, building on existing knowledge to make new connections, and applying knowledge and understanding of how things work to new contexts and needs. An example of this would be changing the position of a steering wheel in a car from the right hand side to the left to suit different driving regulations.

ILOs	Key learning	Suggested activities
What do we want pupils to understand about Create – Adapting?	Creating something by adapting can mean repurposing an existing product. Important in any making process is clarity of understanding of the user, the context and/or the purpose of the new product There are very close links between creating-adapting, creating-problem solving and improving, as during the making it is inevitable that you notice some problems and change and tinker in order to improve the product.	**Changing purpose:** Taking an existing product and using it in a different way. **Activity:** **1.** The humble pen
How do we want them to apply their knowledge?	Repurposing with purpose means being able to take an object or mechanism and explore a wide range of different ways it could be used. Rather than thinking of a final product, it is helpful for pupils to create in response to different criteria, e.g. create something very long, very wide, that you can throw, that can stand by itself. This encourages them to apply what they know about a product by adapting it in ways that are don't always immediately lead to a 'thing' or new object.	**Activity:** **2.** The simple plastic bag

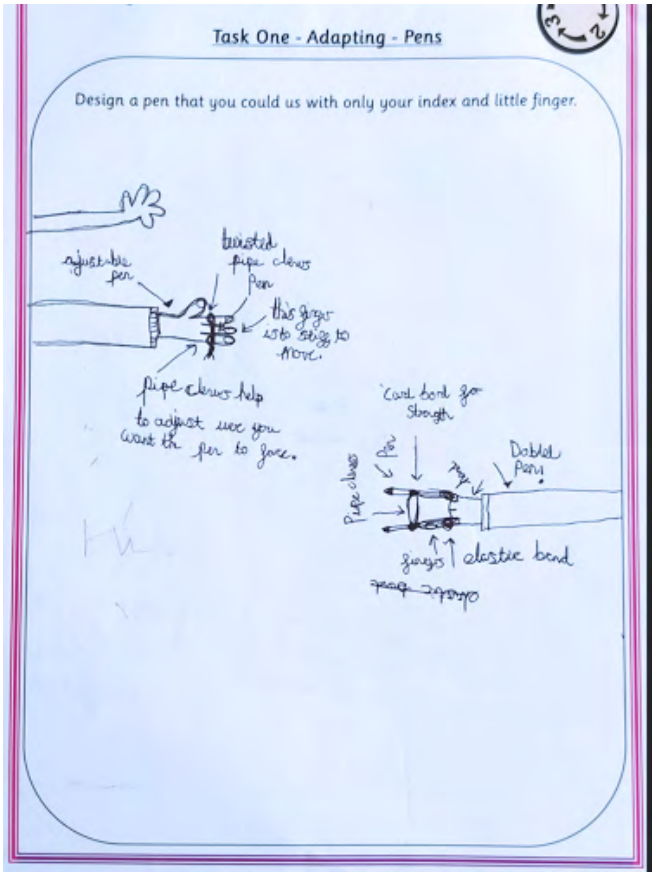
	From	To	Towards
	Suggested 5–7 years	**Suggested 7–11 years**	**Suggested 11–14 years**
Pupils should be taught to:	Take an existing product and repurpose it by using it in a different way.	Repurpose an existing product so that it can be used in a different way, tailored to the needs of a specific user or purpose.	Repurpose an existing product tailored to the needs of a specific user or purpose. Evaluate based on ethical, social and economic aspects.
Success was demonstrated when pupils:	■ were confident to try things out ■ didn't feel there was a 'right' solution at the end ■ Could explain a way of tying or working with the material/product that was different, even if not being able to suggest a final product.	■ could explain what is special/distinctive about the new product they have created and how it used a component or part of a different product to make it work ■ described the pros and cons of the adapted product in terms of its fitness for purpose for a user.	■ could explain how they thought the new adapted product they created was better for the environment or user, or what would need to further be adapted for it to be improved.

Generic task

Initial learning activity – eliciting and developing understanding

Activity 1: The humble pen

The pupils were told to adapt, modify or reinvent a pen that can be used to write comfortably and clearly with only index finger and fifth finger. They shouldn't use the thumb or folded fingers. They should have time to try their product out using their own hand, sketch their ideas, model, text, evaluate and improve their solution.

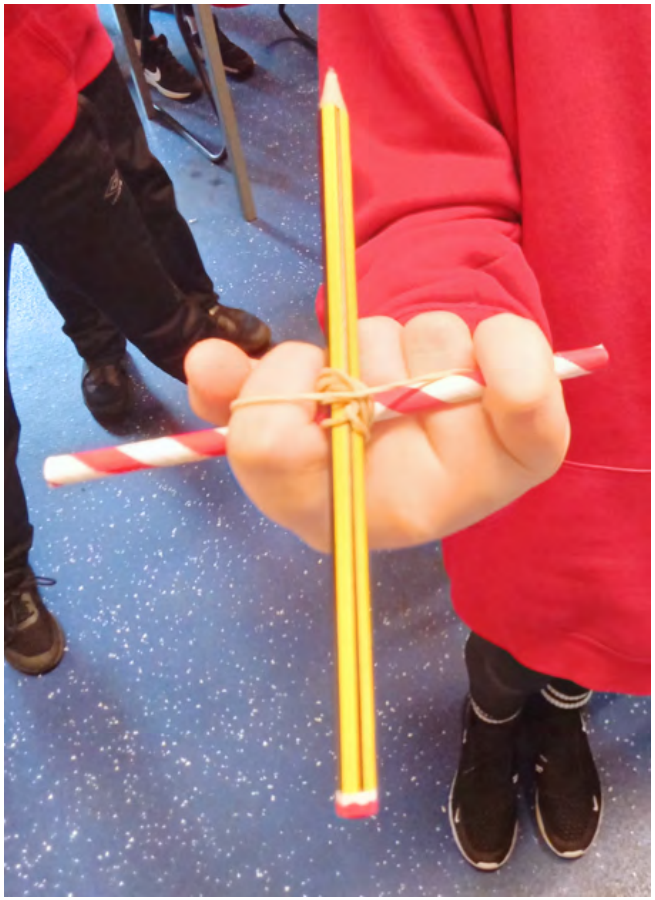


Generic task

Initial learning activity – eliciting and developing understanding (continued)

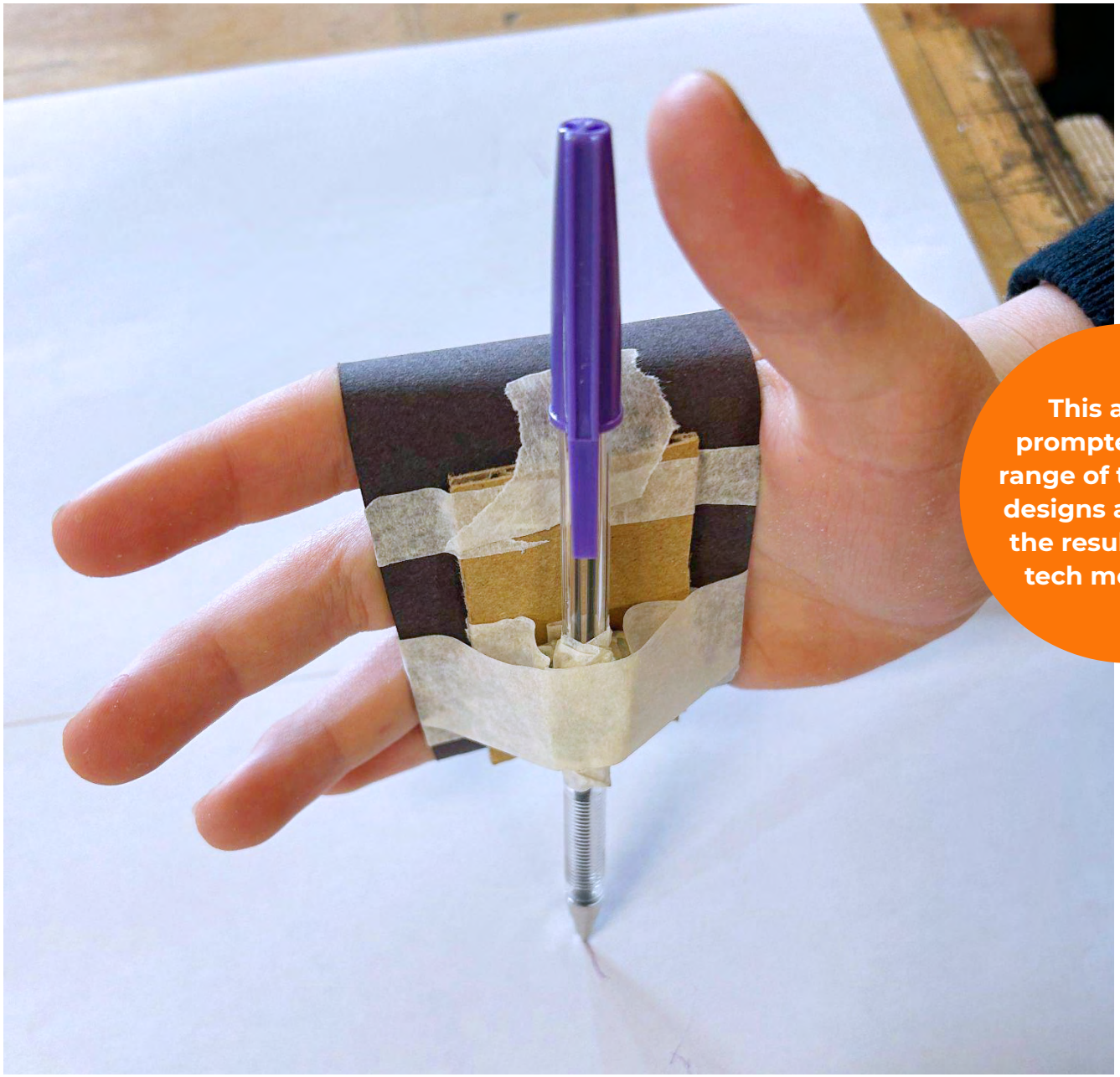
Activity 1: Adapt a Pen

This led to the following types of ideas.

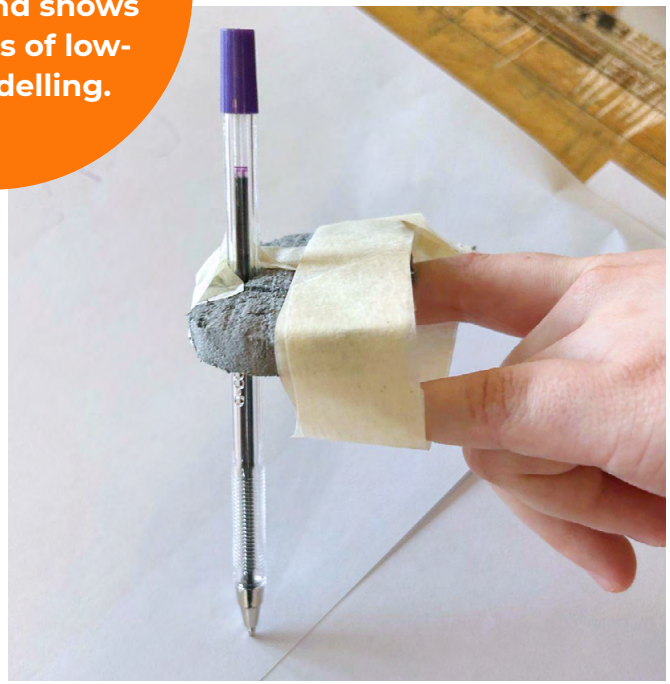


'This was a great task to get the children to think about their user and ensure that the design is capable of meeting the needs of someone other than themselves.

They were also able to think about their choice of materials and make decisions that made sure the material was useful for the task.'



This activity prompted a wide range of thoughtful designs and shows the results of low-tech modelling.



Embedded task

Exploring Create – Adapting in context

Activity 2: Plastic Bags

This activity focused on pupils reading a story, 'One Plastic Bag' by Miranda Paul. The story tells how a simple plastic bag was adapted for use in different ways. Rather than focus on repurposing the bag to make other objects, this task encourage pupils to respond to different criteria, and to explore how a bag could be adapted for these purposes.

Take 3 plastic bags... can you create...

- something you can throw
- something that can carry a small object
- something very long
- something heavy
- something that can stand by itself
- or something else?

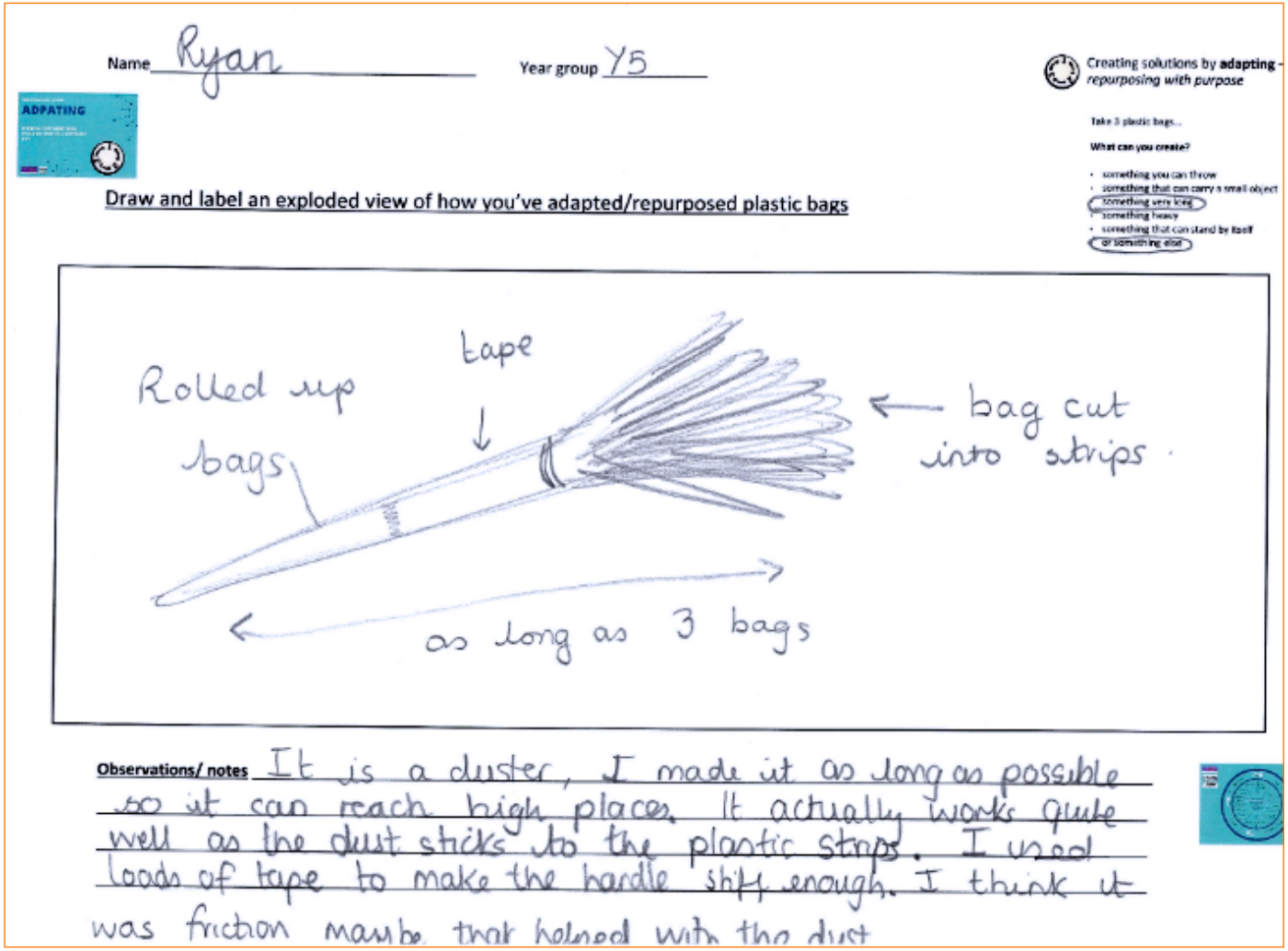
'This pupil considered the properties of the material.

After experimenting with cutting strips of plastic (originally for another purpose) he discovered that fine strips of plastic worked well brushing up some materials, some even clung to the strips of plastic.

He then altered his original idea and made a duster. He used the other bags to create a long stiff handle.'

Embedded task

Exploring Create – Adapting in context (continued)



Name Ryan Year group Y5

ADPATING

Creating solutions by **adapting** - *repurposing with purpose*

Take 3 plastic bags...

What can you create?

- something you can throw
- something that can carry a small object
- something very long
- something heavy
- something that can stand by itself
- or something else

Draw and label an exploded view of how you've adapted/repurposed plastic bags

Observations/ notes It is a duster, I made it as long as possible so it can reach high places. It actually works quite well as the dust sticks to the plastic strips. I used loads of tape to make the handle stiff enough. I think it was friction maybe that helped with the dust

'Children could relate to the context and were interested in taking part in further research. We are taking part in this year's Big Plastic count so it fitted in.'

These designs were created by lower junior pupils. They considered the things that would be helpful in their own lives.

Teachers' ideas to extend and support thinking

Extending

Explore the school environment to find products/mechanisms that can be (or already are) adapted for new **uses**/different **users**. For example, chairs, toilets and sinks are likely to be different in EYFS than the ones used in KS2 / staff room. What else can you identify that could be **adapted** to better suit younger pupils' **needs**? Is it just the size that's different? What other considerations are there?

Extending chair investigation: look at sitting provisions for SEN / other specific users in school (bean bag, office chair, stool) – how have they been adapted?

Can you adapt a simple school chair to meet the needs of more than one user? E.g. make it softer, height-adjustable, modular so parts can be added/ removed, customisable...

Extending the plastic bag activity – identify other forms of litter that can be adapted for new uses rather than discarded, e.g. bottles, tins, paper....

Extending Pen activity: can you think of other tasks you might struggle to perform with only two fingers? Choose one product that would be impossible to use and **adapt it** to make it suitable for such a user.

Further support

Pupils may struggle to think of a new product, therefore the criteria (which are more accessible) provides a way into playfully experiment and try out new ideas.

Work collaboratively to model the process as a class and provide time with resources that don't incur costs so that it's easier to feel the ability to try things out with some freedom.

Create – Adapting

Showing how something could be used in a different way

FROM – taking an existing product and repurposing it by using it in a different way.

TO – repurposing an existing product so that it can be used in a different way, tailored to the needs of a specific user or purpose.

TOWARDS – repurposing an existing product tailored to the needs of a specific user or purpose. Evaluating based on ethical, social and economic aspects.