- Students: 2 large groups

- Conditions of the robot behaviour:

- 1 - Expository: the robot just explains the content

- 2 - Storytelling: the robot tells the generated story about the content

- Q&A: In the two conditions, a questions and answers phase happen at the end

- Sessions:

- The two classes will participate in the two conditions.

- The two first sessions, class A has condition 1 and class B has the condition 2, and the two next sessions, class A has condition 2 and class B condition 1. The last session is an open session where students can contribute to the development of the robot with their feedback. Ex

| Class | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
| --- | --- | --- | --- | --- | --- |
| Year 2-1 | 1 - Story | 1 - Story | 2-Explain | 2-Explain | Feedback |
| Year 2-2 | 2-Explain | 2-Explain | 1 - Story | 1 - Story | Feedback |

PLEASE SEE LESSON PLANS BELOW

| Class | Day 1 objective - Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. | Day 2 objective- Asking simple questions and recognising that they can be answered in different ways to order materials according to their stretchiness. | Day 3 objective- Bending can change the shape of a solid object. | Day 4 objective- Twisting can change the shape of a solid object. Twisted materials are used to make everyday objects. | Day 5- Feedback |
| --- | --- | --- | --- | --- | --- |
| Year 2-1 | 1 - Story- The 7 year old artist who would **mould things into shape: ʻbendingʼ, ʻtwistingʼ, ʻstretchingʼ and ʻsquashingʼ** | 1 - Story- The Tale of Stretchy Sam and the Stretchy Material Contest- order materials according to their stretchiness. | 2-Explain- see lesson plan provided below. | 2-Explain- see lesson plan provided below | Feedback[1] |
| Year 2-2 | 2-Explain- See lesson plan | 2-Explain- See lesson plan | 1 - Story- The Story of Benny the Blacksmith and Bendy Metal- Bending can change the shape of a solid object. | 1 - Story- The Journey of Twisty the Cotton Thread- Twisted materials are used to make everyday objects. | Feedback |

- 1 hour (50 minutes) every day for 1 week

- Theme should be similar between sessions (ex. Science)

- Preparation with teachers

- Storytelling generation

- Validation tests (how well students understood)

- 1 pre-set meeting + 1 post evaluation meeting (30 min)

- Total 6/hours (only 1 outside regular class time)

- How to measure:

- Validations tests (questions about content)

- Number of interactions

- Comparative feedback from teachers

- Global/local appreciation survey

To consider: Would they like the system more or less after knowing how it works?

**MONDAY- Changing Shape Lesson 1**

### **Objective**

* Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
* Introduce the quest question- *How can we make art by changing the shape of materials?*
* ***key vocabulary used to describe how we mould things into shape: ʻbendingʼ, ʻtwistingʼ, ʻstretchingʼ and ʻsquashingʼ.***

### **Learning Outcome**

* Children will have shared what they know about changing the shape of solid objects.
* Children will have been introduced to the Quest question.- *How can we make art by changing the shape of materials?*
* ***Introduce or remind children of some of the key vocabulary used to describe how we mould things into shape: ʻbendingʼ, ʻtwistingʼ, ʻstretchingʼ and ʻsquashingʼ.***

### ***Activity: Thinking of materials that change shape***

* *ʻYou can change the shape of ... by ...ʼ.* 
  + *Students can use words to fill in the blanks.*
* *Collect childrenʼs initial ideas and record them for future reference.*
* *Explain that the following lessons are designed to help children discover new and different ways to change the shape of materials.*
* *At the end of the unit, children will be asked to create a piece of artwork that applies the skills and knowledge they have developed.*

### ***Activity INFO:***

Some materials change shape easily. Some materials do not seem to change shape at all.

We can change the shape of materials if we bend, twist, squash or stretch them.

WORD BOX- define these words. BEND, SQUASH, STRETCH, TWIST.

*Q&A- here are a few questions that the children would like to ask the robot.*

1. *Which materials change shape easily?*
2. *Which materials do not change shape easily?*
3. *Why does modelling clay change shape easily?*
4. *Which everyday objects in the classroom can change shape easily?*
5. *Other questions from students if time allows.*

## **TUESDAY- Changing Shape LESSON 2**

### **NC Objective**

* Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
* Asking simple questions and recognising that they can be answered in different ways to order materials according to their stretchiness.

### **Learning Outcome**

* Children will have ordered materials according to their stretchiness.

### **Activity: Identifying common features of materials**

* Here are a sample of the materials : Elastic bands; modelling clay; cling film; hair tie.
* *What do all these materials have in common?*
* Children identify the materials that will stretch the most and the materials that will stretch the least.
* Take responses, aiming to get a consensus from the groups as to which materials children think are the most and the least stretchy.
* Elastic bands; modelling clay; cling film; hair tie.
* People use elastic bungee cords to jump off high buildings and bridges.
* If you blow up a rubber balloon too much it will pop.
* Gymnasts have clothing that stretches so they can move freely.
* Plastic wrap is used to stop food drying out.
* The biggest elastic band ball weighs the same as two rhinos (4,097kg).

*Q&A- STUDENTS have requested to ask the following questions.*

1. *In what ways are bungee cords, rubber balloons, gymnastics clothing and elastic bands in the same?*
2. *What would happen if rubber balloons and elastic bands did not stretch?*
3. *What materials would not be good for making a bungee cord, plastic food wrap or a balloon?*
4. *Do all elastic bands feel the same when you stretch them?*
5. *Why does our stomach stretch?*
6. *OTHER questions from students if time allows.*

## **WEDNESDAY- Changing Shape Lesson 3**

### **NC Objective**

* Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
* Bending can change the shape of a solid object.

### **Learning Outcome**

* Children will have investigated some bendy materials.
* Children will have recognised that artists can bend everyday objects to create pieces of art.

### 

### **Activity: Investigating bendy materials**

T-shirt, paper napkin, Sponge, Bouncy Castle, Toothpaste tube, TV cables. What might happen if each object was not bendy?

e.g. clothes would be very uncomfortable; bath sponges would be too scratchy; toothpaste tubes would be difficult to empty; bouncy castles wouldn't bounce, etc.

Rulers can be made from different materials and can be different sizes.

Some rulers are made of wood. Some rulers are made from plastic, some rulers are made from metal.

Which ruler would be the most and which ruler would be the least bendy?

### **Main Activity: Bendy Metals**

Metal is usually very strong and not very bendy.

There are a few metals that are very bendy. We can use these metals to make artwork and jewellery or simply to cover food.

We can easily bend kitchen foil because it is very thin. Humans have been making metal jewellery for over eight thousand years. Egyptians made metal bracelets over 2000 years ago.

Sometimes we need to shape metal that is not easy to bend. A blacksmith uses heat to help bend the metals. Blacksmiths wear thick gloves and clothes to protect them from the heat. Once the metal is hot enough the blacksmith can bend the metal into shapes. As the metal gets very hot it changes colour. Artists also use heat to bend metals. Once the metal cools it stops being bendy.

Q&A- Questions students would like to ask robot.

1. What would happen if a bridge was made from a bendy material?
2. What would happen when cars and lorries drove over a bendy bridge?
3. What metals are used to make bridges strong?
4. Who is a famous artist who has made art from metal?
5. What kind of art could I make from bending some kitchen foil?

## **THURSDAY- Changing Shape Lesson 4**

### **NC Objective**

* **Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.**
* **Twisting can change the shape of a solid object.**

### **Learning Outcome**

* **Children will have identified how twisted materials are used to make everyday objects.**

### **Activity: Exploring twisted materials**

Twisting is just one way you can change the shape of materials. Rope is made by twisting long, stringy materials together and can be made from plant fibres. The first ever ropes were made by twisting vines (long plant fibres) together. The Ancient Egyptians made special tools to help them make rope. These tools helpd one end of the rope so that the rope makers could use both hands to twist. Egyptians used special tools to make rope from plant fibres.

Cotton comes from a plant. Cotton spinners use twisting to make yarn from cotton. Twisting strands of yarn together makes it stronger. The yarn can then be used to make fabric which can then be made into clothes. This is how cotton spinners work. First they remove all the seeds, this leaves behind soft cotton wool balls. Then they pull and stretch the cotton into long bundles. They use a tool called a spinner to twist the cotton and make the yarn. People weave yarn together to make material. One set of threads hands from top to bottom, these are called the warp threads. Another thread is then passed under, then over each of the hanging threads. These are called the weft threads. The result of weaving threads is a fabric. You can also knit yarn together to make clothes. Knitting bends and knots the yarn together.

**Q&A- Questions students would like to ask robot.**

1. Why does twisting threads together make rope?
2. Why don’t we just use single threads to make a rope?
3. How are clothes made?
4. What is the difference between knitting or weaving?

## **FRIDAY- FEEDBACK AND QUESTIONS**

Session structure:

| Intro and pretest | 10 |
| --- | --- |
| 1st story | 5 |
| 1st Q&A | 10 |
| 2nd story | 5 |
| 2nd Q&A | 10 |
| Conclusion | 10 |

Pre-test: quick test to validate how much students know beforehand about the content. It could be drawing, multiple choice, directs questions (not desirable).

# Detailed daily daily activities:

## Day 1

objective - Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

### Pre-test:

Please draw in many different ways a t-shirt can have the shape changed and the name of the process of the changing.

OR

Direct question: Through which processes solid object can have their shapes changed?

## Class A: Story- The 7 year old artist who would **mould things into shape: ʻbendingʼ, ʻtwistingʼ, ʻstretchingʼ and ʻsquashingʼ**

Story:

## Class B: Explanation

Generate explanation based on:

### **Objective**

* Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
* Introduce the quest question- *How can we make art by changing the shape of materials?*
* ***key vocabulary used to describe how we mould things into shape: ʻbendingʼ, ʻtwistingʼ, ʻstretchingʼ and ʻsquashingʼ.***

### **Learning Outcome**

* Children will have shared what they know about changing the shape of solid objects.
* Children will have been introduced to the Quest question.- *How can we make art by changing the shape of materials?*
* ***Introduce or remind children of some of the key vocabulary used to describe how we mould things into shape: ʻbendingʼ, ʻtwistingʼ, ʻstretchingʼ and ʻsquashingʼ.***