

Learning Journey: Science from Stories: Investigating Materials

Age: 4-5

Learning activities: making connections, communicating, explanations

Creative dispositions: motivation, ability to make connections

Synergies: motivation and affect, questioning and curiosity, teacher scaffolding and involvement

Background information

School setting: Urban with high socio-economic deprivation (1 form entry)

Curriculum links: Links to *Early Years Foundation Stage* Characteristics of effective learning

- Playing and exploring – engagement,
- Active learning – motivation,
- Creating and thinking critically – thinking

For example

'I am able to make predictions.'

'I am able to test my ideas.'

'I can show high levels of energy and fascination.'

'I can stick with an activity, even with challenges.'

Setting the scene

Focus

The aspects of my practice I wanted to focus on were questioning and curiosity, motivation and affect and teacher scaffolding and involvement. To motivate children they need to be challenged with first hand experiences, engaged through the context using cross curriculum links and providing real problems to solve. How could I use questioning to help children to make connections between their thinking and what they observe, and how could I support them in communication their ideas?

Rationale

The children I chose to take part in the sessions had a natural curiosity that I could observe from their play and exploration of the environment, and the questions they asked. To develop their curiosity further I thought it would be helpful to encourage them to think in a more scientific way about the observations they were making, and use a more systematic approach to their investigations.

Implications

I wanted to foster children's motivation so I would need to plan real problems to solve, linked to the topic we were learning, in order to capture children's imagination and engage them. To encourage them to communicate scientifically and make links I would need to plan my questioning and model the use of scientific topical language and investigation. I would also need to make opportunities to work with a small group of children in depth and to monitor their interests. This would feed into future planning to further maintain their interest.

Outline of learning activities

Starting points

After introducing the story of Little Red Riding Hood, I used the context to build up a real science problem to solve. This involved the introduction of Red Riding Hood's teddy who needed to make a journey across the forest.

Learning Journey

1. Testing materials and sorting into waterproof/ not waterproof

The children were involved in feeling the different materials and they were discussing their uses and making links to their own everyday experiences of going out in the wet weather. The children then had to make a prediction on whether the material was going to be waterproof or not. As a class we tested out each of the materials and the children sorted them into waterproof / not waterproof in order to solve the problem of which material to use for teddy's journey.

2. Testing materials as surfaces

Building on children's interest in the materials, and linking back to the original story, the next problem was for the children to find the best surface for Red Riding Hood's car to carry a present to Grandma's. Again the children felt the materials and discussed their properties. They then selected the material they thought would be the smoothest and were asked to explain why they thought the car would move more easily on the material. I then modelled how to test the car on the material and the the children repeated this using the material they had chosen.

3. Testing materials to see if they float or sink

The context this time was the Billy Goats Gruff story. The problem I posed was to design a boat to help the goats cross over the water, as the bridge was broken. This was building on the children's idea of waterproof from experiment 1, and making a new link to what objects or materials would float and sink. The children explored a range of materials again, and then selected the material they thought would be able to float and be waterproof, which they then tested. From this the children identified the materials for making the boat.

Developing the Learning Journey

Starting point: Can you help Teddy make a coat that keeps out the rain?

Teddy has lost Red Riding Hood. Can you help Teddy travel through the forest to find her? Oh no! It's raining, can you help Teddy make a coat that keeps out the rain?



Child:
Teddy's going to
wet!



Child:
I like the red
one, it's big.

Teacher reflection and implications

The children are really excited, because they have seen the resources after I unveiled for them. They are motivated because they have the opportunity to play with the water. Their comments are initially based on their visual observations and are not using their other senses.

I need to maintain curiosity but will need to introduce scientific vocabulary so children can communicate in more scientific way. I wanted to encourage the children to use what they know about the materials to make a prediction, I would need to plan some questions and first-hand experience of feeling the material and thinking about their properties.

Activity: Testing materials

Sorting into waterproof/ not waterproof Part 1

The children were involved in feeling the different materials and discussing their uses, making links to their own everyday experiences of going out in the wet weather. The children then had to predict whether the material was going to be waterproof or not.

Rationale

This provided an opportunity for the children to make some observations using their sense of touch and use this information to make a prediction which could be tested. Using the results of the test the children can then make connections between what they observed and their prediction. By verbalising their prediction they are communicating their ideas.



Chris –when I go camping I have to wear a rain coat so we have to make a rain coat for teddy. My raincoat is a bit shiny because its red and it doesn't let any water in.

Teacher – what materials do we have here that feel like your raincoat?

Chris – (picks up the wool and compares it to the polyester) it's like this but a bit harder.

	Waterproof or not?	
	What are you predictions?	
	Waterproof	Not waterproof
cotton	13	17
polyester	5	25
Bubble wrap	10	20
Tinfoil	7	23
Denim	24	6
Wool	15	15

June – I think the water will go through because it feels soft, I use a towel after I take a bath.

Teacher – so because you use a towel to dry you after a shower you think the towel might soak up all the water?

June – I don't know yet. We have to try it.

Teacher reflection and implications

I recorded the children's descriptions so that I can assess how their language develops through the topic. The children are using everyday words so I will need to introduce scientific vocabulary. I can see that June is making links to her everyday experience when she offers her explanations. I have modelled an explanation through my questioning. She recognises that she needs more information before making her own explanation.

Activity: Testing materials

Sorting into waterproof/ not waterproof Part 2

As a class we tested out each of the materials by wrapping teddy up in the material and pouring water over him. The children sorted the materials into waterproof /not waterproof to solve the problem of which material to use for teddy's journey.

Rationale

Using the results of the test, the children can organise the material into waterproof / not waterproof, and can compare what they observed to their original prediction. This will give them an opportunity to communicate and make connections.



Eric – Miss this is how you know (material is waterproof) if it's like an umbrella and the water can't go in then it works.
Teacher – what happens if it lets some water in but not all of it?
Eric – then it kind of work. It's like coat



Teacher reflection and implications

I was able to quickly observe which children were beginning to understand the idea of waterproof. In future I will need to consider how to give the children more experience of materials in different contexts to build on their experience and how to support children who are not able to make connections. I will ensure the children have opportunities to plan and carry out the testing themselves to promote their agency.

Activity: Testing materials as surfaces Part 1

The next problem was for the children to find the best surface for Red Riding Hood's car to carry a present to Grandma's. Again the children felt the materials and discussed their properties. They then selected the material they thought would be the smoothest. They were asked to explain why they thought the car would move more easily on the material. I then modelled how to test the car on the material and the children repeated this using the material they had chosen.

Rationale

I wanted to introduce another investigation which would build on the children's interest in the materials and the Red Riding Hood story, but this time give the children more agency in carrying out the testing. I wanted to help the children record data from their investigation systematically to encourage them to reflect on what they had found out.



Chris – I think the grass is going to be the best because when I play on the grass I go really fast!

Teacher – that's a good idea, touch the grass does it feel soft and easy to move across?

Chris – Oh no it's really bumpy, that's going to slow down the car.

Teacher – why do you think it will slow the car down?

Chris – because those spikes are going to stop the car from moving.



June – miss what happens if we can't get the car to the other side?

Teacher – what can we do to help the car travel further?

June – I think we should have a bigger car, then it can go longer.

Teacher – why do you think a bigger car will help?

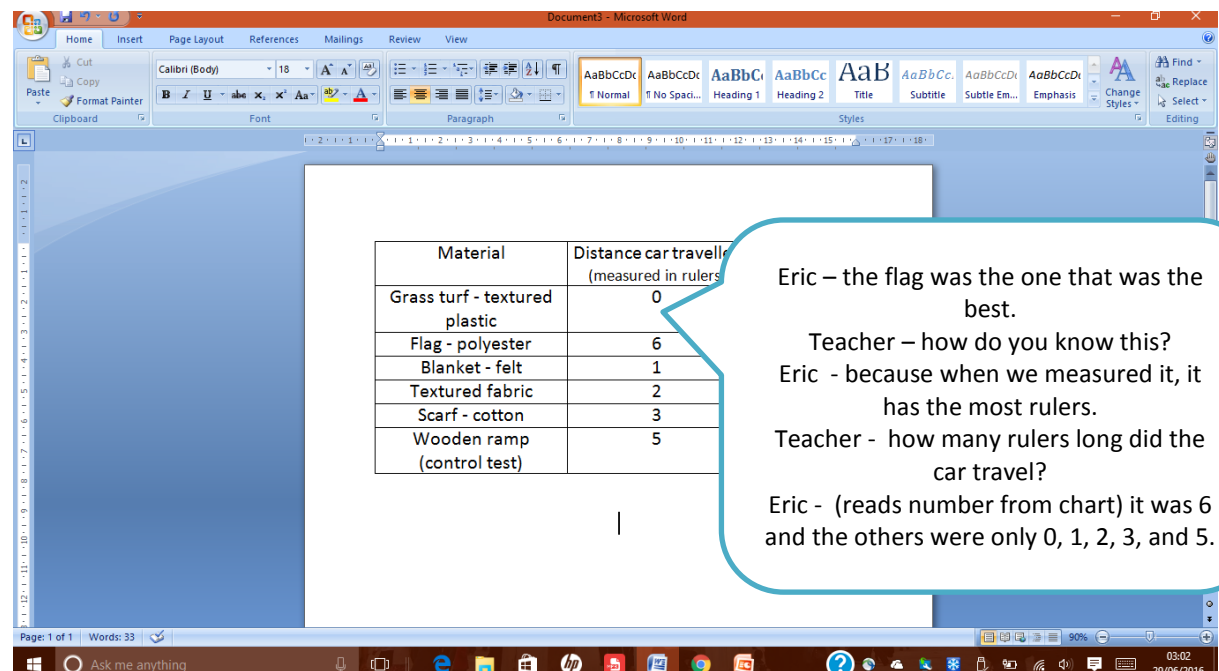
June – because it's got bigger wheels!

Teacher reflection

I modelled using target language such as distance and measuring to encourage the children to start using those words in order to explain the reasons for their predictions. The children enjoyed testing the different materials and were able to talk about their results.

The children were able to talk about the reasoning behind their predictions. They were making connections between their environment and what might happen.

Activity: Testing materials as surfaces Part 2



Material	Distance car travelled (measured in rulers)
Grass turf - textured plastic	0
Flag - polyester	6
Blanket - felt	1
Textured fabric	2
Scarf - cotton	3
Wooden ramp (control test)	5

Eric – the flag was the one that was the best.
Teacher – how do you know this?
Eric - because when we measured it, it has the most rulers.
Teacher - how many rulers long did the car travel?
Eric - (reads number from chart) it was 6 and the others were only 0, 1, 2, 3, and 5.

Teacher reflection and implications

I needed to model how to record data by making a chart which measured distance using rulers. Children were beginning to understand how to take information from data to help draw conclusions from investigations.

The children are beginning to offer reasons for their predictions and to appreciate how data can be used to explain the findings of an experiment. I wanted to provide further opportunities to develop their reasoning skills.

Activity: Testing materials to see if they float or sink: Part 1

The context this time was the Billy Goats Gruff story. The problem I posed was to design a boat to help the goats cross over the water, as the bridge was broken. The children explored a range of materials again, and then selected the material they thought would be able to float and be waterproof, which they then tested. From this the children identified the materials for making the boat.

Rationale

The children had been motivated previously by my making links between stories and science problems to solve, so I wanted to build on this further. I also wanted to build on children's developing understanding of waterproof and introduce the new concept of floating. Once again I wanted the children to have hands on opportunities to investigate and to give reasons for their predictions. They would also be encouraged to make their own records of their findings.



Chris – (referring to plastic log) this isn't going to float because it's far too big.

The water is going to go on top and make it sink.

Teacher – well let's see if big objects can float.

Chris – it floated! It's not going down.

Teacher – yes that's right, inside the plastic is air and that's what made it light enough to float.

June – miss look first it was floating and now it's going to the bottom!

Teacher – I wonder why? Has anything happened to the material?

June – well first it was dry and now it's all wet and soggy.

Teacher - it must not be waterproof, the water has gotten in and it's made it all heavy and now it's sinking.

June – what else is waterproof?

Teacher reflections

I modelled using the language 'floating and sinking' to encourage children to use these words when making predictions. The children enjoyed testing the different materials to find out which would be best for making a boat.

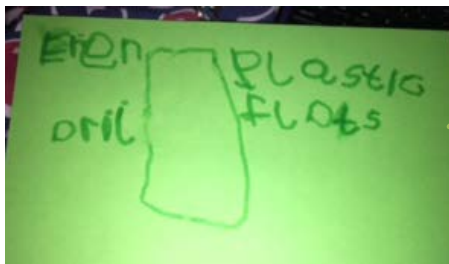
The children are beginning to give more in-depth analysis about their observations. The children learn that changes occur within different materials as they get wet.

Activity: Testing materials to see if they float or sink Part 2

The children created pictorial representations of what they had learnt about sinking and floating.

Rationale

In what ways could the children record and assess what they have learnt?



Eric has documented what he had learn about floating objects – he has summarised that the best objects to create a boat out of were the plastic and the toy orange because they both floated. He was also able to talk about why the plastic was better than the fruit toy.

Eric – you can't make a boat from the orange because its round, but the plastic is flat. Its better.

Teacher reflection and implications

The children were now able to come up with their own ways of recording what they had learnt about floating and sinking objects. They were able to create their own charts.

I modelled using prediction language saying 'I think this will happen because..' basing my prediction on my own knowledge or my experience of the investigation. I.e. I think the plastic will float because

it is waterproof. I got children to test their ideas by providing them with resources to explore themselves. I was able to observe how their exploration developed into interest and fascination by seeing their reaction to the investigation.

Overall Reflections

Children's progress

- By providing the groundwork – e.g.. making charts with data, modelling language and asking questions the children were then able to create their own versions to document their reflections.
- Children were very good at verbalising their reflections – reasoning was developed with teacher scaffolding language and making observations for them to comment on.
- Children found it very difficult to ask questions before experiencing something, they needed the experience to then say 'I wonder what happens if we do this next time...'

Examples of Children's Progress

Eric: Attitude towards creative learning:



Eric's reflection

I liked when we got to race the cars across the room. It was fun because there we had to get Red riding hood to her grandma's house and that one time the car didn't even move.

Eric can be very quick to make a judgement and often thinks' he will be right straight away. By providing challenges that made him predict and then reflect it made him realise that we can change our minds, and that he needs to know all the information before we make a judgement.

Chris: Attitude towards working alongside others with a collective goal



Chris's reflection

When we got to see the teddy it wet it was so funny. The best bit was when we wrapped him in a towel to stop him getting wet, but he still got wet!

Chris can find it very difficult to work in a group and these sessions made him begin to realise that it's a positive thing to share your ideas and opinions. He is now very good with taking on new vocabulary and was able to reason his ideas even more succinctly when talking to a peer.

June: Attitudes towards making connections and showing ability to think



June's reflection

I like when we use the big blue water and saw things go up and down in the water. Some of them stayed up like some of the toys my mum puts in my bath with me.

June is very observant and articulate but can often take a backseat during whole carpet sessions. By getting her involved at the forefront it was great to see her beginning to question her experiences and learn how to represent her ideas on paper.

Reflections: Teacher's role in developing creative inquiry

How can I make defining links?

Each of the investigations was linked strongly to a fairy tale story to help children have a familiar context, for example: Little Red Riding hood.

How can I make links to characteristics of learning to foster creativity in science?

Children who took part had a natural affinity to talk about observations they made in their play and environment, I wanted to capture their progression by observing how they responded to different investigations.

What kinds of questions might children be thinking about a concept – what might they know already?

I tried to assess children's understanding of a concept before the investigation by getting them to talk about what they might know beforehand, for example. Whilst discussing materials I got children to explore their experiences of using a material, they were able to recall past experiences with using or seeing the material.

Teacher reflection: My progress linked to creativity and inquiry

My practice has developed in the following ways

- Planning sessions with children's interests in mind and relating it to a theme to support context in learning. (I realise the importance of planning and providing resources that will help motivate the children ... and the importance of involving them in the testing.)
- Providing tactile resources that children would be able to explore and play with beforehand.
- Using questioning and modelling of explanations to help children make links in their learning and form explanations and importance of supporting the development of vocabulary to do that.
- Exploring children's prior knowledge.
- Providing a scientific language framework for children to build up their knowledge and understanding of a concept.
- Building up children's experience of ways to record information gathered.
- Providing children ample time to reflect and reason their ideas and thoughts.

Next steps for learning and teaching

Learning activities – how are the children learning?

- They are learning through play and exploration.
- They are able to experience something before they make up their minds.
- They are able to make connections based on their immediate environment.

Next steps for learning and teaching

- To work alongside the EYFS team to support all children to become confident with reflection and reasoning behind their understanding.
- To have teachers consistently provide effective scaffolding to build children's curiosity and make links to scientific inquiry.
- To consistently work on creating opportunities to document, independently record and interpret data.

Reflection questions for the reader:

- In what ways do you make links with children's everyday experiences?
- How do you support children's reflection and reasoning?
- How do you stimulate children's curiosity and motivation?
- What progression is evident in children's attitudes, skills and concepts?



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