

Learning Journey: Investigating materials

Age: 5-6 years old

Learning activities: Designing and planning investigations; Gathering evidence

Creative dispositions: Ability to work together

Synergies: Collaboration and Dialogue

Contextual factors: Group work

Background Information

School setting: Inner city primary school (in England).

School policy: Working with others (WVO)

Curriculum links: Development matters in the early years foundation stage (Early Education, 2012), Early years (under 5s) foundation stage framework (DfE, 2014)

Setting the Scene

Focus and Rationale

As a school, we are part of the Working With Others (WVO) Project and I am currently the lead teacher. The aim of this project is to teach children the core skills they need to be able to work with others successfully. Having carried out observations both in my own class and across the school, I noted that while most children were effective communicators they were yet to develop the skills of responding and building on each others' ideas. In addition, I wanted to give the children more agency in their learning, allowing them to generate questions and then respond to them.

Implications for my planning and teaching

The implications for my planning and teaching were to foster collaboration and dialogue by discretely teaching the skills of active listening in order to respond and the skill of disagreeing politely. I promoted agency by offering a range of opportunities for children to develop their questions and ideas through active investigation, and for recording and reflecting on their learning in a variety of ways.

Outline of learning activities

Starting point:

To develop dialogue and collaboration, we played 'agreeing' and 'disagreeing' games and discussed 'absorbent' and 'non-absorbent' materials

Activity 1: Raising questions

We raised questions linked to our learning journey *Ice & Fire* and then voted for our favourite question to investigate

Activity 2: Investigating questions 1

We first focused on ‘Which material would be best for cleaning up the Firebird’s wee?’

Activity 3: Investigating questions 2

Then we focused on ‘Which material would be best for making our Firebird’s nest waterproof?’

Activity 4: Recording our findings

I asked the children to write down their findings.

Activity 5: Independent activities

These activities were designed to further the children’s understanding of waterproof materials and absorbency.

Developing the learning journey

Starting point

Rationale: Prior to commencing with our scientific learning, I felt it was really important to teach the core skills involved in active listening and then discuss ‘absorbent’ and ‘non-absorbent’ materials

Activities: Consequently, we played many games over a week with a strong emphasis on disagreeing politely. Before every activity my teaching assistant and I modelled how to share our ideas using the script “I think... because...” And the counter argument “I disagree because...” Initially the children found it very challenging to make decisions and share their ideas without getting frustrated. However, as the week progressed we observed a greater number of children beginning to naturally adopt the script.

Here are some examples:

Ice Cream Vs chocolate:

The children were randomly paired and were given the statement ‘chocolate is better than ice cream.’

Best animal in the world:

In randomly selected groups of six the children had five minutes to decide on the best animal in the world. They had to provide a reason for their choice and justify this to the rest of the class.

Lunch date:

In randomly selected groups of three, the children had to decide who they would go for pizza with out of a section of given character. They had to provide a reason for their choice and justify this to the rest of the class.

Making it non-science based made it easier to focus on the core skills needed.

Using named lollipop sticks to ensure a random selection of children, I grouped the children into threes. I gave each group a bag with four objects and two key vocabulary cards inside, for example, absorbent and not absorbent. The children had to discuss which card matched which object. The adults were asked to stand back and observe, giving the children space to discuss and build on each other’s ideas. After three or four minutes the children moved onto the next bag until they had explored and discussed each of the objects in the ten bags.



E: That paper sucks up water.
 J: Yeah, like my juice.
 E: This (waffle bricks) might suck up water too, it's got holes.
 M: No! It's plastic, so it can't be absorbent. It should go here.
 E: I think you're not right actually because holes do really suck up water.

Photo 1: Sorting Waffle Bricks, Duplo, paper and a sponge into absorbent and not absorbent.

Here, it was interesting to see that E has interpreted the given script in his own way in saying: "I think you're not right actually." This is not something he had been observed saying prior to the active listening input.



H: This one is quite hard, so it might not actually be bendy.
 E: It does. Look! I can bend it right in half. He's a bendy croc!

Photo 2: E proving to H that he could mend his object

Again, while the children were not sticking to the script, there is evidence of E responding to H when he states "it does."

Reflections: As well as observing dialogue and collaboration the sorting activity provided an opportunity for me to observe what the children already knew and spot for any

misconceptions. At this stage, it was beginning to become apparent that there might be some confusion between absorbency and waterproof. I made a note to explore this further.

Developing the learning sequence

Learning activity 1 – Raising questions

Rationale: Following the introductory activity, we had a whole class discussion, ensuring that the children were remembering to use the script: “I think... because...” And the counter argument “I disagree because...” Alongside this, I introduced the questions “who agrees?” and “who disagrees?” By using their thumbs, the children gave me a clear indicator of their levels of understanding.

The discussion gave the children an opportunity to raise questions. As a result, we generated two key questions that linked our science learning journey with our overall class learning journey, Ice and Fire. The questions we decided on were:

1. What material would be best for cleaning up a Firebird’s wee?
2. Which material would make our nest waterproof?

Reflections: We raised many questions linked to our learning journey *Ice & Fire* (and to our Firebird) and then voted for our favourite question to investigate. Children already demonstrate some elements of *collaboration and dialogue*.

Learning activity 2 – Investigating questions 1

Rationale: In the following activity we decided to tackle the question: *Which material would be best for cleaning up the Firebird’s wee (gold glittery water)?* This was an opportunity for children to further explore which materials are absorbent.

Again, the children were randomly grouped using named lollipop sticks. I reminded children that the adults in the room were going to act as observers and that we would only be stepping in if we were really needed. We preempted the activity with a game, to act as a further reminder of how the children needed to use their working with others skills to build on each other’s ideas and to actively respond to each other.

The children were given time to discuss and self-select the objects that they wanted to test from anywhere in the classroom. I did however; ensure that each group included an object with holes in, in light of E’s prediction that objects “with holes in suck up water.”



Photo 3: K, L and E testing their chosen materials

K: We should choose this one. It will certainly suck up the wee.

L: *I agree with you* K, it's kind of spongy, isn't it?

E: Yes, but look at this too. This is sucky isn't it? (holding up a small plastic box.

K + L: Noooooo!

K: That one can't.

L: No, no. That one definitely can't but we can check it if you really want E.

This was one of the first times that I was aware of any of the children adopting part of the script, e.g. "I agree with you K" without being guided by an adult. The children are actively listening and responding to each other.



Photo 4: L, A and I testing their chosen materials

L: This feels funny.

A: It's a sponge. My Mum uses sponges at home to suck up our spills.

I: We do that too. It's really spongy and drinks up the water quite fast.

L: Oh, I didn't know it was that.

Whereas before I frequently observed children making unrelated statements based on their own experiences when they were in group situations, I was now witnessing the children actively collaborating and building on each others' ideas. This was not evident previously.

Reflections: From a scientific standpoint, it was also very interesting to note that through their own explorations and the children’s dialogue and collaboration none of the children observed, left the session still thinking that holes in an object automatically makes it absorbent.

Learning activity 3 – Investigating questions 2

Rationale: In the following session we decided to tackle the question: *Which material would be best for making our Firebird’s nest waterproof?* This was an opportunity for children to further explore which materials are waterproof.

From the initial investigations, it was clear that some of the children had prior understanding that paper is not waterproof but were unsure about any other materials. As before, the children were randomly grouped using named lollipop sticks. The children were given reminders about the adults’ role and a game was used to ‘warm up’ their dialogue and collaboration skills.

In this activity, the children first worked together to build a nest from lego, then selected 5 materials that they thought might be waterproof and tested them. I laid out 3 boxes of different fabrics, e.g. leather, plastic, felt etc. However, I also made it clear to the children that they could use other materials that interested them from around the school environment.



I: “Well, this is not absorbent is it A?”

A: “No. It’s not absorbent now, so it won’t be absorbent later.”

Photo 5: I and A preparing to test whether their chosen materials protect their lego nest

What I really like about this snippet of dialogue is that I is asking A for confirmation. She has her own idea but she is actively seeking A’s opinion. This is not something I think she would have done prior to our input on dialogue and communication.



Before testing...

M: Felt is not waterproof. Hmm. I'm actually not sure.

E: I agree with M. It's quite sucky uppy so it probably isn't waterproof.

L: I agree with you E.

H: So do I E.

After testing...

H: I think the felt is absorbent.

E: I think it's both actually, some water is going through and there is some on top. Look on the bottom, it's soaked.

Photo 6: M, E, L and H testing their materials over their lego nest

The dialogue above shows the children really collaborating and sharing their ideas. They are adopting the script of "I agree with you" and justifying their thinking.

M: I actually think this (stuffing) is not waterproof.

E: You have to explain why M.

M: Well, I don't think it will protect the nest.

L: Do you know nothing about sponges M? This is like a sponge, it will suck up water.

H: I don't think it's waterproof, it doesn't feel like a sponge at all.

L: Can I feel it? It feels cloudy. It is waterproof because it looks spongy.

E: Shall we try it?



Photo 7:

Science through collaboration and dialogue

I was very excited to hear E reminding M to explain his thinking here. M didn't fully expand his thinking however he did respond and responded positively, which was a step forward for him.

What is evident from the children's dialogue is that there are still misconceptions about the difference between waterproof and absorbency. This was highlighted further still the next day during an independent learning session when F was convinced that paper towels are waterproof despite a clear demonstration of the opposite by W.

Reflection: The children are clearly collaborating and helping each other move their thinking on.



F: I think the paper towel is waterproof because it will soak up the water.
W tried to show F that it soaks up water.
F: But now the table is dry.

Photo 8: Helping each other move their thinking on

Learning activity 4 – Recording our findings and further investigations of waterproof materials

Rationale 1: To capture our investigations, we decided to first record our findings and then continue extending our explorations of different materials.

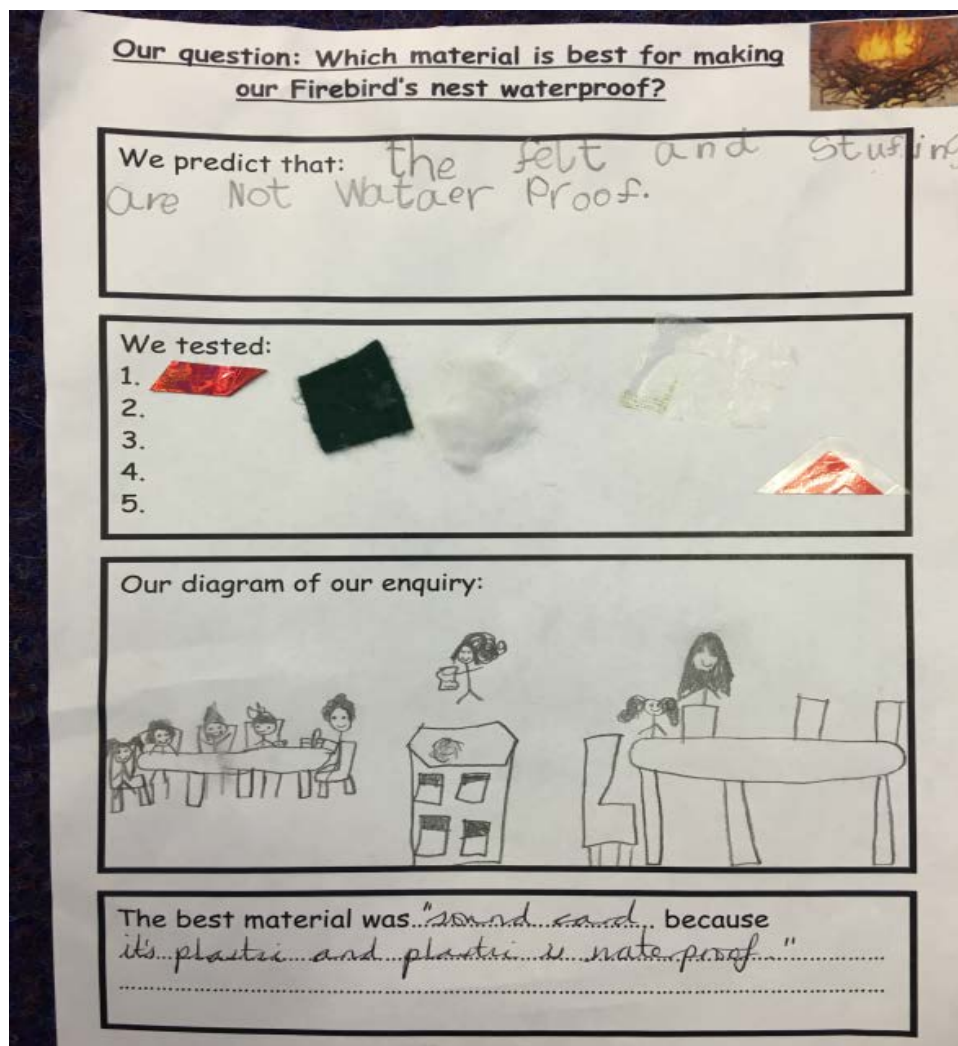


Photo 9: Recording our findings

Rationale 2: To enhance the children's understanding of the word 'waterproof', I waited for the next rainy day and took the children outside, in their coats to play in mid to heavy rain for fifteen minutes.

When we came back in we inspected our coats to see if any water had soaked through to the inside. I targeted F and his coat in order to tackle his previous misconception.



Photo 10: Why is F's coat dry?

Me: I wonder why F's coat is dry on the inside?
 L: Because it's plastic and that is waterproof.
 I: Yeah and water can't get through plastic.
 A: I agree because plastic is definitely waterproof.
 F: So the water is not going in because it's waterproof.
 M: Yes, that is what is happening but not to my coat! Look! It's wet inside!
 F: Your coat is not waterproof then L!

Not only is F actively listening to and learning from what he is seeing and hearing around him but the other children are engaged in their own dialogue about what they have just experienced.

Me: What do you think would happen to M's tummy if she wore this fluffy jumper outside in the rain?
 L: Her tummy would get really, really soggy and wet.
 E: I agree with L.
 M: So I do because that furry stuff will never be waterproof.
 F: The water would go through there wouldn't it if it's not waterproof?
 L: Definitely!



Photo 11: Investigating 'waterproof'

Notice how F intervened again and was supported by L in forming a new idea of what waterproof means.

Reflections: While the initial question was prompted by me the children responded by conversing between themselves with no other input from me needed.

Learning activity 5 – Independent activities

Rationale: These activities were designed to further the children's understanding of waterproof materials and absorbency and they were encouraged to identify new questions to challenge their thinking.

O: The water has gone through it, so it's not waterproof. I thought that. I was right! Did you think that N?



Activity 1: Children were free to access any materials and test them in the water tray.

Photo 12: Independent

Activity 2: Children had to sort test materials to see if they were waterproof.



L: Oh! Biscuits aren't waterproof. I did not know that.

Photo 13: Using technology

Activity 3: On the computer, children had to follow the instructions to collect the correct materials according to their properties, to make a raft.



Photo 14: Making a raft

Reflections: The children enjoyed learning through play and many have started questioning their friends.

Overall Reflections

Children's progress

Ebie has become **more reflective** about in response to other children's ideas. "I agree with M. It's quite sucky uppy so it probably isn't waterproof."

Ebie is **adjusting his ideas based on what he observes** and inline with ideas of the other children. Initially he said "I agree with M. It's quite sucky uppy so it probably isn't waterproof." Following the test he said: "I think it's both actually, some water is going through and there is some on top. Look on the bottom, it's soaked."

Morgan has developed a **greater curiosity** in science and has begun to **formulate his own questions**, M: "What I actually really want to know is would a purse be waterproof?"

Morgan is showing more inclination to join in with a group and contribute his ideas, without being prompted.

Review of children's progress

- Children are increasingly building on each other's ideas, using the given script to create new science based ideas and connections.
- Increased ownership of and agency within the science activities.
- More enthusiastic and motivated – they LOVE science (and great feedback from parents too).

Teacher role

- I provided for a lot more science happening in the classroom now. I have raised the profile of science.
- I taught the core skills of active listening to provide children with the language and the script that they needed in order to build on each others science based ideas and create connections to their existing scientific knowledge.
- I observed the children during science activities and intervened with judicious questioning where appropriate.
- I allowed the children to generate their own questions to increase motivation and engagement.

Classroom environment

The Year one classroom is set up in the style of an early years foundation stage classroom, for example, a role play area, a writing area, sand and water play etc. with children able to engage in child initiated learning activities.

There is always quality science provision on offer and often a choice of options. This has given children the opportunity to follow up their investigations, collaborate and practise the skills they have learned.

Next steps for learning and teaching

- To investigate the children's additional questions: Can we race the Firebird's eggs? How can we make them speedy? Which material would make our nest cosy?
- Continue to develop children's reasoning skills so that they can justify and explain

their ideas to each other in greater depth.

- Continue to link science to our learning journey, to give children greater agency and ownership and for the adults to stand back!

Reflection questions for the reader

- How do you encourage children to discuss and build on each other's ideas?
- Is there any key language that you model to support effective dialogue and collaboration?
- What do you do to ensure that the children are motivated and engaged in their learning in science?

Practical Information

- A tray with glittery water (to act as the Firebird's wee).
- Every day classroom objects (self selected by the children).
- 3 boxes of different fabrics, e.g. leather, plastic, felt etc.
- Lego for building the nests.
- Teat pipettes.
- Beakers for water.
- Bags or boxes.
- Key vocabulary.
- A variety of every day objects for each group to sort



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