

Learning Journey: Everyday Materials

Age: 5-6

Learning activities: Planning investigation /Making Connection/ explaining evidence

Synergies: collaboration/ problem solving and agency

Creative Dispositions: making connections/ working together/thinking skills and

Contextual factors: Group work

Background Information

School setting: Inner London

Age of children: 5-6 (Primary Year 1)

Science Policy: Science lessons are taught once per week for 1 hour

Links to the National Curriculum:

- To identify a range of every day materials
- To distinguish an object and the material from which it is made.
- To describe the simple properties of a variety of everyday materials.
- To use simple equipment to carry out a simple test.
- To record findings using simple scientific languor, drawing and labels.
- To use my observations and ideas to suggest answer to a question.

Setting the Scene

Focus

This project was to focus on developing children's collaboration and problem solving and providing them with opportunities to work together and make decisions on how best they can solve a problem.

Rationale

The children are generally motivated and curious but are quite reliant on adult support in order to solve problems. Also, in group activities the more vocal children will dominate and share their ideas without giving less vocal children a chance to share their opinions.

My aim was to build on their motivation and active curiosity in terms of guiding them to work collaboratively, making decisions on how to carry out an investigation and coming up with a solution for a problem. I wanted to give the children the opportunity to steer the direction of the learning and to feel they were part of the decision making process.

Implications for my planning and teaching

The implications were to foster collaboration by getting the children to listen to each other as they share their ideas, giving group member as chance to speak and to promote problem solving and agency. My role was also to ask questions to

encourage children to make connections with what they already know about materials in planning investigations and explaining.

Group work was also an important feature in my planning. I aimed to build on children's collaborative skills to foster sharing of ideas - identifying and solving problems and reflecting on their developing knowledge and understanding.

Overview of the sequence of activities

Starting points

- **Whole class discussion - Finding out what children already know about materials**
- **Materials Hunt** - exploring classroom objects to identify everyday objects and the materials from which they are made.
- **Properties of everyday materials:** Children explored various objects and decided on adjectives to describe their properties. I asked relevant questions such as; how does it feel? Can you see through the object? Do you know what we call objects that we can see through? This supported them in using scientific vocabulary (transparent, waterproof etc.) when talking about properties and in developing their understanding of the terms.

Outline of learning activities

1. **Sorting objects made from different materials according to children's own criteria**
2. **Investigating the properties of some everyday materials.** The children were given the question (*Which materials are best for making Max's raincoat?*) and sheet to make predictions of which material they think would be best. They then had to come up with ways of testing materials.
3. **Investigating changing state of water.** The children had to discuss and decide on the best way to change solid (ice) to a liquid (water) - the problem to solve was: *How can we get the trapped animal out of the block of ice?*
4. **Finally we reviewed learning across the project.**

I wanted to explore how well children could collaborate in the following situations:

1. **Making decisions on the best way to carry out an investigation**
2. **Carrying out the investigation - Recording their results:** The children drew and labelled their drawings to show the results of their tests and discussed their findings
3. **Explaining and making conclusions based on results/observation.**

Developing the Learning Journey

Starting points

Activity 1: independent work: Materials Hunt

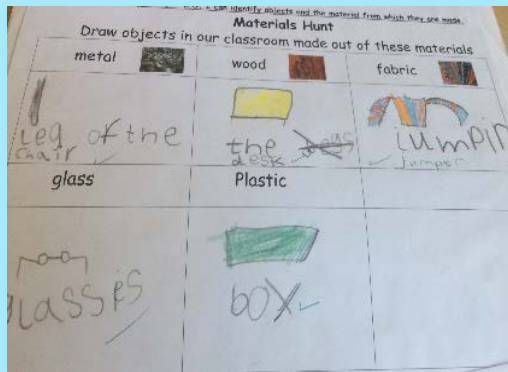
Children finding and recording objects around the classroom that are made from different materials. Children had to differentiate between objects and the materials from which they are made.

Activity 2: small group collaboration

Children exploring everyday objects and describing the materials from which they are made. They used their senses to explore and describe a range of objects made from different materials.

Rationale

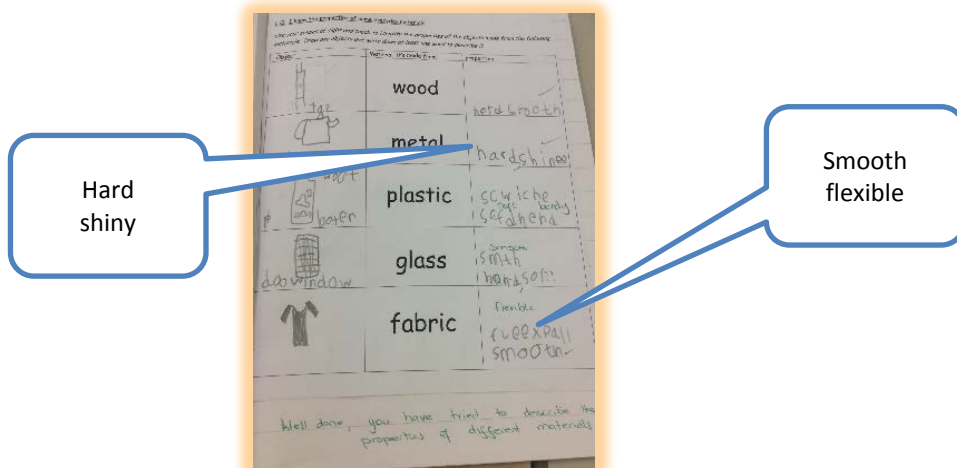
I started with these activities to give the children opportunities to observe, explore and talk about everyday objects in their environment, as well as to introduce the various scientific vocabulary related to in the unit of work



Child's recording of material hunt activity



Children's recording of their work



Hard shiny

Smooth flexible

Children's responses

Children showed a good understanding of the groups of materials and were able to use a range of scientific vocabulary to describe their properties.

Next steps for the children were to develop their problem solving skills to compare and sort various objects, choosing their own criteria and justifying their choices to each other.

Developing the Learning Journey 1: Sorting objects

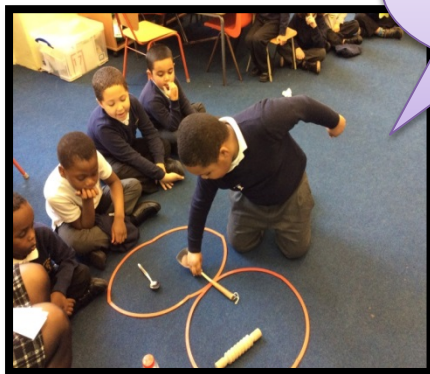
Activity: To sort objects based on children's own criteria

I presented the children with some objects made from wood, metal and both, as well as two hoops. The children's task was now to sort the objects using their own criteria.

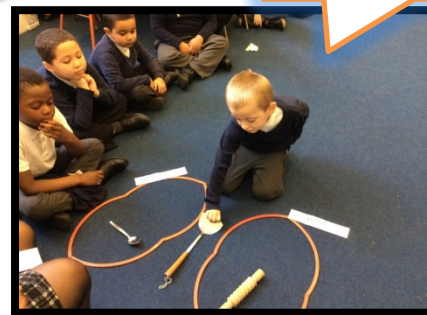
Rationale

The purpose of this activity was to allow children to collaborate and to give them agency in deciding on the criteria to sort the objects. I would need to stand back and allow the children to work independently before asking questions.

Children's responses



Teacher: Why did you sort them like that?



No it has to go in the middle



That's not right
we need another
hoop Ms!

Teacher: Why
did you get
another hoop?

This one is wood
and metal.

Teacher reflection and implications

Children collaborated in coming up with alternative solutions for sorting objects made from more than one material. Perhaps a Venn diagram might stimulate some new thinking. 'Why' questions prompted children to explain their reasoning. But some needed encouragement to share their ideas

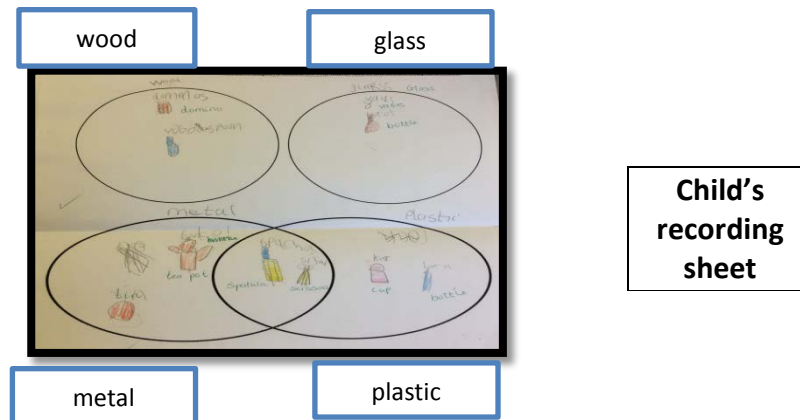
Next steps: Introducing the children to a Venn diagram to stimulate thinking. Plan some scaffolding to encourage all children to share their ideas.

Sorting objects continued

Activity continued Introducing the Venn diagram

After a lot of discussion, I introduced the Venn diagram. Children then continued to sort the objects on their tables using their own criteria, and recording ideas in their books.

Children's responses



Teacher reflection and implications

Without much input from me, children discussed, worked together and made suggestions on how to solve the problem of where to place the object made from more than one material.

They came up with a number of new and plausible solutions. They were quite confident in explaining their reasons for sorting.

However, the children sorted the objects only by the materials from which they were made, but not from their properties.

The children did not make links to the starting activity about the *properties* of materials, as all subsequent groupings were based on just material types. To help them think of other ways of sorting, my next question could have been, *Can we think of any other way to sort these? Why? This could have opened up the activity and increased their agency.* This led to the next activity where they would have to think about the physical properties of materials.

Developing the learning journey 2: Investigating properties of materials

Activity: Which materials are best for Max's raincoat?

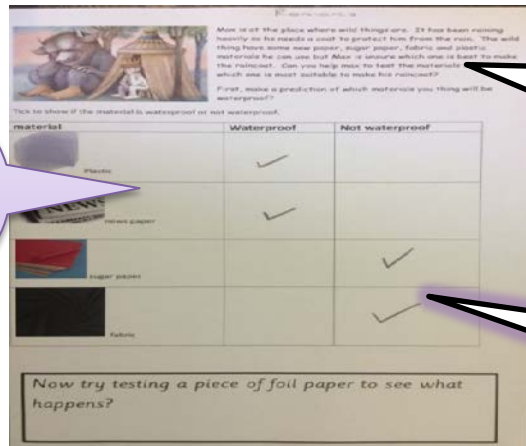
Can children use what they already know about the properties of materials to make a prediction about which materials they think would be best for making Max's raincoat and give reasons for their choices? Can they make decisions and carry out their investigations independently?

Rationale

This provided an opportunity for children to make predictions based on previous knowledge of the materials they were given, as well as collaborate and come up with ways to test their predictions to see if they were correct. I wanted to make sure they were developing independence in making decisions.

Children's responses

Teacher: Look closely at the materials at the table, which one do you think will be



material	Waterproof	Not waterproof
newspaper	<input checked="" type="checkbox"/>	<input type="checkbox"/>
sugar paper	<input checked="" type="checkbox"/>	<input type="checkbox"/>
paper plates	<input type="checkbox"/>	<input checked="" type="checkbox"/>
fabric	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Now try testing a piece of foil paper to see what happens?

The paper and plastic can cover you in the rain

I think the plastic because you won't get wet

Teacher reflection and implications

Children predicted the plastic would be best for making the raincoats, linking this to what they know about raincoats, that it protects you from the rain. However, some of them also chose other materials, such as newspaper. Children used what they already knew to discuss, make and record their predictions. Can children find ways to test the materials to see if their predictions were correct?

Developing the learning journey 2 continued:

Activity: Planning investigations

Can children discuss and make decisions on how they are going to carry out the investigation and do so? Children worked in small groups of 6, discussing how best to carry out the investigation.

Rationale

This was an opportunity to observe how children: used the simple equipment, carried out the test and collaborated and solved problems

Children's responses



You have to put water in the cup and put paper on it then tip it over.

It's not waterproof, it will rip.



That's a bad idea because if you put water – water can easily go through the paper. If you tip water on paper it will get wet

Teacher: What if we take turns to speak, starting with you H?

Teacher reflection and implications

The children were motivated and curious about the resources. They immediately started selecting resources, working and generating ideas in pairs (rather than as a whole group). They were eager to show/tell their partner how it should be done. I needed to support and guide children through questions to help them share ideas as a group.

Children had good ideas and came up with some plausible ways of conducting the investigation. For me this was a dilemma as they were trying out ways of testing that were different from my preconceived ideas. If I want to develop their agency then I need to stand back and not give them my solutions.

Next steps: The children reasoned their ideas for carrying out the investigation.

Can they test their ideas? Is the group size was too large? Should I have put out greater range of resources to support and allow them to choose in order to develop their ideas independently?

Developing the learning journey 2 continued:

Activity: Exploring resources

Children continued to explore the resources, discussing and trying out different ways to test the materials.

Children's responses



One child placed the plastic, fabric and newspaper over the cup all at once.



Teacher: Why do you think you were given four of each?

We can do this – the child then took each material and placed them over the cups.

Teacher reflection and implications

My questioning encouraged children to articulate their thinking but I needed to ensure that my questioning wasn't closing down opportunities for children to come up with their own ideas.

The children were very motivated and curious to try out the resources, especially the pipettes. They used their imagination, and reasoning skills to try different ways of solving the problem of how to test the materials.

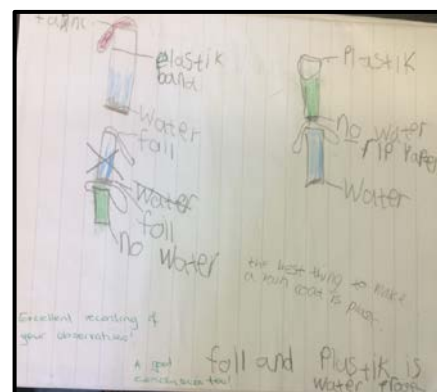
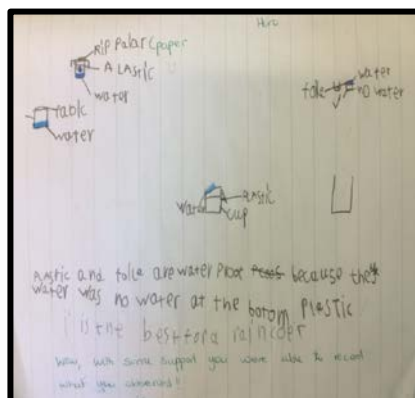
It was important to give children *time* to explore the resources. They used resources in *new and unexpected ways*! Finally, they independently tested the materials, placing each on a cup then pouring water on. If I want children to have agency though, it is important to accept that they will not all be doing the same experiment.

Developing the Learning journey 2 continued:

Activity: Observing and recording results

Children also recorded the results of their challenge, testing foil and paper.

Children's responses



Teacher reflection and implications

The children tested the materials and observed & recorded results. They made conclusions, explaining what they observed and connecting their findings to the original problem.

I have learnt that in order to support children's agency, I need to ask more open, rather leading questions, plan resources to support a variety of outcomes and to plan ways of enabling children to move from collaborating in pairs to collaborating in bigger groups

Developing the learning journey 3: Freeing animals from the ice

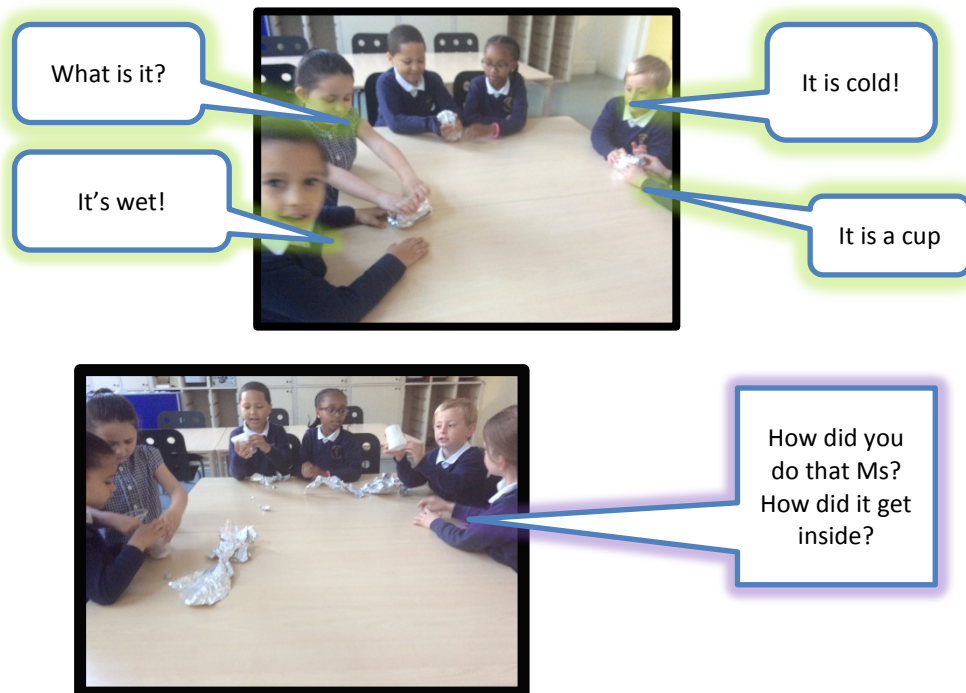
Activity: Suggesting ways to free the animals

The children were given parcels wrapped in foil to handle and describe what they noticed and felt. After exploring the parcel, they were asked to unwrap it. They realized that inside were toy animals trapped in ice. They had to work together to suggest and compare ways to help the animals escape.

Rationale

This activity provided the children with opportunities to learn about the properties of water – that it freezes and melts. I wanted the children to use their thinking skills and everyday experiences to make predictions, and communicate ways in which to solve the problem.

Children's responses



Teacher questions:

Why is it wet and cold? Will a cup be that cold? Can you bend or stretch it?

Teacher reflection and implications

Children were quite excited and curious about the parcel. They were all eager to find out what was inside. I provided an element of surprise. As the children unwrapped the parcels they were amazed to find animals trapped inside the block of ice, which provoked / raised questions.

I needed to ask questions to support discussion in pairs, and in particular 'why' questions to encourage children to explain their ideas. I also needed to intervene so that the children shared their ideas with other pairs to support collaboration. Children were distracted from discussing the properties by the cup shape of the ice. Would have been better to freeze the objects within a more uniform ice shape.

Developing the learning journey 3 continued:

Activity: Suggesting ways to free the animals

The children collaborated in a group of 6 to come up with different ways to get the animals out of the ice and solve the problem in pairs. I allowed time during the day for the children to keep checking the ice cubes that took a longer time to melt before we discussed the result.

Rationale

- To foster sharing of alternative ideas and agency in planning how to solve the problem
- To encourage children to explain and evaluate their ideas

Children's responses



Child banging with hammer



Child pouring warm water on



Child leaving ice on radiator

Children's suggestions

- Melt it
- Bang it with a hammer
- Hold in my hand
- Put water on it
- Put it on the radiator

Teacher questions

- How can we get them out?
- Are there any other ways we could get the ice to melt?
- Why the radiator?
- What type of water do you think will make it melt quicker?
- Which way will be the fastest to get the animals out?
- Is that also the safest way?

Teacher reflection and implications

Children had great ideas and decided on the approaches above to test them, themselves. However, I was surprised no one suggested putting it out in the sun. My questions promoted alternative ideas, reasoning and evaluation of the different methods.

Developing the learning journey 3 continued:

Activity: Checking and Explaining the Results

Children's responses





Teacher: So we started out with ice, what is it? solid or liquid?

Child 1: Solid.

Teacher: What happened to the ice?

Child 2: It turns into something else, water.

Child 3: It turned into water and the toys came out.

Teacher: If ice is solid what is water?

Child 1. Liquid.

Teacher: What happened to the ice?

Child 2: It melts.

Teacher: Yes the ice thawed out.

Child: What is thawed?

Teacher: Why did it melt? What caused it to happen?

Child1: Because there is hot air and it started to melt.

Child3: Because of the hot water and because of the radiator in the room.

Teacher reflection and implications

Through discussion, scientific vocabulary such as (melt, thaw, liquid, solid) was introduced naturally into the discussion.

Children collaborated and made decisions on how to test ideas.

They explained what they observed and made connections to their own experiences of – solids melt to become a liquid.

The key implication for my future practice is for the children to given opportunities to come up with a range of ideas and allowed to try them out - even if I think their methods are not the ones I planned for, as these will still present learning opportunities and foster children's inquiry and creativity.

Overall Reflections

Review of children's progress: linked to initial aims

Learning activities

- *Planning investigations:* The children made good progress with making decisions about how to plan their investigations and by the time we did learning journey 3, they independently decided on their own processes for freeing the animals.
- *Making Connections:* The children were able to make connections with real life experiences such as heat will cause the ice to melt.
- *Communicating and explaining evidence:* By the end of the project, the children were more confident at explaining and communicating (both orally and in written forms) what they have observed and the simple conclusions they have made.

Creative dispositions

- *Motivation:* The activities provided a good motivation and children were eager to get involved.
- *Ability to come up with something new:* Children were able to think of and come up with new ways of sorting.
- *Making connections:* They made connection to their own experiences.
- *Working together:* Although all the children made good progress working together in a small group and one of the quieter children is more willing to share her ideas with the group without prompting, the more dominant speaker sometimes had to be reminded to take turns and allow others to speak.

Children's progress: examples



R usually shares his ideas if he thinks they are correct. He was given more opportunity to develop problem solving and agency than before. Throughout the episodes he was more confident at sharing more detailed ideas without worrying too much about getting them wrong. He was able to work collaboratively, make suggestions and solve problems.

Next step: To be given the opportunity to answer 'why' questions and to make links with what he knows to solve problems.

Child R: It was so fun, because I got to use the things.



H is very articulate and is always over enthusiastic to share his ideas with others. However, he gets distracted quite easily, speaks out of turn and has the tendency to 'go with his ideas' without taking into account the ideas of others and struggles to write down his ideas. H is getting much better at listening to others during collaboration, as well as, communicating his ideas in written form.

Next step: To use scaffolding to structure his exploration.

Child H: It was good and I had fun playing with the water and those things, the pipettes.



S.L. has a positive attitude to learning, listens well and follows instructions. She can be quite reserved, will work independently and doesn't always share her ideas within small group or in whole group sessions. Throughout the episodes of learning, she has grown in confidence. With a little encouragement, she will share her ideas, makes suggestions and collaborate with others.

Next Step: Provide more opportunities to promote risk taking and sharing ideas with others.

Child S.L: I got to do fun stuff, testing the stuff to see if water could come through

Reflections on my role as a teacher

I recognised the importance of the following:

- Continuous assessment.
- Recording observations
- Asking relevant questions to support children's thinking
- Guiding children in taking turns, listening to each other and giving others a chance to speak
- Keeping focus children in mind (listening, working with them, recording what they say/do)

- Developing the children's scientific thinking skills e.g. questioning, helping them to make connections with the task and resources.

The classroom display contributed to the children's learning journey as it had a range of objects with the materials from which they are made, also the appropriate scientific vocabulary related to the objects and the materials.

Next steps for learning and teaching

- Think more about my role - provide children with resources to explore, while standing back and observing more.
- Think more about my questions when planning and encouraging children to ask their own questions.
- Building on children's ideas, instead of using my preconceived ideas.

Reflection questions for the reader:

- In what ways do you open up activities to allow children to make their own decisions?
- What are the opportunities for creativity?
- How do you organise groups in your class (group composition and size of groups) and why do you organise them in this way?
- In what ways do you foster collaboration and exchange of ideas?
- What strategies do you use to manage group work to ensure all children make progress?



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