For children, ‘materials’ often mean fabrics or textiles when in fact we can use it to mean any substance. Materials exist as solids, liquids or gases and as mixtures of these and when introducing their classification it is worth beginning with this grouping especially with young children, since, for example, many of them think of liquids as being only water. Materials are also natural or man-made. Confusion often arises for children because man-made materials can be divided into two groups; those that are derived from natural products but are refined or altered by man for his use, and synthetic products originally derived from substances from the Earth and then changed chemically into new products. A further complication comes from the fact that some things originally made from the natural material like candles from beeswax, are now more commonly man-made, in this case from paraffin wax. At this stage it is also worthwhile discussing the term man-made where the word man is used generically and not specifically.

**Natural materials** include wool, cotton, linen, leather, wood, cork, stone, gravel, sand, salt, coal, gypsum, talc, some metals eg gold and silver, silk, oil, gemstones, beeswax.

**Converted raw materials** include pottery, china, earthenware, most metals eg steel and aluminium, coke, charcoal, rubber, paints, some medicines and drugs, paper and viscose.

**Synthetics** include plastics, polyester, acrylic, PVC, nylon, polythene, glass, some other medicines and drugs.

Materials are used for different jobs on the basis of their properties, so young children need to begin to identify such properties before they can consider the suitability of materials for different uses. They can group materials on the basis of the simple properties that they can experience with their senses, beginning with simple ideas such as texture, and building up to more complex concepts, such as elasticity. A large amount of descriptive vocabulary can be introduced in this context.

Most towns and villages have areas where glass, paper and metals can be taken, sorted and put into the appropriate bins for recycling. This science topic is an ideal opportunity to raise the children’s awareness of this idea.
SKILLS

- Describing with increasing accuracy using the senses.
- Grouping according to different and given criteria.
- Carrying out simple tests.
- Working cooperatively.
- Recording in different ways.
- Use software to combine words and pictures about objects.
Key ideas and activities

The senses can be used to explore the differences and similarities between materials.

(a) **Tactile** Prepare a ‘feely’ bag with different objects inside which have a variety of tactile properties. Pass the bag round, let the children feel an object without looking and describe what they feel, then pass the bag on. Include bendy, stretchy and squashy objects.

(b) **Observation** Children draw some objects and describe them; include transparent and shiny objects. Encourage the children to name the material the objects are made from.

(c) **Sense of smell** Prepare some ‘smelly’ materials and put them in opaque jars or boxes with lids. The children take off the lids and describe the smells without looking inside. (Use small pieces of soap, spices, onion, herbs, cotton wool soaked in vinegar, lemon juice, coffee.)

(d) **Hearing** Show the children a tray of objects, then unseen you tap the object (set up a screen or get the children to turn round) and the children guess which one it was and describe the sound. Include soft items such as a cushion so that they hear nothing even though you are hitting it. (Noise pollution is often a consideration in using a material eg rubber feet on furniture.)

(e) **All the senses** Give the children different objects which they describe using all their senses.

(f) **Sorting materials using the senses** Children can begin to classify and sort objects and the materials from which they are made. Set up different tables displaying different types of materials eg a table of shiny things, transparent things, soft things, and get the children to record the object, material and its property.

Include a table of materials that may be stretchy or squashy, older children can be introduced into the idea of materials being ‘elastic’.

<table>
<thead>
<tr>
<th>Object</th>
<th>Material</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear</td>
<td>Wool</td>
<td>Soft, Warm, Squidgy</td>
</tr>
<tr>
<td>Car</td>
<td>Metal</td>
<td>Hard, Cold, Shiny</td>
</tr>
</tbody>
</table>
(g) **Materials may be sorted in various ways** Re-sort some of the materials in a different way eg a glass is transparent and hard.

(h) **Recognising materials/objects using a verbal description**

Play an ‘I spy’ game, describe an object or material and the children guess what it is from your description.

such as drawing, painting and using materials to make collage can be used here very effectively. For example, get the children to make collage using only paper, only shiny materials, only natural materials etc.

(a) **Naming and sorting** As in activity (f) above set up tables of different, named materials – wood, metal and plastic, and get the children to record in this way. They can begin to do Venn activities using hoops to sort the materials and eventually recording using Venn diagrams. At this point it is worth discussing how objects do not always look as though they are made from the same material, even though they are, and this is because of the variation within the same material, eg different types of woods and plastics. Older children can be introduced to specific names of materials, such as polythene bag instead of plastic bag, stainless steel rather than metal.

(b) **Matching card game** Make or purchase a matching materials card game for the children to play, where children match a picture with the name of a material that it may be made from.

So they may match a picture of a bucket with ‘plastic’ or ‘metal’.
(c) **Natural and manufactured materials** Begin to discuss the idea of natural materials using obvious examples such as wood as natural and plastic as man-made and get the children to record some and say their origin, eg draw a wooden object and a tree. A *sorting activity* could be done also using natural and man-made as the criteria. Older children can consider sorting man-made products into synthetics (raw materials that have been chemically changed such as nylon) and non-synthetics (converted raw materials such as pottery).

(a) **Different uses for the same material** Using for example, a ‘wood’ table, discuss the uses of the different objects made of wood and get the children to record these or their own objects or collect pictures and record the uses. Do this for a variety of materials.

(b) **Objects used for the same purpose made from different materials** Look at a collection of similar objects eg mugs and discuss what they are made of. Do this for some other objects, eg shoes, hats.

Some of these activities may be set up as simple classification investigations by asking the children how they would find out which things were for example magnetic or floated. Older children could investigate Are all metals magnetic? Which is the best magnet?

(a) **Ability to float** Get the children to test a range of objects and materials using bowls or plastic boxes of water. Get them to change the shapes of some materials to see if it makes a difference, eg foil and plasticine screwed up and made flat.

(b) **Magnetic or non-magnetic** Give the children magnets and a selection of objects including metals and non-metals to find out which are magnetic. This can be used as a simple classification activity which they can record in chart form.

(c) **Ability to change its shape** Which materials will change their shape and remain in the new shape (plastic) or return to their original shape (elastic)? Give a variety of materials to test including, clay, (part of an art activity), plasticene, Blu-tack®, foam sponge, elastic bands, nylon, rubber ball, plastic rulers.

<table>
<thead>
<tr>
<th>Object</th>
<th>Material</th>
<th>Change Shape</th>
<th>Go back again</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball</td>
<td>Rubber</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lump</td>
<td>Plasticene</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
d) **Waterproof** Which materials are waterproof? A simple way to carry out this activity is to lay different materials onto paper and, using a dropper, drop water onto the materials. If the water goes through, the material is not waterproof, if it sits on the top it is. Alternatively, stretch equal sized pieces of material over jam jars and drop equal quantities of water from a dropper onto the fabric. Water will sit on the top of waterproof materials. A chance to discuss 'fair testing'.

(e) **Absorbency** If a material is not waterproof then it may be absorbent and sometimes absorbency is a quality that we want, for example, in blotting paper and babies’ nappies. Absorbent materials will hold a lot of water in their fibres. The waterproof activity above can also be used to test for absorbency. Instead of dropping equal quantities of water onto the fabric, water is dropped on continually until the fabric will hold no more and the water just drips into the jar underneath. The amount of water absorbed by each fabric can then be recorded. The most absorbent fabric is the one that holds the most water. Older or more able children could plan their own investigation; ‘Which is the most absorbent cloth?’

(f) **Making waterproof paper** This activity can have cross-curricular links with art. Rubbing or drawing with wax crayon or candle onto paper then washing over the picture with a paint or ink wash. Children can see that the wash does not go where the wax has been.

(g) **Drying fabric** Investigate Which fabric dries the fastest? An opportunity to involve fair testing using equal sized pieces of fabric, measured equal volumes of water, timing, and recording results in a block graph. This is also an opportunity to use science in an example of an everyday activity.
Use the same size fabric and the same volume of water each time.

Where shall we put our washing line?

A graph to show the time taken for fabrics to dry

<table>
<thead>
<tr>
<th>Fabrics used</th>
<th>Time in hours to dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyester</td>
<td>2</td>
</tr>
<tr>
<td>Cotton</td>
<td>3</td>
</tr>
<tr>
<td>Acrylic</td>
<td>4</td>
</tr>
<tr>
<td>Cotton Jersey</td>
<td>5</td>
</tr>
<tr>
<td>Wool</td>
<td>7</td>
</tr>
</tbody>
</table>

h) **Transparent papers** Which papers can you see through clearly (transparent), which show the light through (translucent) and which show nothing through (opaque)? Children can investigate papers and put them in an order of transparency. Older children can learn the correct terms.

(i) **Writing/drawing paper** Is all paper good for drawing on? Investigate which is the best. This activity is beginning to look at the specific uses of a material for a purpose, and is very appropriate for young children. All children have experienced the

<table>
<thead>
<tr>
<th>Writing Tool</th>
<th>Type of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cartridge</td>
</tr>
<tr>
<td>Lead Pencil</td>
<td>Good</td>
</tr>
<tr>
<td>Coloured Pencil</td>
<td></td>
</tr>
<tr>
<td>Wax Crayon</td>
<td></td>
</tr>
<tr>
<td>Pastel</td>
<td></td>
</tr>
<tr>
<td>Chalk (White)</td>
<td></td>
</tr>
</tbody>
</table>
frustration of paper that you can’t draw on properly. This investigation is simple, keeps the variables to a minimum and they can use the paper they test as a record for their results. They could also try different writing implements on different paper. The children can chart their results.

**Woolly Saucepan** The wrong materials used for things, as the name suggests.

**Bottle Bank** At the bottle bank, things are sorted according to the colour they are.

**Grandparents House** In the house there are lots of interesting things made from different materials.

**Scoop a Gloop** Clay is a very tactile material, which also has a distinctive smell. It can change its shape and finally becomes hard.

**Night-time Kitchen** The different materials used in the kitchen.

**Rubber Dubber** Balls are made of various materials, this one is rubber and bounces.

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**Woolly Saucepan**

Could I have
a woolly saucepan
a metal jumper
a glass chair
and a wooden window-pane please?

Er-sorry – I mean
a woolly chair
a glass jumper
a wooden saucepan
and a metal window-pane please?

Er-sorry – I mean
Oh – blow it!
You know what I mean, don’t you?

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**Bottle Bank**

The bottle bank
gobbled up my bottle
and the bottle bank
went clank.

That’s bad. Look at all the work I do

giving it hundreds of bottles to chew.

And that’s not all:
at home,
we’ve got three bins:
one for bottles,
one for paper
and one for tins.

After all that work
I don’t think
a bottle bank
should just say clank.
I think
bottle banks
should say thanks.
**Grandparents' House**

At my grandparents' house
they've got a very old plate
with a gold edge round it
and my grandad says,
it's real gold
that's so thin it's like paper.

At my grandparents' house
they've got a very old picture
made of wood,
and my grandma says
that her grandad made it
by cutting out lots of tiny bits
of different kinds of wood
to make all the colours.

At my grandparents' house
they've got a very old newspaper that tells the story of how
when my grandparents
were teenagers
they once rowed out to sea
and nearly drowned
and the paper has gone all brown.

At my grandparents' house
they've just fitted a new kitchen
and it looks like it's made of wood
with all the lines and whirly bits
but really it's plastic.

I love going to my grandparents' house
and looking at all their stuff.

**Scoop a Gloop**

Scoop a gloop
of slimy clay
squeeze it, knead it,
pummel it, stretch it
roly poly, roll it
into long, thin
sausages.

Bend them, coil them
one on top
of one another
up and up
and round and round
to make a
pot.

It's still soft
and leans a bit
but wait –
and wait –
it slowly hardens
sits dry and dusty
crisp as a biscuit.

Don't tap
or drop
it'll crack
or crumble.

Take it gently
to the kiln
and under fire
of fantastic heat
it strengthens
toughens
enough
to let you
use your spoon
or run your
thumbnail
up and down
your clever coils.
Rubber Dubber

Rubber dubber floucer bouncer up the wall and in and outer under over bouncing backer mustn't dropper mustn't stopper in betweener do a clapper in betweener do a spinner faster faster to and fro-er rubber dubber floucer bouncer

BUT
then oh bother! Butter finger dropped the ball and pitter patter patter patter rubber ball ran right away.

Night-time Kitchen

It was all dark in the kitchen
Everyone was in bed,
when suddenly the saucepan said
'It's time I had a bit of respect around here.
I get thrown about, banged down, scraped with a spoon,
left for hours covered in old food.
I am made of the finest steel.
I want everyone to know that if it wasn't for steel
and all the other metals round here this whole place would grind to a standstill.

Without us, there would be nothing.
We are the most important.
They wouldn't be able to cook without their metal cooker.
They wouldn't be able to eat without their metal knives and forks.
They wouldn't be able to drink and keep clean
if it wasn't for all the metal pipes.

From now on everyone round here should call us Lord.
Lord Saucepan, Lord Spoon, Lord Tap and -'

The breadboard had been listening to all this and was getting cross.
'Hang on there, Potty! Those of us round here who are made of wood think we've got a case.'
'Huh!' said the saucepan, 'hark at old Blockhead!'

'No, listen. Without wooden table and chairs they'd be eating off the floor. But without wooden floorboards they'd be eating off the ground. But without the wooden beams the house would fall down on everyone so no one would be left alive to use you, Mr Potty. If anyone round here ought to be called Lord it's people like Floorboard.'

'So,' said the saucepan, turning to the window, 'who's the most important round here? Metal or Wood?'

And the window said, 'This is crazy.
We don't think either of you should boss over the rest of us. You're both great stuff - different but both great.

But watch it - You saucepan. They're making glass saucepans, these days. And you, table! Glass tables are really rather fancy.'

And at that metal and wood agreed to respect each other though they're still arguing they would stop rowing though they're arguing over which of them should be the door handle!