Responding to pupil’s needs when teaching Science

***The importance of Science to pupils with learning difficulties***

Learning science gives all pupils the opportunity to think and learn, and develop an interest in, and curiosity about, the world around them through exploratory and investigative experiences and activities.

In particular, science offers pupils with learning difficulties opportunities to:

* Develop an awareness of, and interest in, themselves and their immediate surroundings and environment
* Join in practical activities that link to ideas, *for example, doing and thinking*
* Use their senses to explore and investigate
* Develop an understanding of cause and effect

In response to these opportunities, pupils can make progress in science by:

* Experiencing that personal actions have consequences, leading to the seeking of explanations, and an understanding of the links between cause and effects
* Increasing the breadth and depth of their experiences, knowledge and understanding
* Linking and applying scientific knowledge and understanding to everyday life,  *for example to cooking, to their own health, in the use of materials for functional purposes*
* *Investigating the familiar, and later developing a broader environmental and technological perspective*
* *Developing an understanding of the more abstract as well as the concrete and practical*
* *Moving from description to explanation of events and phenomena*

***Scientific enquiry***

**Planning**

Planning involves anticipation, thinking about what might happened, and deciding what action to take. It begins with the awareness that actions have consequences and that these are linked, *for example, operating a switch to play music or move a toy*. Anticipation can be encouraged by exaggerating and building-up a coming event, for example, ‘wait for it, wait for it…’.Taking part in the planning process for an investigation is made easier by offering alternatives, brainstorming ideas, and encouraging pupils to think about previous experiences and knowledge.Teaching this aspect across the key stages can help pupils to:

* Respond to, and answer, scientific questions (at first it may be necessary for staff to give pupils examples of questions and ways of answering), leading to asking scientific questions, *for example, what will happen if…..?’ ‘why did….?’*
* Think and communicate about what might happen if, try things out when deciding what to do, and choosing what equipment and materials to use
* Decide what kind of evidence to collect, *for example, surveys, measurement, observation, information*
* Know about the range of available sources of information, *for example, asking people, looking at pictures, photographs, CD-ROMs and the internet*
* Learn about tests that are fair, and those that are not, by taking part in a variety of investigations involving fair and unfair tests

***Obtaining and presenting evidence***

Obtaining and presenting evidence begins with the exploration and investigation of a range of living things, materials and phenomena, using the senses of sight, hearing, smell, touch and taste, as appropriate. Observation is indicated initially by attending, showing an interest in, and manipulating. Care needs to be taken to avoid confusion, and only a manageable amount of sensory input should be presented at any one time. Teaching this aspect across the key stages can help pupils to:

* Follow simple instructions to keep themselves and others safe, *for example, ‘stop’, ‘no more’,*  and learn to take action to control risks to themselves and others
* Use a range of scientific equipment and materials, at first for play and exploration and then in a planned way
* Make observations and measurements, becoming more systematic and accurate
* Record what happens using a variety of means,  *for example, remembering, using symbols to indicate to a member of staff, using sticky symbols on prepared graphs or tables*
* Present the evidence and explain what happened, *for example, summing up using a variety of ways including concrete objects, three-dimensional models, photographs, symbols, tallies, drawings, diagrams, graphs, tape recorders, videos and other forms of ICT.*

***Considering evidence and evaluating***

Considering evidence and evaluating evidence begins with the demonstration of consistent responses and using discrimination during a scientific activity, *for example, choosing certain materials and rejecting others to indicate personal preference.* Teaching this aspect of across the key stages can help pupils to:

* Use evidence for a purpose and recognise its relevance, *for example, selecting fabrics for clothes to keep warm*
* Make simple comparisons and identify simple patterns or associations, *for example, ‘which is the biggest?’ ‘Which is the fastest?’*
* Communicate ‘what happened when…?’ and begin to provide an explanation and compare what happened with what pupils expected, *for example, using before/after photographs or video clips*
* Use observations, measurements or other data to draw conclusions, *for example, after an investigation about freezing and melting, pupils might know and communicate where to put their ice lollipop to keep it frozen*
* Review their work and communicate it to others, *for example, suggesting improvements for the next time*

***Life processes and living things***

**Humans and other animals**

Knowledge and understanding of humans and other animals starts with pupils’ awareness of themselves , *for example, body* awareness and self-awareness, and , at first, relates to personal experience, *for example, food tasting and preferences, experiencing movement, exploring their own body parts and senses.*it leads to a basic knowledge of how the human body works and how to keep healthy. Teaching this aspect across the key stages can help pupils to:

* Recognise that animals, including humans, move, fees, grow, use their senses and reproduce
* Treat animals with care and sensitivity
* Recognise the variety of foods to be included in a healthy diet and the need for a balanced diet
* Observe and explore movement in themselves, other humans and animals, and know about the role of skeletons and muscle
* Recognise that humans and other animals can produce offspring and that these grow into adults
* Know about the main stages of the human life cycle, *for example, babyhood, childhood, adolescence, adulthood, old age, death*
* Be aware that we breathe in and out, into the lungs, and that blood flows through the body
* Recognise the need for personal hygiene and follow simple and safe routines to reduce the spread of bacteria
* Explore different factors that contribute to a healthy lifestyle, including the choices pupils can make, *for example, diet, exercise, effects of tobacco and alcohol, drugs as medicines, keeping food fresh*

***Green plants***

Knowledge and understanding of green plants starts by exploring with the senses, *for example, feeling, smelling and looking at a variety of plants.* Teaching this aspect across the key stages can help pupils to:

* Explore the smell, texture and visual appearance of herbs, flowering plants and other plants
* Recognise
* That plants grow from seeds and that they need light, water and warmth to flourish
* Recognise that parts of a plant, *for example, leaf, stem, flower, root*  leading to an understanding of their role and function
* Observe the life cycle of plants and recognise when they are living or dead, *for example, taking and viewing photographs at different times to show differences*

***Variation and classification***

Knowledge and understanding of variation and classification begins by pupils’ awareness that others are different from them. Teaching this aspect across the key stages can help pupils to:

* Recognise similarities and differences between themselves and others
* Recognise that the variety of living things can be grouped in different ways.

***Living things in their environment***

Knowledge and understanding of living things in their environment starts by exploring the local environments, *for example, the school and its grounds. Teaching this aspect across the key stages can help pupils to:*

* Care for the environment
* Recognise that the different living things are suited to different environments, *for example, fish swim in water, birds fly, plants grow in the earth*
* Explore how the environments provides for living things, *for example, food, shelter/protection*

***Materials and their properties***

**Grouping and classifying materials**

Knowledge and understanding of grouping materials starts by exploring a range of materials with different sensory properties. Teaching this aspect across all the key stages can help pupils to:

* Use all their available senses to explore and make responses to materials
* Match and sort materials and recognise similarities and differences between them
* Discover the properties of different materials, *for example, roughness, ability to float*
* Explore the usefulness of materials with regard to properties, *for example, thermal insulators, electrical conductors*

**Changing Materials**

Knowledge and understanding of changing materials starts by noticing a change, *for example, in shape , colour, temperature.* Teaching this aspect across the key stages can help pupils to:

* Explore materials that change shape by physical means
* Investigate reversible changes, *for example, freezing water, heating chocolate, dissolving sugar in water, drying clay*
* Investigating non-reversible changes, *for example, heating butter and eggs, adding water to plaster, baking clay*
* Recognise how reactions can be useful, *for example, baking powder in cooking,* and not useful, *for example, the rusting of iron.*

***Physical processes***

**Electricity**

Knowledge and understanding of electricity starts by using electrical equipment and items, *for example, through a range of switches.* Teaching this aspect across the key stages can help pupils to:

* Explore/use switches that operate items easily observable outcomes, *for example, on/off, bright/dim light,* and realise that their action causes the effect
* Observe that electricity is used in a variety of ways in school and home,  *for example, light, power, heating*
* Use electrical appliances and everyday equipment safely in functional contexts, *for example, Playstation, cassette or video recorder*
* Build simple series circuits using batteries, wires, bulbs, switches and other components, and test whether a circuit will work by using practical experiments.

***Forces and Motion***

Knowledge and understanding of forces and motion starts by experiencing a range of movements followed by feeling and anticipating their effects, *for example, being pushed on a swing or pulled on a ground sheet.* Teaching this aspect across the key stages can help pupils to:

* Make movement happen by applying a force, *for example, to doors, objects on wheels*
* Recognise that when things speed up, slow down or change direction or shape, there is a cause, *for example, push or pull*
* *Explore resistance to movement,* for example, air resistance and parachutes, friction and different shoe surfaces, water resistance and swimming
* *Investigate the properties of magnets*
* Explore the force of gravity, *for example* , *things fall , gravity pulls things down*

***Light and sound***

Knowledge and understanding of light and sound starts by exploring, recognising and responding to contrasting stimuli, *for example, light and darkness, sound and silence.* Teaching this aspect across the key stages can help pupils to:

* Experience light
* Respond to, locate and track (safe) sources of light
* Explore shadows, reflections, coloured filters and lights
* Experience sound
* Recognise and locate sources of sound, including some that are far away
* Make sounds using objects and materials, including their own bodies
* Explore volume and pitch.

***The Earth and beyond***

Knowledge and understanding of the Earth and beyond starts by appreciating that night and day are different and are associated with two different activities. Teaching this aspect across the key stages can help pupils to:

* Be aware of the sun during the day and know that there is no Sun at night
* Observe how the position of the Sun appears to change in the sky and how shadows change as this happens
* Realise that the Earth is only one of several planets in the solar system.