

Exploration/Maths/Science Policy

The aim of this policy is to define exploration and to clarify our understanding of exploration as the foundation for developing mathematical and scientific understanding. It will describe the approach to enabling pupil development and the assessment of that development.

Exploration can be defined as the search for pattern and order in the world. Children develop understanding of the world around them through experiences of similarities, differences, patterns and changes. At SHS we believe that development of exploration skills is fundamental to the development of understanding of the physical world.

In the early stages of learning, pupils may encounter exploration experiences, which are structured by the adults around them. This structure may include the pace at which new experiences are introduced, the way in which those experiences are managed, the role of the adult and the strategies employed. Children at these early stages of learning may begin their development of exploration skills using a limited range of materials, with frequent repetitions and a framework that provides routine to that experience. Familiarity with the materials will raise the child's awareness. Through raised awareness children will begin to differentiate responses within different exploration experiences.

Throughout the early stages, the adult may be supporting the child to explore with a purpose. As the pupil progresses to responding, coactively exploring and independently exploring experiences, the role of the adult moves from physical support to verbal support, where the adult narrates or provides a commentary to the pupil's exploration experience. It is through the adult support that pupil's exploration experiences are guided to become mathematical or scientific experiences, enabling pupils to develop ideas that form the basis for future learning within maths and science.

The Curriculum – Exploration

Pupils need to have had extensive opportunities to build up their experience in exploration. They also need to develop their curiosity and investigative skills. Pupils with profound and multiple learning difficulties require frequent exploration opportunities and they require a lot of adult support and modelling in order for them to gain these skills. Three developmental stages describe this progress:

As pupils develop their exploration skills using a range of materials, are supported to engage in co-active exploration, and experience frequent repetition of activities, they are being provided with the foundation to develop an awareness of difference and change. In order for pupils to develop this awareness, adults need to limit the range of materials at first, encourage pupils to explore materials in different ways and observe pupils' reactions.

This awareness becomes the basis for children's curiosity, they begin to be more proactive in their interactions, remembering learned responses over longer periods, exploring in more

complex ways, and applying potential solutions systematically to problems. In order to encourage pupils to become more proactive in their interactions, adults need to be aware of their likes and dislikes and to support them to make simple choices.

At this stage of development, pupils are ready to use their experience in exploration and their curiosity to engage in simple scientific investigations. They are able to match and sort objects into single features or properties. Later on, they begin to make generalisations, connections and predictions from their regular experiences.

The Early Years Curriculum has been developed to meet the needs of the pupils in line with the requirements of the Early Years Foundation Stage. The exploration part of the Early Years Curriculum begins in Nursery 1 class, where two years olds are introduced to a restricted range of tactile experiences, which are available every day. This enables children to gradually build their experience of tactile play and to become confident in their exploration experiences.

In Nursery 2, children continue to be offered daily opportunities for independent exploration. These activities change half termly. There is also a daily tactile activity.

In Reception class, exploration activities are timetabled and change more frequently. The links to topics are more apparent and tactile activities begin to have a purpose, for example cooking.

The exploration curriculum in KS1 and KS2 is wholly topic based and largely timetabled. The activities will change at least termly.

The exploration curriculum aims to provide pupils with the opportunity:

- To develop an awareness of, and interest in, themselves and their environment
- For pupils to receive appropriate support for their individual level of exploration development

The Curriculum – Mathematics.

QCA guidance (2009) states that ‘mathematics is vital to everyday life as it encourages logical reasoning’ through the application of the skills of making comparisons, identifying differences, investigating relationships and establishing connections’.

In Early Years, pupils are introduced to basic mathematical language during tactile and water play sessions. Children explore themed areas, for instance objects that are all round. In Reception, there are timetabled sessions for number, colour, shape and space work and routines include opportunities for counting, sequencing and matching.

At KS1 and KS2 the mathematics curriculum is planned in accordance with the Numeracy Strategy. Objectives have been identified within the five strands – using and applying

(problem solving), number, shape, space, measure. The Stephen Hawking objectives are viewed as end of key stage targets, with each target comprising several objectives or small steps achievable by pupils working at P4 or above.

Mathematics is taught as a discrete subject at KS1 and KS2. However, we do recognise that language plays an essential part in the formation and expression of mathematical ideas and it is important that every opportunity to develop pupil's skills in understanding and using related language is taken. This means that mathematical concepts may be part of every daily routine – the daily timetable (concepts of time); what's next (ordering and sequencing events); have we got enough plates at snack time (problem solving); art – is this paper too big (concepts of measure).

The mathematics curriculum aims to provide pupils with the opportunity:

- To manipulate concrete materials in order to acquire sound mathematical concepts
- To use the understanding of pattern, space, shape and number to develop problem solving skills
- To encourage the development of language and communication
- To enjoy experiences and activities which encompass a range of activities which allow for different rates of mathematical development
- For different modes of learning – doing, observation, communicating, listening
- For individual and cooperative work.

The Curriculum – Science

QCA (2009) states that “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.”

Research has shown that children learn best in science when they are engaged in practical activities when these activities are based on pupils existing ideas about the world. From this it has been suggested that Science teaching may involve the following phases:

- orientation – the teacher sets the scene and seeks to arouse learners' interest and curiosity
- elicitation – the teacher helps learners find out, clarify and share, what they already think (structuring their existing ideas)
- intervention – the teacher encourages learners to test their ideas, to extend, develop and replace them (restructuring their understanding)
- review – the teacher helps learners recognise the significance of what they have found out/ learnt and how
- Application – the teacher helps learners to relate what they have learned to their everyday lives.

At Stephen Hawking School Science will be introduced initially by looking at practical situations in the context of familiar environments such as the school, the home and familiar

aspects of the local environment. Initially by the use of concrete experiences, starting with materials the pupils understand and then by building on this knowledge using the phases suggested earlier.

Within the Foundation Stage Science is taught as part of Knowledge and Understanding of the World, Strand A – Exploration and Investigations.

This part of the Foundation Stage curriculum states that:

“From their earliest days, children try to make sense of their world. Their natural curiosity drives them to explore and understand their environment using their senses and at times to wonder at its beauty and scale”.

At Stephen Hawking School the Foundation Stage curriculum is based on ‘Planning for Inclusion’ and it is the work in Exploration and Investigation that will inform later scientific understanding.

In addition, due to cross curricular nature of the Early Years curriculum, scientific understanding may also be encouraged and developed via other aspects of the Foundation Stage curriculum.

Within the Foundation Stage

All children will: experience a range of objects that can be explored in a variety of different ways.

Most children will: begin to show a response to elements of their environments

Some children will: begin to show an interest in elements of their environment and how objects within it can be used.

Science during this stage of each child’s school career will be taught via three topics: myself in the Autumn Term; growth and change in the Spring Term; and the world about us in the Summer Term.

Science in Key Stages 1 and 2 is based on the National Curriculum and is wholly topic based.

Aims of the Science Curriculum

Experimental and Investigative Science.

- Pupils will be able to ask questions, predict and hypothesise
- Pupils will be able to observe, measure and manipulate variables e.g. changing one variable whilst keeping the other the same allowing for a fair test
- Pupils will interpret their results and evaluate scientific evidence

Life Processes and Living things

- Pupils will find out about themselves and about how they grow, feed, move and use their senses
- Pupils will know something about the stages of human development
- Pupils will be able to sort living things into broad groups according to similarities and differences using observable features
- Pupils will understand about the basic requirements for life

Materials and their properties

- Pupils will be able to collect and find similarities and differences between everyday materials
- Pupils will understand that materials have different properties e.g. hard and soft and that these properties can be used for different things
- Pupils will know that joining one material with another can change the properties.

Physical Processes

- Pupils will know that light and sound come from different sources
- Pupils will know that different forces allow things to move at different speeds
- Pupils will understand that different forces can be used to move different objects
- Pupils will understand that electricity comes from a source and that it can be used by man to power things