PRIMARY SCIENCE

Syllabus for Primary Schools

RATIONALE

THE PRIMARY SCIENCE SYLLABUS PROGRAMME

For Primary Schools

Rationale

Science is a means of discovering and understanding the world around us. It consists of a body of knowledge which attempts to explain phenomena and experiences. It also involves a number of skills and processes by which this knowledge is achieved and applied. Science is also concerned with the development of attitudes concerning scientific activity.

Science forms an integral part of our everyday life. It is therefore important for all citizens to be scientifically literate.

General Aims

This Primary Science Framework is designed to implement the objectives as stated in the National Minimum Curriculum. Objective 12 of the National Minimum Curriculum focuses on the need for students to have a '***greater awareness of the role of Science and Technology in Everyday life'.***

The Primary Science Framework therefore aims to support schools meet this requirement. It aims to lay the foundation of knowledge and understanding, and to develop the skills and attitudes related to science through first hand experience. This foundation is intended to lead to a deeper progressive understanding of scientific activity, forming a basis for further study in science at secondary level.

What is Science?

As already referred to above and as clearly stated in the National Minimum Curriculum, science has three main aspects: knowledge, skills and attitudes. Knowledge refers to the theories and concepts making up science. Skills refer to the method of posing questions and carrying out investigations in science. Although there is no fixed way in which scientists work, all investigations tend to have aspects of common processes such as observation, classification, hypothesising, data collection, interpretation of data and evaluation. Attitudes are concerned with the way which scientific knowledge and its application is evaluated and appreciated together with an understanding of its limitations.

The National Minimum Curriculum

The National Minimum Curriculum elaborates on the aspects of knowledge, skills and attitudes in science. These can be summarised to include:

Knowledge

- based on children's existing concepts in science;
- arousing curiosity about natural phenomena and stimulate the posing of questions about them;
- as a systematic means of asking and attempting to answer questions arising from observations;
- providing models of scientists who have contributed to the field of science;
- exposing students to the various strands of specialisation but which are still related;
- recognising that different students experience science differently;
- in which information technology plays a key role.

Skills

- the ability to develop cognitive skills related to science such as acquiring scientific language, making observations, taking measurements, gathering, analysing and interpreting data, making generalisations, creating models, communicating and carrying out investigations;
- the ability to apply scientific knowledge in their everyday life;
- the ability to make effective use of scientific and technological apparata;
- the ability to avail themselves of information technology to acquire, analyse, classify and communicate information and data;
- safeguarding the natural environment in a sensitive manner.

Attitudes

- changing the perception that science can provide absolute truth and provide a solution to all problems;
- readiness to appreciate the scientific process as one way of appreciating life;
- appreciating the importance of science in everyday life;
- appreciate the influence of science on society;
- develop a positive critical attitude towards scientific developments;
- recognising the limitations of science;
- be ready to engage in science and scientific methodology;
- be ready to work to ensure that everyone benefits from the positive results of science.

How do Children Learn Science

This framework was developed within the ***'constructivist approach'*** which specifies the way children learn science. The constructivist approach considers the learning process to involve the construction of meanings by learners. Put in simple words, it emphasises the need for children to think about the scientific activity in order to be able to make sense of and understand the scientific concepts being introduced.

The construction of meaning can take place both on an individual level when a child tries to make sense of the phenomena under study, or else within a social context where a scientific concept is being discussed within a group.

The implications of constructivist learning are considered to include the following:

- learning depends on both the learning environment and the learner's prior knowledge;
- learning involves the construction of meaning;
- learning is a continuous process;
- meanings, once constructed can be evaluated, accepted or rejected;
- children tend to share meanings due to shared experiences and use of language.

It is therefore essential to keep in mind the need to make children think about the investigations, discussions etc. which are being organised in science when delivering the science curriculum.

Teaching Primary Science

The National Minimum Curriculum distinguishes Science from other subjects. However it also realizes the fact that all subjects should be integrated together. Yet it is essential for the teacher to be clear of the aims of primary science.

The teaching of Primary Science should aim to:

- develop an interest in science as a body of knowledge and a method of thinking, inquiring and working.
- develop a concern for the world around us.
- make the children aware of themselves within the world we live and the importance of science in relation to this.
- help children realize the importance of technology for society and the need of scientific knowledge in understanding our present technological age.

To develop positive attitudes, practical skills and basic scientific concepts.

The Structure of the Primary Science Framework

Whilst attitudes should be constantly kept in mind when organizing scientific activities, strands termed ***Acquiring Scientific Knowledge (Strand 1)*** and ***Acquiring Scientific Knowledge (Strand 2)*** are structured in levels to be achieved at different years.

Acquiring Scientific Knowledge (Strand 1)

Working scientifically is an area of study which offers primary school children opportunities to learn about ways of thinking and of finding out about, and communicating ideas as well exploring values and attitudes through science.

Acquiring Scientific Knowledge (Strand 2)

Understanding concepts is an area of study which offers primary school children opportunities to widen the knowledge and understanding of important scientific ideas and to relate them to everyday experiences.

Attitudes

Attitudes that children should be encouraged to develop should include:
co-operation, self discipline, open mindedness, responsibility, perseverance, self discipline, curiosity and creativity.

Acquiring Scientific Knowledge

By the end of the primary years children should develop a number of thinking and practical skills that would enable them to work in a scientific manner. Thus activities should be designed which help children acquire and refine these skills so that children would have the tools necessary to deepen their understanding of science and of the procedures of scientific investigations. Therefore:

In Early Primary Years (1-3) children should be able to:

- Use their senses to observe and group objects and events in their immediate environment and identify possible situations for scientific investigation.
- Use these observations to make predictions or suggest possible solutions.
- Suggest simple investigations and make simple non standard and standard measurements in an effective manner.
- Carry out investigations in a group with responsibility.
- Carry out investigations in a group with responsibility.
- Make a simple evaluation by describing whether what happened was expected and share what they did and what they found out with the whole class.

In Later Primary Years (4-6) children should be able to:

- Compare and classify objects and events in their immediate environment and ask suitable questions for scientific investigation.
- Use these ideas to make testable predictions and find out ways to carry out fair tests.
- Select appropriate resources and instruments and use standard measurements with appropriate precision.
- Organise themselves within a group with members having different responsibilities whilst working as a team.
- Record data and analyse it using graphs and information processing technologies to find patterns.
- Draw conclusions which reflect the information collected.
- Evaluate the process and generate ideas while presenting well reasoned complete reports to the whole class.

Developing Scientific Understanding

Understanding concepts is divided into three concept areas:

Sharing our World
Energy
Materials around Us

Children learn effectively, and see relevance in learning science, when they have opportunities to develop and use their scientific ideas and skills, first in a variety of familiar contexts and later in other challenging situations. All these areas interrelate and inevitably there will be some overlap.

The strand **Sharing our World** allows children to understand their own biology and that of other living things; recognize the interdependence of life and how the physical environment impact on the way we live.

The strand **Energy** allows children to understand the basic characteristics of light, sound, electricity, magnetism and forces which may enable them to answer questions they ask regarding technological happenings.

The strand **Materials around Us** allows children to understand the biggest of all units of structures – the universe – and the structure of everyday materials and their properties.

Units of Work

Each strand is subdivided in units of work as follows:

Sharing our World	**Energy**	**Materials around Us**
1. Other Animals and Us	5. Electricity	9. Change
2. Plant Life	6. Forces	10. Uses and Properties of Materials
3. Habitats	7. Light	11. Our Planet and its Neighbours
4. Weather Watch	8. Sound	

Each unit of work is divided into levels which describe the progression of the science curriculum from Year 1 to Year 6. Student learning outcomes are stated in each strand and at each level. A range of sample learning contexts is suggested for each level. This allows the outcomes to be attained. The suggested contexts listed at each level are not intended to be exhaustive. It is expected that teachers will not only select from the sample learning contexts but also identify others which are appropriate to their students.

LEVEL DESCRIPTORS

Level Descriptors

The attainment of each of the following Level Descriptors does not depend on the study of any one particular Unit of Work, but rather on how learners are encouraged to think about and act upon the acquired scientific knowledge (*Strand 1*) to develop their scientific way of thinking *(Strand 2).*

Level 1

Learners are able to describe objects and events according to observable features – eg. '*The green and the blue balls are bigger than the yellow ball'.* They are able to use their senses to describe objects and events during a teacher-led science investigation – eg. '*The green ball bounces highest of the three balls'.* Learners are able to make use of non standard measurements as part of a science investigation – eg. *Use of string …to measure how high balls bounce,* and, are able to record information *using pictures, drawings and charts…*

Level 2

Learners are able to carry out an investigation and make observations on what happens –eg. '*From our investigation we conclude that the green ball bounces highest'.* Learners are able to use appropriate resources when doing a science investigation – eg. *Balls, different carpet surfacing….*, and are able to record findings in table form – eg. *Display charts, bar charts….* Also, learners are able to talk about whether what happened was what they expected – eg. '*Yes – the green ball bounces higher…as expected'*

Level 3

Learners are able to come up with ideas or questions for scientific investigation – eg. '*What makes a ball bounce higher?'* Learners are able to select appropriate resources and instruments when doing a science investigation and, use standard measurements with acceptable precision. Learners are able to carry out a fair test with help – eg. *….using same balls on different surfaces*, and are able to identify patterns and / or relationships in recorded measurements- eg. '*Yes- the harder the surface the higher the ball bounces.'*

Level 4

Learners are able to make testable predictions as part of a scientific investigation –eg. '*I think that the ball bounces higher on a harder surface, because…'.* Learners are able to design and carry out fair tests as part of a science investigations on their own / within a group. They are able to give their interpretation and / or draw conclusions based on patterns observed or data collected – eg. *'not all balls bounce the same height on the same surface'.* Also, learners are able to demonstrate the importance of science investigation as a possible means to solve problems and / or seek solutions related to every day issues.