St. John Bosco Junior Boys’ School

Science Policy

**Introduction**

This policy was formulated by the Principal and teaching staff of St. John Bosco Junior Boys’ School in accordance with the guidelines set out in the Primary School Science Curriculum. As a whole school plan it will guide and organise the teaching of science as part of the SESE curriculum. This plan will also serve as the basis for all long and short term planning in Science in Junior Infants, Senior Infants and First class. It will also inform new and temporary teachers of the approaches and methodologies used in the teaching of Science in our school.

**Rationale**

We believe that SESE, of which Science forms an important dimension, provides the opportunities for the children to explore, investigate and develop an understanding of the natural, human, social and cultural dimensions of their local and wider environment. It also allows the child to learn and practise a wide range of skills and to acquire open, critical and responsible attitudes to the world around them. The study of Science enables children to construct, modify and develop a broad range of scientific concepts and ideas. Science education equips children to live in a world that is increasingly scientifically and technologically orientated.

**Vision**

Our science programme will take consideration of the environment, which is unique to our school.St. John Bosco Junior Boys’ School is situated within walking distance of Dublin Zoo, Ashtown Castle and the Phoenix Park. There are a considerable variety of trees, plants, flora and fauna growing in the area and due to our proximity to Dublin Zoo and the Phoenix Park there is an abundance of local wildlife and exotic animals e.g. deer and squirrels.

It is our intention that through Science the pupils will study and explore their immediate environment. We aim to familiarise the children with the range of habitats and explore areas of scientific discovery in the locality. We aim to provide scientific education taking into account that there are many different levels of scientific experience in the locality.

**Aims**

We endorse the aims of the Primary School Curriculum for Science

* To develop knowledge and understanding of scientific and technological concepts through the exploration of human, natural and physical aspects of the environment
* To develop a scientific approach to problem-solving which emphasises understanding and constructive thinking
* To encourage the child to explore, develop and apply scientific ideas and concepts through designing and making activities
* To foster the child’s natural curiosity, so encouraging independent enquiry and creative action
* To help the child to appreciate the contribution of science and technology to the social, economic, cultural and other dimensions of society
* To cultivate an appreciation and respect for the diversity of living and non-living things, their interdependence and interactions
* To encourage the child to behave responsibly, to protect, improve and cherish the environment and to become involved in the identification, discussion, resolution and avoidance of environmental problems and so promote sustainable development
* To enable the child to communicate ideas, present work and report findings using a variety of media

**Curriculum planning**

Teachers are aware of the need to

* Adopt a pace of Curriculum development which is both challenging and realistic
* Ensure that the whole-school process links with and influences, teaching and learning in individual classrooms
* Monitor the implementation of the plan with particular references to the learning outcomes for children

**Skills Development**

The Teaching of Science in the Primary School Curriculum involves the development of two types of understanding

* Conceptual Understanding

Children’s conceptual understanding is concerned with the development of scientific knowledge and with their deepening understanding of scientific ideas

* Procedural understanding

Knowledge of the scientific process is sometimes referred to as procedural understanding

Children’s own ideas are the starting points for all scientific learning and teaching. The term ‘**working scientifically’** outlines how pupils may engage in scientific enquiry and describes the science skills that children should develop through their scientific investigations. These skills involve the children in the following

* Observing.
* Questioning.
* Predicting.
* Investigating and experimenting.
* Estimating and measuring.
* Analysing – sorting and classifying.
* Recording and communicating.

The **Designing and Making** skills will involve pupils in exploring materials, planning designs and making models that will provide solutions to practical problems. These skills involves the children in the following

* Exploring.
* Planning.
* Making.
* Evaluating.

First hand investigation is central to the way in which young children learn science.

**The Strands and Strand Units are as follows**

|  |  |
| --- | --- |
| **Strand** | **Strand units** |
| Living things | * Myself * Plants and animals |
| Energy and forces | * Light * Sound * Heat * Magnetism and electricity * Forces |
| Materials | * Properties and characteristics of materials * Materials and change |
| Environmental awareness and care | * Caring for my locality |

**Objectives**

| **Strand and strand units** | **Junior and Senior Infants** | **First Class** |
| --- | --- | --- |
| Strand: Living Things  Strand Unit : Myself  **Strand: Living Things**  **Strand Unit: Plants and animals** | **Variety and characteristics of humans**   * identify parts of the male and female body * recognise and measure physical similarities and differences between people   **Human life processes**   * become aware of some changes that occur as children grow and mature * become aware that people have a variety of needs for growth (exercise, food, clothing and shelter) * develop an awareness of human birth * use all the senses (touch, smell, sight, taste and hearing) to become aware of process of life   **Variety and characteristics of living things**   * Observe, discuss and identify a variety of plants and animals in different habitats in the immediate environment * Become aware of animals and plants of other environments * Sort and group living things into sets * Recognise and identify the external parts of living things   **Processes of life**   * Observe growth and change in some living things * Explore conditions for growth of bulbs and seeds * Become aware that the animals and plants undergo seasonal change in appearance or behaviour | **Variety and characteristics of living things**   * Name and identify external parts of the male and female body and their associated functions or senses * Become aware of the role of each sense in detecting information about the environment and in protecting the body * Recognise and/or measure physical similarities and differences between individuals   **Human life processes**   * Recognise that all living things grow and change * Recognise that physical growth has taken place since birth * Identify some requirements for growth and development in the human * Begin to identify the main phases of the human life cycle * Use all the senses to become aware of and explore environments   **Variety and characteristics of living things**   * Observe, identify and explore a variety of living things in local habitats and environments * Develop some awareness of plants and animals from wider environments * Recognise and describe the parts of some living things * Recognise that trees are plants * Group and sort living things into sets according to certain characteristics   **Processes of life**   * Appreciate that living things have essential needs for growth * Explore, through the growing of seeds, the need of plants for water and heat * Investigate how plants respond to light * Understand that seasonal changes occur in living things and examine the changes in plant and animal life during the different seasons * Become familiar with the lifecycle of common plants and animals |
| **Strand: Energy and Forces**  **Strand unit: Light** | * Identify and name different colours * Sort objects into sets according to colour * Observe colours in the local environment * Explore dark and bright colours and become aware of different shades of colour * Discuss differences between day and night, light and shade * Explore how shadows are formed. | * Recognise that light comes from different sources * Recognise that light is needed in order to see * Investigate the relationship between light and materials * Recognise that the sun gives us heat and light, without which we could not survive * Become aware of the dangers of looking directly at the sun. |
| **Strand unit: Sound** | * Recognise and identify a variety of sounds in the environment * Identify and differentiate between high and low sounds, loud and soft sounds * Explore ways of making different sounds using a variety of materials | * Recognise and identify a variety of sounds in the environment * Identify and differentiate between high and low sounds, loud and soft sounds * Explore ways of making different sounds using a variety of materials * Design and make a range of simple percussion instruments |
| **Strand unit: Heat** | * Recognise the difference between hot and cold in terms of weather, food , water and the body * Identify ways of keeping objects and substances warm and cold | * Become aware of different sources of heat energy * Learn that temperature is a measure of how hot something is |
| **Strand unit: Magnetism and electricity** | * Use magnets of different shapes and sizes in purposeful play to explore their effects on different materials * Investigate the fact that magnets attract certain materials * Become aware of the uses of electricity in school and at home * Identify some household appliances that use electricity * Become aware of the dangers of electricity | * Use magnets of different shapes and sizes in purposeful play to explore their effects on different materials * Investigate that magnets attract magnetic materials, such as iron and steel * Investigate that magnets attract certain materials through other materials * Explore the effects of static electricity * Become aware of the uses of electricity in school and at home * Identify some household appliances that use electricity * Become aware of the dangers of electricity |
| **Strand unit: Forces** | * Explore through informal activity with toys, forces such as pushing and pulling * Explore how shape of objects can be changed by squashing, pulling and other forces * Investigate how forces act in objects | * Explore how objects may be moved by pushing and pulling * Become aware of and explore how moving water and moving air can make things move * Observe and investigate the movement of objects such as toys on various materials and surfaces * Investigate how forces act in objects |
| **Strand: Materials**  **Strand Unit: Properties and characteristics of materials** | * Observe and investigate a range of familiar materials in the immediate environment * Describe and compare materials, noting the differences in the colour, shape and texture * Know about some everyday uses of common materials * Group materials according to certain criteria * Investigate materials for different properties e.g. materials that are attracted by magnets, keep us warm, absorb water and materials   that are waterproof | * Identify and investigate a range of common materials in the immediate environment * Describe and compare materials, noting the differences in the colour, shape and texture * Begin to distinguish between natural and manufactured materials * Group materials according to properties * Identify and investigate materials that absorb water and those that are waterproof * Begin to explore how different materials may be used in the construction of homes suited to their environments |
| **Strand Unit: Materials and Change** | * Explore the effects of water on a variety of materials * Observe and describe materials when they are wet and when they are dry * Identify some materials that are waterproof * Explore the effects of heating and cooling on everyday objects, materials and substances | **Heating and cooling**   * Explore the effects of heating and cooling on a range of liquids and solids * Become aware of and investigate the suitability of different kinds of clothes for variations in temperature * Explore ways in which liquids and solids may be kept hot or cold   **Mixing and other changes**   * Begin to investigate how materials may be changed by mixing * Investigate the characteristics of different materials when wet and dry |
| **Strand; Environmental awareness and care**  **Strand Unit: Caring for my locality** | * Observe, discuss and appreciate the attributes of the local environment * Appreciate that people share the environment with plant and animal life * Develop a sense of responsibility for taking care of and improving the environment * Identify, discuss and implement simple strategies for improving and caring for the environment | * Identify, discuss and appreciate the natural and human features of the local environment * Observe and develop and awareness of living things in a range of habitats in local and wider environments * Observe similarities and differences among plants and animals in different local habitats * Develop an awareness that air, water, soil, living and non-living things are essential to the environment * Begin to recognise that people, animals, and plants depend on one another * Realise that there is both an individual and a community responsibility for taking care of the environment * Identify, discuss and implement simple strategies for improving and caring for the environment * Identify and help to implement simple strategies for protecting, conserving and enhancing the environment * Become aware of ways in which the environment can be polluted or harmed |

**Approaches and Methodologies:**

Our main aim is to get the children ‘thinking scientifically’. It is essential that we use a range of teaching methods and approaches when teaching Science. Lessons should not be work card or textbook based but text books and work cards may be used to support a lesson.

The **approaches** adopted should create a learning environment where

* Hands – on discovery is encouraged.
* Links with the environment are fostered.
* Children have an opportunity to work together, share ideas and communicate their findings.
* Children’s ideas are the starting point for science activities (concept mapping).
* Children should be allowed the excitement of finding out for themselves.
* Children are encouraged to pose their own questions.

The nature of the strands and strand units themselves necessitates the use of a variety of teaching methods.

**Key Methodologies**

We adapt and modify activities so that they meet the needs of all children in the class. We plan to use the six central methodologies of the Primary School in the teaching of Science

* Active learning
* Problem solving
* Developing skills through content
* Talk and discussion
* Co-operative learning
* Use of the environment

In addition we plan to use the following

* Free exploration of materials
* Spiral nature of the curriculum – opportunities to return to earlier learning and to extend and enhance it
* Learning through language

The approaches chosen should enable the children to work scientifically in a variety of contexts, to understand practical activities and to tackle open-ended investigation.

Different methods are outlined as follows:

**Whole – class work**

This is effective when introducing a topic or when using concept – mapping. It is also useful in providing background information that may be required for an activity.

**Small groups**

The children may work on an activity as follows

* Several groups working on the same activity.
* Small groups rotating around different activities (circus of experiments).
* Small groups working on independent activities.

**Individual work**

This occurs when children pursue their own studies and carry out investigations that allow them to pursue their own interests and ideas.

**Learning in Science**

**Children’s Ideas**

The development of children’s ideas is central to science education. Young children come to science activities with ideas they have formed from previous experiences. The focus should be on helping the children to modify their ideas and to develop more scientific understanding. It is important to consider the children’s ideas as the starting points for science activities and education. Work on each topic will draw on experience and knowledge of the class as appropriate.

**Practical Investigations**

A variety of methods for organising practical investigations will be employed e.g. designing and making, open investigation and closed activities. ????

These will be used as appropriate at each class level.

**Classroom Management**

Teachers will organise the class as appropriate.

**Assessment**

Assessment in science is concerned with the children’s mastery of knowledge and understanding of the strands of the science programme and the development of skills and attitudes. Consequently a broad range of assessment tools and approaches will be necessary. The following are among the assessment tools found useful in schools:

**Teacher Observation**

The teacher makes observations during practical science tasks will help to determine the development of process skills and attitudes. They will also help to establish the extent to which the children have mastered the knowledge aspect. The children will need to take an active role in science tasks and ask open-ended questions to gain insight into a child’s understanding. Teacher designed tasks and tests.

Some representational record, whether written, drawn, sculptured or modelled is necessary to build up a picture of the child’s achievements. A wide variety of tasks should be provided for the children including;

* Observing.
* Analysing processes and hypothesising about how systems work or are made.
* Predicting outcomes of the investigation
* Collecting information from books and materials.
* Asking questions.
* Providing oral, written or pictorial accounts of investigations.
* Displaying projects.
* Using work cards or activity sheets.
* Designing, making and evaluating models and structures.
* Using interactive multimedia programs to explore themes and complete a range of tasks and problems.
* Exploring and engaging in practical investigations in the environment.
* Displaying and reporting project work.
* Drawing with labels (teacher can discuss drawing with child and annotate it as a result of asking questions.

**Concept Mapping and KWL sheets**

The child’s initial ideas must be explored if they are to form a starting point for learning. Concept – mapping helps children to record and discuss their ideas (in other words (brain-storming). This will help enormously to see what pre-conceived ideas the children may have. It is also useful as an assessment tool at the end of a unit to see if there have been any progressions.

**Work samples**

A wide range of samples of a child’s work is compiled to document and assess progress over the year. Teachers can also keep photographic record of some of the experiments carried out during the year.

**Children with differing needs**

The children will work together in mixed ability groupings to carry out experiments etc. The more able pupils can record the experiment (written) and the weaker pupils can help with the pictorial records. The teacher will also differentiate through learning objectives and by support.

**Linkage and Integration**

Opportunities for Linkage and Integration will be provided for where possible in the Science Programme in St. John Bosco Junior Boys’ school. This process will help extend the child’s understanding of both the Science strands and the subject areas with which they can be integrated.

The strands and units of the science curriculum are not discrete – work on a topic or investigation may incorporate strands from other curriculum areas. Teachers will make provision for this linkage in their short-term planning.

Other curricular areas for integration will include:

* Gaeilge
* English
* Music
* Geography- drawing maps and charts
* History
* SPHE
* Religion

**Timetable**

Our science plan is based on a **spiral approach** as per the curriculum. For this reason, it is not intended that all strand units will be taught in each class. Some units will be taught during Junior Infants only, some will be taught in Senior Infants only while others may be taught in each class each year with more complex details as appropriate. The units may be supplemented by extension work at the discretion of the class teacher. A two year plan is in place for Junior Infants and Senior Infants while First class has a one year plan.

Science is often integrated with History and Geography. Please see appended SESE overview.

**Health and Safety**

During practical work teachers should be aware of the safety implications of any

exploratory or investigative work to be undertaken. Children should be encouraged to observe safety procedures during all tasks. There are many safety issues to consider including:

**Plants and Animals**

Disposable gloves should be used when investigating hedgerows. Children should never handle unknown or unfamiliar plants, especially fungi. Gloves must be worn also when handling birds or animals. Hand washing should be encouraged after handling plants and animals.

**Electricity**

Children should only use low-voltage battery powered devices. Mains electricity should never be used for electricity and magnetism experiments. If mains-powered equipment is used then it should be connected and operated by the teacher only. Children should be repeatedly warned about the danger of mains electricity

**Eyes**

Children should never use lenses, binoculars or other lenses .devices to look directly at the sun or other intense source of light. This includes dark glass and plastic.

**Polythene Bags**

Children should be warned of the dangers of using these bags as they may cause suffocation.

**Cleanliness and Hygiene**

The teacher should explain that anything the children are asked to smell or taste has been carefully chosen for that activity. The sharing of spoons or other utensils should not be permitted. Hand washing should be encouraged before food activities.

**Individual teachers’ planning and reporting**

All teachers will use the Whole School Plan, yearly plans and the Science Curriculum strands and strand units to inform their classroom planning. Teachers also keep long and short term plans in their individual planning folders.

All work completed by the teachers is documented on a Cúntas Miosúil ( monthly record sheet) which are stored onThe Naz drive central computer system.

**Equality of Participation and Access**

Equal opportunities will be given to all children in the school, across all science strands and activities.

**Staff Development**

All staff members are encouraged to take part in courses or to do Summer Courses in Science. Teachers are encouraged to share their interests and expertise.

**Parental Involvement/ Community Links**

Parents are encouraged to contribute to our science programme. People in the locality who have an interest and knowledge of the local area may be invited in to speak to the children.

We foster links with the community by using the facilities in the locality e.g. Dublin Zoo. We use the expertise of schools advisors in Dublin Zoo, Ashtown Castle and also the Phoenix Park.

**Resources**

We have compiled a variety of Science kits, which contain most of our resources for science. We also have a large collection of Science resource books, posters, CD’s and DVD’s which are stored in the staffroom and the Library and shared between classes as required. Resource boxes have been created to support the teaching of each strand. These boxes are stored in the Library and include the following

* Photocopiable Masters
* Laminated Work cards
* Relevant equipment (excluding consumables)

Textbooks and work cards can be used during science lessons to support active investigative work.

**Success Criteria**

The success of this plan will be measured by:

* Teacher observation of the child’s progress by observing, questioning and monitoring.
* The child’s response in a variety of ways to scientific tasks.
* The child’s ability to evaluate his own work, and the work of others.
* The child’s commitment and involvement with the assigned tasks.
* Teacher assigned tasks to see how the child responds to a set task the use of skills and materials.
* Samples of the child’s work.
* Collaborative work.

**Implementation and Review**

The Principal is responsible for the implementation of the Science programme as part of the SESE curriculum in St. John Bosco Junior Boy’s school. Class teachers are responsible for the implementation of the Science programme for their own classes.

It will be necessary to review this policy on a regular basis to ensure optimum implementation of the SESE/Science curriculum in our school. Any amendments will be noted and acted upon. This review will be carried out by all teaching staff.

**Ratification**

This policy was ratified by the Board of Management in November 2013

Signed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Chairperson BOM

Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_