**Whole School Development Plan Science**

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**Science**

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| * **Introductory Statement and Rationale**  1. **Introductory Statement**   Science education enhances children's knowledge and understanding of themselves and the world in which they live. It involves children in the active construction of their own understanding. This understanding changes in response to the children's broadening experience. A scientific approach to investigations fosters the development of important skills, concepts and knowledge through which children can observe, question, investigate, understand and think logically about living things and their environments, materials, forces, everyday events and problems. The knowledge and skills acquired may be applied in designing and making activities in which children perceive a need to create or modify elements of their environments.   1. **Rationale**   The purpose of this plan is to provide practical guidance for teachers, parents and other relevant persons on the provision of effective science education in our school. |
| * **Vision and Aims**  1. **Vision:**   At Scoil Ghormáin Naofa, we are committed to providing a science programme that will encourage children to work scientifically, involves the development of a broad range of skills of enquiry, the cultivation of important attitudes and the acquisition of scientific knowledge and concepts.   1. **Aims:**   We endorse the aims of the Primary School Science Curriculum:   * To develop knowledge and understanding of scientific and technological concepts through the exploration of human, natural and physical aspects of the environment. * 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 cultivate the 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. |
| * **Content of Plan**     **Curriculum:**   1. ***Science Programme:***    1. ***Strands and Strand Units:***   **Junior and Senior Infants**   |  |  |  | | --- | --- | --- | | **Strand** | **Strand Unit** | **Objectives** | | **Living things** | **Myself** | 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 * Develop an awareness of human birth * Use all the senses (touch, smell, sight, taste, hearing) to become aware of and explore environments | |  | **Plants and animals** | 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 animals and plants undergo seasonal change in appearance or behaviour | | **Energy and forces** | **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 | |  | **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 | |  | **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 | |  | **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 | |  | **Forces** | * Explore, through informal activity with toys, forces such as pushing and pulling * Explore how the shape of objects can be changed by squashing, pulling and other forces * Investigate how forces act on objects | | **Materials** | **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, for example | |  | **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 | | **Environmental awareness and care** | **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 |   **First and Second Class**   |  |  |  | | --- | --- | --- | | **Strand** | **Strand Unit** | **Objectives** | | **Living things** | **Myself** | 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 | |  | **Plant and animals** | 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 life cycles of common plants and animals | | **Energy and forces** | **Light** | * 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 | |  | **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 tins, metals, bottles, paper * Design and make a range of simple percussion instruments | |  | **Heat** | * Become aware of different sources of heat energy * Learn that temperature is a measurement of how hot something is * Measure and compare temperatures in different places in the classroom, school and environment | |  | **Magnetism and 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 | |  | **Forces** | * 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 on objects | | **Materials** | **Properties and characteristics of materials** | * Identify and investigate a range of common materials used in the immediate environment * Describe and compare materials, noting the differences in colour, shape and texture * Begin to distinguish between natural and manufactured materials * Group materials according to their 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 | |  | **Materials and change** | 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 | | **Environmental awareness and care** | **Caring for my locality** | * Identify, discuss and appreciate the natural and human features of the local environment * Observe and develop an 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 |   **Third and Fourth Class**   |  |  |  | | --- | --- | --- | | **Strand** | **Strand Unit** | **Objectives** | | **Living Things** | **Human Life** | Variety and characteristics of humans   * Become aware of the names and structure of some of the body’s major external and internal organs   Human life processes   * Develop an awareness of the importance of food for energy and growth * Understand the physical changes taking place in both male and female during growth to adulthood * Become aware of and investigate breathing * Explore and investigate how people move | |  | **Plant and animal life** | Variety and characteristics of living things   * Observe, identify and investigate the animals and plants that live in local environments * Develop an increasing awareness of plants and animals from wider environments * Observe and explore some ways in which plant and animal behaviour is influenced by, or adapted to, environmental conditions * Sort and group living things into sets according to observable features * Use simple keys to identify common species of plants and animals * Understand that plants use light energy from the sun * Come to appreciate that animals depend on plants and indirectly on the sun for food * Discuss simple food chains   Processes of life   * Become aware of some of the basic life processes in animals * Investigate the factors that affect plant growth | | **Energy and forces** | **Light** | * Learn that light is a form of energy * Recognise that light comes from different natural and artificial sources * Investigate that light can be broken up into many different colours * Investigate the relationships between light and materials * Investigate how mirrors and other shiny surfaces are good reflectors of light * Recognise that the sun gives us heat and light, without which people and animals could not survive * Be aware of the dangers of looking directly at the sun | |  | **Sound** | * Learn that sound is a form of energy * Recognise and identify a variety of sounds in the environment * Understand and explore how different sounds may be made by making a variety of materials vibrate * Design and make a range of simple string instruments using an increasing variety of tools and materials * Explore the fact that sound travels through materials | |  | **Heat** | * Learn that heat can be transferred * Recognise that temperature is a measurement of how hot something is * Measure changes in temperature using a thermometer * Measure and compare temperatures in different places in the classroom, school and environment and explore reasons for variations * Understand that the sun is the Earth’s most important heat source * Identify ways in which homes, buildings and materials are heated | |  | **Magnetism and electricity** | * Learn that magnets can push or pull magnetic materials * Explore how magnets have poles and investigate how these poles attract and repel each other * Explore the relationship between magnets and compasses * Examine and classify objects and materials as magnetic and non-magnetic * Investigate that magnets attract certain materials through other materials * Explore the effects of static electricity * Observe the effects of static electricity on everyday things in the environment * Learn about electrical energy * Investigate current electricity by constructing simple circuits * Examine and group materials as conductors (those that conduct electricity) and insulators (those that do not allow electricity to pass through) * Become aware of the dangers of electricity | |  | **Forces** | * Explore how objects may be moved * Explore how some moving objects may be slowed down * Explore the effect of friction on movement through experimenting with toys and objects on various surfaces * Investigate falling objects * Explore how levers may be used to help lift different objects * Investigate the pushing force of water | | **Materials** | **Properties and characteristics of materials** | * Identify and investigate a range of common materials in the immediate environment * Recognise that materials can be solid, liquid or gaseous * Describe and compare materials, noting the differences in colour, shape and texture * Distinguish between raw and manufactured materials * Group materials according to their properties * Investigate how materials may be used in construction | |  | **Materials and change** | Heating and cooling   * Explore the effects of heating and cooling on a range of liquids, solids and gases * Investigate the suitability of different kinds of clothes for variations in temperature * Experiment to establish which materials are   conductors of heat or insulators  Mixing and other changes   * Investigate how materials may be changed by mixing * Investigate the characteristics of different materials when wet and dry * Examine the changes that take place in materials when physical forces are applied * Explore some simple ways in which materials may be separated | | **Environmental awareness and care** | **Environmental awareness** | * Identify positive aspects of natural and built environments through observation, discussion and recording * Identify the interrelationship of the living and non-living elements of local and other environments * Become aware of the importance of the Earth’s renewable and non-renewable resources * Recognise how the actions of people may impact upon environments * Come to appreciate the need to conserve resources | |  | **Science and the environment** | * Begin to explore and appreciate the application of science and technology in familiar contexts * Identify some ways in which science and technology contributes positively to society * Recognise and investigate human activities which have positive or adverse effects on local and wider environments | |  | **Caring for the environment** | * Examine a number of ways in which the local environment could be improved or enhanced * Identify and discuss a local, national or global environmental issue * Realise that there is a personal and community responsibility for taking care of the environment |   **Fifth and Sixth Class**   |  |  |  | | --- | --- | --- | | **Strand** | **Strand Unit** | **Objectives** | | **Living things** | **Human life** | Variety and characteristics of humans   * Develop a simple understanding of the structure of some of the body’s major internal and external organs   Human life processes   * Develop a simple understanding of food and nutrition * Develop an understanding of the reproductive systems of both male and female and of the physical changes taking place in both male and female during growth to adulthood * Become aware of and investigate breathing * Identify and understand ways in which the body protects itself against disease and infection | |  | **Plant and animal life** | Variety and characteristics of living things   * Observe, identify and examine the animals and plants that live in local habitats and environments * Develop an increasing awareness of plants and animals from wider environments * Identify the interrelationships and interdependence between plants and animals in local and other habitats * Become aware of the sun as a source of energy for plants through photosynthesis * Observe and explore some ways in which plant and animal behaviour is influenced by, or adapted to, environmental conditions * Recognise that there is a great diversity of plants and animals in different regions and environments * Group and compare living things into sets according to their similarities and differences * Become familiar with the characteristics of some major groups of living things * Construct and use simple keys to identify locally occurring species of plants and animals   Processes of life   * Become aware of some of the basic life processes in animals and plants * Investigate the factors that affect plant growth * Understand some ways in which plants reproduce | | **Energy and forces** | **Light** | * Learn that light is a form of energy * Know that light travels from a source * Investigate the splitting and mixing of light * Investigate the refraction of light * Investigate how mirrors and other shiny surfaces are good reflectors of light * Explore how objects may be magnified using simple lens or magnifier * Appreciate the importance of sight * Understand the role of sunlight in photosynthesis and appreciate that the sun gives us heat and light without which people and animals could not survive * Be aware of the dangers of excessive sunlight | |  | **Sound** | * Learn that sound is a form of energy * Recognise and identify a variety of sounds in the environment and appreciate the importance of noise control * Understand and explore how different sounds may be made by making a variety of materials vibrate * Design and make simple woodwind instruments * Explore how sound travels through materials * Appreciate the importance of hearing | |  | **Heat** | * Experiment with a range of materials to establish that heat may be transferred in different ways * Recognise a variety of sources of heat * Know that heat energy can be transferred * Measure and record temperature using thermometer | |  | **Magnetism and electricity** | * Learn that magnets can push or pull magnetic materials * Investigate how magnets may be made * Explore the use of magnets to lift and hold objects * Learn about electrical energy * Investigate current electricity by constructing simple circuits * Become aware of how some common electrical appliances work * Become aware of and understand the dangers of electricity | |  | **Forces** | * Identify and explore how objects and materials may be moved * Explore the effect of friction on movement and how it may be used to slow or stop moving objects * Explore how friction can generate heat * Come to appreciate that gravity is a force * Become aware that objects have weight because of the pull of gravity * Explore how levers may be used to help lift different objects | | **Materials** | **Properties and characteristics of materials** | * Recognise that materials can be in solid, liquid or gas form * Identify and investigate a widening range of common materials in the immediate environment * Explore the origins of these materials * Group materials according to their properties and/or composition * Identify how materials are used * Recognise that a gas, such as air, occupies space, has mass and exerts pressure * Recognise that some materials decay naturally while others survive a long time in the environment * Become aware that air is composed of different gases * Become aware of some of the practical applications of these gases in everyday life | |  | **Materials and change** | Heating and Cooling   * Explore the effects of heating and cooling on a range of solids, liquids and gases * Experiment to establish which materials are good conductors of heat or good insulators * Identify ways in which homes and buildings are heated and insulated * Recognise how heating and cooling can be used to preserve food   Mixing, separating and other changes   * Investigate how a wide range of materials may be changed by mixing * Investigate the effects of light, air and water on materials * Examine the changes that take place in materials when physical forces are applied * Recognise that oxygen is required for burning * Explore some simple ways in which materials may be separated | | **Environmental awareness and care** | **Environmental awareness** | * Identify positive aspects of natural and built environments through observation, discussion and recording * Explore some examples of the interrelationship of living and non-living aspects of local and other environments * Become aware of the importance of the Earth’s renewable and non-renewable resources * Foster an appreciation of the ways in which people use the Earth’s resources * Come to appreciate the need to conserve resources | |  | **Science and the environment** | * Appreciate the application of science and technology in familiar contexts * Examine some ways that science and technology have contributed positively to the use of the Earth’s resources * Recognise the contribution of scientists to society * Recognise and investigate aspects of human activities that may have positive or adverse effects on environments | |  | **Caring for the environment** | * Participate in activities that contribute to the enhancement of the environment * Identify and discuss a local, national or global environmental issue * Come to appreciate individual, community and national responsibility for environmental care |  * 1. ***Children’s Ideas:***   We will use children’s ideas as a starting point for scientific activity. Strategies we may use to elicit children’s ideas are*:*   * Talk and dicussion * Open and closed questioning * Annontated drawings * Concept maps * Concept cartoons * Brainstorming * Free play with materials * KWL Charts   1. ***Practical Investigations:***   When planning practical investigations we will use:   * Open Investigations: Pupils are given or may suggest an open question for which they have to design their own investigation * Closed Investigations: Pupils will engae in activities where the end result is obvious and there are not many variables. * Fair Testing: Pupils develop a sense of what should be kept the same and what should be variable to ensure that an investigation is fair. * We will consult the Teacher Guidelines pg 54 in this regard.   1. ***Classroom Management:***   A combined approach of whole class work, small group work and individual work on chosen topics and projects will be used in each class. Children will be given opportunities to work together collaboratively and share their own ideas. We encourage both the investigative approach and the teacher-directed approach Teachers will use their professional judgement to decide which methods and approaches are best suited to the needs of their pupils.   * 1. ***Key Methodologies:***   Our aim is to provide a hands on approach to science which in turn will encourage the children to think scientifically.  We will use a variety of the following approaches and methodologies to facilitate the implementation of the science curriculum:   * Using children’s questions as a starting point * Guided discovery approach * Active learning * Collaborative learning (Whole class work/small group work) * Individual discovery * Problem solving * Use of the environment * Talk and discussion * Skills development through content * Integration   1. ***Linkage and Integration:***   Every attempt will be made to link the various strands of the Science curriculum and to integrate the other subject areas with Science, where appropriate.   * Science with History – Egyptian tomb building and the pulley in science * Science with English – Literacy- Writing up an experiment * Science with Maths – measurements, recording results and analysing them on graphs * Science with SPHE –human life e.g. digestive system and healthy eating   1. ***Using the Environment:***   Features of the local environment are incorportaed into the science programme. The following are examples of habitat studies which classes may engage in:   1. Minibeasts on concrete surface area 2. Study of a logpile/stonepile in school grounds 3. Birds in our school grounds 4. Trees in our school grounds. 5. School Garden 6. Nature trails    1. ***Balance between Knowledge and Skills:***   Science is not only concerned with the acquisition of knowledge but the understanding of concepts. We can nurture this understanding by developing skills of ., questioning, observing, predicting, investigating, analysing and recording and therefore acquiring knowledge. Children will explore, plan and analyse materials through Design and Make activities. |
| **2. Assessment – Looking at Childrens’ Work**  In Science we will assess:   * Knowledge * Understanding * Skills * Attitudes * Ability to work collaboratively   Assessment will be in the form of:   * Teacher observation, * Concept-mapping, * Annotated drawings * Teacher-designed tasks and tests * Portfolio and project work   The following are other assessment tools used by teachers:   * + Experiments   + Design and make products   + Worksheets and work in copies   + Quizzes   There will be opportunities for the pupils to engage in self assessment as they analyse the success of Design and Make activities and get an opportunity to view their own work portfolios. Information from assessment will be communicated to parents in the school report at the end of the year and at the parent/teacher meetings. |
| ***3. Children with Different Needs:***  We acknowledge that each individual child has particular needs and all are at different stages of their personal development.  At times, the children will work in similar class groupings or mixed class groupings to stretch the children to the upper level of their zone of proximal development.  Support will be given to children with special needs such as dyslexia during literacy driven Science tasks such as the writing up of experiments.  Lessons will be adapted to the best of the teacher’s ability to include all children regardless of their special need.  It is the policy of our school that children will participate in science activities. Science activities will be differentiated in order to meet the needs of the children in the class. This will be done by careful grouping of children, consciousness by the teacher of children’s abilities when giving briefs and instructions and by providing opportunities for different types of reflection. |
| ***4. Equality of Participation and Access:***   * Boys and girls will be have equal opportunities to participate in science lessons and activities. * Equal opportunity will be given to boys and girls to experience all strands. * Science will be for all children regardless of gender, age or ability. |
| * **Organisation**   ***5. Timetable:***  The teaching of SESE is allocated as follows:   * Infant classrooms 2 hours 15 minutes per week * 1st-6th 3 hours per week   This must be divided up among the three SESE subjects hence Science will have:   * Infant classes approx. 45 minutes a week * 1st - 6th 1 hour a week |
| **6. Resources and Equipment:**  The following resources are available to the children and staff for the teaching of Science:   * Magnets * Bulbs, wires, crocodile clips * Magnifying glasses * Droppers * Jars   It has been acknowledged in the development of this plan that science resources are an area that needs significant improvement and restoration. |
| **7. Safety:**  All health and safety precautions should be adhered to when taking the children on outside excursions/field trips. Children should always wash their hands when they return to the classroom after an outdoor lesson.  In conducting experiments teacher demonstration will be used where there is an element of risk. Should an accident occur in the Science lesson we will follow the procedures outlined for accidents in our Health and Safety policy. |
| ***8. Individual Teachers’ Planning and Reporting:***  Teachers will refer to the curriculum strands and strand units when planning both short term and long term objectives. Teachers will also be encouraged to refer to this plan to aid in their planning.  The Cuntas Míosúil will be kept as a record of work carried out in Science. |
| ***9. Staff Development:***  Teachers will have access to reference books, resource materials and websites dealing with Science.  Teachers will be informed about upcoming courses in the education centres and other bodies providing professional development.  If the need arises, the school will access the PCSP Science Cuiditheoir through the Regional Curriculum Support Service to support the staff in certain strands. Visiting teachers may be used to supplement and support the work of the class teacher. These are recognised as up-skilling opportunities for the teachers involved. |
| ***10. Parental Involvement:***  Parents have and will continue to be invited into the school for Science Week events organised in the school.  Parents may also be involved in the provision of science education if the teacher feels the parent has a certain level of expertise that can contribute to the lesson. |
| ***11. Community Links:***  We are very much aware of the school’s role in the community and we are also conscious of the fact that the expertise of the people in the community is an invaluable resource to any school.  Members of the wider school community have and will continue to be invited into the school for Science Week events organised in the school.  Members of the wider school community may also be involved in the provision of science education if the teacher feels the parent has a certain level of expertise that can contribute to the lesson. |
| * **Success Criteria**   Success of this plan will be determined by:   * The maximum participation of all children * The level of enjoyment exhibited by the children * The development of independent scientific thinking * The development of skills and understanding |
| * **Implementation and Review**  1. **Roles and Responsibilities:**   Each teacher and the staff as a group will evaluate the progress in Science by referring back to our set of stated objectives as outlined in this plan. A short session at staff meeting will be allocated to this work.   1. **Timeframe:**   The content of this policy will be reviewed at the end of the school year 2016/2017 and every two years thereafter. |
| * **Ratification and Communication**   The Science policy was drawn up by the teaching staff of Scoil Ghormáin Naofa in the 2015/2016 academic year and was ratified by the Board of Management on \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Parents can inspect the policy in the school office.  Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signed:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Chairperson BOM Principal  Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |