



Udston Primary School – Draft Science Rationale

Developing our Science Curriculum

There are 2 aspects of Science which run side by side:-

- Curricular Content – knowledge, understanding and application of learning.
- Science Skills – scientific inquiry, investigation, analytical thinking and scientific literacy.

We have developed a progressive curricular programme to support staff in the delivery of Science from Primary 1-7.

Science Curricular Programme

Progression of concepts, ideas and principles in curricular content can be found through the Lines of Development across themes in Science which were produced by Education Scotland (available on Staff Drive). These were used to identify the skills and knowledge which children should have developed for each Experience and Outcome by the end of a curricular level. There are scientific concepts which are dependent on prior learning, e.g. being able to classify living things relies on an understanding of living and non-living things. It is therefore important that teachers have an understanding of learners' prior knowledge and experiences and use this to inform their planning.

In order to ensure all children receive their entitlement to a broad general education, it is essential that there is curricular coverage of **all** Experiences and Outcomes as well as depth and breadth. Taking all of this into account, there are two documents to support planning for progression within and across levels.

- **Science Bundled Outcomes Overview** – The Experiences and Outcomes for Science have been grouped into concepts which allow them to be taught together as a unit of work. The learning in these units can be taught as discrete Science or through Interdisciplinary Learning Contexts depending on which best suits the needs of the children. Bundles should be selected during collegiate planning time to ensure consistency across stages and to cater for composite classes. First and Second Level will operate on a three-yearly rolling programme to ensure full coverage of all outcomes. Three or four bundles should be identified at the beginning of the school year and covered at a time suitable to each class. In the event of a cross-level composite class (e.g. P4/5), bundles which focus on the same concept/theme should be chosen for each level (e.g. First Level SCN1-06a and Second Level SCN2-06a) to allow whole class teaching of concepts with differentiated follow-up activities.
- **Science Planning Mats** – Planning Mats have also been developed for each bundle of Experiences and Outcomes from Early to Second Level. These plans are designed to be a starter to support teacher planning and are fully editable for staff to add their own resources, learning experiences and assessment to meet the needs of their children. Each planning mat includes the following:
 - The Experience(s) and Outcome(s).
 - Links to the Significant Aspects of Learning.
 - Core knowledge which children should have by the end of a curriculum level enabling support/challenge and flexibility depending on the stage the concept is being taught, e.g. expectations will be different at Primary 2 than Primary 4.
 - Links to the skills which children should develop through their learning in Science.
 - Suggested learning experiences (to be added to by the teacher).
 - Suggested resources and web links to support learning (to be added to by the teacher).
 - Assessment approaches (to be completed by the teacher).
 - Suggested key scientific questions (to be added to by the teacher).
 - Suggested key scientific words (to be added to by the teacher).
 - Links to learning across the curriculum e.g. IDL, Outdoor Learning, ICT, Rights-Based Learning, Citizenship, Sustainability, etc. (to be added to by the teacher).
 - Learning at home (to be completed by the teacher).
 - Evaluation of pupil learning (to be completed by the teacher).



Science Skills Progression – Scientific Inquiry, Investigation, Analytical Thinking and Scientific Literacy

Scientific Inquiry is the term that encompasses different types of practical work in science. An essential aspect of Scientific Inquiry is that children make decisions about how to plan, carry out and evaluate the evidence. The main approaches to Scientific Inquiry are:

- Observing and exploring – careful observation of how something behaves, looking for changes over time and exploring ‘what happens if...’ and ‘how could I.....?’
- Classifying – through identifying key characteristics
- Fair testing – through identifying all possible variables and then changing only one while controlling all others
- Finding an association – linking two variables to determine relationships
- Problem solving – design, test and adapting an object or system.

The development of skills can be achieved through collaborative investigations, inquiries and challenges with occasional opportunities for more detailed comprehensive activities. It should be recognised that any one investigation does not always require children and young people to develop the full range of skills at any one time. In Scientific Inquiry, children need to develop a range of skills with increasing independence and accuracy. They need to be able to ask questions, decide on an appropriate approach, plan what to do, predict what might happen, select equipment and carry out practical work safely and accurately. They need to make observations, take measurements and present the data collected. Finally, they need to describe patterns and trends, compare results to predictions, evaluate and interpret the evidence and draw conclusions. Children need to develop Scientific Analytical Thinking skills through:

- Being open to new ideas and linking and applying learning
- Thinking creatively and critically
- Developing skills of reasoning to provide explanations and evaluations supported by evidence or justifications
- Making predictions, generalisations and deductions
- Drawing conclusions based on reliable scientific evidence

Where possible, pupils should be involved in using a range of ICT to support their observations, data collection and analysis including use of databases, spreadsheets, graphics programmes, data-logging equipment, digital cameras, video, webcams etc. Skills in the collection and presentation of data should also be linked with Mathematics and Numeracy Experiences and Outcomes.

Skills Progression Framework

The Skills Progression Framework (found on the back of the Planning Mats) outlines progression in the skills of Scientific Enquiry. The skills are organised under 3 main areas – Planning, Carrying Out and Evaluating. These are then subdivided into more specific skills. Science Skills should be developed and applied through learning in the curricular programme and teachers should refer to the Skills Progression Framework and Skills in Science Poster for guidance (see below).

Skills in Science – Higher Order Thinking Skills

The Skills in Science Poster (copy provided) links higher order thinking skills to the Skills Progression Framework and they should both be used together to guide planning. The poster should be displayed in your classroom and referred to during learning and teaching in Science. These skills should be highlighted on the Science Planning Mat and a selection evidenced in the Assessment Approaches section.