Minet Junior School

Science Policy 2023-2024

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At Minet Junior School, we seek to deliver knowledge rich, sequential learning which excites and inspires, provides opportunity for recap and challenge, raises questions for debate, develops learners' confidence and enables independent learning to flourish.

Intent

In Science, we aim to provide a science curriculum which enables all children to show curiosity about, explore and discover both the world around them and the wider world. We believe Science is a way of working that assists children in building confidence in an investigative, working scientifically, 'hands-on', practical, visual approach, with opportunities to develop language and vocabulary by discussing ideas, knowledge and findings. By recording ideas and findings in a variety of ways, we aim to establish links with the wider school curriculum and utilise skills from other curriculum areas. It is essential that these intents are embedded throughout all units of the Science curriculum.

Our intent is to encourage children to:

- To help children gain a deeper understanding in scientific knowledge through the key areas of biology, chemistry, and physics.
- To develop understanding of the processes and methods used in science by promoting inquiry-based learning
- Use hands-on and exciting experiments, models, and enjoyable activities to foster curiosity and understanding working safely
- Provide opportunities for children to ask and investigate their own scientific questions through different types of investigations
- Equip children with the knowledge and understanding of how science impacts their daily lives and the world they live in.
- Encourage students to be curious about the world, ask questions, and explore how things work while understanding that science is always evolving.
- develop transferable enquiry skills for future education and employment

Implementation

The curriculum will be delivered through varied and engaging Science lessons that seek to develop understanding of new content, building on prior learning. Lessons will vary widely, depending on what is being taught. The school uses a variety of teaching and learning styles in science.

At Minet Junior, teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following;

- We provide high quality teaching by all teaching staff and have high standards of all pupils in our school.
- Long term plans are followed that ensure all coverage and progression of the 2014 National Curriculum.
- We plan for problem solving and real-life opportunities that enable children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom.
- We use various planning resources that provide bespoke lessons designed to inform, interest and inspire our children. This is implemented through Collins Hub and White Rose Hub science schemes, Concept Cartoons, Explorify and documents from PSTT (Primary Science Teachers Trust).
- We embed health and safety in our lessons using risk assessments on CLEAPSS.
- Cross-curricular links are made where helpful, to highlight real-world application and relevance of the curriculum.
- Science is taught for the equivalent of 2 hours a week. This is mainly timetabled through weekly sessions.
- Each lesson will have clear learning objectives, which will be shared with pupils at the beginning of the lesson. The majority of lessons will have a content objective as well as a skills-based objective.
- Pupils will learn new content/concepts through a range of different methods and resources including,
    - posing questions and carrying out enquiries
    - watching videos
    - listening to explanations
    - observation
    - diagrams
    - role-play and drama
    - photographs
    - animations
    - non-fiction reading texts
    - models
    - research using secondary sources
    - trips
    - newspaper/journal articles

- The progression of skills for working scientifically are developed through the year groups and scientific enquiry skills are of key importance within lessons.
    - Working Scientifically

Pupils will be taught the Working Scientifically skills outlined in the curriculum across the units for the year, not in isolation. These skills build and progress through the year groups, however the level to which the children are expected to carry out these skills will develop across the years. As pupils progress through the school, they will be encouraged to become more independent in being able to carry out the skills.

- Enquiry Types
  Pupils will explore a variety of scientific questions each year and will need to develop the necessary approaches. Each year they will take part in different types of scientific enquiries, applying the applicable working scientifically skills. Pupils will grow more independent as they move through the year groups, identifying which type of enquiry is best for answering different enquiry questions.

- Each unit's content, including ambitious key vocabulary and key concepts, will be summarised on a Knowledge Organiser. These will be used with pupils as appropriate (for example, to teach content, to revise content once they learned it through enquiry or as a vocabulary/spelling prompt). These are also used to develop retention of key content and vocabulary through a range of creative activities that promote recall to help develop long-term memory. Knowledge organisers will also be shared with parents at the start of each unit and made available on class webpages to promote discussion about science learning at home.
- All lessons will ensure the children's prior knowledge is taken into account so that progress is evident in every lesson.
- Provision will be made for children who are not making the expected level of progress through I.E.Ps.
- KW grids and post-assessment will be used as a tool to inform planning and identify misconceptions that need addressing.
- Post-assessment will be used to help the teachers see where changes need to be made to improve students' ability to comprehend and retain the material in the future. Also, comparing pre-assessment and post-assessment scores will let the teacher drill down into specific areas of improvement.
- Children's attainment and progress is discussed with parents/carers during parents' evenings
- Teachers find opportunities to develop children's understanding of their surroundings by accessing outdoor learning and workshops with experts.

- Through enrichment days, such as 'science week' and 'science fair', we promote the profile of science and allow time for the children to freely explore scientific topics.

Impact

The successful approach to the teaching of science at Minet results in a fun, engaging, high-quality science education, that provides children with the foundations for understanding the world that they can take with them once they complete their primary education.

If our intent and implementation are successful, then at Minet Junior we would expect to see:

- A broad and engaging curriculum that makes use of a range of resources, such as visitors and local attractions
- Children and staff who are enthusiastic about scientific learning
- Children and staff who can speak confidently about science, including uses in the real world
- Children who can use appropriate scientific vocabulary in written and oral form
- All children being successful in sharing their understanding of scientific concepts
- Children who can make links between different areas of science and other subject areas
- Children who can recall prior scientific learning when required and use this to understand new learning
- Children increasingly being able to instigate their own investigations confidently and interpreting their findings
- Staff who are able to anticipate potential misconceptions and address these confidently
- Children meeting their age-related expectations in science consistently

Progression through the Curriculum

The National Curriculum 2014 is designed as a year-by-year programme of study. Our school follows the national curriculum, which focuses on year groups teaching specific subject units.

- We have broken down every National Curriculum conceptual knowledge statement into a series of steps to create a detailed progression.

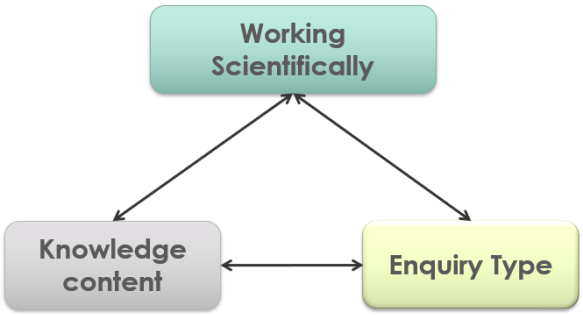
Ensure that enough time is built into the curriculum for pupils to learn and remember key knowledge. (Ofsted (2023) Finding the optimum: the science subject report – GOV.UK)

- Each lesson in a module focuses on one step in this progression, ensuring that children build secure knowledge. This progression sequences conceptual knowledge in Biology, Chemistry and Physics for one year to the next, and in the case of topics like light and classification, between Key Stage phases.
- We have identified and sequenced the disciplinary knowledge children need to work scientifically into the long-term plan. This includes the explicit teaching and practice of scientific skills, ensuring children can use them with increasing accuracy and independence. We use the Conceptual and Vocabulary progression charts to support our teachers' understanding of how scientific ideas develop and are connected. The teachers are advised to look at the progression statements not only for the module they are teaching but also to see what children learnt previously in the topic and what they will learn next.
- Teachers ensure that each concept is grasped and mastered by pupils to enable them to progress to the next stage of learning, equipped with the knowledge and skills needed to become fluent in using appropriate scientific vocabulary in written and oral form, sharing their understanding of scientific concepts and can make links between different areas of science and other subject areas.
- Key assessment questions that allow teachers to assess children's levels of understanding at various points in the lesson are interwoven into the teaching sequence.

Teaching and learning

Planning

- Long Term Science Planning is set out in our Curriculum Overview for each Year Group from the National Curriculum. The document shows that each year group has 5 units covered over the academic year. Each unit is carefully sequenced to ensure cross-curricular links, where possible, to develop technical language and oracy skills.
- Planning involves real-life science contexts, where children investigate scientific questions with a real purpose in mind.
- Lessons are planned using the following model.



- Working Scientifically skills are embedded in the content of biology, chemistry, and physics, focusing on the key features of scientific enquiry. These skills are built and progressed through the year groups. The level to which children are expected to carry out these skills will develop across the years. As pupils progress through the school, they will be encouraged to become more independent in being able to carry out the skills.
- Enquiry-based learning is central to teaching scientific knowledge and understanding. It brings learning to life, helping students acquire new knowledge and develop deeper understanding across all areas of the primary science curriculum. The children use their enquiry skills to answer their relevant questions.
- Where children work significantly above or below the objective, the majority of the class needs to work towards the objective. In this scenario, the success criteria are expanded to meet the individual's needs, which may include scaffolding or opportunities to research challenging questions or enquiries independently to allow them to develop mastery of the objective.
- Wherever possible, the local environment is used to bring each topic to life.
- Class teachers regularly plan for opportunities for children to apply their scientific skills to different areas within science lessons and across the curriculum. This will also allow children to revisit, practice and consolidate different areas of science and apply them within different contexts.

Teaching

Science is a core subject taught throughout the school regularly, at a time when a teaching assistant can support it. A typical lesson consists of:

- All lessons have clear learning objectives and steps to success, which are shared and reviewed with the pupils.
- **Recall previous learning through Flashback 4s** -to enable pupils to reflect on conclusions or statements from the last lesson, this unit, last unit and last year.
    - Teachers pinpoint a particular section to remind pupils of any misconceptions they had in the previous lesson, re-address these, and ensure that all pupils are mindful of them. This lesson stage is crucial and cannot be missed as it checks previous learning and makes connections to future learning opportunities. It ensures children know more and remember more.
- **Vocabulary instruction** is designed to equip the children with the scientific vocabulary they need for the lesson.
- **Starter/Hook** – may include ideas from Explorify, Concept Cartoon, Big Questions(P4C) and PMI.
- **Explore** – hands-on activities, making predictions, raising questions and creating conceptual coherence by constructing knowledge using scientific practices.

- **Explain** - With the teacher's guidance, students explain the concepts they explored and demonstrate their understanding of the new terms introduced. Depending on the concept being taught, teachers may provide an explanation before the exploration phase.
- **Elaborate** – Deep Dive – application in different scenarios.
- **Evaluate** – draw conclusions and raise further questions.
- **Plenary** involves working with the whole class to identify progress, summarise key facts, review the content and ideas used in the lesson and discuss the next steps. Effective plenaries give pupils enough time for self-assessment and/or peer assessment.

Pupils are provided with various opportunities to develop and extend their scientific knowledge and skills through whole-class teaching, paired work, group work and individual work.

Use of ICT

ICT is used to help deliver curriculum, including high-quality videos, animations, and websites. ICT can also be used to develop pupils' working scientific skills. For example, pupils might use laptops and tablets for research (identifying and using quality secondary sources) and measuring (using data loggers).

Health and Safety

It is important that children are taught the rules of safety when undertaking experiments and investigations. Materials and equipment need to be handled sensibly. The teacher must ensure that all staff and pupils know the safety implications of any science activity they are undertaking.
The class teacher is expected to assess the risks and adjust their lessons accordingly to ensure safe practice and appropriate levels of supervision.
Teachers may consider looking at CLEAPSS, which the school is a member of, for safety advice when carrying out activities.
Doing Things Safely (cleapss.org.uk)
https://primary.cleapss.org.uk/Resources/Doing-Things-Safely/
Teachers in any doubt should contact the Science leader or CLEAP on 01895 251 496

Assessment

Assessment of children's learning is made through a combination of evaluation prior to learning, ongoing teacher formative assessment, formal tasks, marking codes, and pre and post-unit assessments. Formative assessment may take many different forms in science, including,

- Mind maps
- Quizzes
- KW grids

- Labelled diagrams
- Scientific role play/drama activities
- Models and simulations
- Writing explanations
- Illustrations
- Retention and recall activities, e.g. concept cartoons, explorify, PMI

The assessment occurs throughout the science lesson, enabling teachers/teaching assistants to adapt their teaching/input to meet the children's needs. This feedback is incisive and regular.

- Children self-assess and peer-assess against the learning objective and success criteria, giving them a sense of success.
- Pupil's work is marked in line with the Marking Policy and should model how corrections should be made, giving children a chance to learn from their misconceptions or incorrect methods. At the beginning of each lesson, time is given for pupils to reflect on marking and comments on the previous work.
- Future lesson design depends on class success, evaluated through marking and observations made during the lesson.
- Assessment of pupil work and progress is on-going by the class teacher and informs future planning.
- Teachers mark work in science in line with the school marking policy.
- Teachers record children's achievements in science on Target Tracker termly.
- Progress and achievement in science are reported to parents through end-of-year reports and parents' evenings.
- The Science Lead assesses the impact on children's learning over time through staff meetings, children's work, pupil voice, and analysis of Target Tracker.

SMSC: The Contribution of Science

Through our teaching of science and our attitudes to learning, we strive to develop SMSC in the following ways:

Spiritual development: Science encourages students to develop a sense of wonder and curiosity about the natural world. Through exploring the intricacies of life, the universe, and natural phenomena, students gain an appreciation for the complexities and beauty of the world around them.

Moral development: Science promotes ethical thinking by guiding students to consider the implications of scientific discoveries and innovations. Students learn to reflect on the moral responsibilities associated with scientific advancements, such as environmental sustainability, healthcare, and technological progress.

Social development: Science fosters collaboration by encouraging students to work cooperatively during experiments and investigations. This helps them develop essential teamwork and communication skills, as well as an understanding of how collective effort leads to enhanced outcomes.

Cultural development: Science helps students recognize that scientific knowledge and discoveries are the result of contributions from various cultures and societies throughout history. It encourages an appreciation of the global impact of science and its significance in shaping the technological and cultural advancements of the modern world.

British Values in Science

The science curriculum fosters the British Values of tolerance and resilience by engaging pupils in exploring complex scientific concepts. Students are encouraged to become lifelong learners while developing their scientific skills through investigation and problem-solving.

Pupils are encouraged to persevere and to feel reassured when making mistakes or taking risks, which helps build their self-confidence and self-esteem. Collaboration is a key aspect of science education, facilitated through peer-assessment, peer-mentoring, and group activities. As students work together, they develop mutual respect, build confidence, and offer support and inspiration to one another. **Peer assessment, in particular, provides guidance** and inspiration**, enhancing the learning experience**.

Curriculum content:

Science is a core subject and must be timetabled for 2 hours every week.

During years 3 and 4 (LKS2), our children are taught to use the practical scientific methods, processes and skills (working scientifically- see appendix 1)

This is taught through a programme of study that includes:

Year 3:

- Plants
- Animals including humans
- Rocks
- Light
- Forces and magnets

Year 4:

- Living things and their habitats
- States of matter
- Sound
- Electricity
- Animals including Humans

During years 5 and 6 (UKS2), working scientifically skills (see appendix 2) are taught through programmes of studies that include:

Year 5:

- Living things and their habitats
- Animals including humans
- Properties and changes of materials
- Earth and space
- Forces

Year 6:

- Living things and their habitats
- Animals including Humans
- Evolution and inheritance
- Light
- Electricity

Vocabulary and Language

Developing children's language and vocabulary is essential in science education.

'The national curriculum for science reflects the importance of ***spoken language*** *in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in* ***developing their scientific vocabulary and articulating scientific concepts clearly and precisely.*** *They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that* ***pupils build secure foundations by using discussion to probe and remedy their misconceptions.****'*
National Curriculum for Primary Science (2013)

- In all science lessons, attention is given to ensuring that key scientific vocabulary has been learned.
- The children are exposed to the key vocabulary at the beginning of each lesson. The teacher read the scientific terms and the children repeat them (my turn, your turn).
- Paired talk activities are used to encourage children to discuss scientific concepts and processes.
- Teachers model and insist that children use the scientific terminology they hear from adults.
- Where appropriate, children are encouraged to answer questions using complete sentences.
- Adults provide alternative terms with the same meaning to enrich children's vocabulary. For example, if a child says, "The water boils at 100 degrees," the teacher might model, "The water reaches its boiling point at 100 degrees Celsius."
- Children are required to provide explanations and reasoning for their observations and conclusions. For example, "I know this plant needs sunlight because…"
- Sentence stems and a list of Vocabulary is provided, if needed.

Teachers are expected to have a thorough understanding of scientific terminology and concepts, and they refer to the school's glossary of scientific terms (refer to the Progression of Vocabulary document) if unsure.

Inclusion

Subject leaders and class teachers ensure the curriculum is accessible to all, especially SEND and disadvantaged pupils. Teachers adapt their teaching to cater to SEND and disadvantaged pupils' needs. Disadvantaged pupils always have the opportunity to participate in science-related trips and experiences through Pupil Premium funding. We have high aspirations for all pupils and staff use scaffolding effectively to help all pupils to access the Science curriculum. This includes considering their learning styles (VAK), time given to complete activities, additional resources and activities for vocabulary development, use of teaching staff, grouping, seating, scribing, reading and use of ICT.

Higher ability pupils in science are considered by staff as part of their planning. The curriculum is ambitious in its content and expectations of pupils. When it is appropriate to differentiate learning support and the progress of higher-ability pupils, pupils are targeted with more demanding questions and given next steps that encourage them to enquire more deeply. This may include using additional scientific vocabulary, developing higher-order thinking skills and challenging pupils to work scientifically more independently.

Inclusion is also considered when carrying out ongoing assessments as part of teaching and summative assessment activities. Activities are designed and implemented to allow children to show everything they know without being limited by things such as their writing ability. Assessment in Science at Minet Junior acknowledges that children often know more about science than they can record in written form. We believe that children should be given the opportunity to share what they know about science, whatever their literacy levels, and that teacher assessment reflects this understanding.

The learning environment

Each classroom has a display of the current science unit/ module.

The science display features a comprehensive and engaging layout, including

- a **KW grid** (What we Know, Want to know), which tracks students' learning progress
- key **vocabulary** related to current topics is clearly presented, helping to reinforce language development and subject knowledge.
- detailed **diagrams** that visually explain key concepts, accompanied by **definitions** of important scientific terms.

Monitoring

Role of Science Subject Leader

The science subject leader monitors and evaluates the quality and standards of science across the school:

- Ensures that all teachers understand the requirements of the National Curriculum and supports them in following the medium-term planning.
- Informs senior leadership of the progress in developing effective science teaching based on CPD received.
- Develops policies in line with new requirements and changes in the science curriculum.
- Leads by example by setting high standards in their own teaching.
- Prepares, organises, and leads CPD for staff to enhance science teaching.
- Monitors and evaluates science provision in the school by conducting regular work scrutiny, planning scrutiny, learning walks, observations, and analysis of formal assessment data.
- Takes responsibility for the selection, purchase, and organisation of science resources.
- Reports on science progress to the SLT.

Resources

Each year group store cupboard is equipped with essential and sufficient resources to support pupils in developing their skills and understanding in various areas of science. Consumable items can be purchased on request.

Extra-curricular opportunities

Fieldwork and visits to places of scientific interest are planned to support the learning objectives for work units relevant and planned well in advance. STEM ambassadors and other outside agencies can be booked, when possible, to support the teaching and learning of science further and raise the profile of science.

Appendix 1:

Working scientifically

Statutory requirements

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Appendix 2

Working scientifically

Statutory requirements

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 3

Dentist Workshop

Constructing and erupting volcanoes

Constructing imprint fossils.

Comparing flora and fauna in our school forest to the Amazon.

Making Amazon inspired fruit drinks, learning about fruit and its growth from trees.

Year 4

Dentist Workshop

Climate Change Workshop

Digestive Drama sessions

Constructing models to explore the digestive system

Explore minibeast and different types of leaves in local environment

Year 5

Kew Gardens

Winchester Science Museum

Visit to Planetarium

Hosting and explaining Prediction Stations, practising scientific vocabulary and explanations.

Observing habitats and microhabitats in Forest School sessions.

Year 6

Mitsubishi Energy Project

Mini medics First Aid training