



Yoxall St Peter's CofE Primary

Curriculum



How we teach: Science

(Updated Sept. 22)

Basic principles

- At Yoxall St Peter's, we want pupils to develop key scientific skills which are applicable across primary science, as well as building a strong knowledge and content base with which to explore and investigate.
- As stated in the National Curriculum 2014, we want to equip pupils with the knowledge and understanding behind a concept, the methods and processes to investigate it and the uses or implications in the wider world and in daily life.

Curriculum intent model

- We want to inspire an appreciation and wonder for science in order to build pupils' understanding of the world around them across all the disciplines (biology, chemistry and physics) and of the possibilities of its application to future generations in terms of enhancing lives, solving problems and protecting the natural world.
- As stated in our Christian Aims and Vision, we believe that our pupils are the foundations of the future and that their perception and engagement with science now is a building block for shaping their future roles in society and the lives that they build for themselves. Learning about the human body and the importance of staying healthy, both mentally and physically, is integral to teaching children how to live fulfilling and balanced lives, especially in the face of numerous modern-day challenges. With the ever-increasing threats and impacts of climate change, biodiversity loss and the depreciation of natural resources, it is more important than ever to nurture a sense of connection, responsibility, respect and reverence for the natural world and to show children how our actions now can help to safeguard the world for future generations and to mitigate against some of the issues it is currently experiencing. Through learning about materials or properties, we want children to be able to see how science has sculpted the ways of life they know, their everyday objects and appliances, and how it can now also help less developed communities around the world where the quality of life is different. We want pupils to be inspired by explorations into space, by how light, electricity and magnets have fostered global innovations and how collaboration and teamwork between scientists have helped to achieve this.
- We want pupils to develop an enthusiasm, curiosity and appreciation for the role of science within daily lives and within society. We want to link the scientific knowledge and skills they are learning with their applications, such as using magnets on high-speed railways and medical equipment or in using road salt or friction tyres for safer winter driving. In this way, we hope that pupils can see the purpose of science, how it underpins the structure of past, current and future life and therefore develop their enthusiasm to learn. We hope that some children may also then aspire to pursue science into the future.
- Additionally, we want children to be aware of current global issues within the scientific and wider community and how they affect the natural world as well as human societies (where there are appropriate links with relevant curriculum topics). This will link to our Christian aims and values as a school in supporting the global community and considering how we can help the lives of others and how we can protect the world.
- We hope to form greater links within the parent or local community where visitors may be able to give small talks to children about their work or be involved within projects in school, such as has happened with designing the new school library. Pupils with a parent or family member working in a science career may be

able to bring some outside knowledge or experience to enhance lesson content and hopefully inspire and interest peers about the types of science careers that people can do.

Implementation

Teaching Science:

- In order to ensure subject coverage and aid teacher knowledge or CPD in unfamiliar topics, ASE (Association Science Education) endorsed PLAN (Pan London Assessment Network) planning matrices will be used as skeleton documents to inform teachers on key vocabulary, what needs to be learned and how that might be demonstrated or investigated by pupils. It also shows that these are the expectations for a child to be assessed as being *secure* in the topic.
- Building on from this, teachers are to use science lessons from the 'Grammarsaurus' scheme in order to find lesson materials. We will use this to aid differentiation where mixed year groups are covering the same topic. For example, in a Y4/5 mixed class, Year 5 children may be *revisiting* a topic they covered in Y4. As they have already covered the topic in their previous year, this will be a revision unit for them but they will be set application or explanation tasks, e.g. *Challenge* or *Next Step* tasks from Grammarsaurus, *What if* questions from Explorify, or data collection tasks based on that year group's maths coverage, etc. Where a lower year group is covering a topic not normally assigned to their year group, this will be an introductory unit for them and they will either consolidate on previous learning or they could use the *Easy* level task of Grammarsaurus. For example, in a Y2/3 class, the Y2 children have previously covered *Animals, Including Humans* in KS1 but would be exposed to the Y3 level topic in their new class mix. In this situation, their task would either be one consolidating learning from when it was covered in KS1. If this were not possible, they could complete the *Easy* level task from Grammarsaurus for the Y3 topic. Teachers do not have to use every single lesson in Grammarsaurus, so long as they have covered the key areas and skills outlined in the ASE PLAN documents, mentioned above.
- Science knowledge organisers with vocabulary lists (from Grammarsaurus) are to be used to improve children's understanding and retention of key points to a topic. They are also intended as an aid to improve the use of scientific vocabulary, both verbally and in written work, as well as revising key learning points. Grammarsaurus additionally provide quiz questions which can check understanding and retention in a lesson.
- Science teaching needs to occur once per week for at least an hour in order to cover the relevant topics across the year. A topic may take a few weeks to complete, depending on its size and content, and each topic should include some investigation work. This could take the form of a long investigation which spans more than one lesson, e.g. a planning lesson to outline the enquiry, a testing lesson where the investigation is conducted, and a follow-up lesson where results are presented, analysed and discussed (as appropriate to the year group in question).
- We want pupils to experience a range of practical activities and enquiry skills throughout their science curriculum. Science does not always need to result in written work, and children can benefit greatly from in-depth peer or class discussions which still use their knowledge, skills or ideas. Teachers need to show an appropriate balance in how much written work is recorded or is necessary and this may vary between key stages. In Key Stage 1, it may be appropriate for teachers to use single class books to record pupil responses or pictures where writing is still a developing skill and would hamper the flow or direction of the lesson. This may depend on the ability of the class and the topic being studied.
- As stated in the National Curriculum, it is important that children grasp the basics of a topic and that these basic ideas are revisited throughout a topic in order to reinforce long-term memory of ideas.
- Online activities, such as those provided by Explorify (<https://explorify.wellcome.ac.uk/activities>), can provide valuable opportunities for discussion around a topic and can encourage children to reason and think around their existing knowledge, or to learn from other pupils' ideas. Short quizzes, such as those from the

'Grammarsaurus' website could be used as quick checks of pupils' knowledge or understanding during a topic.

- 'Working Scientifically' skills do not need to be taught separately but need to be included in enquiry and investigation work across the year. The National Curriculum states that '*These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources*'. We want children to be able to recognise when and how they are using these different skills and we are going to trial the use of enquiry logo stickers, taken from the PSTT (Primary Science Teaching Trust).
- Due to the challenges faced as a mixed-age school where class mixes are not always constant, fitting all the topics from both the year groups in a class can sometimes be difficult. We have found that a Science Catch-Up Week, perhaps twice a year (e.g. Spring Term & Summer Term) would allow for all content to be covered, particularly where other school events such as the Nativity can make timetabling difficult. (This can also be particularly beneficial in weeks where older year groups are away on residential trips as it can allow split year groups to come together for teaching of their topic.) During the Catch-Up Week, maths lessons would be taught as normal during the morning, but other lessons during the week could be devoted to science. (NB. Science topics can be used as a basis for literacy lessons, but this should be as a review task and not when the science content is first being learned - it is important for pupils to learn and explore the basic science properly before they use it in writing.)

Science Marking Policy January 2020

- Children respond to corrections in purple pen, as in other subjects. Teachers use a dot/line for incorrect spellings (~3) or other mistakes, as used in other marking.
- Use a marking 'Feedback/Assessment' sheet (also used in literacy) for when marking an investigation or an in-depth piece of science, e.g. explanation. (It does not need to be used for smaller content-based lessons where it would not be appropriate.) As investigations sometimes cover more than one lesson, it would not necessarily be expected that you complete the feedback sheet for the planning part of the investigation (down to teacher discretion), but instead to do it for the lesson following where children may have recorded results and explanations. This would allow for addressing any misconceptions in children's understanding. If children have a key misunderstanding, it needs to be addressed and corrected in purple pen. Teachers could also stamp VF where they have spoken and explained to the child. Therefore, each science topic may expect to have about 3 feedback sheets by the end.
- It is important for children to be exposed to key scientific vocabulary which is appropriate to their topic and also their key stage. Children should be encouraged to use words verbally and in writing, where appropriate in key stage 1 and 2. Following a lesson, recurring misspellings can be noted on the feedback sheet and displayed the following lesson for children to correct; however, there is the expectation that they should copy things down correctly first time around (excepting SEN). Vocabulary lists are now on the Grammarsaurus knowledge organisers, which children can also refer to for spelling support.
- Remember to refer to the PLAN matrices to inform planning - these were handed out to each class and are also available in Staff>Everything you need> Science Planning & Assessment documents. They are nationally moderated sheets which detail everything we need to teach for each topic and year group and will help with ensuring progression and coverage, whilst also offering some background and vocabulary for the topic.

Applications and Broadening Horizons

- In order to broaden children's horizons and link to the schools Christian Aims and Vision, the school will take part in a Science STEM Week each year (at an agreed date) where each class will choose a STEM project, such as from the *Practical Action Global STEM Challenges* which are based on UN Sustainable Development Goals and address issues such as poverty, climate change and other global challenges. They are available online at <https://practicalaction.org/schools/>. The list of projects from the website have been copied into the school's science progression document to show which topics would suit which year groups. *Practical Action* have already sorted these to match each year group's science topics from the National Curriculum. Where there is an overlap of the same project listed in multiple year groups, all staff would meet beforehand to plan which class was doing which project for that year. In subsequent years, this would also check that

children who covered one project in one class, wouldn't immediately repeat it in the next class if it was also listed for their next year group as well. Where projects do recur across different year groups, teachers would adapt the level of the learning to suit their year group mix and key stage.

- In order to *involve pupils in determining the subject content*, teachers could discuss the choices of global projects available to their class mix, prior to the STEM week, and allow some discussion as to which projects pupils feel impassioned to follow, based on their own interests, their own experiences or other current global, national or local issues.
- In order to foster links within the local or parent community, we would investigate the possibility of inviting parents or visitors with a scientific based career to discuss with the children and perhaps also to be involved in the STEM project week, such as working with small groups. It could also involve a mini 'careers' session for children to explore and be enthused by opportunities. This would be a low-key event with the intention to interest and inspire children with where they might take their learning in future. However, it will depend on parent/visitor uptake as well as the span of applicable employment areas within the group.

Impact

- Over their school life, children gain a solid understanding across the main disciplines of biology, chemistry and physics as well as the skills to investigate in different ways and to discuss and present what they have found.
- Children have clear expectations of how they learn science and can participate in discussions with confidence so that scientific understanding is strengthened across the school.
- Teachers have a clearer idea of what content needs to be taught and how that might look using the planning resources provided. Teachers are also more confident in knowing what working at a *secure* level would look like.
- Using *Global STEM* challenges in a specific science week during the year would allow children to experience the applications of science 'on the front line' and to see its importance to protecting and enhancing the natural world and human society.
- Children appreciate the difficulties and challenges that many communities around the world can face and how science can aim to address them, but also the exciting opportunities that science can bring in terms of innovation and advancement.
- We hope to inspire children with a life-long appreciation and interest in science, and to build aspirations to pursue science in the future.