



## **Curriculum Statement for Science Intent, Implementation and Impact**

*At Laurel Avenue Community Primary we define learning as a change to long term memory. Our aims are to ensure that our pupils experience a wide breadth of study and have, by the end of each key stage, long-term memory of an ambitious body of procedural and semantic knowledge, that will support them in later life.*

*Science stimulates and excites pupils' curiosity about phenomena and events in the world around them. It also satisfies their curiosity with knowledge. Because science links direct practical experience with ideas, it can engage learners at many levels. Scientific method is about developing and evaluating explanations through experimental evidence and modelling. This is an ignition to critical and creative thought. Through science, pupils understand how major scientific ideas contribute to technological change – impacting on industry, business and medicine and improving the quality of life. Pupils recognise the cultural significance of science and trace its world-wide development. They learn to question and discuss science-based issues that may affect their own lives, the direction of society and the future of the world.*

*Our curriculum includes 'Threshold Concepts' (the ideas that shape pupils' thinking), taken from Chris Quigley's 'Essentials Curriculum' in each subject to track pupils' learning through the Milestones.*

*Each Threshold Concept is explored within different contexts so that it has tangibility and meaning. Breadth of contexts ensures that children gain relevant knowledge and can transfer this knowledge.*

### **Our Aims – The Essential Characteristics of our Science Curriculum**

*We aim to ensure that all pupils gain:*

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.*
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.*
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.*
- High levels of originality, imagination or innovation in the application of skills.*
- The ability to undertake practical work in a variety of contexts, including fieldwork.*
- A passion for science and its application in past, present and future technologies.*

### **Curriculum Intent**

*Our Curriculum is underpinned by our core values and the three drivers. We use both the EYFS framework and the National Curriculum to shape the content and expectations of our curriculum. The Chris Quigley Essentials curriculum is used to help us structure this in each year group and look at progress within each phase. We have structured this so that each year group has:*

- a) A clear list of what must be covered.*
- b) The threshold concepts pupils should understand.*

*c) Criteria for progression within the threshold.*

*d) Criteria for the depth of understanding (Basic, Advancing and Deep)*

*1. Curriculum drivers shape our curriculum breadth. They are derived from an exploration of the backgrounds of our pupils, our beliefs about high-quality education and our values. They are used to ensure we give our pupils appropriate and ambitious curriculum opportunities.*

*Our drivers are identified as:*

***Ambition and Possibilities***

*To have a life-long love of learning that inspires them to look to the future*

*To have high expectations of themselves and their future*

*To recognise opportunities beyond the local community*

*To increase knowledge of different career choices*

*To develop self-confidence and a 'have a go' attitude*

***Process***

*Planning to ensure opportunities to raise children's self-belief and develop a positive attitude towards risk and challenge*

*Focus on ambition, identifying different jobs and possibilities through topics, visits and visitors; role models for success*

*Regular opportunities to work as a team, especially Key Stage 2*

***Life Skills and Enterprise***

*To develop questioning and research skills, applying to a range of hands-on learning experiences*

*To work effectively as a team to organise themselves and create an end product*

*To work independently and be organised and ready for learning*

*To listen and communicate with others*

*To complete set tasks in a given period and not give up*

*To have excellent attendance*

*To think 'creatively' to solve problems*

*To be equipped for life beyond Primary School*

***Process***

*Opportunities for learning through each of the 5 learning skills - reflective, relationships, resilient, resourceful and risk taking will be provided*

*Through each topic, children will have opportunities, through a wider range of skills based lessons, to take ownership of their learning and direct it more*

*Wider opportunities for learning beyond the curriculum to equip children with relevant life skills; health and economic well-being, cooking, e-safety*

*Encouraged expectation that children attend school and are ready to learn with appropriate equipment and kit and take responsibility to be ready and prepared*

***Knowledge and Understanding of the World***

*To experience opportunities that broaden their horizons*

*To enhance their insight into the community and world by providing meaningful learning opportunities*

*To celebrate/appreciate diversity and culture at national and international level*

*To widen general knowledge*

*To give opportunities to pursue their own lines of enquiry*

## **Process**

*Using the 'news flash' feature of Espresso and First News newspapers to keep in touch with current issues*

*Providing opportunities through visits, local exploration and the use of visitors to ask questions and explore the diversity of people, society, culture*

*Discussing local and global issues and the impact that they have*

*Asking questions and research historical events in the local and wider communities*

*2. Cultural capital gives our pupils the vital background knowledge required to be informed and thoughtful members of our community who understand and believe in British values. For example, local history days, Black History Month, educational visits and visitors, intergenerational links through Age UK, assemblies, celebration days.*

*3. Curriculum breadth is shaped by our curriculum drivers, cultural capital, subject topics and our ambition for pupils to study the best of what has been thought and said by many generations of academics and scholars.*

*4. Our curriculum distinguishes between subject topics and threshold concepts. Subject topics are the specific aspects of subjects that are studied.*

*5. Threshold concepts tie together the subject topics into meaningful schema. The same concepts are explored in a wide breadth of topics. Through this 'forwards-and-backwards engineering' of the curriculum, pupils return to the same concepts over and over, and gradually build understanding of them.*

*Our curriculum includes 'Threshold Concepts' (the ideas that shape pupils' thinking), taken from Chris Quigley's 'Essentials Curriculum' in each subject to track pupils' learning through the Milestones.*

*Each Threshold Concept is explored within different contexts so that it has tangibility and meaning. Breadth of contexts ensures that children gain relevant knowledge and can transfer this knowledge.*

## **Working scientifically**

- *Work scientifically*

*This concept involves learning the methodologies of the discipline of science.*

## **Biology**

- *Understand plants*

*This concept involves becoming familiar with different types of plants, their structure and reproduction.*

- *Understand animals and humans*

*This concept involves becoming familiar with different types of animals, humans and the life processes they share.*

- *Investigate living things*

*This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.*

## **Chemistry**

- *Investigate materials*

*This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.*

## **Physics**

- *Understand movement, forces and magnets*

*This concept involves understanding what causes motion.*

- *Understand the Earth's movement in space*

*This concept involves understanding what causes seasonal changes, day and night.*

- *Investigate light and seeing*

*This concept involves understanding how light and reflection affect sight.*

- *Investigate sound and hearing*

*This concept involves understanding how sound is produced, how it travels and how it is heard.*

- *Understand electrical circuits*

*This concept involves understanding circuits and their role in electrical applications.*

6. For each of the threshold concepts there are three milestones, each of which includes the procedural and semantic knowledge pupils need to understand the threshold concepts, provide a progression model.

7. Cognitive science tell us that working memory is limited and that cognitive load is too high if pupils are rushed through content. This limits the acquisition of long-term memory. Cognitive science also tells us that in order for pupils to become creative thinkers, or have a greater depth of understanding, they must first master the basics, which takes time.

8. Within each milestone, pupils gradually progress in their procedural fluency and semantic strength through three cognitive domains: basic, advancing and deep. The goal for pupils is to display sustained mastery at the advancing stage of understanding by the end of each milestone and for the most able to have a greater depth of understanding at the deep stage. The time-scale for sustained mastery or greater depth is, therefore, two years of study.

The Diagram below shows a model of our curriculum structure:

Curriculum Map for Years 1 and 2			Curriculum Map for Years 3 and 4			Curriculum Map for Years 5 and 6		
Threshold Concepts								
Milestone 1			Milestone 2			Milestone 3		
B Year 1	A Year 1/2	D Year 2	B Year 3	A Year 3/4	D Year 4	B Year 5	A Year 5/6	D Year 6

9. *As part of our progression model we use a different pedagogical style in each of the cognitive domains of basic, advancing and deep. This is based on the research of Sweller, Kirschner and Rosenshine who argue for direct instruction in the early stages of learning and discovery-based approaches later. We use direct instruction in the basic domain and problem-based discovery in the deep domain. This is called the reversal effect.*

10. *Also as part of our progression model we use POP tasks (Proof of Progress) which shows our curriculum expectations in each cognitive domain.*

### **Implementation**

11. *Our curriculum design is based on evidence from cognitive science; three main principles underpin it:*

- *Learning is most effective with spaced repetition.*
- *Interleaving helps pupils to discriminate between topics and aids long-term retention.*
- *Retrieval of previously learned content is frequent and regular, which increases both storage and retrieval strength.*

12. *In addition to the three principles, we also understand that learning is invisible in the short term and that sustained mastery takes time.*

13. *Our content is subject specific. We make intra-curricular links to strengthen schema.*

14. *Continuous provision, in the form of daily routines, replaces the teaching of some aspects of the curriculum and, in other cases, provides retrieval practice for previously learned content.*

15. *Through the use of 'Know Its' taken from the topic webs, children are given opportunities to periodically revisit knowledge gained within current and previous Milestones and relate it to current learning.*

### **Impact**

16. *Because learning is a change to long-term memory, it is impossible to see impact in the short term.*

17. *We do, however, use probabilistic assessment based on deliberate practice. This means that we look at the practices taking place to determine whether they are appropriate, related to our goals and likely to produce results in the long run.*

18. *We use comparative judgement in two ways: in the tasks we set (POP) Proof of Progress) tasks, see point 12) and in comparing a pupil's work over time.*

19. *We use lesson observations to see if the pedagogical style matches our depth expectations (see point 11).*

## **Monitoring**

*The Science Co-ordinator and class teachers are responsible for monitoring the standard of the children's work and the quality of teaching in Science. The Co-ordinator is responsible for supporting teaching staff in the teaching of Science, and for providing a strategic lead. The Co-ordinator completes an annual report where they evaluate the strengths and weaknesses in the subject and indicate areas for further improvement. Throughout each academic year, the Co-ordinator will undertake the monitoring of Science across the school.*

*Signed:*

*Chair of Learning, Teaching and Achievement Committee*

*Date:*

*Signed:*

*Co-ordinator*

*Reviewed: October 2021*

*Review Date: October 2024*