Science Intent, Implementation and Impact Statement

At Meopham Community Academy, our stimulating, innovative Science curriculum is designed to ensure that all of our children, no matter what their ability, are exposed to a set of skills that will not only equip them with the knowledge and understanding of all aspects of Science but will enable them to have an awareness of the world around them.

Our engaging, well sequenced Science lessons create curious pupils who ask questions and challenge theories. Teachers continue to build on key concepts yearly in order to ensure that learning has formed in their long term memory.

Our whole school values of Respect, Integrity, Resilience, Equality and Aspiration and our motto of 'Enjoy, Learn, Aspire', drive our curriculum and everything that we do.

Curriculum drivers

'Enjoy' is to provide our pupils with an engaging, bespoke curriculum which fosters a desire to keep learning because "education is not the filling of a pail, but the lighting of a fire" aiming to build positive memories and become life-long learners.

'Learn' is to ensure that all of our pupils, irrespective of background or needs, successfully reach their academic goals through high quality teaching, hard work, determination and persistence.

'Aspire' to ignite our pupils with dreams and aspirations that they know are within their reach. To have high aspirations for their future and know all of the available opportunities open to them.

Intent

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

2. Cultural capital gives our students the vital background knowledge required to be informed and thoughtful members of our community who understand and believe in British values.

3. Curriculum breadth is shaped by our curriculum drivers, cultural capital, subject topics and our ambition for students 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, students return to the same concepts over and over, and gradually build understanding of them.

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

7. Knowledge categories in each subject give students a way of expressing their understanding of the threshold concepts.

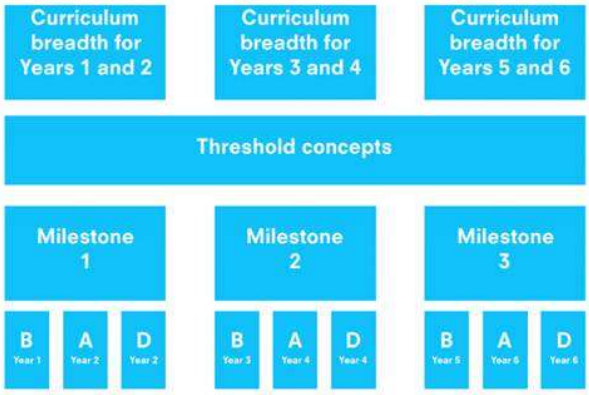
8. Knowledge webs help students to relate each topic to previously studied topics and to form strong, meaningful schema.

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

10. Within each milestone, students gradually progress in their procedural fluency and semantic strength through three cognitive domains: basic, advancing and deep. The goal for students 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 timescale for sustained mastery or greater depth is, therefore, two years of study.

11. 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.

12. Also, as part of our progression model, we use POP tasks (Proof of Progress) which show our curriculum expectations in each cognitive domain.



Characteristics of a Scientist

- 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.

Implementation

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

• Learning is most effective with spaced repetition.

• Interleaving helps students 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.

In addition to the three principles, we also understand that learning is invisible in the short term and that sustained mastery takes time. Our content is subject specific. We make intra-curricular links to strengthen schema.

Our pupils should be able to organise their knowledge, skills and understanding around the following key concepts:

- Work scientifically
- Biology
- Chemistry
- Physics

These key concepts underpin learning in each milestone. This enables pupils to reinforce and build upon prior learning, make connections and develop subject specific language.

Impact

Assessment

Through the explicit teaching of Science skills, both the teachers and the pupils assess their learning continuously throughout the lesson. At the end of the unit, pupils reflect on their knowledge and understanding. Our assessment systems enable teachers to make informed judgements about the depth of their learning and the progress they have made over time.

Aspirations For The Future

Pupils develop an understanding of how subjects and specific skills are linked to future jobs. Here are some of the jobs you could aspire to do in the future as a Scientist:

- Aquatic vet
- Astronaut
- Animal researcher
- Marine biologist
- Helicopter mission control
- Weather presenter