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Science Curriculum Intent – Rationale for the 5E Approach and Dual Objectives

Our Intent

Science has and continues to change our lives and is vital to the world's future prosperity. It should be our aim as a society to ensure that future generations continue to pursue further advancements in the field for the betterment of the human race and the planet.

Our students are the future generation, so in order to ensure this continued pursuit, it is our belief that we must:

- Light the spark of curiosity and excitement about natural phenomena within our students and encourage them to recognise the power of rational and empirically backed explanation. **Why?**
- Equip our students with the key foundational knowledge and concepts of primary science. **What?**
- Provide an immersion in the methods, processes and uses of science. **How?**

By ensuring these three main tenets are met, we aim to create scientifically literate students who progress onto secondary education with the ability to effectively experiment, observe, problem-solve, work collaboratively and think critically.

In doing so, we ensure that further educators are provided with a solid foundation in which to build on so that our children are able to continue realise their full academic potential in the future whether this be in a scientific field or not.

How Do We Provide This? – The 5E Approach and Dual Objectives

The National Curriculum provides educators with the 'What?' of science – in that we understand what key knowledge, concepts and scientific processes must be taught. 5E provides teachers with the 'How?'. It is a pedagogical approach to teaching science; it provides a framework for teachers to develop students' understandings of scientific ideas and proficiency with scientific processes.

The framework (See fig.1) provides opportunity to engage student thinking, then allows for explorative discovery through scientific process. Factual learning is then provided to further deepen understanding of content matter. Students learn first-hand that one scientific question leads to many more and one area of science links and extends into another. Importantly, students are provided the opportunity to be critical thinkers through evaluation also.

If we revisit the three main aims of our science curriculum, it is clear from the brief outline of the structure that it provides staff with the ability to 'Why?' and 'What?' outlined. Importantly, the 5E framework does not define scientific inquiry – children must still be exposed to different scientific processes within the model. The same can be said for content (the What?). In this instance, 5E should be considered the delivery method, the content therefore still needs to be determined.

In conjunction with a leading science co-ordinator across North East schools, LRPS have developed dual objective planning (see Science Learning Policy) that provides staff with the backbone of their planning in that they know which core and scientific skill objective they are teaching throughout the 5E framework. Due to the flexibility of 5E, staff are not hindered in their creativity by the framework but supported. Staff can therefore use different types of instructional resources, programs and materials that they may already have to provide the 'What?' thus providing further support still.

Through the combined use of the 5E approach and dual objectives, staff are able to provide our students with a first-class science education in which they truly experience science, they are not simply taught facts but are guided through scientific exploration and discovery in an immersive and engaging setting. We do not simply teach science, **we are scientists.**

Science in Early Years - Understanding the World and 3E

Following guidance provided by the DfE in 'Development Matters', Early Years focus on guiding our youngest children to make sense of their physical world and their community. This is accomplished by both responding and exploring to their natural curiosities about the world and by sparking curiosity through guided learning experiences. To do this, EYFS utilise the 3E model (Engage, Explore and Explain) to guide the children through a process of understanding different phenomena. Through the observations, explorations and discussions provided to them in EYFS, when entering KS1, our children already have that natural inclination to explore, question and discuss which is a crucial foundation to becoming scientifically literate.

For further in-depth details and first-hand examples of how the 5E model and dual objectives work in LRPS, please view the Science Learning Policy.

Figure 1.

Engage	<ul style="list-style-type: none">• Teachers introduce a topic or idea to capture students' interest, curiosity, and attention.• Teachers tap into students' prior knowledge.• Teachers do not seek a "right answer."• Teachers prompt students to reflect on past experiences or current understandings.
Explore	<ul style="list-style-type: none">• Students conduct hands-on or problem-solving activities or experiments designed to help them explore the topic and make connections to related concepts, often within groups or teams.• Students share common experiences while the teacher acts as a facilitator, providing materials as needed and guiding students' focus.
Explain	<ul style="list-style-type: none">• Teachers help students observe patterns, analyze results, and/or draw conclusions based on their activities and investigations.• Teachers define relevant vocabulary.• Teachers explicitly instruct a concept, process, or skill to students.• Students demonstrate their understanding of the concept, process, or skill through written work, written reflections, or class discussion.
Elaborate or Extend	<ul style="list-style-type: none">• Students build on the concepts or ideas they have learned.• Students make connections to other related concepts through new situations.
Evaluate	<ul style="list-style-type: none">• Students assess their own understanding of the content.• Teachers evaluate students' progress toward mastering the learning objectives.• Evaluation can be formal or informal.

Booker and Kopp, 2013.