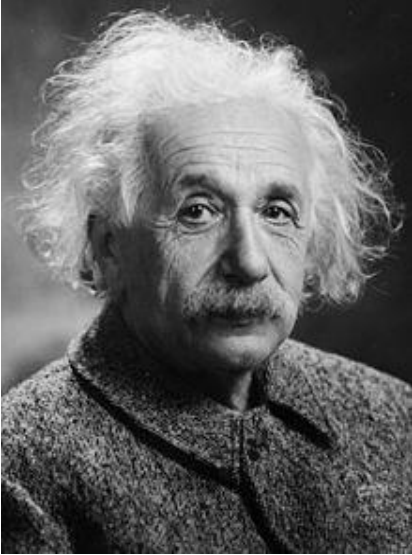


Science at The Trinity

A policy document for all stakeholders

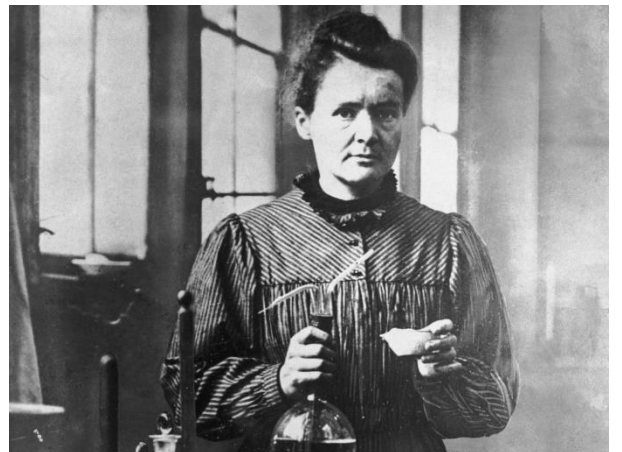


“The important thing is not to stop questioning. Curiosity has its own reason for existence.”

Albert Einstein

"I was taught that the way of progress was neither swift nor easy."

Marie Curie



This document has been written for the purpose of informing stakeholders as to how science is taught at The Trinity Catholic Academy. These stakeholders include parents, teachers, school leaders, governors, Local Authority/colleagues from School Improvement Liverpool and Ofsted inspectors.

If you have any further questions about how the subject or individual topics are taught at our school, please contact the school office for your query to be directed to the science lead.

November 2022

The ‘three I’ approach to science at The Trinity



Intent



Implementation



Impact

Intent

Science in Early Years (taken from the EYFS Statutory Framework)

Understanding the world involves guiding children to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment

Science purpose of study Year 1-6 (taken from 2014 National Curriculum document):

Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Our science intent

Science:

Science provides children with a strong understanding of the world around them.

Harnessing their natural curiosity, we ensure children learn to explore, discover and use Science to explain what is occurring around them; predict how things might behave and then analyse the cause.

What this means in reality

The best learning in science provides our children with the foundations for understanding the world through the disciplines of biology, chemistry and physics. Embedded within and across these disciplines is the concept of working scientifically. Only by 'trying it out' can our pupils progress. Thomas Edison's successes are mentioned far more than his 'failures'. He is quoted as saying, "I have not failed 10,000 times...I've successfully found 10,000 ways that will not work." What a fantastic attitude!

Lessons are planned with the aim of building on prior knowledge. Vocabulary is emphasised in all sessions. This is important in all subjects but particularly important to science. Think about 'light', for example. What does 'light' mean? A mass may be described as feeling light or heavy, a room may be described as being light or dark. Therefore, at the heart of our teaching and learning, scientific vocabulary is emphasised in each session. Pupils are exposed to it through the use of a 'word bank' and high-quality science teaching emphasising the importance of vocabulary.

Due to this need for clarity with scientific language, children at The Trinity have access to a range of age-appropriate vocabulary, suitable for working scientifically and particular topics studied by the children. Expected vocabulary for each year group is available on our school website.

Diversity in science

Diversity in science at The Trinity refers to cultivating talent and promoting full inclusion. This includes people from backgrounds that are traditionally underrepresented and those from backgrounds that are traditionally well represented.

To ensure children learn about scientists from a range of backgrounds in every topic. These are embedded within the curriculum planning and teaching materials. We also use display board, such as our 'women in science' to inspire pupils.

Big ideas in science

Through our science curriculum, tailored for The Trinity, children develop an understanding of the 'big ideas' about objects, phenomena, materials and relationships in the natural world (for instance, that all matter is made of small particles or that objects are able to affect others at a distance). These ideas were first promoted by Wynne Harlen (2010). These ideas are at the head of all topic planning documents. It is the intent that children are given every opportunity to develop their knowledge and understanding of these ideas through their learning in order that they are fully prepared for learning in secondary school and life beyond their school career.

Substantive and Disciplinary Knowledge

Substantive knowledge includes the ‘what’ children learn, for example how light travels (Y6) or the difference between a carnivore, omnivore and herbivore (Y1). Disciplinary knowledge includes the ‘how’ children learn, for example in how they construct their investigations, record and interpret their findings. This can be broadly referred to as ‘working scientifically’. Progression is planned into the curriculum so that pupils return to and build upon prior learning. The sophistication of both their substantive knowledge and disciplinary knowledge therefore increases over time.

	Substantive National Curriculum knowledge statements	Disciplinary National Curriculum working scientifically statements
Conceptual Things pupils need to understand	Knowledge statements from National Curriculum in England	<ul style="list-style-type: none"> • Asking scientific questions • Planning an enquiry • Observing closely • Drawing conclusions • Making predictions • Evaluating an enquiry
Procedural Things pupils need to be able to do	<ul style="list-style-type: none"> • Circuit diagrams • Light ray diagrams • Labelled diagrams • Venn diagrams • Carroll diagrams • Separating mixtures • Making circuit <ul style="list-style-type: none"> • Planting seeds • Food chains • Life-cycle diagrams • Changing the pitch of an instrument • Changing the size of a shadow • Changing the shape of an object 	<ul style="list-style-type: none"> • Taking measurements • Gathering and recording results • Presenting results • Interpreting results

Resources

Our resource cupboard is stocked full of hands-on resources for each and every topic at school. Resources are embedded into planning and items are sourced for topics that relevant, interesting and further the learning of our pupils. We plant seeds of learning about growth by having children planting seeds themselves. The children understand forces by making parachutes and testing them from windows. They learn how to make circuits by making circuits and testing them. We have the equipment and resources needed to provide our children with the best learning. An annual budget is used after reviewing resources in line with intent in planning documents.

Long-term curriculum map

Ark Curriculum + Science planning is used at The Trinity Catholic Academy. Topics are mostly taught on a half-termly basis, with some exceptions where topics are taught across the whole term. It is recognised that science topics are interlinked, providing opportunities for revision of prior learning and enrichment opportunities for topics previously taught.

Year Group	Aut. 1	Aut. 2	Spring term	Sum. 1	Sum. 2
Year 1	Everyday Materials	Autumn and Winter	Amazing Animals	Spring and Summer	Common Plants
Year 2	Animals and Survival	Uses of Materials	Living things and Their Habitats	Protecting Our Environment	Plants and Growth
Year 3	Skeletons and Muscles	Rocks and Fossils	Light and Shadows	Plants: Need for Survival	Forces and Magnets
Year 4	Teeth and Digestion	States of Matter	Classification and Environments	Sound	Electricity
Year 5	Earth and Space	Forces	Properties and Changes of Materials	Life Cycles	Getting Older
Year 6	Light and Perception	Classification	Evolution and Inheritance	Electricity and Circuits	Circulation and Lifestyle

Implementation

Vocabulary

Vocabulary is critical to the understanding of scientific concepts. At The Trinity, vocabulary is embedded within topics and carefully chosen to reflect our pupils' ongoing progression and understanding. Biology, chemistry and physics terminology is introduced gradually, matching the expectations in topics for each year group. At each stage, pupils have the opportunity to build on their prior learning and understanding of vocabulary. As they progress through school, it is expected that children will be able to use, write and spell correctly the appropriate topic-specific vocabulary. This will be of particular focus during marking.

Practical enquiry

Practical enquiry is embedded within the curriculum at The Trinity. The 2017 Gatsby Practical Science report reminds us of the five main reasons we do practical work:

- To teach the principles of scientific enquiry

- To improve understanding of theory through practical experience
- To teach specific practical skills, such as measurement and observation, that may be useful in future study or employment
- To motivate and engage students
- To develop higher-level skills and attributes such as communication, teamwork, and perseverance

Planning a whole-school curriculum

Science planning is delivered through the Ark scheme of work. Prior learning is embedded through the use of low-stakes quizzes, derived from previous lessons, prior to lesson content being delivered.

Working Scientifically

Working scientifically at The Trinity means following scientific enquiry. This includes observing over time, pattern seeking, identifying, classifying and grouping, comparative and fair testing (controlled investigations) and researching using secondary sources. Pupils find answers to questions through collecting, analysing and presenting data.

It is not the case that every single one of the above are taught in every single topic. Rather, they are taught in a broad and balanced way across year group or phase in a manner appropriate to the age and stage of each pupil. Therefore, a child in KS1 may use a pictogram to show results; a child in Upper Key Stage 2 may use a line graph. However, a child in Upper Key Stage 2 may have particular learning needs that mean a pictogram is an appropriate way of showing his or her learning.

We differentiate based on the needs of every one of our pupils, but we also have high, achievable standards for every one of our pupils.

From the moment our pupils don their white lab coats and feel 'like a scientist', they are encouraged through exciting investigations designed to stick in the minds of all learners. Where planning needs to be adapted, teachers use their knowledge of the children to do so, providing the expectations of the curriculum are met and it will excite, engage and spark the curiosity of our pupils.

Our classroom displays should meet the expectations of school for consistency. Science displays are expected to demonstrate reference to work currently being studied; make reference to the 'subject knowledge organiser' available for each topic; and may display examples of children's work to celebrate success.

Impact

In science, progress is the result of the accumulation of knowledge leading to a fuller understanding of the nature of our world. This principle of science in the 'real world' guides science assessment at The Trinity. Science tests are not carried out at our school unless the school has been chosen to take part in biennial national sampling tests. It is unknown if there will be sampling tests in 2023 and/or if The Trinity will be chosen for this. Further information will be available nearer the time (expected spring-summer term 2023).

Formative assessment takes place in books, in line with school's assessment policy. Teachers are expected to challenge pupils with probing questions, where appropriate. Prior learning is designed into the start of each lesson, through the use of low-stakes quizzes, building on from previous lessons. At the start of the topic, this builds on relevant years' learning.

Summative science assessment uses a format of teacher assessment that is harmonised with other subjects in school, such as History and Geography. Assessment opportunities are embedded in planning through prior learning, assessment points to return to children's thinking questions for each topic, and through the use of low-stakes quizzes.

Data collection in science at The Trinity is a means to an end, not an end in itself.

Summative assessment data are usually reported by teachers to the subject lead and this information is analysed and communicated to SLT at 3 points during the year, namely after autumn, spring and towards the end of the summer term.

This document will be reviewed and amended to reflect changes in the intent, implementation and impact of science at The Trinity Catholic Academy.