Our Lady of Mount Carmel
Catholic Primary School

Adaptive teaching in science

"Start children off the way they should go, and even when they are old they will not turn from it."
Proverbs 22:6

Education
Endowment
Foundation

ST FRANCIS
Deus Meus et Omnia

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Teaching and Learning
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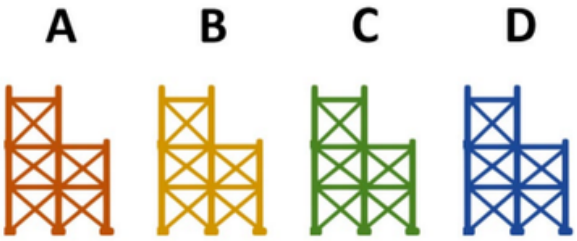
Adaptive teaching

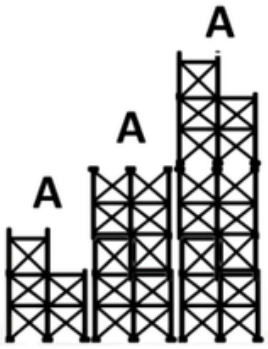
Our classrooms ensure teaching supports all learners. Balancing the necessity to both support and stretch learners is at the core of the craft of teaching and underpins one of our main Teaching and Learning drivers – 'Quality First Teaching Through Inclusive Practice'. Our learners experience a range of teaching strategies to meet their need, all falling under the blanket term of 'adaptive teaching'.

Adaptive teaching is how teachers scaffold, differentiate or adapt provision to ensure learners are being suitably supported and challenged. However, fundamental to this are the high expectations placed on learners. An example of this is how we 'teach to the top' to ensure all learners access a challenging learning objective – typically this is achieved via scaffolding. However, there is an understanding that sometimes more traditional differentiation needs to take place to secure gaps in learning or to enable children to access further material with a good degree of understanding.



Traditional differentiation is often more applicable when there is a large range in learners' understanding and attainment. Often there are occasions where learners may need to focus on specific Learning Plan objectives (SEND), or they need additional challenge to go beyond chronological age teaching content.

Scaffolding is applied to support learners all reach the same learning objective. Scaffolds could include writing frames, prompt sheets, sentence stems, concrete resources etc. Adult support can likewise be considered a scaffold if the adult is enabling the learner to achieve the learning objective. However, one of the most important elements of scaffolding, is knowing when to withdraw them. There is a risk that learners can become too dependent on scaffolds and develop a sense of leaned helplessness. Timing when to withdraw a scaffold is almost as important as providing them in the first instance.



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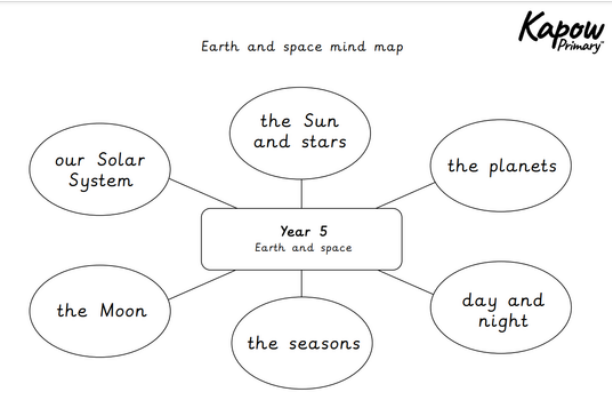
Making the use of prior knowledge

This provides support for students when a new topic and new content is introduced.



Mind Maps/ Knowledge Retrieval Activities
such as these, and bubble and spider diagrams, can be used early in the teaching of a new science topic to link the new and previous learning. They can also be used to provide a scaffold or framework for ongoing learning through the topic.

Teacher led group work

Teacher intervention/discussion when students are working on an enquiry or task, the teacher takes the opportunity to work with groups/individuals to provide scaffolding through questioning and discussion. The teacher probes their understanding, challenges their reasoning and explores whether they can explain the scientific ideas and concepts.

Help sheets/worked examples

Provide learners with worked examples to use as a model whilst completing independent work.These can be a checklist, visual examples or exemplary answers

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Peer discussion

Groups can be carefully chosen with a view to providing peer-support and by getting pairs to work together, utilising dialogic and analytic talk effectively

Transparency table template

Word bank
light intensity (lux)
category
material

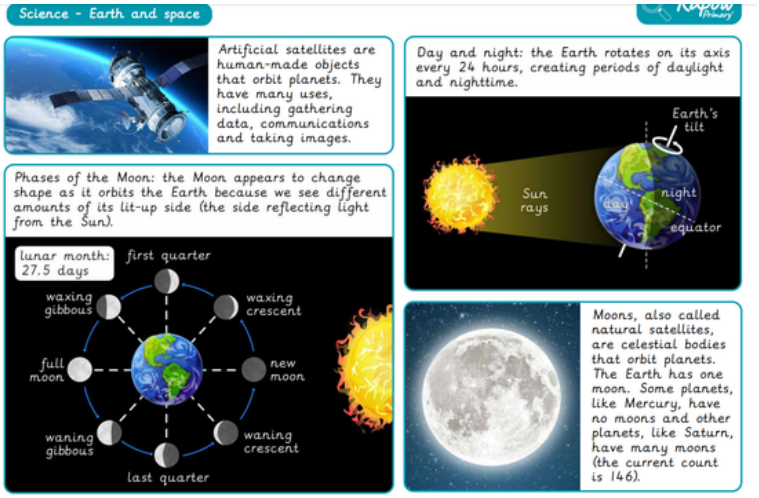
Object	Light Reading	Category

Grids and frameworks

In science, we use a variety of grids, graphs and charts as scaffolding tools, for example: Scientific diagrams, bar charts, scatter graphs, etc.

Pre-taught and embedding vocabulary

The teaching of scientific-specific terms and new vocabulary, early and repeated, allows students use this vocabulary and build a fuller understanding of its meaning in different scientific contexts. Knowledge organisers allow teachers to introduce and assess vocabulary.



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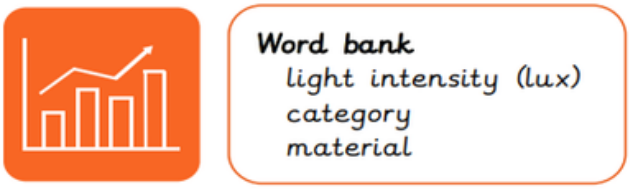
Thorough planning

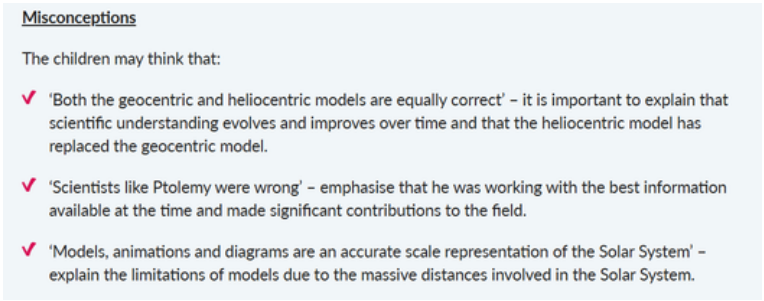
Meticulously plan, and always test practical experiments before the lesson. Use your practice to create step-by-step instructions, which you can then modify with visuals and/or more precise steps for learners needing additional guidance.



Word Banks

Provide topical word banks and picture cards that the learner can point or refer to when explaining scientific processes.

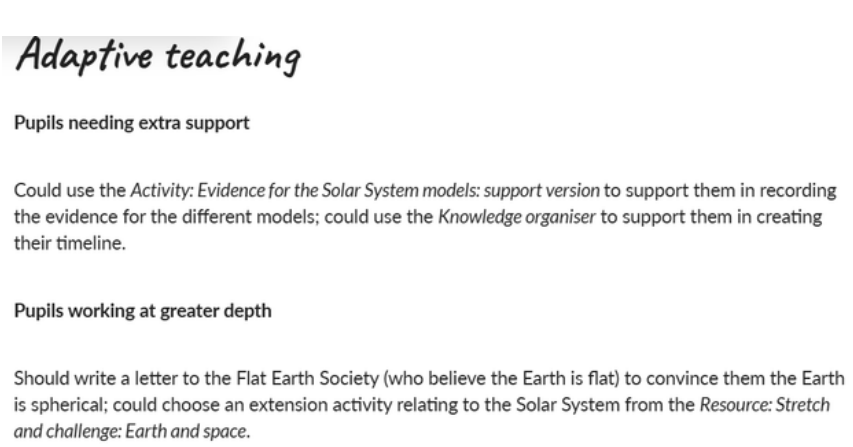
Our curriculum plans for misconceptions and includes an adaptive teaching tool



Misconceptions

The children may think that:

- 'Both the geocentric and heliocentric models are equally correct' – it is important to explain that scientific understanding evolves and improves over time and that the heliocentric model has replaced the geocentric model.
- 'Scientists like Ptolemy were wrong' – emphasise that he was working with the best information available at the time and made significant contributions to the field.
- 'Models, animations and diagrams are an accurate scale representation of the Solar System' – explain the limitations of models due to the massive distances involved in the Solar System.



Adaptive teaching

Pupils needing extra support

Could use the *Activity: Evidence for the Solar System models: support version* to support them in recording the evidence for the different models; could use the *Knowledge organiser* to support them in creating their timeline.

Pupils working at greater depth

Should write a letter to the Flat Earth Society (who believe the Earth is flat) to convince them the Earth is spherical; could choose an extension activity relating to the Solar System from the *Resource: Stretch and challenge: Earth and space.*

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Adapting for Greater Depth

Stretch and Challenge

We are committed to providing a challenging and enriching curriculum for all learners. To further stretch and challenge our most able pupils, we employ a variety of creative and engaging learning techniques. These include activities that encourage higher-order thinking skills such as: exploring "What if?" scenarios, developing persuasive arguments, conducting scientific investigations, and presenting their findings in innovative ways. We also foster independent learning through activities like research projects, creative writing tasks, and the use of digital tools. By providing a range of stimulating and challenging learning opportunities, we aim to nurture a love of learning and equip our most able pupils with the skills and knowledge they need to succeed.

What if?	**Find a solution**	**Argue your case**	**Alternate universe**
Imagine if the telescope (which allows us to see much further into space than we can with our eyes) had not been invented. Explain how this might change our knowledge and understanding of the Solar System.	Explain how people were able to tell the time before clocks and electricity.	Write an explanation to convince a 'flat-earther' that the planets in the Solar System, including the Earth, are spherical.	Describe how life on Earth would be different if the planet did not rotate on its axis.
Picture smart	**The alphabet**	**Sing it, say it, write it**	**What was the question?**
A pupil wants to find out what phase of the Moon they can see. Draw a picture to show the phases of the Moon, which they can use as a reference.	Write a list with an example of something for every letter of the alphabet related to the Earth and space.	Write a story, song or poem about day and night, the seasons, the Moon's phases or the planets' order.	You are given the answer **satellite.** List as many possible questions as you can.
Revision spiders	**What is going on?**	**The good, the bad and the interesting**	**Interesting props**
Create a spider diagram about the Solar System.	List a range of reasons why it would be bad if the Earth were closer or farther from the Sun.	Write down a negative, a positive and an interesting point about the movement of the planets in the Solar System.	Use a selection of classroom objects to model how day and night occur and how the seasons happen.