LIVERPOOL JOHN MOORES UNIVERSITY

Guidance for Observation and Target Setting in Primary Science

National Curriculum 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." (DfE, 2013, p.3)

6 Key Questions to ask when observing primary science lessons:

	Question	*Additional Information*
1	What is the substantive and/or disciplinary knowledge that is developed within the lesson?	*The 'substantiative knowledge' refers to the type of knowledge of the products of science, such as models, laws and theories. 'Disciplinary knowledge' is knowledge of the practices of science and this is often specified within the 'working scientifically' aspects of the NC (Ofsted, 2021).* *Therefore, are both aspects of knowledge referred to on the planning documentation?*
2.	How are the principles of enquiry-based instruction fostered within the lesson?	*Scientific enquiry and enquiry-based instruction are not the same. Enquiry-based teaching is a pedagogy that involves pupils acquiring substantive and/or disciplinary knowledge through exploration. Whereas, scientific enquiry describes the processes and skills pupils should be taught and use, to find out more about the world and how it works. How does the lesson foster an enquiry-based approach rather than a more teacher-led one?*
3	What tools and resources are used to promote reading, writing, talking, vocabulary and representing science?	*Pupils need opportunities in lessons to recap and to orally rehearse and structure their thoughts, using scientific language independently. Pupils also need to learn about the different ways in which scientists engage in their work: through reading, talking, writing and representing science-this is known as disciplinary literacy* *Therefore, how does the teacher model this and allow pupils to practice and lead these discussions?* *Are the resources appropriate and are they used purposefully?*
4	How does the lesson address misconceptions and navigate conflicts between the science world and the everyday world?	*Some substantive concepts are more difficult to learn because the scientific knowledge conflicts with everyday knowledge These misconceptions are not just 'errors' because they are functional in everyday life and so get reinforced. Therefore, is the knowledge shared accurate and are explanations clear?*

5.	Is any practical work purposeful?	*Pupils are not expected to acquire disciplinary knowledge simply as a by-product of taking part in practical activities This is because disciplinary knowledge is developed through the 'working scientifically' aspect of the curriculum where pupils learn about (and model) the diverse ways that science is generated and grows knowledge through scientific enquiry. This is not reduced to a single scientific method or taken to mean just data collection. Doing practical work is part of what it means to 'do science' (Ofsted, 2021).* *Therefore, how do pupils lead and interpret scientific investigations to develop their own disciplinary knowledge and understanding of what science is?*
6.	Are clear connections made to other subjects/real-life when relevant? Eg. Maths, geography etc.	*Planning for progression takes account of what is taught in other subjects. For example, the science curriculum should be coherent with what is taught in mathematics. Where there are differences, these are made explicit to pupils and teachers (Ofsted, 2021).* *Therefore, when teaching science are clear links made to other conceptual ideas and everyday life?*

Potential **Primary Science Specific** Targets on Lesson Analysis Forms.

Lesson design and delivery, including sequencing and choice of teaching methods (CCF curriculum & pedagogy) Next Steps:
Identify the key substantive AND disciplinary knowledge you want the children to know and remember from this lesson/sequence.
What is the big idea/question(s) that pupils are going to explore in the lesson and how will you sequence your planning to build upon knowledge and alleviate misconceptions?
What resources will you use within the lesson to support conceptual understanding and model abstract ideas in science?
How will you sequence your practical activities to promote enquiry and build disciplinary skills of the pupils within the lesson?
How will you further contextualise learning to embed further understanding of how science links to real-life and other subjects?
Speak to the subject leader about where this lesson fits within the whole school science curriculum so that you can build upon prior learning.

Pupil progress in this lesson and use of assessment (including questioning) (CCF assessment) Next Steps:
Identify the key vocabulary you want to develop with the pupils and build in opportunities for the children to explore and use it.
Plan for questions you want to use to support your assessment of the pupils.
How has this lesson developed pupils' understanding of key ideas linked to the science and where/how will you provide further opportunities to embed/extend this?
Make sure that you refer to the substantive concept(s) and ideas and provide opportunities for pupils to evidence their understanding of these.

What opportunities have you planned for to assess how pupils have developed their disciplinary skills?
Utilise a variety of formative assessment strategies to assess the development of pupils' substantive and disciplinary understanding.
How do you facilitate transitions between practical work and theory to make links between the substantive and disciplinary knowledge?

Comments about student teacher's developing Subject Knowledge and Pedagogy (CCF curriculum & pedagogy) Next Steps
Develop your understanding and knowledge of [insert topic/disciplinary skill] so that you are able to identify misconceptions and adapt teaching.
Develop your understanding of practical enquiry to ensure that your findings link to building substantive knowledge.
Develop your understanding of the 'Nature of Science' (NoS) and how this could impact on your approach to 'working scientifically'.
How have you promoted challenge with your lessons to signpost how both substantive and disciplinary knowledge will be developed in the next key stage/year?
How will you integrate purposeful enquiry/practical work in your future planning?
Consider which pedagogies would be most useful to support conceptual understanding and/or build disciplinary knowledge. Can you justify your chosen pedagogical approaches in the context of 'doing science'.

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