LIVERPOOL JOHN MOORES UNIVERSITY

Guidance for Observation and Target Setting in Secondary 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."

6 Key Questions to ask when observing Science lessons:

	Question	*Additional Information*
1	Is a demonstration or interesting scenario used at the start of the lesson to stimulate learners' interest in science?	*This may be to excite interest, or to link the lesson content to a real-world context.*
2.	Are learners carrying out relevant practical work (disciplinary knowledge) for which a specific risk assessment been carried out? If practical work is undertaken were learners fully informed about the steps they needed to take to ensure they were working safely. Were those steps emphasised and enforced by the teacher?	*Disciplinary knowledge is the knowledge of the practices of science (working scientifically).* *A risk assessment for the practical activity must be included with the lesson plan. This should identify measures to be taken to minimise risk to students e.g., wearing safety goggles.*
3	Are learners challenged to predict outcomes, and are conclusions made by the end of the lesson?	*Learners should be being challenged to think critically as scientists and demonstrate evidence of working scientifically.*
4	Is there evidence that substantive knowledge (scientific theory) has been carefully sequenced? Are links made between the science content in this lesson and science content in other lessons?	*Substantive knowledge is a knowledge of the products of science. i.e. science content. Content should be sequenced to allow students to develop complex structures in their long-term memory (schemas) that link knowledge and hence create meaning.*
5.	Are learners challenged to construct explanations and arguments, and to make connections by synthesising and summarising key science ideas?	*Learners should be being challenged to think critically as scientists and demonstrate evidence of working scientifically.*
6.	Are learners using and applying new science ideas in a variety of ways and contexts?	*Exploring how science ideas apply in different contexts challenges learners' misconceptions and helps to develop schemas.*

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

Lesson design and delivery, including sequencing and choice of teaching methods (CCF curriculum & pedagogy) Next Steps:
Make use of a hook at the start of the lesson to excite interest amongst the learners.
Identify the key substantive knowledge you want the learners to know from this lesson.
Model confident, accurate use of specialist vocabulary.
When problem solving, challenge learners to actively engage and contribute.
Use images and analogies to support understanding of difficult concepts.
Gather learners around the front if you are carrying out a demonstration.
Ensure that learners are clear on what to do in a practical activity by asking them to repeat back the steps to follow.
Use predict-observe-explain activities to identify and challenge learner misconceptions.

Pupil progress in this lesson and use of assessment (including questioning) (CCF assessment) Next Steps:
Use cold calling to assess learners' understanding of substantive content.
Ask learners to identify potential hazards and appropriate measure to minimise risk.
Bounce questions around the class to develop detailed answers to open ended questions.
Involve students in demonstrating practical skills.
Challenge learners to construct explanations and arguments based on their substantive knowledge.
Give opportunities for learners to summarise key science ideas in their words.

Comments about student teacher's developing Subject Knowledge and Pedagogy (CCF curriculum & pedagogy) Next Steps
Develop a knowledge of common learner misconceptions associated with the topic.
Practise practical demonstrations to ensure that they work as planned.
Become familiar with all steps in a practical activity to ensure that you can assist learners.
Observe an experienced teacher's use of practical activities to develop learner understanding.
Research real world contexts appropriate to the content and level of topic being taught.
Develop an understanding of potential links between the substantive knowledge of the sequence of learning and the learners' own personal knowledge and experiences.
Develop an awareness of the range of resources available to provide interest and variety to biology/chemistry/physics teaching.

Ofsted research review series: science

https://www.gov.uk/government/publications/research-review-series-science/research-review-series-science

Ofsted subject report series: science

https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2