# MENTOR DEVELOPMENT: Understanding the ITE Partnership Curriculum

## Science

Subject rationale

We believe that education plays a key role in promoting social justice and reducing social inequalities, and that well qualified and highly skilled teachers make a difference to the lives and futures of the learners they teach.

Central to our practice is our belief that: “All children deserve the very best teachers.”

The secondary science programme will help you to develop as a highly skilled professional subject specialist. Our course has been built on the foundations of the Education Endowment Fund's (EEF) seven recommendations to improve secondary science.

All Subject Studies sessions provide an opportunity to debate, question and reflect on key discourses around science teaching from its inception as a compulsory school subject to the present day. At the same time, it is of paramount importance that you are exposed to practical strategies for the classroom. Each session will aim to model best practice and will encourage you to reflect on this, using resources provided. Some elements of reading, writing, or speaking and listening will be incorporated into every session and, as such, will provide an example of how these skills can be encouraged. The current iteration of the National Curriculum will be examined in detail, as will some of the major specifications at both GCSE and A Level.

## **Sequencing the subject for each phase**

The timings of actual outcomes for each BST will vary according to their own background and how they develop through the course. The following expectations represent the general outcomes from the coverage of the core curriculum components and the connected Science curriculum sessions for that phase:

Phase 1 – You have developed a secure understanding of subject specific pedagogy to include theories and approaches like addressing misconceptions and planning and delivering effective practical lessons. Your scientific substantive knowledge is secure (grade 2) in some areas formerly graded 3 or below, on your subject knowledge audit. You have a clear sense of the challenges faced within the science curriculum and the challenges faced by pupils who study it, as well as an understanding of how to address these. You are developing your subject identity that makes clear what you value, believe and are committed to.

Phase 2 – You use your secure understanding of subject specific pedagogy and substantive scientific knowledge, to inspire pupils’ interest, confidently responding to questions in class so that pupils appreciate the value of the subject (meeting the ‘purpose of study’ for science). You improve your substantive knowledge so that it is secure (grade 2) in more areas. You meet pupil needs in science, including those related to numeracy and literacy. Your subject identity may inform some of the pedagogical choices you make, is evident in your teaching and a tool through which you engage pupils.

Phase 3 – You develop routines in your teaching to help meet the outcomes of your lessons/sequence of lessons. You are aware of how to overcome pupils’ barriers to learning in science and plan for these using a range of approaches. You also plan for misconceptions and teach science in a way that does not cause cognitive overload. You apply a range of approaches and ideas related to Component 2 (How Pupils Learn) to the scientific content you are teaching (e.g., scaffolding, modelling etc.), maximising your teaching time. You assertively answer pupil questions about science, often drawing on a deep subject knowledge, which gives pupils confidence in you as their teacher. Through careful target-setting, expert colleague’s support, and routine use of several sources of information (to include textbooks and a range of other sources), you improve your subject knowledge to grade 1 in several areas. You have a clear understanding of your specialism’s (biology, chemistry, or physics) KS5 subject content and assessment frameworks. You understand the challenges faced by pupils studying at this level and how to support pupils to overcome these. Your planning considers ‘the bigger picture’ and help to build more complex knowledge, skills and understanding in your pupils.

Phase 4 – You show passion for science and communicate it clearly, evident from pupils’ engagement in your lessons. You understand that there are multiple factors that impact learning in science and respond by deploying a range of innovative pedagogical approaches. You plan your lessons thoroughly by considering potential misconceptions and barriers to learning, so that all pupils make progress. You demonstrate excellent subject knowledge, reflected in both your practice and your subject knowledge audit (which includes a few to no grade 4s and many grade 2 and 1s). Your subject knowledge and experience may extend to successful Key Stage 5 teaching. You evaluate the success of your lessons and suggest improvements, instinctively becoming metacognitive about your own practice – this supports both your assessment against the Teachers’ Standards and transition to the Early Career Framework

### How mentors can support BSTs in school

* ​​​​​​​​​​​​​Model how elicitation is used to identify what children know, possible misconceptions and alternative frameworks. Deconstruct your practice with the BST so that the BST can start to learn how to teach science effectively.
* Explain how the school’s science curriculum includes essential concepts, knowledge, skills and principles, and model how your planning, teaching and assessment develops children’s science capital and how children are supported to develop scientific literacy across the curriculum.
* Provide opportunities for BSTs to observe and deconstruct how retrieval practice can be used to build automatic recall of key science knowledge and vocabulary and the different forms this can take.
* Model how to use concrete representations of abstract ideas in science.
* Discuss and analyse how the big ideas in science are revisited by using a range of examples to teach key concepts, modelling how they balance exposition, repetition, practice of critical skills and knowledge.
* Model how to plan formative assessments linked to lesson objectives and how learning can be evidenced. Discuss possible misconceptions and how these can be identified and challenged.
* Explore with the BST how to balance substantive and disciplinary science learning within a lesson.
* Model different ways to give children feedback and feedforward about their science learning.
* Support BSTs to draw conclusions about what pupils have learned by looking at patterns of performance over several assessments, including how the statutory science teacher assessments are completed.

### Indicative open access reading

1. Holman, J. and Yeomans, E. (2022) Improving Secondary Science. Guidance Report. Education Endowment Foundation. Available at: <https://d2tic4wvo1iusb.cloudfront.net/production/eefguidance-reports/science-ks3-ks4/Secondary-Science-v2.96-WEB.pdf?v=1690259861>
2. Ofsted. (2021) Research review series: Science. Available at: <https://www.gov.uk/government/publications/research-review-series-science/researchreview-series-science>
3. Ofsted (2023) Finding the optimum: the science subject report. Available at: [Finding the optimum: the science subject report - GOV.UK (www.gov.uk)](https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2#:~:text=Finding%20the%20optimum:%20the%20science%20subject)