# **Primary Initial Teacher Education: Curriculum Plan**

# **Subject: Science Undergraduate Programmes**

# **Curriculum Vision:**

**Through our Initial Teacher Education Curriculum, it is our intention that all Edge Hill Primary teacher trainees will:**

* *have secure science subject and curriculum knowledge so that they can teach across the primary age range with confidence*
* *understand that science is the route to developing both an understanding of the world around them and the skills to become a logical problem solver*
* *develop their confidence and promote an enthusiasm and passion for science*
* *have a secure understanding of primary science pedagogy, and for practical, first-hand experience to be the predominant approach they use in their own classrooms*
* *believe that all children can be successful science, regardless of social background or other circumstances and that this is their moral purpose as educator*

| **Phase 1** |
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| **University Based Learning** | **School/Practical Based Learning** |
| **Learn That** | **Learn How** | **Learn That** | **Learn How** |
| **Component Knowledge** | **the science national curriculum provides a programme of study for the knowledge and skills which children learn aged 5-11 and that the spiral structure provides a minimum requirement and enables progression of substantive and disciplinary knowledge** **LT3.1** | The national curriculum makes clear the expectations for outcomes at different ages.LH1.1 | **experienced teachers with strong SK plan science lessons by carefully integrating substantive and disciplinary knowledge, breaking these down into small steps and fully inclusive of all learners.** **LT3.2, LT5.1, 5.3, 5.7** | **to plan and teach a science lesson, taking the time to extend own science SK as part of the process. Learning should be broken down into small steps and formative information gathered in readiness for the next lesson.****LH8.2, LH2.1, LH2.3,** |  |
| good practice is based on evidence (such as the OFSTED Research Review Series: Science (2021).LT8.2 | research evidence relates to how teachers teach science.LT8.2 |  |  |
| **expertise in science is built through developing substantive and disciplinary knowledge. Each should be taught explicitly, in sequence and they should build on prior learning. Trainees will develop SK and associated vocabulary in the following topics: plants, living things and their habitats, materials and their properties, electricity, sound and rocks.**LT3.2, LT3.5, LT3.6, LT4.4 | consider the order in which components of substantive and disciplinary knowledge are taught in science in order to sequence learning effectively within a lesson with tutor and peer support. LH2.1, LH2.3, |  |  |
| that secure subject, pedagogical and curriculum knowledge is essential for teachers. LT3.2 | to use available resources to develop and deepen their own SK, taking ownership of this process. LH8.2 |  |  |
| there are 5 types of enquiry identified on the primary science national curriculum which can be used to answer questions. A 6th type of enquiry – problem solving can be used to apply knowledge and skills to solve problems.LT 3.2 | to carry out the 6 types of enquiry, purposefully connect enquiry type with appropriate aspects of the curriculum and plan to support children in answering a question using a range of enquiry types. LT3.2 |  |  |
| learning theory (including schemas, neuroscience, working memory, chunking) supports teachers in planning for effective learning in science.LT3.7, LT3.8, LT4.2 | theory shapes classroom practice.LH2.3, LH4.2/3, LH4.10, LH4.12/13 |  |  |
| engagement is important but learning activities are carefully selected in order to also develop deep understanding of the associated concepts. LT3.6 |  |  |  |
| successful teaching depends on carefully planned lessons. It is crucial to carefully sequence learning by breaking it down into components (reducing the risk of cognitive load) to enable pupils to achieve composite outcomes.LH2.1, LH2.3, LT 4.2, LT2.4, LT2.7 | how to plan a science lesson with peers and tutor support.LH2.1, LH4.1 |  |  |
| effective classroom, resource and behaviour management in science helps to ensure that pupils learn safely and make good progress LT7.1, LT7.2 | to plan ahead in order to effectively manage resources and behaviour within practical science with peer and tutor support.LH7.2; 7 | effective behaviour management begins in the planning stages and is particularly important when working practically in science. LT 7.1  | an experienced mentor manages behaviour in practical science lessons through observation and discussion.to manage behaviour and resources in science.LH 7.2; 7. |
| formative strategies are crucial to assess learning in science.LT 6.4, LT6.3 | to apply formative assessment strategies including effective questioning to assess learning in science with peer and tutor support.LH6.1 |  |  |
| it is important to integrate the work of a diverse range of scientists throughout the curriculum. Including the work of female scientists (Mary Anning), scientists of colour (Katherine Johnson) and those with disabilities (Stephen Hawking) | representing a diverse range of scientists can impact upon learners’ perceptions of science and who science is for, increase aspirations and provide role models. |  |  |
| there is an order of progression in recording data and presenting results **LT3.2** | to plan to support progress in working scientifically skills. |  |  |
| adaptive teaching strategies ensure all children have access to the science curriculum and make progress in their science learning, including those with SEN/D LT5.1, 5.3, 5.7  | with peer and tutor support, consider how to ensure all children are included within lessons. LH5.1, 5.5 | adaptive teaching strategies ensure all children have access to the science curriculum and make progress in their science learning, with specific reference to how the content is adapted to the needs of the placement class including those with SEN/D and/ or EAL where relevant. LT5.1, 5.3, 5.7  | An experienced colleague makes planning decisions to ensure that science learning is specifically tailored to the needs of the placement class. Including those with SEN/D and/ or EAL where relevant. To apply this approach in their own planning with mentor support. |
| first-hand practical approaches are effective in supporting children to develop their conceptual understanding given appropriate prior knowledge. When this is not possible, models and analogies are effective ways of teaching concepts.LT4.3 | to select appropriate pedagogy to facilitate the intended learning outcomes. | an experienced teacher uses direct instruction, first-hand practical experience, modelling and analogies as effective strategies to support children to develop their understanding of science concepts. | to select the most appropriate teaching approach in order to support children to learn. |
| misconceptions are children’s ideas which are based on their experience (and should be pre-empted during the planning process and tackled in lessons).LT2.2, LT2.6 | to identify a range of suitable approaches to elicit children’s ideas andaddress misconceptions through planning and teaching. LT2.2, LT2.6 |  |  |
| learning outside the classroom (LOtC) is an important and beneficial part of science education LT3.2 | to use the outdoor environment to support learning in science. |  |  |
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| **Assessment** | **Assessment** | **Assessment** |  |
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| * October 2022-subject knowledge audit
* A computer marked formative assessment
* Regular formative assessment opportunities in seminars (eg peer discussions, tutor questioning and quizzes).
* January-assignment submission.

All of the above to inform interventions. | Assessed throughout Professional Practice 1. * Mentors will assess students against these statements and feedback to link tutors via the weekly development summary.
* Feedback will be provided to student and link tutor by mentor.
* SL will audit a sample of trainees as an indicator or cohort progress.
 | Impact |
| **Composite Knowledge** | **Composite knowledge/understanding/skills** |
| *By the end of this phase trainees will* ***know:*** | *By the end of this phase trainees will* ***understand:*** | *By the end of this phase trainees will* ***be able to:*** |
| that high-quality teaching and learning in science requires strong teacher subject, pedagogical and curriculum knowledge. That science learning needs to be planed in a way that is inclusive and challenges all learners. | that high-quality teaching in science involves breaking down complex ideas into small steps and sequencing these logically to enable children to learn without overloading their working memory. That direct teaching, first-hand practical approaches and modelling are approaches which can be used to support children to understand complex ideas and deepen children’s learning in science. | plan and teach a science lesson that is appropriate to the needs of all learners, that draws on children’s prior learning to develop subject knowledge and enquiry skills and provides opportunities to assess and act on the learning that has taken place. |
| **Research** | **KEY RESEARCH****That Trainees will know that informs teaching and learning in science** |
| * **Primary Science Knowledge & Understanding, Peacock, Sharp, Johnsey, Write and Sewell, 2021.**
* **Primary Science Theory & Practice, Sharp, Peacock, Johnsey, Simon, Smith, Cross and Harris, 2021.**
* **OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:** [**https://www.gov.uk/government/publications/research-review-series-science**](https://www.gov.uk/government/publications/research-review-series-science)
* **Rosenshine, B. (2012) Principles of Instruction: Research-based strategies that all teachers should know. American Educator, 12–20. https://doi.org/10.1111/j.1467-8535.2005.00507.**
* **The Teaching of Science in Primary Schools, Harlen and Qualter, 2017.**
* **Maintaining Curiosity, Ofsted 2013**
* **ASE: Guide to Primary Science, Serret and Earle. 2018**
* **ASE materials**
* **STEM learning centre materials**
* **National Curriculum, 2014**
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| **Phase 2** |
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| **University Based Learning** | **School/Practical Based Learning** |
| **Learn That** | **Learn How** | **Learn That** | **Learn How** |
| **Component Knowledge** | **High quality teaching in science required strong subject knowledge.** The subject knowledge required to teach the following with confidence: teeth and the digestive system; evolution, inheritance and selection; particle theory; changes and properties of materials; reversible and irreversible reactions; forces (including magnets, gravity, air and water resistance and friction); electricity; and light. **(LT3.2)** | To build and develop their subject knowledge further through independent study using available resources. |  |  | Intent |
| **Science is more assessible when taught through real world contexts.** practical strategies for teaching and learning and resourcing science using stimulating context in areas including: teeth and the digestive system; evolution, inheritance and selection; particle theory; changes and properties of materials; reversible and irreversible reactions; forces (including magnets, gravity, air and water resistance and friction); electricity; and light. (**LT4.3; 4.2)** | To integrate effective resources to explore activities to teach: teeth and the digestive system; evolution, inheritance and selection; particle theory; changes and properties of materials; reversible and irreversible reactions; forces (including magnets, gravity, air and water resistance and friction); electricity; and light. **(LH3.6)** |  |  |
| **The importance of sequencing components of substantive and disciplinary knowledge carefully to ensure progression within a lesson and across a sequence of lessons and avoid cognitive overload of working memory (LT2.2, LT2.4)**The key componentsof an effective science lesson plan and the importance of medium-term plans in sequencing learning effectively over time **(LT3.3, LT3.7)** | To select appropriate disciplinary knowledge to be taught through substantive content. **(LH3.1, LH3.4)****To sequence components of substantive and disciplinary knowledge within a lesson and across a series of lessons in a way that supports progression in children’s learning** with peer and tutor support initially. **(LH2.3, LH2.4)** | Medium term plans used by the placement school will consider how science learning is sequenced over a period of time. Through discussion with mentor or science subject lead consider how this effectively supports learning in substantive and disciplinary knowledge in science over time.  | To make decisions regarding the order in which components of science knowledge are taught over a sequence of lessons**To plan for a sequence of science learning which effectively considers how science knowledge will be developed in a small steps over a series of at least three lessons with mentor support initially.** |
| **That new knowledge in science should be connected with what children have previously learned and pupils should be supported to make connections between different concepts that will support retrieval and application to problem solving. (drawing on their understanding of schemata and working memory) (LT2.2, LT2.7, LT3.7)*** That retrieval activities and repeated practice can be used in science to embed learning in long term memory **(LT2.8, LT2.9)**
* That hinge questions can be used to inform the direction of science session in response to pupil feedback **(LT6.1, LT6.5)**
* That anticipating misconceptions in science is an important part of curriculum knowledge and that misconceptions can be more likely to develop when progression is too fast and prior learning insecure. **(LT2.6, LT3.4)**
 | To investigate opportunities for science learning in other contexts and situations outside of the classroom to provide interesting and stimulating contexts **(LH1.1)** |  | To plan for science learning which connects with children’s prior knowledge and experiences. To integrate retrieval practice, repeated and spaced practice when planning for a sequence of science lessons.  |
| How teaching and learning theory underpin their approaches to science* that modelling helps pupils understand new processes and ideas; good models make abstract ideas concrete and accessible and experience its application to a range of concepts **(LT4.3)**
* That guides, scaffolds and worked examples can help pupils apply new science concepts and can be gradually removed as pupil expertise increases **(LT4.4)**
 | To apply a wide range of professional studies concepts such as schema, working memory and cognitive load, in the context of science learning effectively. **LT3.7**To use models and analogies as a theoretical approach to tackle more abstract concepts **(LH3.5, LH)**To use modelling and scaffolds to support learning and embedding new concepts in science and remove these where no longer required **(LH3.13, LH4.2)** |  | **To plan a sequence of science lessons which integrates a range of effective pedagogies and approaches to support science learning (approaches might include first hand practical approaches, modelling, analogies, simulations and direct instruction).** |
| The importance of creative approaches when teaching science whilst ensuring concepts are learned and understood **(LT4.4)**The importance of using problem solving approaches to engage and motivate children with secure conceptual understanding. (**LT3.6, LT3.7,** | **make use of research to make informed decisions about teaching and learning primary science, particularly linked to learning theories (LH5.5)** | .  |  |
| **There are a range of ways that additional adults can support children’s learning in science (LT8.5)** | use additional adults in a range of ways to support learning within the science classroom beyond solely supporting children with lower prior attainment. | That additional adults can be used to stretch and challenge in addition to supporting children with lower levels of prior attainment.That additional adults can contribute towards assessment of learners within science lessons -particularly within practical investigations where observations of children are involved. | To plan for the effective use of additional adults within the classroom linked to the needs of the learners within the class and the science content delivered. |
|  | **Planning with the needs of children with SEN/D from the outset is effective in supporting all learners to make progress towards their end goals in science.** **That talented scientists are not always the most able mathematicians and writers. That it is important to remove literacy and mathematical barriers in order for talented scientists to be appropriately challenged within the subject.** | **how to adapt teaching in science to ensure progress for all including children with SEN/D, EAL and those who require stretch and challenge (LT5.1, LT5.3, LT5.4, LT5.5)** | Identifying talented scientists and children who need work breaking down further within the placement class is an important starting point for adaptive teaching in science. LT5.2 | With support of an experienced colleague to adapt science teaching to the needs of the learners within the placement class including those with SEN/D and EAL where relevant.To plan a sequence of teaching that is adapted to enable children with SEN/D and or EAL to make progress in their science learning where this is appropriate to the context of the placement school. |  |
|  | formative strategies are crucial to assess learning in science and how this can be achieved for working scientifically aspects in practical sessions.LT 6.4, LT6.3 |  |  | to apply formative assessment strategies including effective questioning, feedback, peer and self-assessment to assess learning in science.LH6.1 |  |
|  | **Summative assessments judgements are made regarding children’s attainment at the end of KS1 and KS2.** | **Teachers establish summative judgements of attainment in science and how this might contribute to the end of key stage judgement** |  | To assess children’s learning over a sequence of science lessons and use this knowledge to inform judgements about their attainment in relation to expectations with the support of an experienced colleague.  |  |

| **Assessment** | **Assessment** | **Assessment** | Impact |
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| * October 2022-subject knowledge audit Students will revisit their science subject knowledge audit to assess progress and identify new targets.
* Regular formative assessment opportunities in seminars (e.g. peer discussions, tutor questioning and quizzes).
* March -assignment submission.
* All of the above to inform interventions.
* **A written submission will evaluate students understanding of planning for effective learning in science over a sequence of science lessons. The assessment will involve reflecting on the impact of a sequence of science lessons they have planned and delivered on placement.**
 | Assessed throughout Professional Practice 2. * Mentors will assess students against these statements and feedback to link tutors via the weekly development summary.
* Feedback will be provided to student and link tutor by mentor.
* SL will audit a sample of trainees as an indicator or cohort progress.
* **A written submission involving reflecting on the impact of a sequence of science lessons they have planned and delivered on placement will establish students understanding of planning for effective learning in science.**
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| **Composite Knowledge** | **Composite knowledge/understanding/skills** |
| *By the end of this phase trainees will* ***know:*** | *By the end of this phase trainees will* ***understand:*** | *By the end of this phase trainees will* ***be able to:*** |
| The key subject knowledge in relation to: teeth and the digestive system; evolution, inheritance and selection; particle theory; changes and properties of materials; reversible and irreversible reactions; forces (including magnets, gravity, air and water resistance and friction); electricity; and light. How to expand their own subject, pedagogical and curriculum knowledge further. | The importance of sequencing science learning and adapting teaching to allow for progression of all learners **(LT2.2, LT2.6, LT3.3, LT5.1)** | Plan and teach a series of science lessons that is sequenced to develop subject knowledge and enquiry skills over time, is appropriate to the needs of all learners and integrates the contribution of additional adults and formative assessment **(LH1.1, LH2.1, LH2.2, LH2.3, LH2.4, LH2.8, LH3.7, LH4.1, LH4.2, LH5.5, LH5.6)** |
| **Research** | **KEY RESEARCH****That Trainees will know that informs teaching and learning in Science** |
| * **Primary Science Knowledge & Understanding, Peacock, Sharp, Johnsey, Write and Sewell, 2021.**
* **Primary Science Theory & Practice, Sharp, Peacock, Johnsey, Simon, Smith, Cross and Harris, 2021.**
* **Education Endowment Foundation (2015) Making Best Use of Teaching Assistants Guidance Report. [Online] Accessible from: https://educationendowmentfoundation.org.uk/tools/guidance-reports/ [retrieved 10 October 2018].**
* [**Special Educational Needs in Mainstream Schools | EEF (educationendowmentfoundation.org.uk)**](https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/send)
* **OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:** [**https://www.gov.uk/government/publications/research-review-series-science**](https://www.gov.uk/government/publications/research-review-series-science)
* **The Teaching of Science in Primary Schools, Harlen and Qualter, 2017.**
* **Maintaining Curiosity, Ofsted 2013**
* **State of the nation report of UK primary science education, Wellcome Trust 2017**
* **ASE materials**
* **STEM learning centre materials**
* **National Curriculum, 2014**
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| **Phase 3** |
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| **University Based Learning** | **School/Practical Based Learning** |
| **Learn That** | **Learn How** | **Learn That** | **Learn How** |
| **Component Knowledge** | The subject knowledge required to teach more conceptually challenging concepts with confidence: forces; levers, pulleys & gears, and space classifying living things; space (including gravity and phases of the moon), static electricity; habitats; the muscular, skeletal and circulatory systems. The subject knowledge required to support children to go beyond the national curriculum in subject areas such as static electricity and sustainability issues such as climate change and pollution. **LT3.2** | To self-assess and set targets related to subject knowledge and professional practice **LT8.2** |  |  | Intent |
| **Engaging in current primary science research can support ongoing development in their practice.****There are challenges in leading primary science, including teacher subject knowledge, funding for resources and staff training, State of the Nation report findings regarding status of science in primary schools and assessment of primary science.**How the Ofsted Inspection Framework influences planning and teaching in England. **LT8.1**There are challenges facing effective science teaching in school including curriculum time, profile and priority given to the subject, teacher’s subject knowledge and confidence, funding for resources and training. That it is important to plan to overcome these or reduce the impact of these challenges. | To draw on research to inform planning and teaching in science. | There are many aspects to the role of the science subject leader. Through discussion with science subject leader in school establish how subject leader ensures curriculum builds on what children learn in EYFS and is logically sequenced through KS1 and KS2. How summative assessment in science is established. (other aspects of discussion could include science subject action plan, CPD, raising the profile of science) | The science subject leader ensures that an effective curriculum is in place and that high quality science teaching supports pupils to know, remember and do more in science. How science subject leader and teaching team ensure accurate judgements on pupil attainment are made. Through discussion with science subject leader. |
| **The importance of planning for talk in supporting children to use and apply new vocabulary and share ideas LT4.7**Talk enables children to share their ideas, progress their scientific vocabulary and develop conceptual understanding. **LT4.7**the importance of key vocabulary, use of images, video and first-hand practical experience. That is important for all learners, but particularly important for learners with SEN/D and/ or EAL. **LT3.6; LT3.7** | talk can support children to build conceptual knowledge **LT4.7**To use planned talk to support children to share their ideas, progress their scientific vocabulary and develop conceptual understanding. **LT4.7** |  | To use planned talk to support children to share their ideas, progress their scientific vocabulary and develop conceptual understanding. **LT4.7**To use observations made during planned talk to inform the direction of the next steps in the lesson or next steps in learning. |
| That Covid-19 has impacted upon children’s health and access to practical science and that there are long term implications to consider as a teacher. **LT1.6**The current issues related to children’s health as a result of Covid-19 and begin to consider the implications of this for the role of the class teacher **LT1.1, LT1.6**The role of parents and carers in supporting children’s development in science. LT4.11 | To support children and families in returning to learning and closing gaps post Covid home learning.To identify purposeful links between science and PE **LT3.8**Support children to select variables when conducting a pattern seeking enquiry. To select appropriate variables depending on the graphing skills they are supporting the children to develop. **LT3.2** |  |  |
| Thematic teaching can engage and motivate children, sparking their curiosity for learning and that is also important to maintain focus on the subject specific learning within this approach. LT3.8 | How to ensure subject specific learning objectives are identified, covered and assessed in cross curricular lessons.  |  | How to effectively plan using a cross curricular approach whilst maintaining the purpose and rigour of each individual subject |
| Science planning at different levels act to ensure coverage and quality of provision **LT4.1, LT4.2,****Sequencing science learning considering the application of professional skills components – e.g. planning to avoid cognitive load, interleaving and repeated practice. (LT2.4, LH2.1, LH2.2, LH2.3, LH2.4, LH2.5, LH2.6)****Curriculum as progression: Understand progression within specific strands of science (materials and working scientifically) LT 3.1****Small step progression within science which takes account of SEN/D from the outset can support the development of all learners. Including revisiting the importance of considering prior learning.****There are a variety of ways to challenge learners in science LT1.3** | To plan for science learning which considers the small steps required for all children (including those with SEND) to know more, remember more and do more in science.How challenge can be integrated into science learning to stretch learners.How to sequence science learning considering the application of professional skills components. LH 2.4; 2.5; 2.6To plan for progression in the working scientifically strand of the science national curriculum progresses as children move through KS1 and KS2. |  | **Plan, deliver, assess and reflect on the impact of a sequence of science lessons.**Design a sequence of lessons that considers the needs of pupils with SEN/D from the outset by building in a small step progression in science which meets the needs of all learners in the placement class. LH5.2, 5.5To integrate appropriate levels of challenge to move all learners on, with a particular focus on catering appropriately for talented scientists |
| **That science capital, similar to cultural capital, is individual and can vary widely within a cohort.*** **That tackling aspects of science capital within and beyond the classroom can contribute to a child’s engagement and relationship with a subject.**
 | To apply the science capital teaching approach to widen children’s understanding of what science is and how it relates to their lives, engage learners and promote high aspirations. |  |  |
| How metacognitive strategies can be integrated into science teaching and learning to support children development. LT4.5Revisiting the importance of first-hand practical experiences and prior learning in supporting children to develop their substantive and disciplinary knowledge in scienceProblem solving in science supports children to make links between their prior knowledge and apply conceptual learning to real world problems | To plan for opportunities to integrate metacognitive strategies into science teachingTo plan for opportunities to connect substantive content with real world contexts and problem-solving challenges.  |  |  |
| Revisit the role of models and analogies in supporting children to develop their conceptual understanding in topics where first-hand practical experiences are challenging.Revisit how to support children to build on their prior learning in science The process of summative assessment in science including end of key stage judgements and the importance of record keeping. LT6.1 | To support children to develop their substantive understanding of conceptually challenging and abstract concepts. To assess children’s attainment in science and how this contributes to the summative at the end of key stage judgements |  |  |
| Draw on research to develop a range of teaching approaches which can be used to tackle controversial issues and contemporary challenges within science **LT8.1**That teaching controversial topics can present a challenge, why this might be and how to overcome this **LT1.1, LT1.5**Sustainable development goals can be addressed through and beyond the science curriculum LT3.6 | To tackle sensitive and controversial issues in science with confidence How children’s science learning can be extended beyond the minimum requirements of the national curriculum. To design learning connected with sustainable development goals LT 3.7;3.8 |  | integrate sustainability and sustainable development goals in their science delivery. If possible, plan science learning which allows all pupils to go beyond the scope of the national curriculum. For example, using their science knowledge about habitats to discuss climate change and its impact and potential future impact on the environment.  |
| Secure subject, curriculum and pedagogical knowledge is essential for high quality teaching. Ongoing science specific CPD is available to qualified teachers and how to access this support. **LT8.1** | To seek out CPD opportunities in their ECT years and beyond using their knowledge of science specific providers e.g. STEM learning centre and ASE. **LT 8.1****To demonstrate their own curiosity, love of learning and commitment to continuing development of their subject knowledge. LT1.2** |  |  |
| **Assessment** | **Assessment** | **Assessment** | Impact |
| * Students will revisit their own areas of development and access available resources to develop their own subject knowledge.
* Formative assessment at the end of the taught element to assess what has been learned through centre-based training.
* A written submission will evaluate students understanding of high-quality science teaching, learning and science pedagogy.
 | Assessed throughout Professional Practice 3. * Mentors will assess students against these statements and feedback to link tutors via the weekly development summary.
* Feedback will be provided to student and link tutor by mentor.
* SL will audit a sample of trainees as an indicator or cohort progress.
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| **Composite Knowledge** | **Composite knowledge/understanding/skills** |  |
| --- | --- | --- |
| *By the end of this phase trainees will* ***know:*** | *By the end of this phase trainees will* ***understand:*** | *By the end of this phase trainees will* ***be able to:*** |
| *The features of effective teaching and learning in science including research informed best practice and how this is translated to different contexts.* | *The bigger picture-issues surrounding primary science education which directly impact on classroom teaching and the role of the science subject leader in ensuring high quality provision.* | Plan and teach an effective sequence of science learning which is informed by assessment of prior learning, uses science specific pedagogies to facilitate progression in subject knowledge and enquiry skills, integrates formative assessment and is inclusive, appropriate and flexible to the needs of all learners including those with SEN/D, EAL and talented scientists. To take science learning beyond the national curriculum where appropriate. |
| **Research** | **KEY RESEARCH****That Trainees will know that informs teaching and learning in Science** |
| * **The 10 Key Issues with Children’s Learning in Science, Bianchi, Whittaker and Poole,** **2021**
* **OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:** [**https://www.gov.uk/government/publications/research-review-series-science**](https://www.gov.uk/government/publications/research-review-series-science)
* **Harlen, W. 2015. Towards big ideas of science education. School Science Review, 97 (359), pp. 97-107.**
* **Education Endowment Foundation (2017) Metacognition and Self-regulated learning Guidance Report. [Online] Accessible from: https://educationendowmentfoundation.org.uk/tools/guidance-reports/**
* **Primary Science Knowledge & Understanding, Peacock, Sharp, Johnsey, Write and Sewell, 2021.**
* **Primary Science Theory & Practice, Sharp, Peacock, Johnsey, Simon, Smith, Cross and Harris, 2021.**
* **Primary Science Journal.**
* **The Teaching of Science in Primary Schools, Harlen and Qualter, 2017.**
* **Misconceptions in Primary Science, Allen, 2017**
* **Maintaining Curiosity, Ofsted 2013**
* **State of the nation report of UK primary science education, Wellcome Trust 2017**
* **Primary Science Capital Teaching approach materials, Archer 2021**
* **ASE materials**
* **STEM learning centre materials**
* **National Curriculum, 2014**
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**Designed in collaboration with partnership colleagues:**

I *confirm that I have contributed to the development of this plan*

Nicky Bolton – Deputy headteacher and Science Subject Leader Heswall Primary School Signed: 

Toby Barrett – Science Subject champion, Holland Moor Primary School Signed: Signature pending



Heidi Jackson – Primary Science Lead & Acting Headteacher, Mawdesley St Peter’s CE Primary School Signed:

**Externally verified by:**

*I have reviewed the plan and I can confirm that the content is appropriate and is well-sequenced*

Michele Grimshaw, Primary Science Teaching Trust (PSTT) NW Lead Signed: 