### Using Research to Improve Science Teaching: The Education Endowment Foundation’s Guidance Report

#### Why Science?
Science education is one of the ways to social mobility... and has a very high profile today in the UK. Science education is important to everyone, and as a subject it can engage and inspire pupils. Science, most pupils mention an enjoyment of science.

#### How was it put together?
The guidance report draws on a body of evidence and research of the EEF evidence team, who appointed an Advisory Panel and evidence review team.

#### Modelling: Use models to support understanding
- **Cognitive science** has led to breakthroughs in our understanding of how knowledge is learned and processed, but applying laboratory-based classroom research to the classroom is not straightforward. Researchers have developed ways of thinking about the teaching of key concepts. Some of these ideas have been translated into models that can inform teachers' practice.

#### Memory: Support pupils to remember and retrieve knowledge
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#### Practical Work: Use practical work purposefully and as part of a learning sequence
- **Practical science engages pupils**, but it is important to remember that there is a difference between **procedural and conceptual understandings**. **Procedural understanding** refers to pupils' ability to carry out a series of steps to achieve a specific outcome, whereas **conceptual understanding** refers to pupils' ability to explain why the procedures are carried out in a particular way and to understand the underlying scientific principles.

#### Language of Science: Develop scientific vocabulary and support pupils to read and write about science
- **Language of science** is crucial for pupils' learning in science. Effective use of scientific vocabulary can help pupils' understanding and communication of scientific ideas.

#### Feedback: Use structured feedback to move pupils' thinking
- **Feedback** is an important aspect of learning in science. Pupils need to know how they are performing and what they need to do to improve. Effective feedback can help pupils identify their strengths and areas for improvement, and guide their learning.

### Recommendations

<table>
<thead>
<tr>
<th>Clarity of Learning Objectives</th>
<th>Evidence-base of the Teaching Practice</th>
<th>Support for the Implementation of the Teaching Practice</th>
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</thead>
<tbody>
<tr>
<td><strong>1. Preconceptions</strong></td>
<td><strong>Build on the ideas that pupils bring to lessons</strong></td>
<td><strong>Provide examples that are familiar to pupils, and it is important that pupils understand them before they are given new scientific ideas.</strong></td>
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<td><strong>2. Self-regulation</strong></td>
<td><strong>Help pupils direct their own learning</strong></td>
<td><strong>Develop strategies to help pupils monitor and evaluate their own progress.</strong></td>
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### Examples

- **Teaching science engages pupils**, but it is important to remember that there is a difference between **procedural and conceptual understandings**. **Procedural understanding** refers to pupils' ability to carry out a series of steps to achieve a specific outcome, whereas **conceptual understanding** refers to pupils' ability to explain why the procedures are carried out in a particular way and to understand the underlying scientific principles.

#### Applications

- **Applications for practical work** vary depending on the context of the teaching. In some cases, the focus might be on developing pupils' understanding of scientific concepts, whereas in others, the focus might be on developing pupils' practical skills.

### References and acknowledgments
- **Fletcher-Wood, C.** (2018). **“The role of feedback in science.”** In *The EEF guide to improving learning.* Oxford: *EEF.*
- **National Foundation for Educational Research (NFER) 2018.** *The EEF guide to improving learning.* Oxford: *EEF.*