Improving secondary science

EVIDENCE FOR LEARNING

Summary of recommendations

1

Preconceptions:
Build on the ideas that students bring to lessons

- Understand the preconceptions that students bring to science lessons
- Develop students' thinking through cognitive conflict and discussion
- Allow enough time to challenge misconceptions and change thinking

2

Self-regulation:
Help students direct their own learning

- Explicitly teach students how to plan, monitor, and evaluate their learning
- Model your own thinking to help students develop their metacognitive and cognitive knowledge
- Promote metacognitive talk and dialogue in the classroom

3

Modelling:
Use models to support understanding

- Use models to help students develop a deeper understanding of scientific concepts
- Select the models you use with care
- Explicitly teach students about models and encourage students to critique them

4

Memory:
Support students to retain and retrieve knowledge

- Pay attention to cognitive load—structure tasks to limit the amount of new information students need to process
- Revisit knowledge after a gap to help students retain it in their long-term memory
- Provide opportunities for students to retrieve the knowledge that they have previously learnt
- Encourage students to elaborate on what they have learnt

5

Practical Work:
Use practical work purposefully and as part of a learning sequence

- Know the purpose of each practical activity
- Sequence practical activities with other learning
- Use practical work to develop scientific reasoning
- Use a variety of approaches to practical science

6

Language of Science:
Develop scientific vocabulary and support students to read and write about science

- Carefully select the vocabulary to teach and focus on the most challenging words
- Show the links between words and their composite parts
- Use activities to engage students with reading scientific text and help them to comprehend it
- Support students to develop their scientific writing skills

7

Feedback:
Use structured feedback to move on students' thinking

- Find out what your students understand
- Think about what you're providing feedback on
- Provide feedback as comments rather than marks
- Make sure students can respond to your feedback

This resource relates to Evidence for Learning's Improving secondary science Guidance Report. The full Guidance Report and supporting resources are available here: E4L.org.au/science-secondary