

Young Scientists at Work

Finding Dinosaurs

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Curriculum
CORPORATION





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Introduction

The field of palaeontology, particularly the study of dinosaurs, is a subject that most children find immensely appealing. *Finding Dinosaurs* introduces middle and upper primary students to our latest understanding of dinosaurs and other Mesozoic life. Rather than only focus on the usual favourites, it introduces students to some less well-known and more recently discovered types of dinosaurs, re-examines some of the famous genera and addresses many of the misconceptions that still prevail.

Finding Dinosaurs encourages students to ‘become scientists’ – ask questions, propose and test theories, design experiments and discover for themselves the latest ideas about dinosaurs. Students are also encouraged to make links between our knowledge of dinosaurs – how they evolved, adapted and interacted with other life – with issues relevant to the students’ lives today, such as sustainability and biodiversity.

The approach

This book has been designed around a constructivist model. This pedagogical approach suggests that students learn best when they gain knowledge through exploration and active learning. A feature of this approach is the use of hands-on materials, where students are encouraged to think and construct explanations and new ideas for themselves based on existing knowledge, beliefs and skills, rather than simply memorising and reciting facts.

The 5Es model is one method of instruction that supports constructivist teaching and learning. This model identifies five different phases of learning:

- 1 Engage** – students’ interest and curiosity in the topic or question is attracted; they are given the opportunity to make connections with what they already know about the topic or question; they anticipate the learning that will occur; they develop their own questions about the topic or concept
- 2 Explore** – students actively explore the concept or question using hands-on methods; they identify and develop concepts, processes and skills
- 3 Explain** – students are given opportunities to communicate their new understanding or to demonstrate new skills to a wider audience; if necessary, the teacher might introduce definitions and explanations
- 4 Elaborate** – students extend, develop and broaden their understanding by applying their new knowledge or experience to a new or different situation; they discuss and compare their results with one another
- 5 Evaluate** – students reflect on and assess their new understanding and abilities; they may revisit the questions asked in the ‘engage’ phase; teachers evaluate student understanding of concepts and development of new skills.

Although this model is described as a linear sequence, it is often appropriate to revisit different stages throughout the learning experience. For example, evaluation will be an ongoing process and should not necessarily be left until the end of an activity.

Science skills

The activities included in this book aim to develop students' understanding of conceptual ideas, and give them opportunities to gain skills and practise working scientifically.

The book aims to develop a range of scientific skills in students, including:

- questioning
- hypothesising and predicting
- experimenting and following procedures
- thinking analytically, critically and creatively
- observing, measuring and classifying
- inferring
- collecting and recording data
- communicating.

The book

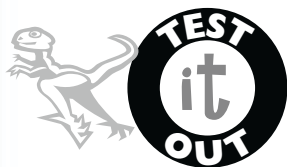
Finding Dinosaurs has been divided into three sections – Triassic, Jurassic and Cretaceous – to emphasise the differences in climate, geography and dinosaur genera in each period. Each section has been further divided into a number of topics, each posed as a question for students to explore. Each topic includes:

- a reproducible student fact file that contains background information and illustrations to engage students. This may be used for guided reading or to assist students' investigations
- a teacher information sheet that lists the key concepts, cross-curricular links, materials and preparation required, and instructions for guiding students through the activity, including brainstorm topics, discussion questions and assessment pointers
- a reproducible student activity sheet with creative and fun investigations that will allow students to explore and explain the central concept, and then elaborate and evaluate their learning.

The activities promote a range of science skills. Icons have been used throughout the book to denote each activity's focus.



Students experience how people work with and through science, and employ real tools and techniques used by scientists.



Students design and pursue hands-on investigations and experiments that build on their curiosity and answer their own questions and hypotheses.



Students gather and present information about current scientific ideas to expand their knowledge and understanding, and answer their focus questions.

There is also a glossary of new or unusual words with a pronunciation guide included. (These words appear in bold throughout the book.)

For the teacher

Aim

Students will:

- appreciate the amount of information that can be learnt from a close study of dinosaur footprints
- understand how this information has helped scientists understand aspects of dinosaur behaviour that cannot be learnt from fossil bones.

Cross-curricular links

- Literacy: creating information reports
- Technology: properties of materials, design

Materials: modelling clay, shallow plastic food containers (at least 2 or 3 cm deep), plastic dinosaur models, plaster, mixing containers, stirrers, a sandpit or long jump pit or any outside area that will show footprints

ENGAGE

- Distribute the fact file (pp 19 and 20).
- Brainstorm: Where have you seen non-fossil footprints? (eg beach, muddy spots around school) Could you tell what sort of animal made them?

EXPLORE

- Discuss: What places are not good for producing footprints? In a large group of tracks, how could you tell: Which animals were adults and which youngsters? Which ones were heavier? Which ones were moving the fastest? Which ones were at the front of the herd? If any were sick or injured?
- Discover how scientists work: Distribute the student activity sheet (p 22). How can students test what can be discovered from trackways? Can they think of a way to make their own trackways? Depending on the materials available, students work individually, in pairs or in small groups.

EXPLAIN

- Students 'read' the footprints they have created. Can they explain how the physical characteristics and behaviour of the animal making the prints is reflected in the track?
- Students write a caption card so that their footprint casts can be displayed in the class 'museum'.

ELABORATE

- Students research more about fossils and how they are formed.
- Ask: Can you think of other scientific applications for making casts?

EVALUATE

- Have students understood that the ground type affects the state of the print and how fossil prints are formed? Does their model trackway reasonably reflect the features one would expect from a real trackway?
- Ask: If you were making another set of footprint casts, would you change the materials or the conditions to increase the accuracy of your results?



Fossil footprints

STUDENT ACTIVITY

Make a fossil trackway

- Lay a one-centimetre thick layer of soft clay in the bottom of a shallow plastic container.
- Using plastic dinosaurs, press a trackway of footprints into the clay, remembering variables such as stride length, weight and speed.
- Let the clay dry for a few days. Cracks may appear, just like they do in real trackways. Once the clay has hardened, it is time to make a 'cast' of the tracks with plaster, just like real palaeontologists.
- Obey the safety instructions for using plaster. Your teacher will help you mix the plaster and then pour it over the clay trackway in a layer about a centimetre thick.
- Leave it for an hour until it is dry and cold. (If it is warm, it is still drying!)
- Carefully remove the plaster, turn it over, and you have a cast of your footprints. Can you tell from the cast which dinosaurs had wide strides, were heavy or moved quickly?

TIP: You may want to put in tracks from more than one type of dinosaur, but remember which one was bigger and heavier.

Reading footprints

- Split into two groups – the 'palaeontologists' and the 'herd'.
- Out of sight of the palaeontologists, the herd makes a series of trackways in an appropriate spot, such as a long jump pit or even somewhere muddy. Make the prints as varied as possible – some small, some large, running or walking, heavy and light, or dragging an injured leg, but don't make too many or people will get confused!
- The palaeontologists should then inspect the trackways and present an oral report to the rest of the class with as much information as possible about the characteristics and behaviour of the 'animals' that made the tracks.
- When the palaeontologists have finished, swap roles.

Create a fossil museum

Create a museum in your class to display your footprint casts. On a piece of card, write a caption to accompany your cast that explains to museum visitors what creature/s created the tracks, and where and when they were made. Be creative and include maps or diagrams on the card if appropriate.

