

Earth science: Learning about Earth's processes and materials in early childhood



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ECE resources

Earth science is part of the study of the physical world, and a branch of the physical sciences. In early childhood settings, Earth science learning might include learning about the weather, seasons, day and night, and earth materials (water, sand, stones, et cetera)¹.

Key questions children might explore in Earth science include:

- What non-living things form part of our natural world?
- What can we see in the sky?
- What materials make up the ground below us?

Key understandings that children might develop include:

- There are lots of types of weather and weather can change across a day
- Rain comes from clouds
- Wind moves things
- We can see the sun in the sky during the day and the moon at night
- Darkness is the absence of light
- The sun makes shadows
- There are lots of useful, non-living natural things found in the earth
- Water and soil make mud²

Possible areas for inquiry and investigation in Earth science are:

- What happens when we mix water and soil or sand?
- How much did it rain last night?
- Where did the puddle go?
- Where does rain come from?
- Can we make shadows today? Why did your shadow suddenly disappear?

Science process skills that might be used:

- Observing, identifying and classifying, measuring, asking questions, making predictions, and solving problems

Why is learning about Earth science important? How can Earth science contribute to early childhood curricular goals?

Te Whāriki views exploration as encompassing all aspects of the environment, including the earth and its resources such as sand, water, and rock. It recognises the diversity of ways in which different groups and whānau make sense of, respect, and appreciate the natural world. Exploring earth sciences and developing relationships with materials such as sand, water, and rock enables children to learn by asking questions, discussing ideas with others, devising and testing working theories, and solving problems by drawing on understandings about these materials and their properties and uses³. Starting to develop these science process skills is an important preparation for later science learning.

Materials of earth and their properties can foster high levels of curiosity and interest. These resources invite children to use all of their senses and increasing physical skill for manipulating and discovering earth's resources. Their interactions with the resources of earth enable children to develop an understanding that exploring, playing, experimenting, and collaborating are valuable and useful ways of learning⁴.

Earth science also offers fantastic opportunities for children to wonder about and make sense of the world, particularly in regard to concepts such as night and day, sun and moon, and where and how different weather patterns are formed⁵. There are opportunities to draw richly on mātauranga Māori, such as the use of the sun and stars to guide navigation in the history of Māori and Pacific exploration, supporting the intent of *Te Whāriki* to promote bicultural content in children's learning⁶.

Environments, resources, and activities for Earth sciences

Important experiences that build the foundations of natural science knowledge include:

- Creating open-ended and sensory-rich experiences with **Earth materials such as sand, water, pebbles**.
- **Actively and creatively exploring** the shapes, colours, textures, patterns, and properties of earth materials, with support from teachers for children's unique choices of interactions. Teachers should support children to build vocabulary, discuss ideas, and develop working theories as they work with the physical properties of diverse resources and materials⁷.
- **Mixing and combining materials from the Earth**, exploring the varying properties of sand of different wetness, for example, with all the senses.
- Being outdoors in **different weather conditions**. Watch the sky and talking about the sun, clouds, wind, and rain. Talk about the wind moving the trees (some children can develop the misconception that it is the trees that make the wind⁸). Teach children about the clouds, their colours and shapes, and when it looks like it might rain. Explore meteorological maps and radar pictures of the weather. Use rain gauges, wind chimes, weathervanes and windmills to provide a measure of the weather (how much rain, how strong is the wind and in which direction)⁹.
- **Observing, discussing, and reflecting upon the patterns and diversity** of the weather, to make meaning of their observations, and to make comparisons that help them to identify categories and classifications (such as classifying clouds for example).
- Building and creating with earth materials, implementing purposeful activities, and setting and solving problems¹⁰ such as transporting water through sand and rock channels.

- Playing with shadows on sunny days, and at different times of the day, noticing how the angle of the sun effects the length of shadows made. Use the light of the sun to create shadows against a blank wall outside.
- Looking at **globes and models of the solar system**, and (with older children) talking about the Earth moving around the Sun, the Earth spinning on its axis, and how this creates day and night, as well as different seasons (a result of the Earth's tilt, meaning that certain parts of the globe are closer to the sun at particular times of the year)¹¹.
- Exploring books, images, posters, maps, and reference materials to support children's interests and thinking about Earth science¹².

Books to support Earth science learning

[*Hello World! Weather*](#) by Jill McDonald describes different weather and what to wear to protect yourself in different weather.

[*Here We Are: Notes for Living on Planet Earth*](#) by Oliver Jeffers explores the different terrains and inhabitants of earth, as well as concepts such as day and night, and images of Earth.

[*I am Earth*](#) by Rebecca and James McDonald introduces Planet Earth and its features, including its orbit around the sun, the importance of water, land, the sun, seasons, weather and the water cycle, and how to look after planet Earth.

[*I am the Solar System*](#) by Rebecca and James McDonald introduces the different planets in our solar system, and concepts such as gravity and planets' orbits around the sun.

[*Layer of the Earth: Book for Kids*](#) by Mangano Amanda takes children on a journey through the Earth's layers, from the crust where we live to the hot, molten core.

[*Maisy's Wonderful Weather Book*](#) by Lucy Cousins is an interactive flap book in which Maisy explores the different things she can do in different weather.

[*Meanwhile Back on Earth*](#) by Oliver Jeffers is about a family travelling through space and looking back at the history of Earth (science concepts and history are covered here).

[*Oh Say, Can You Say What's the Weather Today?*](#) by Dr. Seuss is a more extensive exploration of weather, including the importance of weather-watching for human activities, the water cycle, and how weather is made.

Endnotes

- 1 Trundle, K. C. & Saçkes, M. (2012). Science and early education. In Pianta, R., W. Steven Barnett, W. S., Justice, L. M., & Sheridan, S. M. (Eds.) *Handbook of Early Childhood Education* (pp.240 – 258), Guilford Press.
 - 2 Aitken, J., Hunt, J., Roy, E., & Sajfar, B. (2016). *A Sense of Wonder : Science in Early Childhood Education*. Teaching Solutions.
 - 3 Ministry of Education. (2017). Te Whāriki. He whāriki mātauranga mō ngā mokopuna o Aotearoa. Early childhood curriculum. Author. <https://tewhariki>.
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tahurangi.education.govt.nz/te-whariki-online/our-curriculum/te-wh-riki/te-wh-riki-early-childhood-curriculum-document/5637184332.p

- 4 Ministry of Education (2017).
- 5 Ministry of Education (2017).
- 6 Ministry of Education (2017).
- 7 Ministry of Education (2017).
- 8 Saçkes, M. (2015). Young children's ideas about earth and space science concepts. In K. C. Trundle, & M. Saçkes (Eds.). *Research in Early Childhood Science Education* (pp. 35 - 66). Springer.
- 9 Fleer, M. (2015). How preschools environments afford science learning. In M. Fleer, & N. Pramling (Eds.). *A Cultural-Historical Study of Children Learning Science : Foregrounding Affective Imagination in Play-based Settings* (pp.23 – 37). Springer.
- 10 Ministry of Education (2017).
- 11 Saçkes (2015).
- 12 Ministry of Education (2017).

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