Sustainability science: Learning about environmental science in early childhood

ECE resources

Environmental science draws on science knowledge about the natural world and the physical and earth sciences, focusing on the interactions between humans and the natural world and their impact, and on addressing critical environmental issues such as climate change. In early childhood settings, learning about environmental science might include learning about waste, composting, worm farming, recycling, and upcycling[1].

Key questions children might explore in environmental science include:

- How can we care for our world?
- What can we do to improve the survival of non-human others?

Key understandings that children might develop include:

- Some resources are finite and need to be conserved
- Waste can be managed and reduced
- We can reuse things, and we can make new things out of old things
- Worms can turn food scraps into compost
- Worm tea and worm poo help plants grow
- Plants provide food
- Insects are needed for some plants' life cycles
- Destroying the habitats of living things can make it difficult for creatures to survive

Possible areas for inquiry and investigation in the natural sciences are:

- What diversity of species can we find in our environment? How can we attract more wildlife?
- What happens to our rubbish? Which materials decompose and which don't?
- How much rubbish does our early childhood setting produce? What can we do to reduce the amount of our rubbish that goes to landfill?
- How can food scraps be recycled?

Science process skills that might be used in environmental science:

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

Why is learning about environmental science important? How can environmental science contribute to early childhood curriculum goals?

Environmental education extends children's experience, knowledge, and values about the natural environment, in particular in relation to developing an increased understanding of the interdependence between land, people, plants, insects, and animals, and of the impact of human actions on environments

and other creatures[2]. It promotes pro-environment values and actions[3], and is also seen as an important way in which people can respond to the way in which human interactions with the environment can and have damaged the earth and its resources, habitats, and ecosystems. While environmental education can be couched in terms of learning about sustainability, some scholars reject the anthropocentric aspect to this term, which prioritises taking care of the environment for ongoing human needs. An ecocentric view is preferred, as it emphasises valuing and caring for the environment for its own intrinsic value rather than for what it offers in terms of resources for humans[4].

Environmental learning is important in the early years to enable children both to acquire knowledge about the natural world and to develop biophilic dispositions (an affinity with nature rather than being biophobic or afraid of nature), which is a crucial basis for developing an ongoing commitment to sustainability in their lives now and in the future[5]. Experiences in nature alone do not necessarily lead to positive environmental dispositions and actions later in life, so children's enjoyment of natural settings needs to be connected with knowledge about the value of biodiversity and the potential impact of environmental issues[6].

Te Whāriki views exploration as encompassing all aspects of the environment, including the natural environment. It both encourages and recognises diversity within the natural world, as well as ways of respecting, taking care of, and appreciating it. There are specific goals for children to develop a sense of responsibility for the natural world as well as knowledge about how to take care of it. Exploring the natural world with an environmental science focus enables children to learn by asking questions, discussing ideas with others, and devising and testing working theories related to taking care of the natural world. Environmental concerns support children to set and solve problems (for example, about how to attract bees to pollinate flowers), and to engage in trial and error, observing, comparing, planning, explaining, and discussing ideas[7]. Developing these science process skills is an important foundation for later science learning.

Te Whāriki also suggests that it is important to show children that there are many disciplines and domains of knowledge that can support them to understand their environment and to develop a sense of care for it, including literature and art forms from different cultures. There are valuable opportunities to develop bicultural content, aligning with the intent of *Te Whāriki* to promote mātauranga Māori, for example, by recognising and promoting the relationship that children have with their natural environment, and supporting them to fulfil their responsibilities to look after it. Kaitiakitanga is a crucial practice that expresses respect for nature, which may be expressed as respect for Papatūānuku, Ranginui, and the atua Māori that take care of different elements of the natural world[8].

Environments, resources, and activities for environmental science

It can be especially useful for teachers to be alongside children as they interact with nature, to promote respectful and biophilic dispositions and counter any default behaviours that children may have previously learned and display (such as harming insects)[9]. Playing in nature with other children, using resources such as sticks, stones, and walnuts to build forts and play games, is not as well linked to positive environmental attitudes in adulthood as nature play in which children are engaged in more deliberate scientific activities such as searching under logs for insects. Children who engage in these latter activities in childhood are found to be more likely to engage in environmental conservation activities in adulthood[10].

Important experiences for environmental education include:

- **Experiences in outdoor spaces** where children can appreciate nature in an open-ended way with all their senses[11], develop wellbeing, and learn to slow down and observe without touching.
- Opportunities to observe and take care of **animals and living things.**

- Observing, discussing, and reflecting upon the **interactions between the plants and creatures found in nature**[12], and (for older children) to increasingly recognise how they can positively influence their natural environment.
- Making **worm farms and other minibeast habitats**[13], discussing the useful role that these creatures play in ecosystems.
- Exploring **pondlife** by collecting water from a local stream or pond into containers, and examining the tiny creatures inside (the diversity of life forms provides an indication of the health of the stream or pond) [14].
- Finding **minibeasts or macroinvertebrates** (small insects and other creatures without a backbone that can be seen without a microscope, including insects, slugs and snails, and spiders) in the outdoor area, noting what living things there are, where they are found, and the important role they play in ecosystems.
- Going **litter-picking**, examining waste, and making decisions about the best way to deal with the waste that is found.
- Encouragement for older children to **offer ideas and theories,** to give reasons for choices and to put forward their arguments, to reflect and make meaning of their observations[15].
- Exploring **books, images, posters, maps, and reference materials** to support children's interests and thinking about sustainability and environmental education[16].

Books that support learning about sustainability science

Derek the Waste Warrior by Debbie McNeill, a story about an ibis who is hungry and eating rubbish, which teaches about the dangers of waste in our environment for wildlife.

Fish by Brendan Kearney, describes Skip, a fisherman, who discovers the damage that litter is doing to the sea, and learns about the changes that can help.

Nita Learns to Save the Planet by Karen Cammell is a series of short books in which Nita learns about looking after bees in the garden (*In the Garden*), conserving water (*At Grandpa's House*), growing vegetables at home (*A Vegetable Garden*), and the importance of trees (*A Forest Walk*).

Under Your Feet: Soil, Sand, and Everything Underground by Wenjia Tang is full of facts about soil, its organisms, and its place in ecosystems.

Uno's Garden by Graeme Base tells the story of a man who moves into the forest, starts building, and later regrets the city that has overtaken nature, before finding ways to restore balance and save the habitat of the snortle pig.

What Does it Mean to be Green? by Rana DiOrio describes many actions that children and families might take that are 'green', or environmentally conscious, and offer a great opportunity to talk to children about why these actions help the environment.

Endnotes

1 Aitken, J., Hunt, J., Roy, E., & Sajfar, B. (2016). A Sense of Wonder: Science in Early Childhood Education. Teaching Solutions.

2 Edwards, S., & Cutter-Mackenzie, A. (2011). Environmentalising early childhood education curriculum through pedagogies of play. Australasian Journal of Early Childhood, 36 (1), 51 – 59.

3 Cutter-Mackenzie, A. & Edwards, S. (2013). Toward a model for early childhood environmental education: Foregrounding, developing, and connecting knowledge through play-based learning. The Journal of Environmental Education, 44 (3), 195-213. https://doi.org/10.1080/00958964.2012.751892

4 Cutter-Mackenzie, A., Edwards, S., Moore, D., & Boyd, W. (2014). Young Children's Play and Environmental Education in Early Childhood Education. Springer.

5 Cutter-Mackenzie et al. (2014).

6 Cutter-MacKenzie & Edwards (2013).

7 Ministry of Education. (2017). Te Whāriki. He whāriki mātauranga mō ngā mokopuna o Aotearoa. Early childhood curriculum. Author. https://tewhariki.tahurangi.education.govt.nz/te-whariki-online/our-curriculum/te-wh-riki/te-wh-riki-early-childhood-curriculum-document/5637184332.p

8 Ministry of Education (2017).

9 Cutter-Mackenzie et al. (2014).

10 Cutter-Mackenzie et al. (2014).

11 Ministry of Education (2017).

12 Ministry of Education (2017).

13 Cutter-Mackenzie et al. (2014).

14 Cutter-Mackenzie et al. (2014).

15 Ministry of Education (2017).

16 Ministry of Education (2017).

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