INDEPENDENT THINKING ON ...

NATURE-BASED LEARNING

Alexia Barrable

IMPROVING LEARNING AND WELL-BEING BY TEACHING WITH NATURE IN MIND

First published by

Independent Thinking Press
Crown Buildings, Bancyfelin, Carmarthen, Wales, SA33 5ND, UK
www.independentthinkingpress.com

and

Independent Thinking Press
PO Box 2223, Williston, VT 05495, USA
www.crownhousepublishing.com

Independent Thinking Press is an imprint of Crown House Publishing Ltd.

First published 2022.

Edited by Ian Gilbert.

The Independent Thinking On … series is typeset in Azote, Buckwheat TC Sans, Cormorant Garamond and Montserrat.

The Independent Thinking On … series cover style was designed by Tania Willis www.taniawillis.com.

British Library Cataloguing-in-Publication Data
A catalogue entry for this book is available from the British Library.

Print ISBN 978-178135408-7
Mobi ISBN 978-178135412-4
ePub ISBN 978-178135413-1
ePDF ISBN 978-178135414-8

LCCN 2022935906

Printed and bound in the UK by

FOREWORD

Anyone with young children knows that a 'lovely walk in the countryside' is the worst thing you can do to engender a life-long love of nature in them. That mile-long hike to see the stunning waterfall/special tree/amazing view soon becomes a painful trudge accompanied by a regular chorus of 'Are we there yet?' and ends with at least one point of agreement – never again.

Then you wake up one morning and the sun is shining and the birds are singing and your optimism, like the sap in spring, is rising and off you go again. If only you stopped and realised that nature isn't something 'over there'. It's everywhere. If only you stopped and realised you can find as much beauty in an overgrown verge as you can in that stunning waterfall/special tree/amazing view. If only you kitted yourselves out for the hike but went as far as the muddy puddle within sight of the house and just stopped there. And played. For an hour.

A love of nature is a beautiful thing. Natural, if you like. But it is fragile. Nature is wonderful but it is also too cold and too hot and too wet and not muddy enough and hard to deal with and easy to hate. If the job of the adult is to bring out the love of nature in a child in a world of quick-fix media and shortening attention spans, then the job of the adult is to find the nature buttons to press. And while the teacher teaching outside will enjoy many benefits, this alone is no guarantee that you are helping that child grow up to love the natural world. As Principal Skinner explains to Bart Simpson as they prepare for a spot of astronomy out in the open one night, 'Ah, there's nothing more exciting than science. You get all the fun of sitting still, being

quiet, writing down numbers, paying attention … science has it all.'[1]

My own love of nature, birds especially, didn't come from being pushed out into the woods at the crack of sparrows. It started when my grandfather gave me a book about how to identify birds.[2] I still have it; both the book and the love. With the book as the key, the natural world opened up before me. No pushing was needed. This book by Dr Alexia Barrable is a key too. It is a simple, easy-to-read and easy-to-apply guide to helping develop a love of all things natural in all children. It's not only about taking them outside into nature – it's about bringing nature inside to them too. It's about learning *with* nature, not just *in* nature or *through* nature. It's about helping children become adults who will love, respect and care for the natural world at a time when the natural world is in trouble; man-made trouble.

We need this book like never before.

IAN GILBERT
SOMEWHERE IN CHESHIRE

1 *The Simpsons*, 'Bart's Comet', dir. Bob Anderson [TV series] (Gracie Films, 1989–present).

2 R. T. Peterson, G. Mountford and P. A. D. Hollum, *A Field Guide to the Birds of Britain and Europe* (London: Collins, 1974).

CONTENTS

FIRST THOUGHTS

As we navigate the multiple small and large challenges posed by the 21st century, including enormous ones such as the climate crisis and a global pandemic, many of us are looking for solutions in nature. Nature-based solutions, the sustainable use of natural processes and features to tackle societal challenges, are front and centre in our bid to restore balance and create a sustainable future. It is my conviction that in education, too, nature-based learning is one of the ways in which to creatively tackle some of the challenges we face, but also a way to future-proof our practice. The benefits of considering a turn towards nature-based education, whether it is on a small or incrementally larger scale, are numerous – both for humans, with regard to our well-being and ability to thrive, and for the planet. I propose that we invest in this symbiotic relationship – by fully understanding our place within nature, rather than apart from it – and bring nature back into all aspects of our own and our pupils' lives. In this book, I will put forward this argument by sharing the current state of evidence from the scientific literature and by putting it into scalable and practical contexts. Furthermore, by sharing examples of how others have put it into practice, as illustrated in the case studies provided throughout, I hope to inspire and facilitate this change for all. Start small and be brave!

A BIT ABOUT ME

It may sound like a bit of a cliché to start by saying that nature played a big part in my childhood – as it seems that every naturalist and nature lover starts their life story thus. However, in my case, the nature that surrounded my childhood games and first memories is largely urban nature. You see, I grew up in Athens in the 1980s – the capital with the lowest estimates of green area per person, with a mere 0.96m^2 for each adult and child according to the Organization for Economic Co-operation and Development. To put that into context, the World Health Organization recommends 9m^2 per person in order to support health and well-being.[1] And yet, nature was everywhere. My father was a naturalist and brought nature into our home in all its forms. We lived in a small flat for most of my childhood, but we had a gorgeous garden of potted plants on our balcony – I still remember growing tomatoes and peppers, and getting excited at the new daffodils breaking the soil in early spring. Actions speak louder than words, and I knew that my parents cared for nature in a very deep way; my dad rescued wildlife and nurtured it back to life. Our bathroom was, at different times, the temporary home of a recuperating common moorhen, a Eurasian owl with an injured wing, a corn crake that had been shot and a hedgehog hit by a car. More permanent residents of our home, when we eventually moved to a ground-floor flat with access to a garden, were two cats and a tortoise. Invariably, my brothers and I were interested in nature, but we also saw it as an integral part of our lives. It didn't exist as a separate place that we visited at weekends, but was in and around our home.

1 S. Karakasidis, WWF Greece introduces app mapping urban green areas, *Greece Is* (14 June 2016). Available at: https://www.greece-is.com/news/wwf-greece-introduces-app-mapping-urban-green-areas.

In my early teens I moved to England and was really taken by the accessibility of urban nature. Parks and commons, meadows and canals – I loved being able to explore and immerse myself in a different sort of natural landscape. My first teaching post was in London and it took me several years to start bringing nature into my practice. I remember no input into outdoor learning or any nature-based education at university; most of our training was on phonics, mathematical thinking, child development and curriculum. It was as I found my confidence as a teacher that I wanted to take my pupils into nature and bring nature into my classroom. I have 11 years of teaching experience in varied settings and across the primary age range. The more I became comfortable in my role, the more I tried to include nature in my practice. I started slowly, taking my reading group outdoors, then introduced some indoor gardening. I brought some pets (well, a snail farm) into my classroom and began to plan trips, purely so that my pupils could experience nature – meet it, play in it, start being part of it.

Ultimately, I came into academia with a desire to learn more; to try different things out, to see how things work. My research has been focused on nature connection in childhood and beyond, as well as the exploration of human–nature interactions. What is it about nature that promotes well-being? How can we support our children's tendency towards connection? The questions are endless and the more I learn, the more questions arise. This book brings some of my accumulated knowledge of practice and research into what I hope will be a useful primer to help you, the practitioner, to bring nature into your teaching.

WHAT IS NATURE?

Close your eyes for a moment. Take a deep breath and let your mind travel to the last natural space that you visited. What can you see, smell and hear? Where is this place? A forest? A meadow? A beach? Now, let us think about what nature means to you. What do you think of when you think of nature? Most of us tend to have a very clear idea of what is and what isn't nature; we often conceptualise nature as something removed from human influence – something different from us. In fact, in many people's minds there is a very clear dichotomy between nature and human. In research conducted in 1996, Claudia Mausner asked people to define what the term 'nature' meant to them.[2] Most participants described nature as something different and away from human influence, highlighting this separation that a lot of western people feel from the natural world. Nature was seen as pristine and unspoilt: a virgin rainforest, an untouched stream in the woods, an unspoilt beach with clean, crystal-clear waters. This is definitely one of the romanticised ways of viewing the natural world – as something separate and away from us. I don't want to get overly philosophical here. What I want us to do, as we embark on this journey towards nature-based education, is to work together to challenge this notion – challenge our view of nature as something remote, and come to a more balanced understanding of what nature really is. A happy side effect of this is that we are likely to become aware of nature everywhere we look, because it *is* everywhere we look!

2 C. Mausner, A kaleidoscope model: defining natural environments, *Journal of Environmental Psychology* 16(4) (1996): 335–348.

FINDING NATURE

For the next few days, I want you to look for nature wherever you are – walking in town, looking out of your window, when in a room. What is natural? Start from the understanding that we are part of nature – even if we often see ourselves as apart from it. This is, in fact, the essence of the idea of nature connection that my own research is based on and that I will be looking at in depth in upcoming chapters. The minute you start to notice nature, you realise it really is everywhere; from the bee that flies into your kitchen through an open window and the spider that lives behind your dresser (my dresser anyway), to the moss that covers part of your patio and the weeds that come out from between the cracks of paving stones. This shift in attention is key to changing our relationship to the natural world, but also to bringing nature into our teaching and learning – towards including the natural world in more of what we do in and out of the classroom. We find nature everywhere: in our homes, our gardens, in our cities and schools. Urban nature has been overlooked for a long time, and yet recent research suggests that it can have measurable positive effects on people's health and well-being.[3] Studies have reported benefits of engaging with urban nature on physical and psychological well-being, conservation behaviours and even improved executive functions in children, which are the set of cognitive processes that allow us to plan and execute complex actions, and attention.[4]

3 L. Taylor, A. K. Hahs and D. F. Hochuli, Wellbeing and urban living: nurtured by nature, *Urban Ecosystems* 21(1) (2017): 197–208.

4 A. R. Schutte, J. C. Torquati and H. L. Beattie, Impact of urban nature on executive functioning in early and middle childhood. *Environment and Behavior* 49(1) (2017): 3–30.

So, although most of us don't find ourselves with unlimited access to unspoilt natural spaces for our teaching and learning (though I am aware that some of you do – lucky you!), we all have natural features in playgrounds and neighbourhoods around our school; a grassy area, a few trees or some raised planters. In my first post in London, the playground consisted of a tarmacked area so small that breaktime was staggered. With the help of the parent–teacher association, we managed to add a variety of sturdy pots around one of the playground edges. This attracted a lot of interest from the children and was looked after by Year 4 and Year 5 classes. It also attracted wildlife, insects and pollinators, birds and sometimes small mammals and other animals (we soon noticed that at a certain time of year a load of 'two-headed frogs' appeared around our pots, so we had to – some of us reluctantly – cover reproduction in amphibians).

The tide is, however, changing – and in 2020 the 'greening' of school playgrounds became the principle aim of a £6.4 million campaign to improve children's well-being, learning and care for the environment.[5] Through adding natural areas to school grounds, the project aims to bring all children closer to nature and help everyone access the benefits of learning, playing and simply being close to the natural world. But you don't have to wait – you can start thinking about connecting with nature and its benefits as part of your teaching and learning today. A good starting point is to take an audit of what is accessible to you at your current setting. (See Appendix 1 for the audit form and instructions on how to use it.) Ideally, a few colleagues might join you in this exercise, ensuring that you don't

5 Nature Friendly Schools, New 'Nature Friendly Schools' will help to 'green' hundreds of school grounds and bring thousands of children closer to nature (1 February 2019). Available at: https://www.naturefriendlyschools.co.uk/new-project-will-help-green-hundreds-school-grounds-and-bring-children-closer-nature.

miss any spaces, but also so that you fully explore the possibilities of what your local nature can offer.

WHAT IS THIS BOOK ABOUT?

Nature-based education is not a set of activities. It is an ethos and a philosophy that brings nature to the forefront of our minds in all teaching and learning, and it nurtures a relationship between our pupils and the natural world. In this sense, nature-based education does not have to take place solely in natural spaces (although that is an important part of it too); instead, it is about learning with nature and about nature and includes a culture shift that enables the fostering of certain values and attributes, such as respect and empathy towards the natural world.

The term 'nature-based education' covers a huge array of diverse settings and contexts, programmes and experiences (for an extensive, though not exhaustive, list of what nature-based education is and can be, please see Appendix 1). Given their diversity and the varied contact with the natural world that each experience offers, their benefits also vary, both in quantity and quality. For example, spending all day in a forest nursery is likely to have very different benefits from taking part in animal-assisted learning. Equally, given that we work in different contexts and settings, we will all have varied access to the benefits described in this book. What I have attempted to do is to inspire and empower you to consider including nature in your work with children and young people. If you work in education, whether it be in formal or less formal settings, this book can offer you the information and motivation to start this culture shift and embed learning in, about and for nature in your practice. In less formal settings this may

be easier, with fewer curricular and time constraints. However, it is in schools, especially primary schools, where this shift can have the most effect – on our children's ability to learn, their health and well-being, and their cognitive and social skills; all of which has been documented by a growing body of literature (shared in this book).

You may be surprised to find out that as a researcher in the field of nature-based education, I am often frustrated by the assertion that nature is good for children. I want to move away from that and other romantic notions which are taken as scripture. In all my work, I want to look at the evidence and scrutinise it – to take nothing as a given. For many years, the evidence was uncompelling and a lot of the studies done in this area were badly designed, with samples that were hard to generalise from or were biased from the outset. In the last decade or so, however, there is a body of research emerging that is bringing real rigour to why and how nature-based learning can be beneficial to children (and, as it happens, to adults and the planet too).

However, this is not an academic book; it is a book written for practitioners – for the people on the ground who bring children to nature and nature to the classroom. This cannot be done simply with a set of activities. Each chapter aims to explain the evidence so that you, the practitioner, can make decisions about how best to teach in, with and about the natural world. By knowing and questioning the evidence, and by understanding the mechanisms of action by which nature benefits a particular system, you can then make the right decisions and plan an activity that is optimised to support your learners' needs – be that well-being or improving attention. You can read this book from start to finish, if you'd like, or you can dip into a specific topic that interests you – improving behaviour, finding suitable inclusion strategies or enriching your learning environment. Overall, what I want you to do is leave the

book lying on the staffroom coffee table. I want you to bring others along on this journey – to shape the culture of your setting beyond your own class or group. After all, this is what a culture shift is about. So, bring others with you and get ready for the ride!

TAKEAWAY POINTS

- Nature does not need to be an unspoilt paradise. There is nature everywhere (even indoors).
- Urban nature can have many positive effects.
- Directing our attention towards nature – simply noticing the nature around us – can be beneficial.

CHAPTER 1

EQUITY OF ACCESS – WHO IS NATURE FOR?

TACKLING INEQUALITIES

Stop for a minute and consider the issue of access to nature. Who has access more readily? Think about, for example, leafy neighbourhoods and parks. Consider who has access to privately owned cars and the time and resources to drive out of town in order to access natural spots. Finally – the simplest of all metrics – consider private green space; namely, gardens.

The truth is that one in eight British households has no access to a private green space at home. Those who don't have access are more likely to be members of an ethnic minority, while in England specifically, a Black person is four times more likely not to have a garden, covered patio or balcony than a White person. Different localities are also affected in different ways – you are less likely to have access to a garden if you live in London, where more than one in five households have no private outdoor space. Surprisingly, Scotland as a whole is not far off this statistic – no doubt being pushed up by urban areas. What is of interest is that, even when we account for socio-economic status and age, Black people are still less likely to have access to private green space. Finally, even access to public green spaces, such as parks, is limited for minority ethnic groups. To add to the inequality of access, those who have

their own private garden also tend to live closest to public parks. Still, as a country, the UK has relatively high access to public green spaces, especially when we include playing fields and playgrounds. The good news for Londoners is that despite the fact that they are less likely to have a garden, they live in a city with the easiest access to public parks. Having said that, population density means that certain parks in London, like Clapham Common, cater for a population of close to 50,000 people – while the average park across Great Britain serves about 2,000 people. [1]

Access to green spaces is important, especially when looked at from a developmental perspective. A longitudinal study from Scotland that looked at different access to nature – namely gardens and neighbourhood nature – found that children living in homes with gardens had better social, emotional and behavioural scores at age 6.[2] Neighbourhood green space was also associated with better social skills. Residential green space during one's childhood – namely gardens and balconies – has also been found to be associated with lower risk of psychiatric disorders in adolescence and adulthood.[3] At the same time, proximity to public green space has a similar association

1 Office for National Statistics, One in eight British households has no garden (14 May 2020). Available at: https://www.ons.gov.uk/economy/environmentalaccounts/articles/oneineightbritishhouseholdshasnogarden/2020-05-14.

2 E. A. Richardson, J. Pearce, N. K. Shortt and R. Mitchell, The role of public and private natural space in children's social, emotional and behavioural development in Scotland: a longitudinal study, *Environmental Research* 158 (2017): 729–736.

3 K. Engemann, C. B. Pedersen, L. Arge, C. Tsirogiannis, P. B. Mortensen and J. C. Svenning, Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood, *Proceedings of the National Academy of Sciences* 116(11) (2019): 5188–5193.

with better mental and physical health.[4] We can certainly make a case for the importance of growing up with access to green spaces – whether these are private or public – and yet, it is clear there are great disparities between regions, socio-economic statuses and ethnicities; disparities that became even more obvious during the COVID-19 restrictions. Schools offer one way to address these and present an opportunity for greater equity in access. School grounds should be the first port of call in bridging this divide. Access to green school spaces – meaning playgrounds that are almost park-like with greenery and other natural elements, such as trees or hedges – is associated with improvements to physical and mental health.[5] Unfortunately, a lot of schools in the UK do not have the autonomy, time or funding to make radical changes to the playground environment, as local authorities tend to have oversight. However, even small changes, such as adding raised planters or potted plants, or ensuring that children have access to any natural areas already included within the perimeter of the school, but are sometimes out of bounds, can be a positive step in the right direction.

HEALTH AND WELL-BEING FOR ALL

Health and well-being are inextricable parts of quality education, and an implicit (and in many parts of the world, including Scotland, Wales and Northern Ireland, explicit) aim of what we do in schools. Nature-based education can be a strong ally in this, helping us to nurture physically and

4 D. Aggio, L. Smith, A. Fisher and M. Hamer, Mothers' perceived proximity to green space is associated with TV viewing time in children: the Growing Up in Scotland study, *Preventive Medicine* 70 (2015): 46–49.

5 J. C. Bikomeye, J. Balza and K. M. Beyer, The impact of schoolyard greening on children's physical activity and socioemotional health: a systematic review of experimental studies, *International Journal of Environmental Research and Public Health* 18(2) (2021): 535.

mentally healthy young people. This short section can be useful for practitioners who wish to undertake nature-based activities, for leaders who want an evidence-based approach to effective health and well-being practices, or to lay out a case for directing funding in their schools.

As evidence is mounting about the positive effects of nature on our health, access to nature becomes more than just a luxury – it is now a matter of necessity and equitable access to basic quality of life. A minimum of 2 hours in nature per week seems to be necessary for optimal health and well-being.[6] Being in nature impacts our immune system through different mechanisms: early contact with nature in childhood can help build a more robust immune system through exposure to germs that can help develop a measured immune response (also known as the hygiene hypothesis);[7] regular contact with particular types of green environments, such as conifer forests, has also been found to boost immune functions through exposure to phytoncides;[8] in a recent experimental study, researchers in Finland found that children who played in outdoor areas that were made more biodiverse (from gravel to planted green areas) showed improved immune markers in blood and skin.[9] Such biodiversity interventions may prove crucial for maintaining or improving the health of urban populations. Other associated benefits to health

6 M. P. White, I. Alcock, J. Grellier, B. W. Wheeler, T. Hartig, S. L. Warber et al., Spending at least 120 minutes a week in nature is associated with good health and wellbeing, *Scientific Reports* 9 (2019): 7730.

7 H. Okada, C. Kuhn, H. Feillet and J. F. Bach, The 'hygiene hypothesis' for autoimmune and allergic diseases: an update, *Clinical & Experimental Immunology* 160(1) (2010): 1–9.

8 Q. Li, Effect of forest bathing trips on human immune function, *Environmental Health and Preventive Medicine* 15(1) (2010): 9–17.

9 M. I. Roslund, R. Puhakka, M. Grönroos, N. Nurminen, S. Oikarinen, A. M. Gazali et al., Biodiversity intervention enhances immune regulation and health-associated commensal microbiota among daycare children. *Science Advances* 6(42) (2020): 2578.

linked to the outdoors when compared to indoor spaces – such as improved sleep,[10] better eye health[11] and higher physical activity[12] – make nature-based outdoor learning an effective way to boost health and well-being in all our pupils.

INDOOR NATURE

There are, of course, instances when the grounds of the school do not offer much contact with nature, especially in inner-city schools. All is not lost, however, as there are ways to start greening school playgrounds, or ensuring access to nearby nature – including applying for grants from organisations such as Learning Through Landscapes,[13] the Ernest Cook Trust[14] or Nature Friendly Schools[15] for equipment and training.

If all else fails, consider bringing some of nature indoors. Biophilic design includes the use of natural elements such as skylights for natural light, green or living walls, the presence of water such as springs or fountains, and natural materials such as wood and stone being used in a variety

10 L. A. Wood, M. M. Tomlinson, J. A. Pfeiffer, K. L. Walker, R. J. Keith, T. Smith et al., Time spent outdoors and sleep normality: a preliminary investigation, *Population Medicine* 3 (2021): 7.

11 S. Xiong, P. Sankaridurg, T. Naduvilath, J. Zang, H. Zou, J. Zhu et al., Time spent in outdoor activities in relation to myopia prevention and control: a meta-analysis and systematic review, *Acta Ophthalmologica* 95(6) (2017): 551–566.

12 P. S. Tandon, B. E. Saelens, C. Zhou and D. A. Christakis, A comparison of preschoolers' physical activity indoors versus outdoors at child care, *International Journal of Environmental Research and Public Health* 15(11) (2018): 2463.

13 See https://www.ltl.org.uk.

14 See https://ernestcooktrust.org.uk.

15 See https://www.naturefriendlyschools.co.uk.

of public and private spaces. Although biophilic design has been increasingly popular in the architecture of office spaces, hospitals and airports, schools have been largely left behind. Yet, when indoor naturescapes – i.e. natural environments with multiple natural elements within one setting – have been studied in education settings, they have been found to be effective in reducing stress, improving attention and boosting well-being and creativity.[16] The authors write: 'potentially promising leads were found on the associations between campus green space and improved quality of life, perceived restoration, lower outdoor temperature, and between indoor nature and improved indoor climate'. Additionally, air quality and levels of humidity and circulating carbon dioxide were all improved in classrooms that had a number of potted plants, or green/living walls. Even simply viewing nature through a window from inside the classroom is beneficial, and can improve mood, recovery from stress and mental fatigue. And if you are wondering how you will be able to implement this in your inner-city primary, fret not! Studies that have looked at the effect of whole-wall murals depicting natural scenes, such as forests, coastal views or waterfalls, were found to restore attention and ease mental fatigue (the study I've referenced here contains photos of murals, should you need inspiration!).[17] So, if no natural views are possible, consider the use of permanent whole-wall stickers or large posters of natural landscapes on one wall of the classroom.

16 N. van den Bogerd, S. C. Dijkstra, S. L. Koole, J. C. Seidell, R. de Vries and J. Maas, Nature in the indoor and outdoor study environment and secondary and tertiary education students' well-being, academic outcomes, and possible mediating pathways: a systematic review with recommendations for science and practice, *Health & Place* 66 (2020): 102403.

17 G. Felsten, Where to take a study break on the college campus: an attention restoration theory perspective, *Journal of Environmental Psychology* 29(1) (2009): 160–167.

FIND OUT ABOUT THE MANY BENEFITS OF NATURE-BASED LEARNING IN THIS INSIGHTFUL AND PRACTICAL GUIDE. DISCOVER HOW NATURE – INSIDE AND OUTSIDE THE CLASSROOM – CAN BOOST WELL-BEING AS WELL AS IMPROVE BEHAVIOUR AND LEARNING.

At this critical time for our planet, it is vital we help children and young people connect with the living world around them. This is all the more important for those in urban surroundings. With nature-based learning, we can help children care for our planet – as well as care for themselves and each other.

Bringing together evidence from psychology, environmental science and education, and featuring practical advice, case studies and discussion of original theory, this book will surprise, motivate and stimulate educators as they engage with new approaches to teaching and learning. It will inspire individual nature-based lessons as well as help schools build a creative and effective nature-based curriculum.

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DR DYLAN ADAMS, SENIOR LECTURER IN EDUCATION, CARDIFF METROPOLITAN UNIVERSITY

This enjoyable read is inspiring and practical; relevant for teachers across early years to secondary and for student teachers.

DR LAUREN BOATH, DIRECTOR OF INITIAL TEACHER EDUCATION, UNIVERSITY OF GLASGOW

Dr Alexia Barrable was born in Greece and had a wild childhood climbing trees and rescuing tortoises. After moving to the UK in her early teens, she went on to study at Oxford and Cambridge, where she qualified as a teacher. Alexia has a PhD in psychology in education and conducts research on the human–nature relationship. She is passionate about spreading the word on the benefits of, and opportunities offered by, nature-based learning. @AlexiaBarrable

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ISBN-13: 978-1781354087

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Teaching skills and techniques