

The benefits of engaging with nature through learning in natural environments

Learning in the natural environment has a number of direct and indirect benefits. So why are so many children denied opportunities to engage with nature?

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There is substantial evidence that learning in the natural environment (LINE) has direct educational, health and psychological benefits for children and indirect benefits ranging from social to financial. However, despite increasingly robust evidence of these benefits, many children are denied this learning experience. For example, nowadays 10 per cent of children play in the natural environment compared to 40 per cent of adults when they were young.¹ This ‘extinction of experience’² has a detrimental long-term impact on environmental attitudes and behaviours. Worse still, children from low socio-economic groups, especially those living in deprived urban areas are particularly disadvantaged.³ A cultural shift is required, both at home and at school, before the situation can be reversed. Such a cultural shift requires ambitious evidence-led policy and significant improvements in the scale and targeting of services that directly tackle the current levels of inequality of opportunity.

In May 2010, the Prime Minister, David Cameron announced that he wanted the newly-elected administration to be ‘the greenest government ever’ and a year later, Caroline Spelman, the then Secretary of State for Environment, Food and Rural Affairs, presented to Parliament the first white paper on the natural environment for over 20 years. *The Natural Choice: securing the value of nature*, known almost universally as ‘NEWP’ (Natural Environment White Paper), outlined what appeared to be an ambitious new approach to address the inter-linked issues including biodiversity loss, the threat of climate change and a decline in young people’s engagement with the natural environment. A key section stated: “We want more people to enjoy the benefits of nature by giving them freedom to connect with it. Everyone should have fair access to a good-quality natural environment. We want to see every child in England given the opportunity to experience and learn about the natural environment”.⁴

Two months later, I was present at Camley Street Natural Park, near Kings Cross, in my role as trustee of London Wildlife Trust, to witness the Secretary of State launch



Engaged on the riverside with early experience of using field guides.

Photo: Justin Dillon

Biodiversity 2020: A strategy for England’s wildlife and ecosystem services. One of the Strategy’s four key outcomes was that “By 2020, significantly more people will be engaged in biodiversity issues, aware of its value and taking positive action”.⁵ In terms of what engagement might look like, the strategy provided some illustrations: “Many people in England are already very supportive of conservation efforts and make an important contribution through a variety of activities, for example, through management of their land, environmental volunteering or simple activities such as feeding birds in the garden”.⁶

Identifying the evidence base

In the autumn of 2010 I was commissioned by Natural England to summarise the benefits and barriers of Learning in Natural Environments (LINE). As part of that commission I identified where the evidence gaps were, so that Natural England could help to prioritise the strategic research requirements to inform solutions to the challenge of reconnecting children with the natural environment through schools. Underlying the commissioning of this work was a belief that: “The level of direct contact with nature is a factor in influencing attitudes towards it suggesting that the more we can stimulate interest in and access to nature, the more people will be willing to contribute to its protection and enhancement”.⁷

The two reports were published in 2010⁸ and 2011⁹ and, together with an evaluation of the economic benefits of learning in the natural environment¹⁰ formed the basis of *Learning in the Natural Environment: Review of social and economic benefits*

and barriers published by Natural England in 2012¹¹ and which has influenced government work in this area over the past two years. The rest of this article is an abridged version of the benefits report.

The benefits of LINE

The term learning in the natural environment (LINE) encompasses a range of provision, including:

- activities within a school's or college's own buildings, grounds or immediate area;
- educational visits organised within the school day; and,
- residential visits that take place during the school week, weekends or holidays.¹²

Evidence of the benefits of engaging with the natural world has been collected for decades. However, for much of that time, the focus has been on outcomes which were fairly easy to measure. Researchers have been encouraged to provide simple answers to simplistic questions such as 'does LINE raise standards more than learning in the classroom?' More recently, researchers have looked at a wider range of benefits and impacts.

The most authoritative survey of research into outdoor learning was carried out by Rickinson *et al.* in 2004. The review concluded that: "Substantial evidence exists to indicate that fieldwork, properly conceived, adequately planned, well taught and effectively followed up, offers learners opportunities to develop their knowledge and skills in ways that add value to their everyday experiences in the classroom".¹³

The Rickinson *et al.* review identified four areas of impact on students: cognitive, affective; social/inter-personal; and physical behavioural. Many of the outcomes are inter-related and mutually reinforcing. In a seminal study of the impact of residential fieldwork on upper primary school students, Nundy identified a positive impact on long-term memory due to the memorable nature of the fieldwork setting as well as affective benefits of the residential experience, such as individual growth and improvements in social skills.¹⁴ Nundy also reported reinforcement between the affective and the cognitive outcomes which resulted in students being able to access higher levels of learning.

Nundy's findings are supported by an Ofsted report which stated that "learning outside the classroom contributed significantly to raising standards and improving pupils' personal, social and emotional development".¹⁵ Many of the benefits do not occur in isolation and, indeed, a class of 30 students exploring their local surroundings may well have 30 different individual experiences resulting in a set of personal outcomes which is complex and hard to measure.

The benefits accruing from LINE can be reduced remarkably easily by a lack of adequate preparation, weak guidance to pupils and inadequate follow-up back in school. Fredericks and Childers note that "Effective field trips require planning,

preparation, and follow-through upon returning to school as well as coordination between the host site, school, and chaperones".¹⁶

A study of the value of LINE in England found that benefits included educational attainment, attitudes to other children, awareness of environment and natural science skills, behavioural outcomes and social cohesion, health benefits, school staff morale, and a more attractive school (aesthetically and to prospective parents).¹⁷ Furthermore, complementarity between these benefits means that the overall value of LINE to society is probably greater than the sum of these parts. The qualitative evidence linking LINE to such benefits is compelling, however, quantitative evidence linking LINE and changes in these benefits is lacking. Even in the absence of such quantitative links, the costs to society of the problems that are encountered in the absence of health, community cohesion, higher educational attainment and so on range from tens of millions to billions of pounds.

Knowledge and understanding

The vast majority of research findings focus on the impact of LINE on participants' knowledge and understanding. Specifically, students in schools with an environmental focus perform better in reading, mathematics, science and social studies and show greater motivation for studying science.¹⁸ In a comparative study in the USA, Randler *et al.* found that students aged 9-11 who had taken part in conservation action "performed significantly better on achievement tests" and that pupils "expressed high interest and well-being and low anger, anxiety, and boredom" compared with students who had been taught using more traditional methods.¹⁹

The impact of visits to the Eden Project in Cornwall has been reported by Bowker who examined pre- and post-visit drawings of tropical rainforests made by 9-11 year-old children. Bowker reported that the "post-visit drawings [...] demonstrated far greater depth, scale and perspective than the pre-visit drawings".²⁰ In an earlier paper, Bowker (2004) interviewed 72 children from eight primary schools about one month after they had been on a one-day school visit to Eden.²¹ He reported that the children's "opinion of plants changed, they understood the link between plants to their own daily lives and took delight in finding out where chocolate came from". In another study, Hamilton-Ekeke compared three groups of Nigerian school students. Students who were taught ecology by taking them to the school farm, pond, and nearby stream performed better than a matched group who were taught only in the classroom.²²

Developing skills

A broad range of skills ranging from the technical to the social have been identified as outcomes of LINE, particularly when it is integrated with the everyday school curriculum. In a major report on the work of outdoor education centres, Ofsted found that participating students "develop their physical skills in new and challenging situations as well as exercising important social skills such as teamwork and leadership".²³ Peacock's evaluation of the National Trust Guardianship scheme, which involved students making multiple trips to sites, was that participating students developed social skills such as tolerance, caring, group awareness and self-

discipline as well as research skills involving understanding and management of the natural environment. Specific skills were developed which ranged from gardening and cooking to using digital cameras and microscopes.²⁴

Relatively few studies have looked at the experience of early years education. However, Jones reported on the development of children aged 3-5 on a school programme in Minnesota, USA. Jones noted that the “children learn to work collaboratively, socially construct knowledge, and develop social skills while cooperating, helping, negotiating, and talking with others”.²⁵ Possick reported on a small-scale study involving her kindergarten class and another first-grade class. A month-long project culminated in turning their school hall into a ‘forest’. The project “was based on observing, questioning, taking field trips, conducting library research (including the internet) and asking experts”. Possick reports that the children in the two primary classrooms “developed skills in forming questions about what they thought they knew, wanted to know, and had learned”.²⁶

Changing attitudes and behaviours

There is much evidence of the positive impact of LINE on a range of attitudinal and behavioural dimensions. Environmental-based education makes other school subjects rich and relevant and gets apathetic students excited about learning.²⁷ Research has identified such impacts resulting from a range of experiences including school gardening and environmental improvement; visits to local parks; farm visits and residential visits.²⁸ Coskie *et al.*, for example, describe the impact of a five-week intervention in which students aged 8-10 were taught how to write a field-guide to identify plants in a small area of woodland near to the school. The authors found that students “came to understand and care for the natural world in their immediate environment”.²⁹

Relatively few studies have been able to look at long-term impacts of LINE. Farmer *et al.* evaluated *Parks as Classrooms*, an environmental education programme in the Great Smoky Mountains National Park, USA. The programme focused on the impact of non-native species and humans on local biodiversity. The primary school participants were aged 9-10. 15 of the 30 students agreed to be interviewed a year after their visit. The authors reported that “many students remembered what they had seen and heard and had developed a perceived pro-environmental attitude”.³⁰

Health and well-being benefits

Links between contact with the environment and personal health are well-established. Studies have shown that exposure to the natural environment can lower the effects of various mental health issues that can make it difficult for students to pay attention in the classroom. In particular Kaplan proposes the Attention Restoration Theory – the theory that exposure to nature reduces directed attention fatigue, restoring the ability to concentrate at will.³¹ The symptoms of Attention Deficit/Hyperactivity Disorder are less severe when individuals (both children and adults) are regularly exposed to natural outdoor environments.^{32,33}

The publication in 2005 of *Last Child in the Woods*, by Richard Louv, was influential in the US and elsewhere. Louv described a ‘Nature Deficit Disorder’ which was



Fieldwork concentrating young minds.

Photo: Justin Dillon

meant to be a way of thinking about a society-wide problem of disconnectedness with the natural environment. The book stimulated the formation of a ‘No Child Left Inside’ movement which has had substantial success influencing policy makers. For example, environmental literacy appeared in the US Department of Education budget for the first time in 2010.

Children are more likely to have hands-on contact with the natural environment during their time at primary schools than while they are attending secondary schools. A study in Australia found that hands-on contact with nature in primary school “can play a significant role in a cultivating positive mental health and wellbeing”.³⁴ Bird identified more than 100 studies linking improvements in mental health and time spent in the natural environment.³⁵ In 2009, following a study of sustainability education in schools, Ofsted recommended that schools should “ensure that all pupils have access to out-of-classroom learning to support their understanding of the need to care for their environment and to promote their physical and mental well-being”.³⁶

Self-efficacy and self-worth

The mental and physical health benefits are closely linked to other impacts such as improvements in feelings of self-worth and self-efficacy. Swarbrick *et al.* report on a forest school initiative in Oxfordshire.³⁷ Although acknowledging that research into the project is in its infancy, the authors do report that a questionnaire sent to schools and individuals using the forest school approach “revealed that the project was viewed very favourably by participant adults”, adding that they mentioned the

“increased ability of quiet children to express themselves, an increase in confidence, and positive participation from disruptive children”. There was also evidence of increased speaking and listening skills during the one-year involvement in the forest school programme. Amos and Reiss’s evaluation of the 2004 London Challenge Residential Initiative, which involved 51 schools from five relatively deprived London boroughs sending groups of 11-14 year-olds to field centres found that pupils “surpassed their own expectations of achievement during the courses, and both pupils and teachers felt that the general levels of trust in others and the self-confidence shown by the pupils on the courses were higher than in school subjects”.³⁸

An unusual and very thorough approach to evaluating the impact of an outdoor experience was reported by Whittington.³⁹ The participants in this doctoral study were a group of adolescent girls who took part in a 23-day canoe expedition as part of an all-female wilderness programme in Maine, USA. Whittington interviewed the girls twice following the expedition, once 4-5 months afterwards and the second time after 15-18 months had elapsed. Whittington reported that the experience enabled the participating girls to challenge conventional notions of femininity in diverse ways including: 1) perseverance, strength, and determination; 2) challenging assumptions of girls’ abilities; 3) feelings of accomplishment and pride; 4) questioning ideal images of beauty; 5) increased ability to speak out and leadership skills; and 6) building significant relationships with other girls. Implications of these results for programme planners of all-female programs are discussed in the study.

Benefits to schools, teachers and the wider community

The evidence suggests that teachers benefit from LINE, becoming more enthusiastic about teaching and bringing innovative teaching strategies to the classroom.⁴⁰ Schools also benefit from teachers taking more ownership and leadership in terms of changing school culture. Several of the studies mentioned above have already highlighted possible benefits of LINE beyond those felt by the individual. These inter-related benefits include social, economic, health and crime reduction.⁴¹ In an Australian study, Davidson, described the experiences of schools that took part in the ‘Sustainable Schools Initiative’ which focuses on waste, water, biodiversity, school grounds and energy management.⁴²

One of the most well-know examples of cross-community education aimed at intergenerational mentoring is the Garden Mosaics project. Kennedy and Krasny describe the mission of the project which is “connecting youth and elders to explore the mosaics of plants, people, and cultures in gardens, to learn about science, and to act together to enhance their community”.⁴³

In the UK, the National Trust’s Guardianship scheme involved school-age students paying multiple visits to sites. An evaluation of the long-term benefits of the scheme, which involved over 100 schools, found that they saw great benefits from having a ‘classroom in the park’. Headteachers reported a development of ‘community spirit’ and valuing what was ‘in their own back yard’ as a result of the scheme.⁴⁴ A rarely reported finding was that the scheme resulted in an increased willingness of parents to come into school for events and meetings.

Benefits to the natural environment community

The evidence suggests that the more that young people engage with the natural environment, the more they appreciate and care for it.⁴⁵ Schaaf describes how four classes of primary-aged children engaged with a water quality project. By the end of the year-long project the students had not only learned how to monitor water quality but they had raised salmon in the classroom for release into the river.⁴⁶

Natural Connections

We still have a long way to go before the Coalition Government’s wish to see every child in England given the opportunity to experience and learn about the natural environment. Natural England has been keen to pull together the evidence base to support LINE and to understand why some schools promote it and others do not. Armed with that knowledge, DEFRA, Natural England and English Heritage are funding the Natural Connections Demonstration Project (2012-2015) which works in more than 200 schools across the South West of England. The outcomes of Natural Connections might point the way forward to addressing the national disgrace that sees the majority of UK children denied sustained high quality access to nature as part of their education.

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