

Environmental studies: the schools being powered by nature

Children learn better when the outdoors comes into the classroom - and the benefits extend beyond academic achievement

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Howe Dell Primary in Hatfield could well be the UK's most eco-friendly school. It has toilets that flush using rainwater, sedum roofs made of plants and vegetation, and classroom sink-tops made from recycled yoghurt pots. But the school's design doesn't just help project the environment, it also uses nature to improve children's academic performance and behaviour.

In 2007, the school was relocated from its former home - a rectory attached to the historic Hatfield House - to the centre of a new housing development in the Hertfordshire town. It is part of a £10m project funded by Hertfordshire council and includes a nursery, a community centre and a daycare facility.

The architects were given carte blanche by the council to push the limits of sustainable design. As well as a revolutionary heating system that uses the playground to warm and cool its buildings, the school has floor tiles that can be individually moved or replaced once they are worn, solar panels and a wind turbine to produce renewable energy.

"There are lots of technologies and tools in the school building, but for me it is about how they are used to enhance the learning of the children," says headteacher Debra Massey. As such, there is a wetland area on the grounds that is used for science projects and the sedum roof doubles up as a classroom where students learn about the birds and insects that have made it their habitat. The playground also has learning stations where pupils can examine bugs with magnifying glasses.

Massey explains that half of the children in the nursery live in flats that don't have gardens, so exposing them to nature has had a transformative effect. She attributes the school's excellent attendance records, promising academic progress and lack of vandalism to the building's eco-friendly design. "The school is a living, learning organism and we are hugely proud of what the building does for the children, because it motivates them," she explains.

Natural high

Research into design based on biophilia - a love of life or living systems - backs up Massey's ideas. The Carnegie Mellon School of Architecture reported 20%-26% higher test scores in classrooms with ample natural light and trials (pdf) have found that plants in classrooms can lead to improvements in spelling, maths and science of between 10% and 14%.

But the benefits of biophilic design in schools extend beyond academic performance: the use of natural materials in school buildings has also been found to reduce stress levels. A 2009 study of a

school in Austria (pdf) found that classrooms with flooring, ceiling and cupboards made from timber slowed the heart rates of students learning in that environment. Attention restoration theory, developed by Rachel and Stephen Kaplan in the 1980s, claims that people can concentrate better after spending time in nature, or even looking at natural scenes such as clouds moving across the sky, leaves rustling in a breeze or water bubbling over rocks in a stream.

Oliver Heath, an expert in sustainable architectural and interior design, is currently working with The Garden in Hackney, a school for students with autism, to design a “retreat space” where pupils can take a break from the boisterous and sometimes overwhelming playground environment. Initial ideas for the area include window seats and cubby holes that are big enough for the children to climb into. As well as the use of natural textures and materials on the floor and the walls, they plan to use changing LED lighting that reflects the colour of the sky.

Heath is interested in using biophilic design to calm the children, helping them to physically and mentally recuperate. He explains: “Students and teachers are under increasing pressure to perform ever-greater levels of work, under more and more difficult conditions. Recognising that stress plays a part in their lives and looking for an environment to remove that by using elements of nature seems to be a relatively easy win.”

Live and learn

Architects in Scandinavia want to take biophilic design to the next level with their proposals for a series of green schools in Sweden. Architecture firm 3XN’s design for a residential school in Stockholm, where children of all ages will live and study, includes hanging gardens, green terraces and vertical farming on the exterior, as well as indoor vegetable plots and a birch grove next to the kindergarten for younger children to relax in.

Inside, natural light will flood the corridors and learning spaces through the large glass windows that encircle the wave-shaped building. There is a huge chasm in the centre which visually links students and teachers to the different levels of the school.

3XN founder Kim Herforth Nielsen says this learning environment will not only have a positive impact on wellbeing, behaviour and performance, but will be an important tool for teaching the next generation about sustainable living.

“Students [will] learn first-hand about how to work with green technologies, such as urban farming,” explains Nielsen. “It’s not only a nice park, everything has a use and a meaning. You are literally living and learning in a greenhouse.”

The project has yet to secure funding, but Nielsen believes it could have a huge impact on students’ attitudes towards the environment.

He says: “Everything you do as an architect creates some sort of behaviour. I believe you can change people’s thinking about nature and sustainability and how to behave towards each other through how you shape and design architecture.”

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