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Architecture, Education and Experience

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EDUCATION, ENVIRONMENT AND EXPERIENCE

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In the early twentieth century the driving force of open-air schools became one of health, based on concerns for the prevention of disease. With the introduction of compulsory education, authorities required that all children attended schools and were faced with the responsibility of controlling the spread of diseases such as tuberculosis. This had enormous implications for schools, as educationalists proposed to offer similar climatic therapies as those in the sanatoria, and supported outdoor pedagogic agendas. Following discussions, a new type of school emerged, motivated by medical and educational requirements, schools became 'half-clinics, half-schools.'

It had been argued outdoor education provided a richness not evident indoors, with natural experiences contributing towards health by developing the child's bodily strength. The schools proposed to acclimatise children to outdoor conditions. Children spent most of their time outside in order to strengthen themselves. If a child caught a cold on their first day while outside, teachers encouraged them to attend school the next day regardless of how sick they may have been, in order to build up their constitutions. They assured them that the experience would be beneficial and they would not catch cold again.

Informed by an educational theories of Rousseau, Pestalozzi and Fröbel that meaningful experience is deeply embedded in sensory learning, open air school reformers set about creating deep learning experiences for children. Bodily experiences, through the senses and movement dominated. Rousseau suggested, 'our first masters of philosophy are our feet, our hands and our eyes,' In addition, active movement was critical to learning, he claimed. Children should not sit still, rather they should be encouraged to move to think. He explained 'to learn to think we must therefore exercise our limbs, our senses, our organs, which are instruments of our intelligence.' They proposed that children should study real objects in their natural environments to understand things fundamentally before learning concepts that are more abstract. Moreover they believed that the diversity and variability inherent in natural settings stimulated children,

The school's had an experiential bias enhanced by their rural settings and offered the children close contact with nature. The first open air school was located in Germany, in Charlottenburg. Within a pine forest with sandy soil, three miles from Berlin, the school was on a one hectare site. It's placement close to pine trees was based on ancient beliefs, suggesting that the air of coniferous forests had vapours, which had a healing effect on patients with lung and throat complaints. Its popular name in Germany Waldeschulen or Forest school reflected the perceived significance of its natural setting. A bridge lead the children across a stream to the school itself. Rustic wooden fencing, perhaps sourced from the site, lined the sides of the bridge. A simple banner and flag hanging from the trees indicated the entrance of the school. Trees dominated the views, their tall trunks with their coniferous tops obscuring the full view of the sky. Behind them and in between, almost inperceptible, there were low buildings set down into the landscape, nestled in a slight hollow within the middle of the site.

When we look at these forms it is useful to draw attention to the fact that these schools emerged from the sanatoriums – whose designs were preoccupied with maximising the patients exposure to the ultraviolet rays of the sun based on their perceived curative powers. Dettweiler

who developed the first rest cure for tuberculosis sufferers – proposed the veranda form to shelter patients while they lay out exposed to natural elements.

Generally the classrooms had large floor to ceiling windows to improve cross ventilation. In addition there were vents at the roof apex to supplement the rooms ventilation rates. This was based on the idea that the people inside should not rebreathe their exhalations, as much as possible, to reduce the spread of contagion. Similar again to the sanatoria they often had veranda type arrangements to encourage the children to sit outside. This school at Bradford was on a five acre field surrounded on three sides by woodlands. Here the children spend the majority of their time outside using the classrooms or verandas in poor weather. The children were provided with a mackintosh, rug, deckchair and a pair of wooden clogs for their use outside.

At the Elizabeth McCormick schools if weather conditions on the roof were poor, staff took the children into an enclosed shed. From inside the children were sheltered directly from the wind while sitting at their desks. There were top-hinged open window sections above 1.2 metres, on all sides of the classroom from the eaves. Depending on weather conditions there was significant cross ventilation. They were sheltered by a double pitched corrugated metal roof above, which would have been noisy in rain.

At Providence, Rhode Island, which featured in many publications, a section of its front south facing brick wall was removed and replaced with large windows that extended almost from the floor to the ceiling. The windows were top hinged, swinging inwards with pulleys and fixed to the ceiling if opened.

Initially the schools were open seven days a week and school days were 11 hours long. This was a deliberate strategy to minimise the time the children spent in their homes due to fears regarding the conditions of their poor crowded urban environments. The children spent the majority of their time outside with a constantly changing schedule of work, rest and play structuring the long school day. Staff had cut the time given to conventional school lessons by half and encouraged the children to do more outdoor games and nature study.

Children were fed to improve their nutrition and health. When it was rainy or too sunny children sat under a large roof structure to shelter when they ate. In addition, they had compulsory two-hour rest periods during the afternoons when they slept in the open. During this rest time staff encouraged children to lie quietly with their eyes shut, even if they were not asleep. Children relaxed in comfortable positions, listening to the natural soundscapes.

The children never stayed in one place for too long with exercise regimes encouraging them to move around and stretch their limbs. During the day, teachers encouraged the children to exercise; they did light gymnastic movements, with 'wand drills,' and had lessons in breathing. At Charlottenburg the children did outdoor gymnastics.

During their mathematics lessons, the children used the outdoors, marking distances on the ground to understand measurement or making graphs to represent proportional relationships, such as the measuring the distance a snail crawled in successive minutes, or the growth of a plant week by week. They also measured the shadows cast by trees, and used data to determine the tree's height.

Using sand, they constructed topographical maps of the surrounding countryside, showing all geographical features. Vowe Johnson, who was a Medical Officer at the one of the English open-air schools, described the lessons. She recounted examples of children making large-scale

maps on the ground, with depressions for riverbeds, and raised areas for hills. They indicated the locations of mineral deposits, by placing the relevant materials in position on the map. While making a map of Canada, she explained how children carved animals in wood and used twigs to indicate trees. Others, she noted, made smaller scale maps of London, making scaled models of the buildings in clay.

In addition, they used their immediate site environments to learn about natural processes. For example, on one occasion children diverted a small stream through their school garden, they carved lakes and islands in the landscape along its path and observed its effects on the water's flow.

Following school visits to a pre-history museum, staff encouraged the children to translate what they had seen. They made huts out of branches, lake dwellings on a platform on a pond, and a Roman Fort grassed over with cress, learning problem solving skills. The children made these models as close to their original size as possible to exercise their manual dexterity.

They studied and observed the lives of plants, insects and animals at first hand. Some schools kept chickens, rabbits and bees, as well as on occasion, cows and pigs. They used animals for their produce as well as a source of manure to nourish their plants. Many looked after many native animals and kept insects as pets. Bee keeping was a popular school pursuit for children at the time; allowing them to learn about natural processes as well as social order.

They recorded weather conditions, gauged wind direction, noted the sky's appearance, and observed the moving shadows cast by the sun on the ground. They evaluated humidity levels observing seaweed and fir cones. Generally, the children did not use sophisticated equipment. Older children used thermometers they had made themselves using coloured water rather than mercury. Also simple techniques were used to make weather instruments such as weathercocks, rain gauges and sunshine recorders. For example, the children made a rain gauge from an oilcan, a funnel and a glass cylinder, coating the funnel and can with Vaseline to prevent it from rusting.

The data they collected, could be used to determine relationships between particular conditions, for example between wind and rainfall. They also tracked the movements of birds such as swallows, noting the timing of their migration and climatic conditions. By compiling all this information from their landscape, they then applied the knowledge they had found.

They used this information to decide on gardening strategies such as watering and transplanting, or gauging the germination of seeds or ripening of tomatoes in the garden. They also used their environmental evidence to confirm their heating requirements, whether they would need rugs or fires or both. They used their site environments to learn 'real gardening' and 'real nature study,' by growing their own selections of plants on individual plots. There was also a communal garden that was used for instruction and comparison. They grew water lilies on a pond they constructed with clay and concrete.

In urban locations teachers taught children nature lessons on the roof. To make up for their lack of ecological growth, they brought up planters, placing them on the roofs. Each child had responsibility for a planter, looking after its plants on a large open deck.

Hands on experiences were emphasised in order to enhance the children's learning, and the landscape itself was critical to the school curricula. In many of the classes children learned practical skills that they could apply in their day to day lives. In woodwork classes they made feeding troughs to feed the animals they looked after. They also made 'slats,' and used them as

temporary pathways during wet weather, allowing them to navigate across muddy sites with ease. Children observed and responded to their dynamic environments.

Teachers prescribed reading that was steeped in nature to further reflect the schools' ecological preoccupations. Children learned poems that described nature in ways that evoked its healthfulness and exuberance. Nature often provided a powerful backdrop in their reading. Their heroes were self-reliant, experiencing life according to nature's rules. 'The Children of the New Forest,' lived a simple rural life in the forest while they were in hiding. They had to rely on their own resources, feeding themselves, finding water, and making shelter. Robinson Crusoe learned what to do to survive in the outdoors through necessity. Jim Hawkins in Treasure Island, had to make his way in the world after his father's death, that involved exciting adventures throughout. Robin Hood lived in a forest, hiding out in the oak trees and showed great skill in outdoor pursuits such as archery. Moreover, staff were keen to emphasise children's identification with their protagonists; for example at Bostall Woods they told children that Robin Hood allegedly had dinner with Henry III on the land occupied by school.

The results from open-air schools were convincing. The children were monitored, and compared with their poor home settings as a benchmark. The schools were deemed successful. According to contemporary accounts, the children benefited from their exposure to the open air classrooms, putting on weight, returning to health and learning well. During the year 1910-1911, the children at Public School 21 in New York City, were monitored using weight gain and haemoglobin levels as health indicators. The average children had a weight gain of 49 percent by the end of the school year. However they lost an average of 1.72 pounds during the school holidays. In addition, the children's haemoglobin levels rose during the school term, falling again during the holidays. They observed that the children's sleep and food intake also improved during the year. The study looked at the children's educational development and concluded that the children in poor health in open-air schools made as much progress, in less time, as the children in good health in traditional schools.

Investigators struggled to pinpoint exactly why the open air schools were more effective than conventional indoor schools. It was proposed that the children's regime of feeding, resting and playing as well as the outdoor methods of instruction contributed, notwithstanding their lower class sizes and more contact time with their teachers. This narrative is interesting in the context of the ensuing debate the emerged regarding the provision of the optimum ventilation methods in school buildings in the U.S. in particular. This debate centred on whether classrooms should be naturally or mechanically ventilated.

There was a contemporary belief that through respiration the chemical composition of air indoors was changed. From miasma, to carbon dioxide, to 'crowd poison,' all could affect indoor air quality. It depended on one's beliefs, but all might be avoided by appropriate ventilation strategies. However, following research into air quality within buildings, Lee, a Professor of Physiology at Columbia University, argued in 1914 that the most significant impact of air indoors did not relate to its chemical purity, rather its physical characteristics. He wrote:

> 'The problem of bad air has thus ceased to be chemical and pulmonary, and has become physical and cutaneous.'

Temperature and humidity, he argued was key to the provision of healthy indoor environments. Stagnant air was problematic in this regard. As a solution he recommended the

environmental stimulus that air movement gave. 'Accustom yourselves to draughts, and especially big draughts,' Lee wrote.

Following the collapse of the chemical theories of air vitiation engineers began to recast the foundations for mechanical ventilation, through the quantification of the optimum environmental conditions particularly in relation to air change rates.

Open-air school supporters saw nature as nourishment for the child's body and soul, and advocated natural environmental strategies. Mechanical systems of ventilation were dismissed as being unhealthy. Heavily influenced by their experience treating the problems of tuberculosis open air crusaders strong ideas about nature, the built environment and health. In an effort to improve the environment of childhood and youth reformers sought a wholesome atmospheric environment for children's early learning and promoted the benefits of natural ventilation... they conflated the atmospheric environment with social environment... healthier life but also a wholesome character.

However the definition of prescriptive standards for the optimum environmental conditions as Cooper explains led to the following outcomes:

> 'When natural climate was the ideal, mechanical systems sometimes fell short; but when quantitative standards of human comfort became the measure, natural climate was found wanting.. When it was shown that no natural climate could consistently deliver perfect comfort conditions, air conditioning broke free of its geographical limits. When no town could deliver an ideal climate, all towns became potential markets for air conditioning.'

Scientification characterises all engineering specialties in the modern era, she notes and the quantification of comfort was significant for the emerging air-conditioning industry.

Current attitudes towards environmental design can focus on control, defining measurable standards, that emphasise objective criteria for light and air. With an almost exclusively scientific emphasis, this has led to advances, but also to regression, and a lack of general concern to the holistic needs of building occupants. By using this technological approach, we narrow the breadth and depth of human sensory experiences. We so commonly think of environmental design as a series of ambient conditions that the existence of other ways of considering it tends to escape us. The educators' preoccupations with the holistic experience of spaces strongly suggests that we need to reassesss our methods; to put forward different values to avoid the path of isolated research.

By using broad integrative approaches to school designs, these narratives illustrate the pivotal role of corporeal experiences within nature to learning and the task that this suggests for the architect. It's not about temperature, nor light levels, nor noise, its about creating the unknowable - buildings that delight and make you smile. It's not just about having energy, it's about having a world to enjoy.