The Sabre Trust is a small charity working on a big issue: Education. Sabre’s operations are focused on the early primary sector in Ghana, where the challenges and needs are significant. In collaboration with Arup and Davis Langdon, Sabre is pioneering a new concept for early years education in Ghana through its “Building Better Schools” programme.

In early 2008, Sabre secured a corporate partnership with construction consultants Davis Langdon, now part of the AECOM Group, and through a charity collaboration which reflected many commercial joint ventures, Arup agreed to join forces with Davis Langdon to develop a blueprint for an exciting and innovative new model kindergarten school in response to the significant infrastructure needs of this sector in Ghana. This collaboration gave Sabre access to the technical expertise which would allow it to begin moving away from building traditional government schools, which were typically small, hot and gloomy, to building classrooms that really would help the children to learn and the teachers to teach. With kindergarten education in Ghana now part of the formal curriculum, and Ghana working to meet its 2015 targets for the UN Millennium Development Goals, the project’s focus on early years education has come at a really important time.

Design work on the prototype kindergarten complex for the remote community of Dwabor began in October 2008, with works on site beginning just six months later in April 2009 – this was a remarkable feat as the dedicated design team was working in a volunteer capacity, and worked late into the evenings and through the weekends to complete the design. During this time a series of participatory planning workshops were held in Ghana with a range of stakeholders at both the community and local government levels.

The project was deliberately seeking “Elders, youth leaders, parents, teachers and pupils were all involved in community level workshops to explore different configurations for the school complex, and to understand the existing construction skills and readiness of community members”
to push boundaries and challenge perceptions on the viability of local materials such as bamboo, and soil blocks. Elders, youth leaders, parents, teachers and pupils were all involved in community level workshops to explore different configurations for the school complex, and to understand the existing construction skills and readiness of community members to volunteer their time as site labourers. With community and local government buy-in secured, the design team was able to produce a design that made extensive use of local, sustainable materials such as soil bricks, bamboo and coconut fibre, which in-filled the main concrete frame.

The fibre from coconut husks is used to insulate the void between the metal roofing sheets and the interlocking split bamboo ceiling. This helps keep the classrooms cool and dampens the noise generated by rain falling on the metal roof. Sabre has also begun to retrofit existing schools with this insulation, as the sound of rain on roofs often causes classes to be cancelled in Ghanaian schools.

Soil blocks produced from site-won soil are used in place of the ‘Sandcrete’ blocks (sand and cement) that are widely used in Ghana. Widely available, fast growing bamboo is used wherever possible, in place of, or else alongside slow growing hardwood. One third of the Portland cement used in the foundations and concrete frame is substituted for locally sourced Pozzolana cement, made from fired clay and palm kernels.

The organisation of the school complex consists of a core circulation route that extends from the kitchen past the three staggered classrooms to the toilets and provides opportunities for interaction between the pupils and the teachers throughout the day. Each classroom module has the capacity for 60 children and four large pivoting doors in each of the classrooms provide access to additional shaded external teaching areas which encourage teachers to vary the learning environment and offer the children a chance to investigate their surroundings.

Local environmental conditions played a major role in influencing the design of the school. With no electricity on site, the need to naturally cool and ventilate the classrooms means that the architecture is largely driven by passive design. The building’s orientation and unique colourful pivoted windows maximise daylight, regulate the ambient temperature, optimise ventilation and control glare.

Many rural schools in Ghana lack any form of water supply, so each classroom is designed with its own rainwater harvesting system for hand washing, drinking and cooking. The scheme also incorporates a drainage system to manage ground water and prevent erosion and flood risk to neighbouring areas and a termite barrier at ground level to prevent termite attack.

Southern Ghana is situated in a seismic zone so it was also important that the design should be disaster resistant. Arup’s seismic experience helped in the design of the prototype - Dwabor is located in an area of the country with the highest seismicity (Zone 3), and the prototype school takes into account the worst scenario, making it safe and

“Southern Ghana is situated in a seismic zone so it was also important that the design should be disaster resistant”
suitable for all regions in Ghana.

The prototype design was assessed at different stages throughout the project using ASPIRE, a software tool developed by Arup and Engineers Against Poverty to measure the sustainability and poverty-reduction potential of infrastructure projects. Consequently, the scheme resulted in a valuable increase in construction skills in the local community. As the project team prepared to replicate the prototype school in the second community of Ayensudo, it was possible to use a core workforce from Dwabor to lead areas of work on the Ayensudo project in order to speed up the programme and assist in dissemination of knowledge.

With Sabre’s local team in Ghana overseeing the delivery of the building project, and directly contracting the community labour force, it was essential that robust project and cost management processes were put in place. A Davis Langdon project management team complemented the Arup-led design team by applying cost control processes and Prince5 project management methodology to the prototype project. As part of the capacity building support provided to Sabre, these responsibilities were then transferred to the local team, and for the Ayensudo school build, project and programme management and cost control responsibilities were fully assumed by the Sabre team.

So far, Sabre has completed two Sustainable Kindergarten Complexes in Ghana. Both schools have dramatically increased school attendance and provided great teaching and learning environments for those fortunate enough to teach and be taught in them. The child centred design and layout of the kindergarten complex creates a hub of playful exploration that is safe and contained and promotes a learning environment unprecedented amongst standard government schools in Ghana. UNICEF, the Ghana Education Service and the UK’s Department for International Development have all cited Sabre’s Sustainable Kindergarten Complex as an exemplar project, delivering some of the best kindergarten classrooms in Ghana and meeting UNICEF’s standards for “child-friendly schools”.

As the classrooms of the school have been designed as a “kit of parts”, with different wall designs fitted to a durable reinforced concrete frame, each classroom can be extended, or reduced, to accommodate varying numbers of children in different communities. The buildability of the school is also enhanced by a user friendly construction manual that uses two and three dimensional drawings alongside annotated material schedules to make the building process as understandable and accessible as possible.

To realise the full potential of this exciting project, Sabre is now seeking funding to conduct a series of studies which would adapt and develop the current design for implementation in a much broader geography. The development of a 5 year operational plan for scaling up quality kindergarten education in Ghana makes this task all the more pressing.

Fundamentally, Sabre’s Sustainable Kindergarten Project demonstrates how global design expertise and local knowledge can combine to change the lives of this and future generations. Providing a comfortable and stimulating learning environment, the school is designed to be easily and affordably replicated throughout Ghana and in other African countries.

For further details of the project please visit www.sabretrust.org or contact dominic@sabretrust.org

“each classroom is designed with its own rainwater harvesting system for hand washing, drinking and cooking”