innovative designs for schools



classrooms of the future

department for
education and skills
creating opportunity, releasing potential, achieving excellence

beautiful
inspirational
adaptable
sustainable
inclusive
fresh
safe
flexible
ICT enabled
multi-user
fun
delightful
curved
growing
natural

We need to try out new ideas now. Look at ways of designing inspiring buildings that can adapt to educational and technological change

In the classroom of the future, the learning environment will look and feel different

foreword

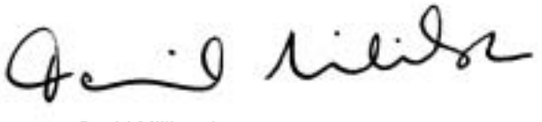
classrooms of the future

If we are going to make sure that our school buildings provide us with a better environment for teaching and learning, we need to ensure that all of the capital going into modernising and renewing buildings is being effectively invested to deliver excellent facilities for today and tomorrow.

We need to try out new ideas now. We need to look at ways of designing inspiring buildings that can adapt to educational and technological change. ICT can give schools the option of teaching children as individuals, in small groups and in large groups, and can provide electronic links to other schools and facilities in this country and abroad. That will not happen if we do not design spaces in schools that are flexible and will facilitate various patterns of group working. Flexibility is key, because whatever visions of education we design our buildings around, we can be sure that they will need to perform in a very different way in a few years' time.

Also key is the quality of the school environment. If we are really serious about raising standards, we need to design buildings that both children and teachers find stimulating as well as functional.

This is why we have invested in the Classrooms of the Future initiative. We are learning from the exciting ideas emerging from the 30 pilot projects, and will continue to do so once teachers and pupils start using them. They were involved in developing design concepts and ideas, and they will tell us which ideas are the best and should be replicated as we modernise our school buildings.



David Miliband
DfES Ministerial Design Champion


The whole building is made out of glass except for the test building.
Virtual room
English room
Computer room
Thick glass walls
Library
Thick glass roof
telescope room
Test building
elevator
rest room
Music room
boys dormitory
History and Geography room
rest room
Maths room
elevator
Main test room
Amazon room. To experience things like the rainforest
language room
elevator
Girls dormitories
Staff building
Pet room. You can bring your pets to school and leave them here during the day.
Science room
elevator
Space room. To see how it's like to have no oxygen and not so much gravity
Dinning room
Toilets
café
Assembly room
office
Technology room
Aquarium
Underground room. To experience the underground

introduction

classrooms of the future

An adventure in design

To deliver the best and most effective education, exploiting all the possibilities of the Information Age, school buildings need to reflect advances in technology. They need to provide a pleasant and comfortable environment for learning, and use architectural and design features to stimulate children's imaginations. And they need to be open to wider use, binding schools into their local communities.

These things will not come about without thorough and practical full-scale exploration of the possibilities offered by modern materials, building techniques and computer technology. Classrooms of the Future is the beginning of exactly such an exploration.

What is the programme about?

The Classrooms of the Future initiative started out with the aim of challenging current thinking on school building design. Raising educational standards is one of the Government's top priorities, and this is reflected in the huge increases in capital investment in schools in the last few years – from £683 million in 1996-97 to £3 billion in 2002-03, and rising to an annual rate of over £5 billion by 2005-06. To ensure this is put to the best use, we need to test out new ideas and construct a vision of how schools should be designed in the future. Twelve local education authorities are developing pilot projects, responding to our collective ideas on what the likely major design drivers will be. They focus on the creation of innovative learning environments that are imaginative and stimulating, with the aim of inspiring children to achieve more.

They are also designed for wider community use, and will have links with other schools and learning centres in this country and abroad. The lessons learned from the pilots will be absorbed into new design guidance and will help to shape the design of schools thereafter.

Alexandra Riakes
St. Clement and
St. James Primary
School, Kensington and
Chelsea

Fred Gonzales
St Francis of Assisi
RC Primary School,
Kensington and
Chelsea

Opposite Page
Details from drawings
by pupils from
St Francis of Assisi and
St Clement and St James
Primary Schools

What will shape the design of schools tomorrow and in the future?

The major drivers of change in school building design now and in the near future are likely to be:

- developments in education – such as the need to spread the expertise of the most able teachers more widely, and the need to stimulate children to achieve more;
- changes in the organisation of the classroom environment – to enable, for example, a range of group sizes to be taught effectively in one space;
- developments in ICT;
- the inclusion of more pupils with special educational needs in mainstream schools;
- increasing community use of school buildings;
- the need for flexibility and adaptability;
- developments in building technology; and
- sustainability of building development and construction.

Individual pilot projects examine many, often all, of these issues.

What do children want?

As is usual with initiatives such as this, the views of teachers were sought at an early stage. With Classrooms of the Future, opportunities were taken to involve children as well. A number of the project teams consulted pupils at the schools where pilots were to be constructed, asking for their ideas on the design of schools. Many ideas and designs resulted, and just a few are included here.

Schools should:

- be a delightful and relaxing place to learn;
- feel fresh, safe and new;
- not consist of squares or oblongs – no straight lines;
- have lots of natural light and fresh air;
- be like a Tardis, a dome, a beehive;
- have lots of space and flexibility;
- have different zones for different work;
- have lots of colours – but not too bright;
- have walls that open up to the outside and a roof that opens up to the sky;
- use new technology, new furniture (such as desks that disappear into the floor), new ideas;
- have lots of storage and walk-in cupboards;
- have lots of green things;
- have curved glass in the garden, a pool, pets and flowers; and
- use solar and wind power.

The pilot projects incorporate many of these ideas, as will be seen in the succeeding pages.

Contacts

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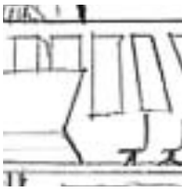
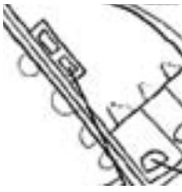




the projects

classrooms of the future

Bedfordshire
Three ultra-modern classroom buildings are being developed in partnership with the Science Museum, complemented by the installation of external skill-based interactive displays. New uses for ICT are being explored and flexibility is emphasised.

Bournemouth
A sustainable centre of e-learning and environmental discovery is being created at a Site of Special Scientific Interest at Hengistbury Head, with electronic links to satellite sites in schools and to remote centres worldwide.

Camden
A fully mobile prototype classroom is being developed with state-of-the-art ICT, which will move from school to school for a term at a time. It will be used by a range of primary and special schools and is designed to cater fully for special educational needs.

Cornwall
The project consists of a space mission control centre and additional zones for carrying out themed activities, including science and research. There will be simulated missions, using television links and robotics, and real-time night astronomy during daylight hours in England, through links to telescopes in Hawaii and Australia.

Devon
Devon's project aims to tackle social exclusion in isolated rural areas and provide greater educational opportunities for both children and adults living in rural communities. Units will be set up in two primary schools and a community college, with the potential of ICT being fully explored.

Durham
Three high-tech global classrooms are being established to develop and evaluate new technology, new teaching and learning styles, sustainability and extended school use. All projects feature arts and media elements.

Kensington and Chelsea
This pilot project is a technology-rich learning laboratory that will allow students of all ages to explore cyberspace, outer space and the world around them. It will have learning zones devoted to astronomy, virtual reality and science, and will feature a full height observatory.

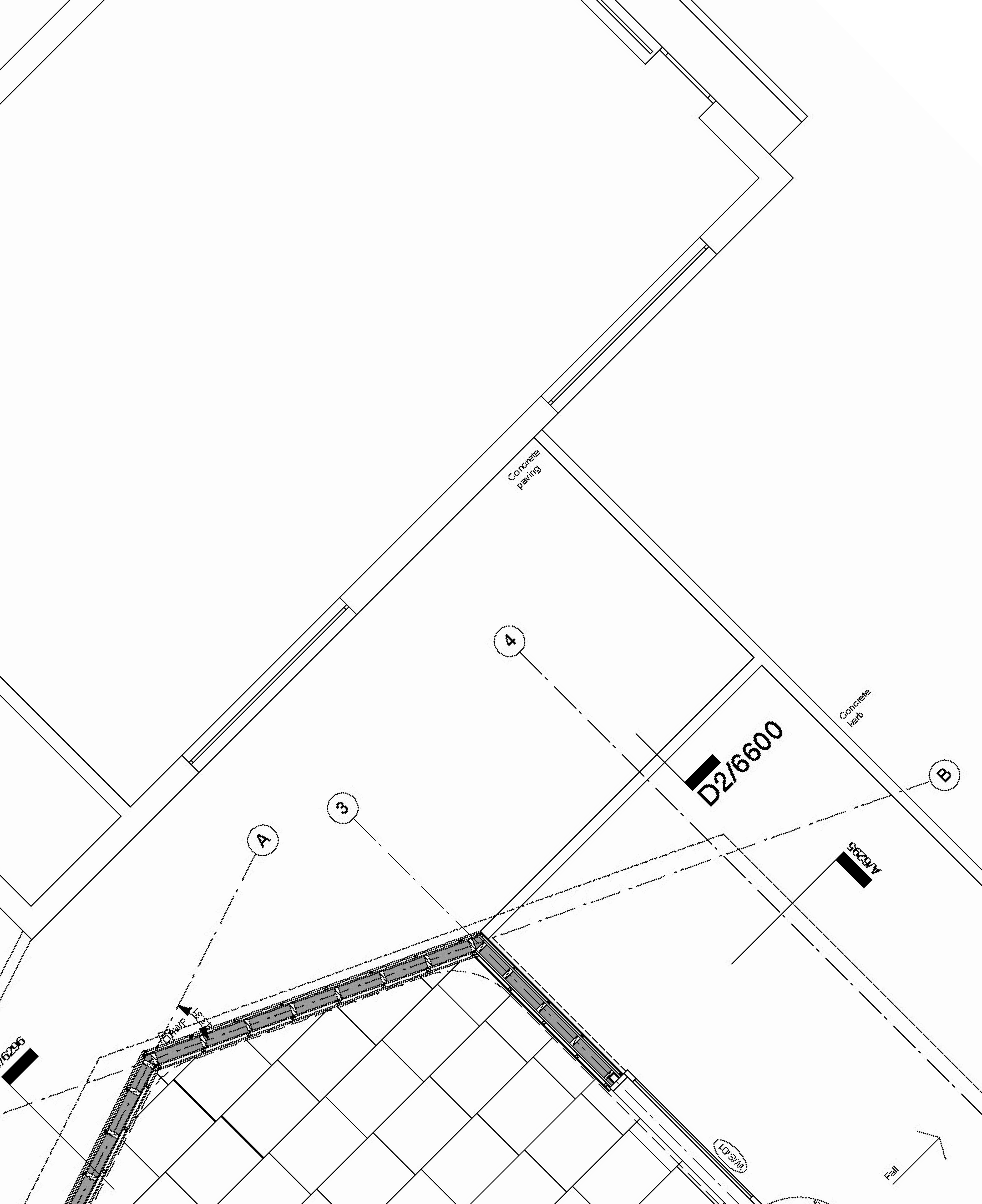
Milton Keynes
One three- and one four-class equivalent prefabricated learning centres are being developed for use in areas of the Authority where demographic changes are unpredictable. The centres can form the nucleus of a new school, if population grows, or be relocated if pupil numbers decline. Sustainability is a major design driver.

Norfolk
Three pilot projects are developing solutions to the challenge of providing and sustaining the educational needs of pupils attending small rural schools. High-tech links between the primaries and the high school will enable, for example, lessons to be taught to larger groups and pupils to interact across distances.

Richmond upon Thames
Three self-contained hi-tech relocatable buildings will be tested in primary, secondary and special school settings. The projects will challenge the roles of teacher and learner, encourage creative thinking and provide a genuinely new experience for all those involved in the learning process.

Sheffield
Pilot projects are being constructed in two primary schools, a secondary school and a primary special school, all of which have particular challenges. Each project has been developed separately to produce prototype generic design solutions, yet with several common, underlying design themes.

Telford and Wrekin
Interactive learning environments are being developed, with learning pods of modular design which can be adapted to the needs of all education sectors with the minimum of effort and disruption. They will incorporate sustainable technologies to improve building performance, and to allow that performance to be monitored within the curriculum.


Concrete paving
Concrete kerb
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3
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D2/6600
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Fall

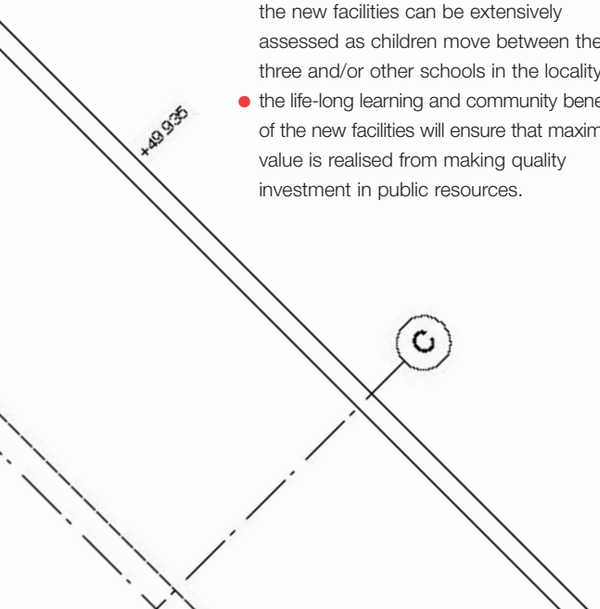
bedfordshire
classrooms of the future

Introduction

Our aim is to construct three ultra-modern classroom buildings, complemented by the installation of external skill-based interactive displays. Bedfordshire County Council and the head teachers and staff of the three schools involved are working in close collaboration with the design team and the Science Museum.

Key aspects of our Classrooms of the Future projects are:

- all three schools are in the Sandy area, are in the same school pyramid and between them cover the full range of formal education. Consequently, the educational benefits of the new facilities can be extensively assessed as children move between the three and/or other schools in the locality;
- the life-long learning and community benefits of the new facilities will ensure that maximum value is realised from making quality investment in public resources.



Education

Development of the education concepts has, from the outset, been a truly collaborative endeavour within each school, between the schools, with LEA staff, with the design team and with the Science Museum. The education ambitions shared with the Science Museum were crucial to the original proposal, and have developed since to such an extent that a real interaction now exists between the traditionally separate 'Museum' and 'Education' sectors. Other traditional boundaries are also being addressed, such as 'inside/outside' (of the classroom), 'lesson time/play time', 'learning and teaching' and 'school time/real time'.

Those involved are confident of meeting the initial mission statement aims, which are:

- to 'provide buildings and facilities that will inspire and motivate users to maximise individual and collective educational potential'; and
- to 'unlock the considerable educational potential of space, resources, environment and children's behaviour, currently not possible in the traditional school regime'.

The educational concepts steering the spatial design include:

- a useable and adaptable teaching space, which is at the same time special;
- a set of spaces that are sustainable in use over a long period of time and can accommodate the changing nature of technology;
- general improvement in terms of daylight provision, ceiling heights and environmental control;
- a set of interlocking spaces that vary in scale and optimise the use of external covered space;
- spaces which nurture new relationships in learning and teaching.

Given that all three schools and the Science Museum share these values and ambitions in common, the images chosen are fundamentally relevant to each.

Top
Sandy Upper School

Middle
Burgoyne Middle School

Bottom
Maple Tree Lower School

Architecture

A grass-roofed garden building is proposed at each school. While the overall appearance of the timber-clad pavilions is similar in each case, the form, window arrangement and colour of each will be adapted to suit its site and anticipated use, and to give individual identity.

In response to the new teaching requirements of a multi-directional space the building plans are non-orthogonal, encouraging and supporting new patterns of learning and teaching relationships. The principal space is similar to a hall or studio space, with ancillary spaces placed around it. Daylight enters from a roof light and from a variety of windows placed at varying heights. The main space is also connected to a generous external covered area that acts as an outdoor teaching or leisure space. The lighting, acoustics and area of the main space can be modified to suit the needs of individual classes.

The designs use cutting-edge environmental construction, with the following components being specified:

- prefabricated timber wall construction;
- timber cladding from a sustainable source with low embodied energy;
- a green roof (mosses and sedum);
- large areas of glazing with low e-coating;
- warm water under-floor heating systems;
- passive stack ventilation;
- solar panels on the roof.

Schools

Sandy Upper School
Engayne Avenue
Sandy
Bedfordshire

Burgoyne Middle School
Mill Lane
Potton
Bedfordshire

Maple Tree Lower School
Hawk Drive
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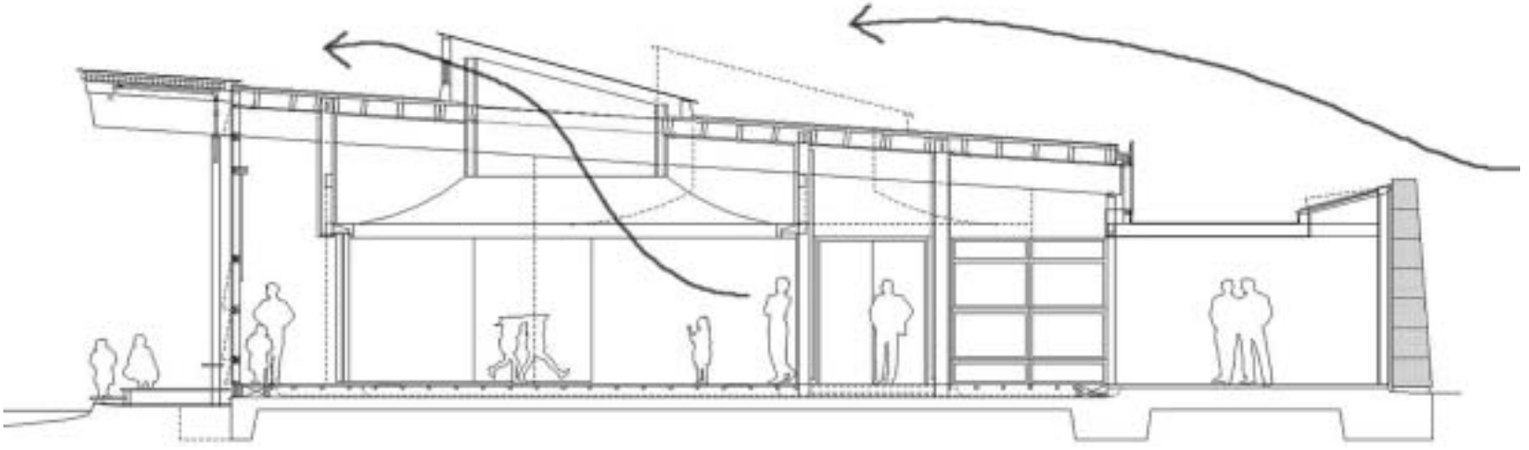
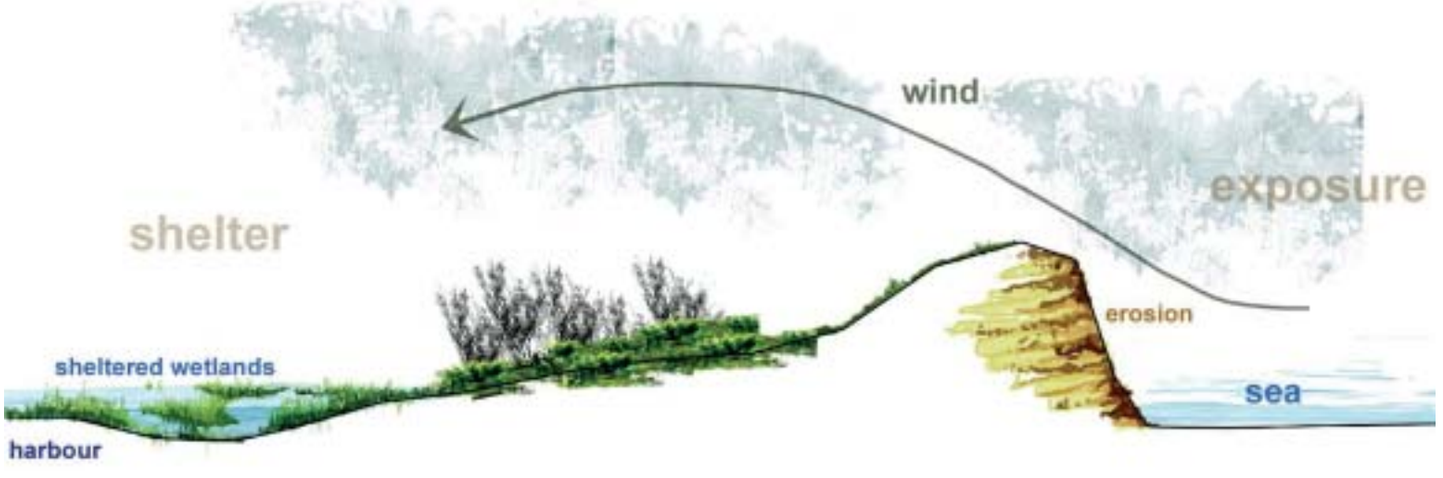
Under development

Programme

The main structural work is set to be completed early in 2003, and all three pilot projects should be fitted out and operational before the Summer.





The building follows the form of Hengistbury Head, turning its back on the prevailing winds and using a geology wall as its cliff

Views of both the sheltered and exposed sides

bournemouth
classrooms of the future

Introduction: E-Learning Centre

This Classroom of the Future project forms the core of developments at Hengistbury Head, a scenic headland near Bournemouth. It is the only pilot project not located on a school site. Our highly innovative scheme will create a new environmental education and field studies centre at the 'gateway' to this special site. It will be a unique centre of e-learning and environmental discovery – a working example of sustainable design in practice.

The project will be at the cutting edge of both new and traditional technologies. It will use Internet and computer links to open up global learning opportunities, while using traditional building methods to provide an environmentally sustainable centre that is compatible with its surroundings.

The story of Hengistbury Head began some 60 million years ago when the foundations of the headland were formed in a hot and steamy tropical delta. Rising and falling sea levels, periods of glaciation, wind and rain and more recently coastal erosion have moulded the headland into what it is today. Hengistbury Head is a Site of Special Scientific Interest, an Ancient Monument and a Nature Reserve. It is a popular site for visitors.

Archaeologists have found evidence of Stone Age and Iron Age activities at the Head. Two thousand years ago it was one of Britain's principal ports, trading in wine and olives from the continent and exporting items such as precious metals and hunting dogs.

Education

The voyage of educational discovery is intermeshed with the conservation objectives of the Hengistbury Head site. The Classroom of the Future will offer the opportunity to explore seven distinct habitats and conservation issues related to geology and erosion, as well as the archaeology of the Head.

The hi-tech flexible e-learning centre will facilitate collection of data on the Head's precious flora and fauna and migrating bird populations. The sharing of data, exchange of information and establishment of cross-cultural links presents a programme of great quality, allowing students to address global priorities of conservation. From the Scottish glens to the remote habitat of the Amazon rainforest, not only will the exploration of biodiversity and sustainability be possible, but also study of the social impact of such issues within these communities.

Technically, the development of 3-D projection images will promote access to a wider range of curriculum materials produced through educational networks, including the South West Grid for Learning. Independent learning will be nurtured through a process of guidance and skill development, by remote access to tutors and professional support, and through use of ICT retrievable learning materials.

Architecture

The design of the building uses Hengistbury Head itself as its inspiration. The headland supports a wide variety of habitats and flora and fauna as a result of its geology, resulting in a unique geological section. The cliffs, facing south, bear the brunt of the predominant south-westerly winds. The leeward north-facing slopes are sheltered and allow the wetlands bordering the estuary to support a rich diversity of plant and wildlife. In a similar way, the building turns its back to the prevailing winds, using a geology wall as its cliff.

This wall forms a dramatic architectural and landscape feature. On one side it represents a termination of public space for visitors arriving on foot, by car and by the local land train.

The E-Learning Centre opens out onto an area of protected calm for education and contemplation, and beyond that out onto the Head itself.

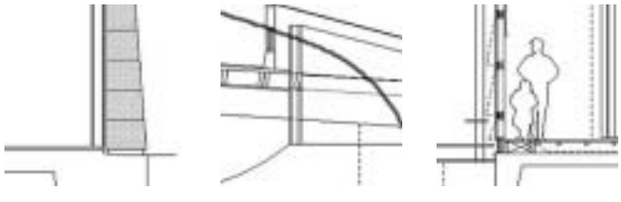
It also screens the parking and service areas

Curves frame the design

Details of the
main route through the
building

The four elevations, east, south, north and west, highlight the contrasts between the open eastern side and the closed western side

Opposite Page (bottom)
Three circular hubs form innovative teaching spaces



On the other side it offers protected calm for education and contemplation. The wall is punctured only by the main entrance, which forms a gateway to the Head itself. From here, doors lead into the e-learning centre and visitor facilities, and ultimately out on to the Head.

The e-learning centre contains three circular hubs. These innovative teaching spaces provide a flexible and multi-functional learning environment. Each hub can be operated independently of the others and has its own natural ventilation and daylight source.

When open, all three hubs form bays onto the larger shared teaching space. This flexibility allows for groups of up to 30 children to use a hub without being disturbed, or larger groups to use the shared teaching spaces. Wireless technology will allow informal and smaller groups to work away from the building, using portable computers and a range of other devices.

The technology within each hub will allow the delivery of compelling learning experiences. This will include using digital projection of slides, animations, and real-time links to remote CCTV cameras on the Head, or on other sites around the world.

The project will have a low environmental impact in its construction, occupation and decommissioning.

This is being achieved through:

- the use of sustainable building materials and construction techniques;
- the orientation and positioning of windows and solar shading to make use of beneficial solar gain, while at the same time providing protection against overheating;
- the use of passive natural ventilation systems;
- the installation of specialist service equipment to reduce water, energy and heat consumption.

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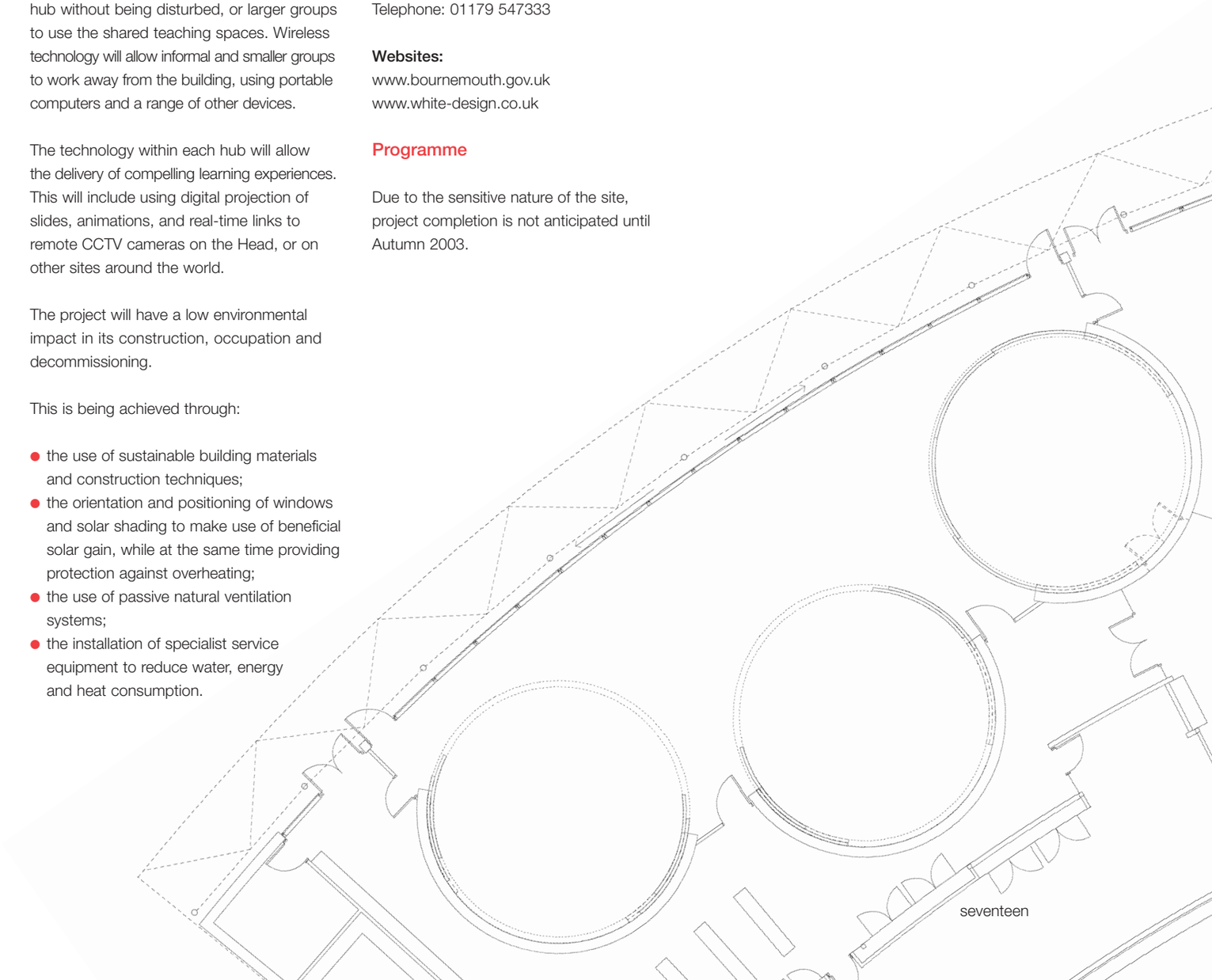
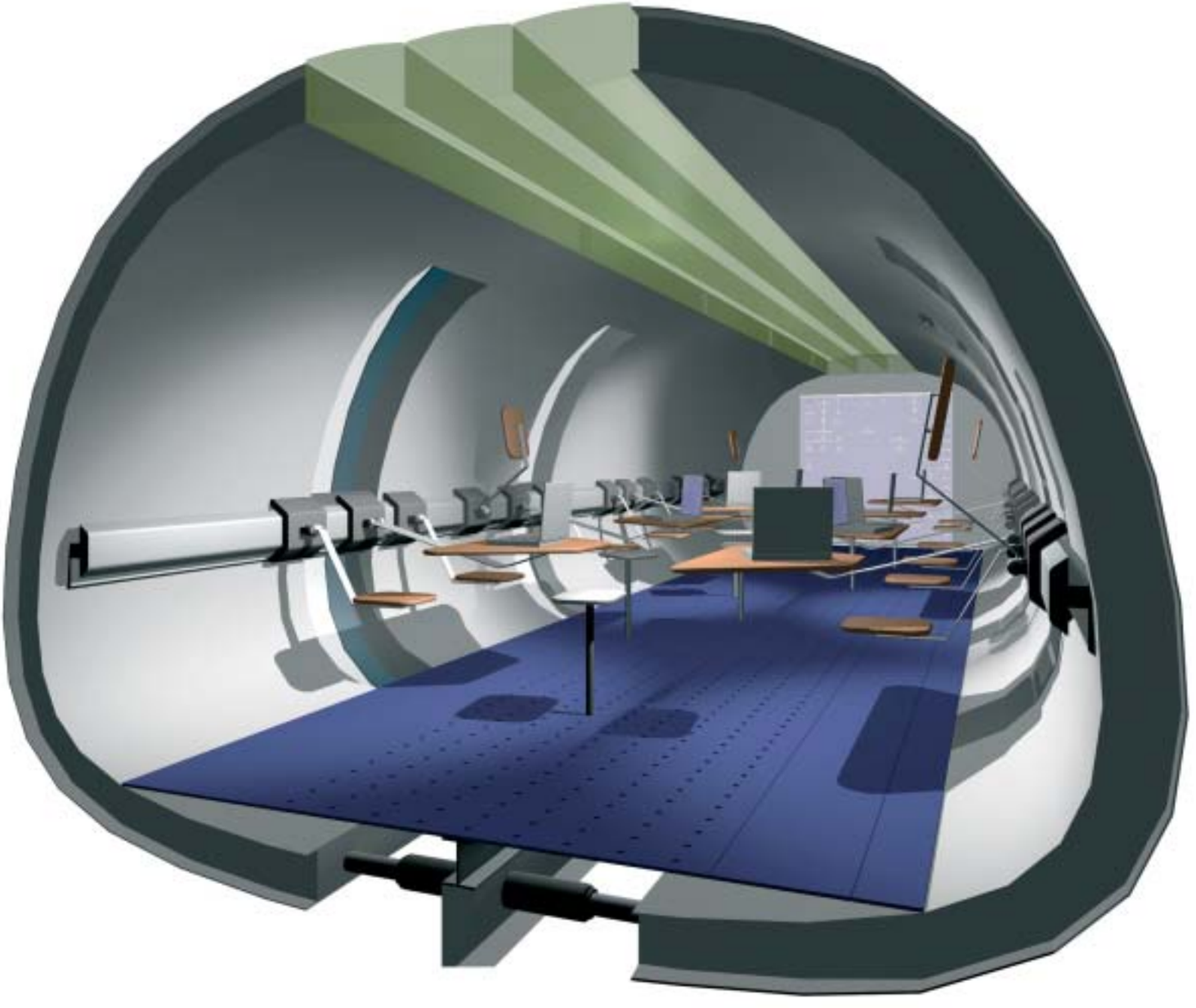
Programme

Due to the sensitive nature of the site, project completion is not anticipated until Autumn 2003.





View into the classroom, showing workstations and teaching wall

Opposite Page
Seats and worktops cantilever from perimeter spines

camden

classrooms of the future

Introduction

Camden is developing a fully mobile prototype classroom, which will deliver innovative ICT in an accessible and futuristic way to primary and special schools throughout the Borough. It will mean that leading edge technology can be taken to the learner, rather than the reverse. It will enable curriculum opportunities to be expanded in schools where, otherwise, the constraints of sites and buildings would make new technological developments difficult to achieve.

Education

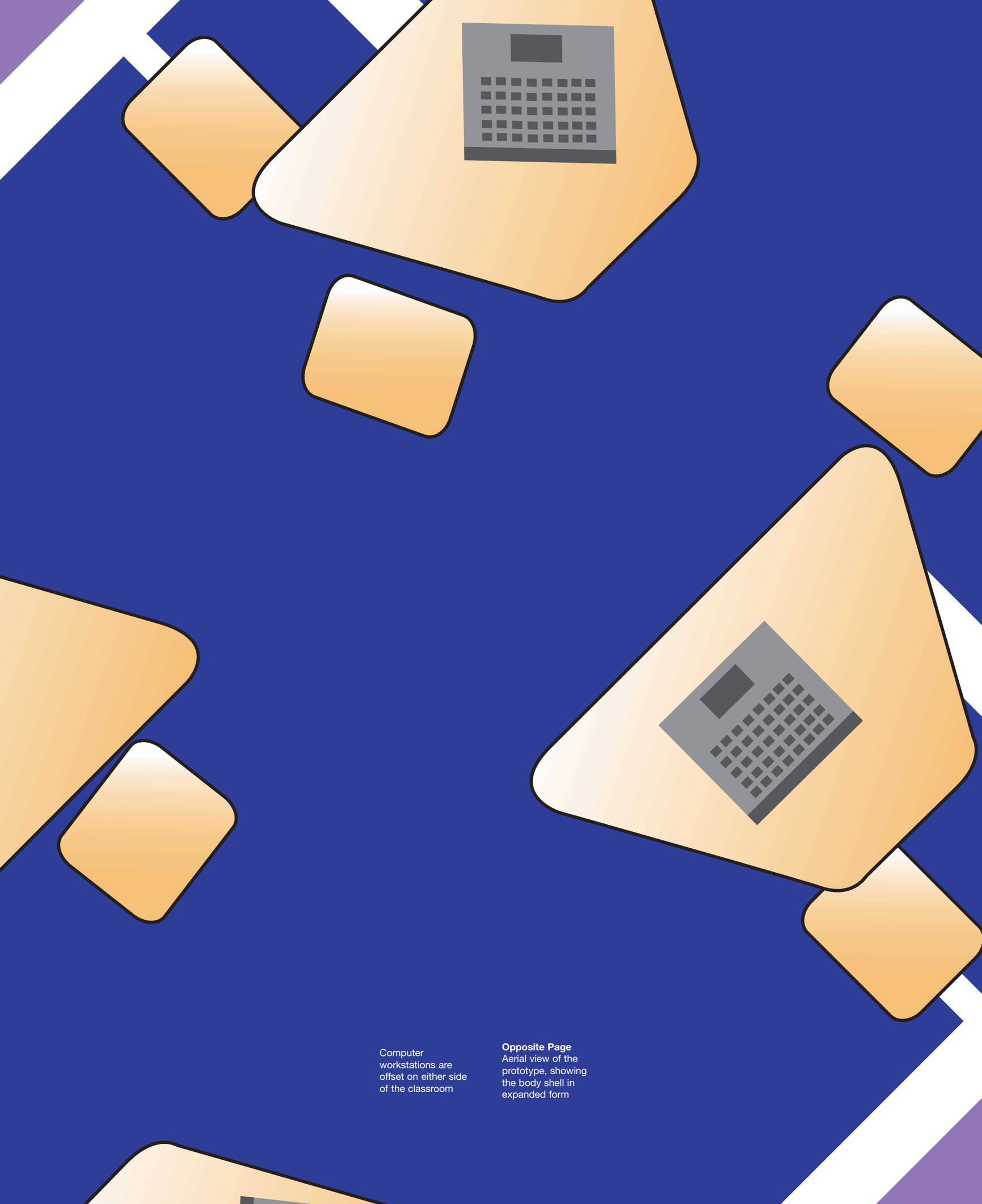
The Classroom will be staffed to provide expertise in the delivery of ICT skills to both pupils and teachers in schools, and to promote and sustain the development of ICT as a teaching and learning medium. It will be set up to encourage interaction and innovation, but also to demystify and generally encourage the use and exploration of ICT. The Classroom will feature:

- high speed, broadband connection to the Internet, facilitating access to a variety of learning materials;
- interactive whiteboards linked to the Internet, with all students being able to operate the boards from their seats;
- virtual reality tools and image projection;
- high quality video-conferencing equipment, enabling students to access teaching at a range of schools both within the Borough and outside it.

Links will be made via satellite to the British Museum, the British Library and Camden's City Learning Centre. This will establish a self-sustainable virtual learning community. The Classroom will act as an outpost of the City Learning Centre, channelling the expertise being developed there to primary and special schools. It will also promote inclusion and focus on Special Educational Needs.

All Camden schools will benefit over time, as the classroom is moved from site to site.

As a self-contained unit, it will also be available for use after normal hours and during school holidays.



Computer workstations are offset on either side of the classroom

Opposite Page
Aerial view of the prototype, showing the body shell in expanded form

Architecture

This project is not just about designing a new version of a standard classroom, though it should invigorate thinking in that area. It concerns creating a test bed for ideas, enabling the piloting of new teaching and learning methods and using ICT as a medium. This is reflected in its design. When the Classroom arrives on a school site, it will be an event and its appearance will have an impact and arouse interest. It will be obviously new and clearly different from the buildings there. The Classroom will be:

- a literal and metaphorical vehicle for learning, spreading ICT skills and stimulating learning across Camden;
- able to adapt and change to suit future scenarios, being robust in technology and form;
- comfortable – utilising natural ventilation, having high levels of insulation, and using solar cells for power;
- striking, innovative, durable, futuristic, provocative and stimulating.

The Classroom is transportable on a standard articulated lorry platform and transforms when it reaches the school site, expanding in width to maximise the internal space available. In doing so, natural light is filtered in at high level where the shell-like exterior is parted. One end of the vehicle drops down to allow easy access. All furniture and seating is integrated with the interior and can be moved to allow different activities to take place. The form of the space and the treatment of the interior are intentionally soft yet futuristic, to concentrate attention within the space, but convey a playful tone. It is meant to be fun to learn here!

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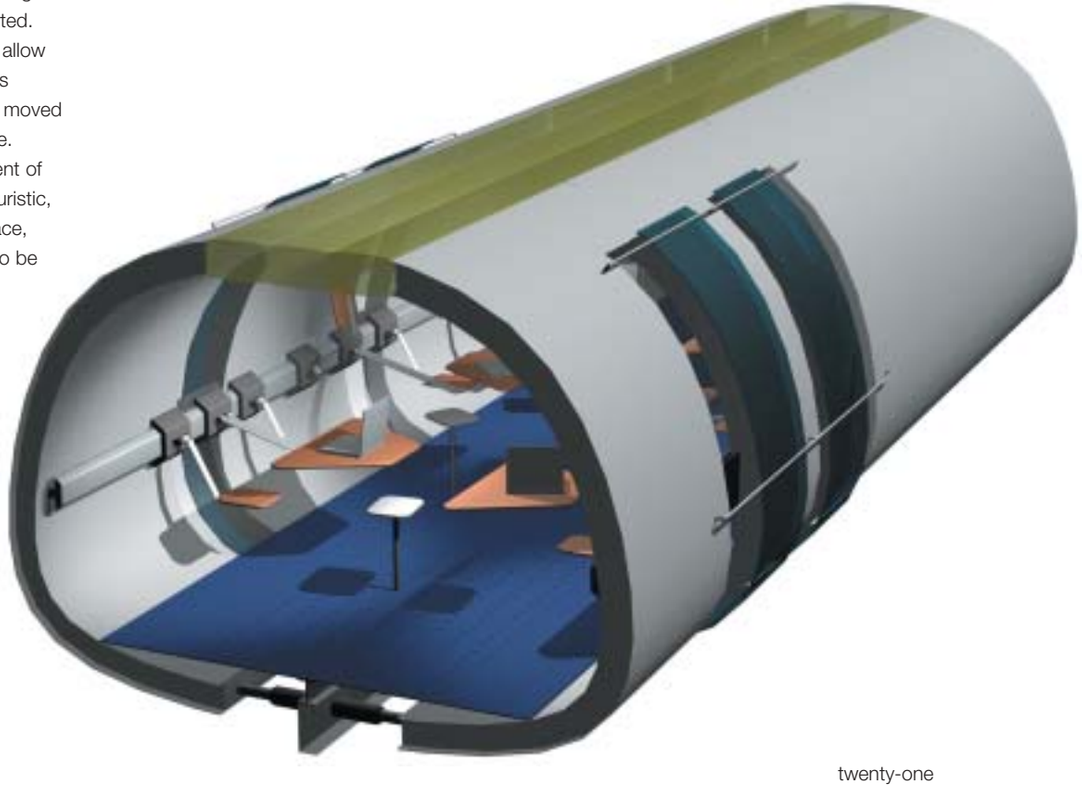
Website:
www.camden.gov.uk/learn/classrooms/classrooms_fr.htm

Programme

The prototype is due to be completed by the Summer of 2003.



A bridge leads to the entrance, spanning alien landscapes and calm water

cornwall

classrooms of the future

Introduction: The Education through Space Centre (ESC)

The main aim of the Centre, part of the Camborne School and Community College in western Cornwall, is to encourage students to learn through carrying out projects based on space travel and exploration and associated themes. Its architecture must reflect this purpose while being, among other things, quite unlike the architecture of housing, schools or other buildings encountered in everyday life.
The ESC will confront the design of learning areas and challenge traditional uses of such facilities in both a local and a global context.

Its design consists of three simple strong forms: a curved Cornish hedge of stone and rammed material, a dome enclosing a single space, and a truncated cone enclosing spaces on two different levels. The various functional spaces within the building must, by their design and layout and through the equipment and facilities contained within them, enable learners to suspend reality and immerse themselves in the activity of the moment.

Education

The ESC will have a wide range of uses in addition to the space education theme, and will enable various curriculum areas to be taught in new and exciting ways, with innovation and flexibility being fostered. In particular, the teaching of Science, Technology and Maths will feature strongly, with data logging, remote sensing, robotics and computer control being major activities. State of the art computer facilities will be included in the building, through links with national companies who are at the forefront of education-based ICT.

The Centre will cater for a broad sector of users of all ages, including teacher training and community use. It will be used not only by students within the Education Action Zone, but by all Cornish students. School parties from other parts of the UK are also likely to visit it.

The building will contain three learning areas. Each area will have the capability of electronically exchanging information with the other two areas, and also with national or international student groups externally.

The first floor of the tower will house a simulated Martian landscape, populated by remotely controlled rovers, and servers for the wireless computer network that will be integrated into the building.

Many of the learning initiatives will be co-ordinated by Dr. Paul Roche, National Schools Astronomer. One example of this will be the Faulkes Telescope project, which will enable students to look at the night sky on the dark side of the planet during UK daylight hours. Partners in the development of the ESC include the Eden Project, the Particle Physics and Astronomy Research Council, University of the First Age, Camborne School of Mines and the Goonhilly International Communications Centre.

Details of contrasting surfaces

The centre's design comprises three strong themes: a curved cornish hedge of stone defining shared areas; a copper dome enclosing a single practical space; and a truncated cone, clad in natural cedar, enclosing space on two levels – the mission control centre and a themed zone

A view at night, emphasising how curved forms dominate the design

Opposite Page
The centre will be used both day and night

Architecture

The overall architectural concept is of a building that in its materials and forms has many references to its location and purpose, while having an air of mystery, delight, fascination and wonder; a place in which learning is an exciting experience for all, whether young or old.

The circle is the simplest and most familiar plan shape for building, enclosing the maximum amount of space with the minimum use of materials. Many primitive shelters, whether of stone, earth, timber or other materials, were circular or curved in plan, and many were partly set into the ground. There are many examples in the Cornish landscape, and the heritage of these prehistoric settlements is reflected in the design of the ESC. This closely links with the current NASA thinking about future colonisation of Mars by making use of the materials in the environment, or 'living off the land', instead of transporting heavy construction resources to the planet.

The world's natural reserves of fossil fuels – coal, oil and gas – will become critically depleted and pressure on the remaining resources is high. Classrooms in the future will therefore need to utilise alternative sustainable forms of energy generation. 'Green energy' will feature in the ESC, with 'earth energy' being used for heating and cooling and a photovoltaic array being installed on the roof.

The provision of some wind energy is being investigated.

Projected cumulative savings in the production of CO_2 have been calibrated and are significant. As the building will be used as an educational resource, the environmental issues represent an important feature of the project.

School

Camborne School and Community College
Camborne Pool Redruth (CPR) Education Action Zone

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Project Management

The Design and Maintenance Consultancy (Architectural Design)
Cornwall County Council
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E-mail: enquiries@cornwall.gov.uk

Website:
www.askesc.org.uk

Programme

The building is due for completion by the end of 2003.

The construction of the ESC and the rationale behind it present many challenges, but the local, regional, national and international interest in the building has encouraged everybody involved in this fantastic opportunity to make it an architectural and educational success.

The project at Chulmleigh Community College is lit almost entirely by a large roof light orientated directly to true north

innovative designs for schools

devon

classrooms of the future

Introduction

Our aim in Devon is to develop Classrooms of the Future pilot projects that will foster new opportunities for lifelong learning through their design and their use of new technologies.

For example, both school pupils and adult learners will be able to benefit from video links with experts at three of Devon's technology colleges. This should enable students and teachers to take lessons or give lectures without moving from their home base. The idea is to provide greater learning opportunities for people living in rural areas and help to cut down social exclusion in isolated areas. All facilities will be available both to pupils and the whole community.

The projects are designed along sustainable principles and will provide for as many different uses as possible. Just as importantly, they will provide stimulating learning environments.

Recent research into effective learning has influenced our planning of the pilots. Layout, shape and size, furniture, heating and lighting can all have an impact on learning.

Classroom space needs to provide opportunities for flexible use, so that there is easy movement between groups and a focal area for formal presentations and larger group activities.

There will be three pilot projects, located at Chulmleigh Community College and two of its feeder primary schools – Winkleigh and Witheridge.

One large flexible space is created at Winkleigh Primary School which can also be subdivided into two individual work-bases

Opposite Page
Laptops will be used in a wireless environment

Details of building elements

Education

The pilot projects are of three different designs, but share a common educational rationale.

All people have different styles of effective learning. The classroom of the future must provide a learning environment that allows teachers the flexibility to teach, and pupils the flexibility to learn, in a variety of ways appropriate to the needs of the curriculum in operation at the time. It will need to be adaptable to future curriculum needs, technology and learning styles. It should not, by its design, limit future potential.

The classroom of the future will support lifelong learning and motivate and encourage learners. The focus on a flexible teaching space that promotes different learning styles will support the development of skills such as communications, and facilitate a longer working day for different groups of users.

These projects will be used by the wider community and support a broader range of learning.

The classroom of the future will enable access to a wide range of high quality resources and tools for teaching and learning. These will include clearly visible interactive displays, individual workstations, generic software applications, assessment tools for teachers, conferencing tools and peripherals such as digital cameras. Resources will be web-based and will include video-rich teaching resources. Children and adult learners will be able to access school networks from home, and tutor support will be available at specified times throughout the day and night.

The classroom of the future must offer equality of opportunity to all learners. An effective and stimulating learning environment is important to everyone, including those with special educational needs and the gifted and talented. The learning environment must feel secure to both young people and adults, and promote the health of those working in the classroom.

Architecture

Chulmleigh Community College
This project has a fully flexible internal space with all furniture and equipment capable of being stored away, enabling a fresh start for each activity. The space links to a café area where students can work on projects using portable computers, with access to the intranet and Internet. There will also be direct links to the local shared library and the learning resource centre used for distance learning. Both main side walls will retract, with motor assistance, to allow larger group activities to take place. The school wishes to see a full 24 hour, seven days a week use of the space by the school, library and community.

The use of wireless portable computers and integrated interactive plasma screens is planned, to provide maximum flexibility. A full video-conferencing facility will be installed for communicating with other schools.

Timber frame construction and recycled insulation will help lower energy use to best practice levels. The space will be lit almost entirely by a large roof light orientated directly to true north. This aims to eliminate the solar gains and glare too often associated with conventional school design. We plan to cover the roof with photovoltaic panels to provide carbon-free generation of electricity, but set near the horizontal to be unobtrusive.

This energy will be used to power a heat pump, transferring low grade heat from 40 metres below ground to a hot water under-floor system. The heating system could be switched around to provide cooling when needed. Passive ventilators built into the external wall and roof light can be boosted by in-line fans under the control of carbon dioxide detectors, to maintain peak learning performance conditions.

Winkleigh Primary School
Winkleigh Primary School is one of a series of steel-framed, system-built schools constructed in Devon in the mid 1970s. It contains classroom work-bases consisting of small, interlinked spaces inappropriate for today's teaching and learning requirements.

This pilot project concerns the radical conversion and refurbishment of one of these work-bases into the Classroom of the Future. The main thrust of this proposal lies in its potential for replication in similar schools across Devon and countrywide.

In the new accommodation, one large flexible space is created that can be subdivided into two individual work-bases. After school and at weekends the classroom becomes a community facility.

The key principles employed in this project are:

- energy efficiency;
- natural and passive ventilation;
- solar shading;
- sustainable specification; and
- an understanding of contemporary educational needs.

Witheridge Church of England Primary School
The new classroom at Witheridge is designed to meet educational and community objectives, incorporating high quality environmental design, sustainability and potential for replication. The main internal space is designed to provide flexibility in teaching layouts and will be quickly convertible to act as a community space out of school hours. A deep storage wall will accommodate ICT, wet services and furniture. Its continuous range of doors can be opened back to convert the walls from children's display to uncluttered surfaces.

The room is designed to ensure excellent daylighting. The external teaching zone will provide a protected space that also acts as a canopy to provide glare-free illumination and optimum passive solar collection, ensuring close to zero comfort energy. Simplicity in form and construction will ensure that replication will be uncomplicated. Environmental monitoring will test performance.

Opposite Page
Views around the building

The new classroom at Witheridge Primary School will incorporate high quality environmental design and sustainability and will open onto an external teaching zone

Views of the external teaching area

Schools

The Community College
Chulmleigh
Devon
EX18 7AA

Winkleigh Primary School
Farmer Frank's Lane
Winkleigh
Devon
EX19 8JQ

Witheridge Church of England Primary School
Witheridge
Tiverton
Devon
EX16 8AH

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Chulmleigh Community College
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Witheridge Church of England Primary School
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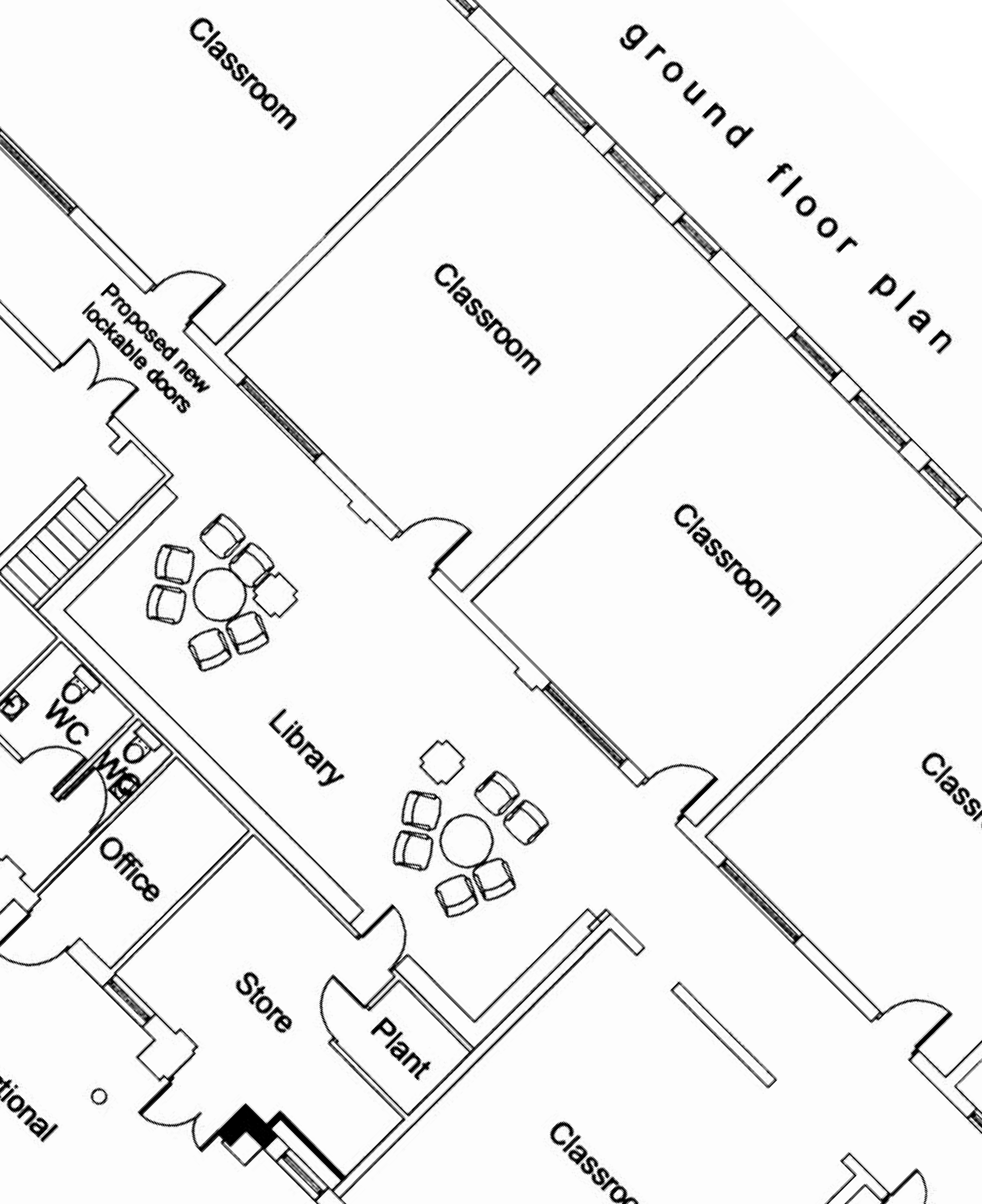
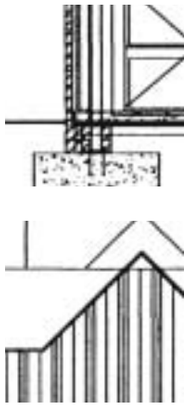
Website:
www.devon.gov.uk/eal/schools/future

Programme

Projects should be completed by April 2003.

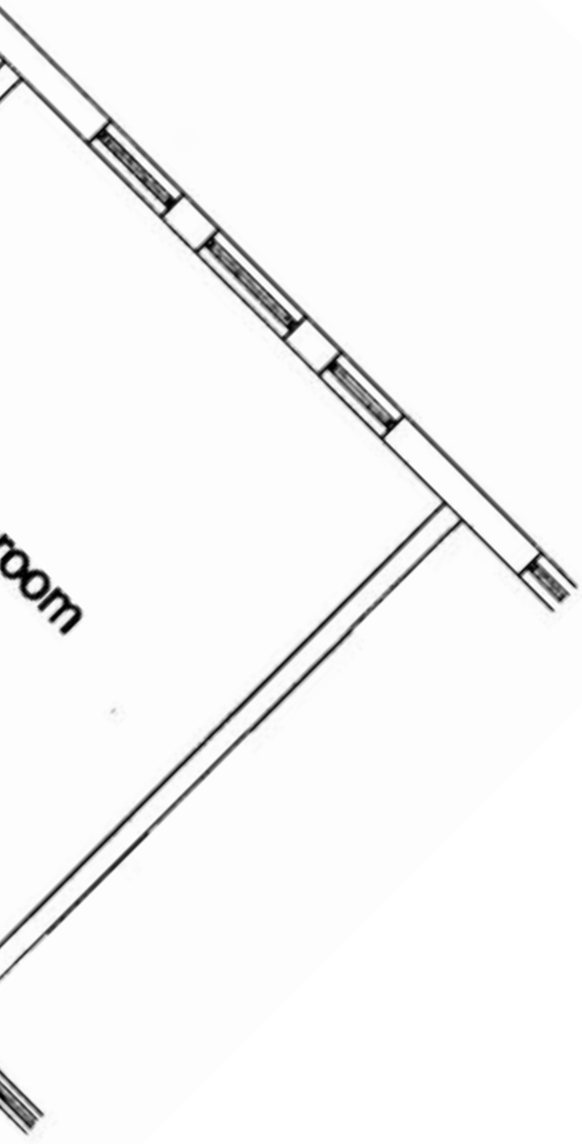


ground floor plan
Classroom
Classroom
Classroom
Proposed new lockable doors
Library
WC
WC
Office
Store
Plant



durham

classrooms of the future



Introduction

In Durham we are establishing three high-tech global classrooms – learning zones – in partnership with staff, pupils and parents and the wider community. In these, we will develop and evaluate:

- new technology, with participation from private companies who will help to develop the electronic and multi-media specifications;
- different teaching and learning styles;
- sustainability; and
- extended school use.

Our approach to each project will vary, in order to make the best use of the current strengths of the pilot schools and the budget available. Although each of the three schools will explore the issues listed above, the input of resources will differ to suit each school's main focus.

The schools selected to host the pilot projects had to meet specific criteria.

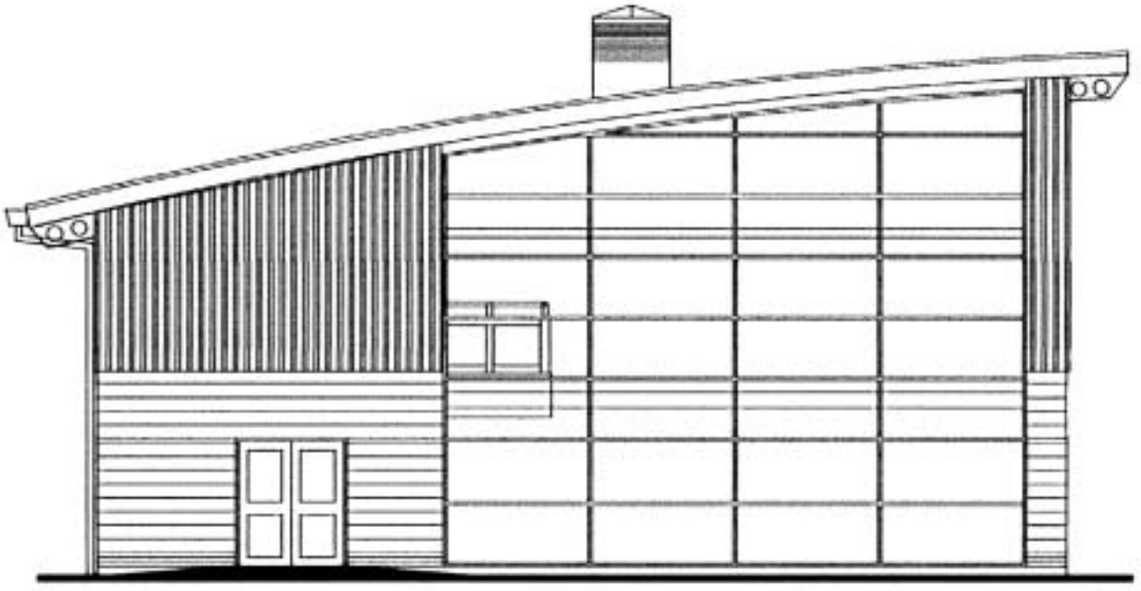
They had to:

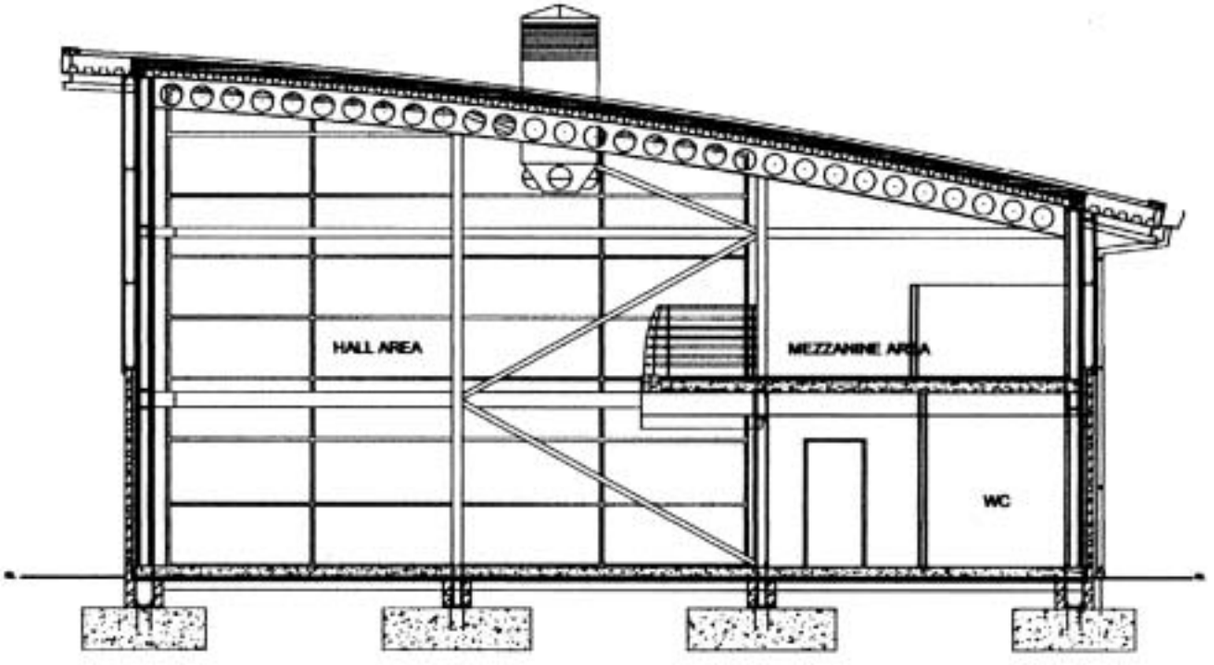
- be popular schools;
- be consistently full, or even have a shortage of places;
- provide a balance between primary and secondary; and
- reflect the urban/rural nature of County Durham.

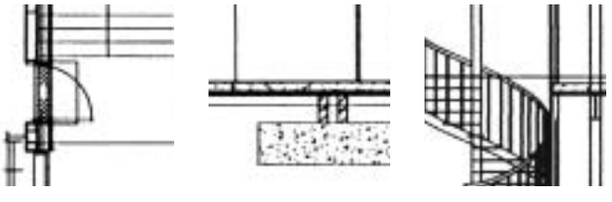
Two of the schools are in an Education Action Zone.

Top
West elevation of the learning zone

Bottom
Section showing the mezzanine floor overlooking the main multi-use space







easington community school
classrooms of the future – durham

Introduction

Easington is a large secondary school and its Classroom of the Future will be the largest project in County Durham. The school is located in the East Durham Education Action Zone; this project will offer opportunities to enhance cross-phase and inclusion work, by providing neighbouring schools with access to specialist staff and resources.

Education

The school will use its pilot project as a learning zone to support teaching and learning in all areas of the curriculum, creating an environment where team teaching can permit groups to access a variety of learning media.

The main emphasis of the project is on the performing arts. Students will be able to benefit from the latest technology to support their studies in music, drama, physical education and art.

The learning zone will be used extensively by the local community and will provide a centre for in-service training in dance, drama and ICT.

Architecture

The school lies in extensive grounds, and the new building will be located at the north of the campus near the site entry road. This area is surplus activity space.

The new building will be a free standing facility of 300m^2, providing hi-tech learning for the school and the community. The main space will be multi-use, allowing various activities and conferencing. This will be overlooked by a mezzanine area at one end, containing space for teaching, an office, a store and a hospitality service room. The mezzanine floor is reached by stairs or lift, and underneath it are ancillary rooms to service the lower floor.

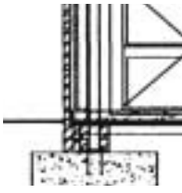
There is an area for a future sound recording studio, together with a control room that will also handle the environmental management of the building.

The project takes a lead from commercial buildings in the way it is put together. Lean construction and the use of dry systems will allow speedy assembly. Curtain walling on the east and west elevations will have low ‘e’ glazing and a brise soleil fitted to control solar gain. The area around the building will be paved to form a communal terrace.

School

Easington Community School
Stockton Road
Easington Village
Peterlee
County Durham

Contacts



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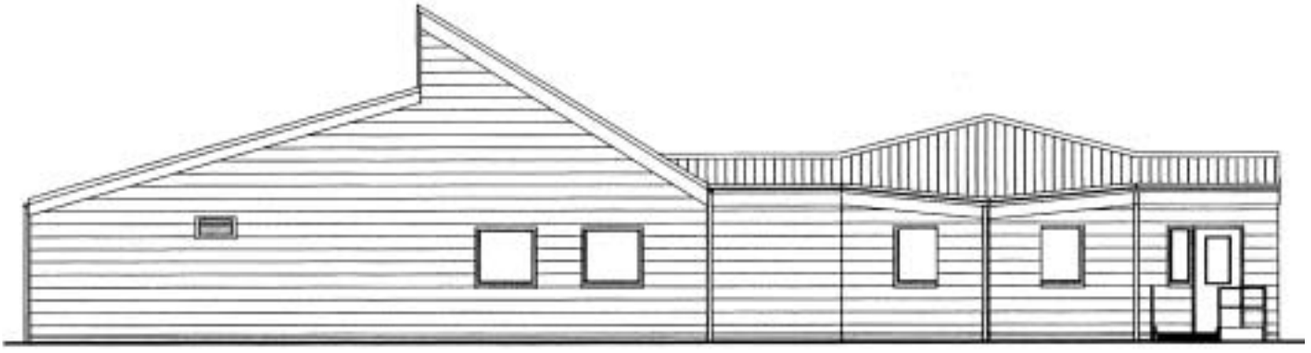
Programme

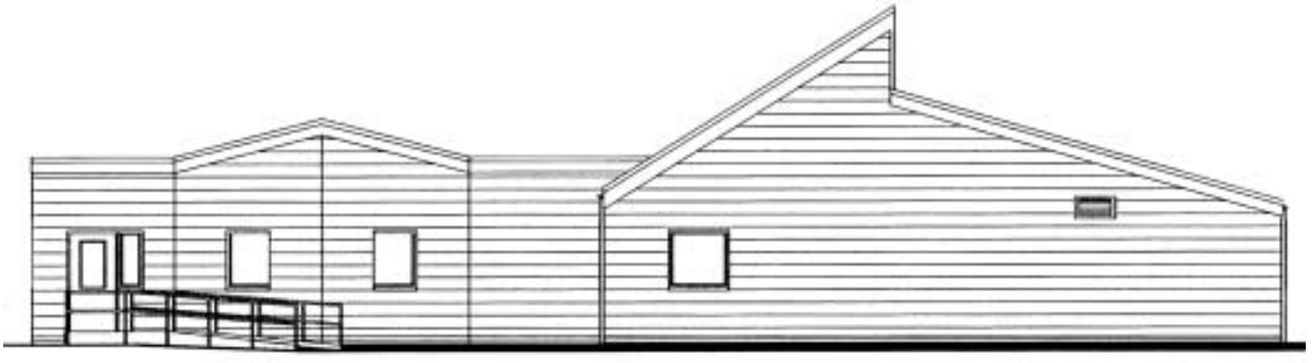
Due to be completed by the end of March 2003.

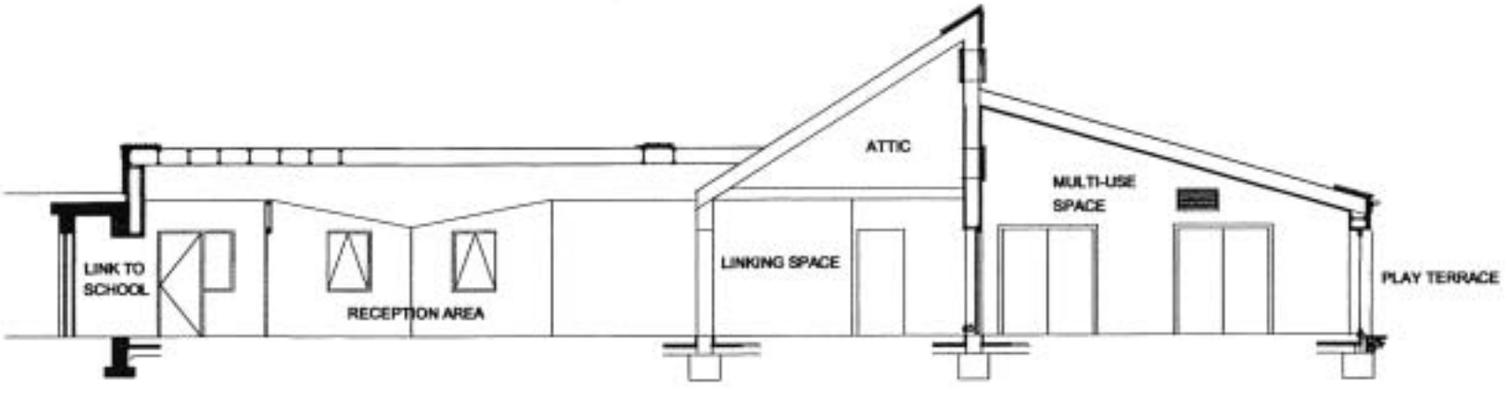
Top
East elevation

Middle
West elevation

Bottom
Long section with link
to main school







escomb primary school
classrooms of the future – durham

Introduction

Escomb is a small rural primary school.

Owing to the insular nature of the local community in which it is situated, the Classroom of the Future will be used to provide opportunities for children to enrich their 'global' experiences by using ICT.

Education

The children need a classroom that is comfortable, secure, bright and airy and which offers facilities including high specification technology, areas which can be subdivided for group work, background music, wet areas and a range of resources and facilities for all aspects of the curriculum. The staff require a versatile and interesting learning area, offering both motivation and challenge for all who are involved and providing opportunities for the development of activities beyond the school day, such as:

- on-line teaching and communication;
- video conferencing;
- presentations;
- the use of resident artists/technologists; and
- the development of data recording equipment.

Architecture

The school is in a rural setting, with its buildings being constructed from a mix of stone and brick. Fields and hedgerows surround the small campus.

The new building will be about 200m^2, linked to the south end of the school. A new school entrance will be formed. The new building will house technology-based activities for the school and the community, as well as being a centre for ecology seminars. There is a primary space for main activities, which has a large opening south window-wall to facilitate outdoor learning on a terrace. A large timber pergola covers the terrace and acts as a solar shading device. Planting screens this from the adjacent car park.The building is constructed using EVT timber frame technology, to achieve superior levels of thermal insulation and self-regulating moisture control. This, together with a natural ventilation system, will provide a healthy risk-free environment.

Erection of the superstructure on site will be quick once the concrete base has been prepared, due to a large degree of pre-assembly in factory conditions. External walls will be clad in larch planking, with the roof covered by non-metallic corrugated sheeting.

School

Escomb Primary School
Escomb
Bishop Auckland
County Durham

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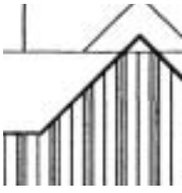
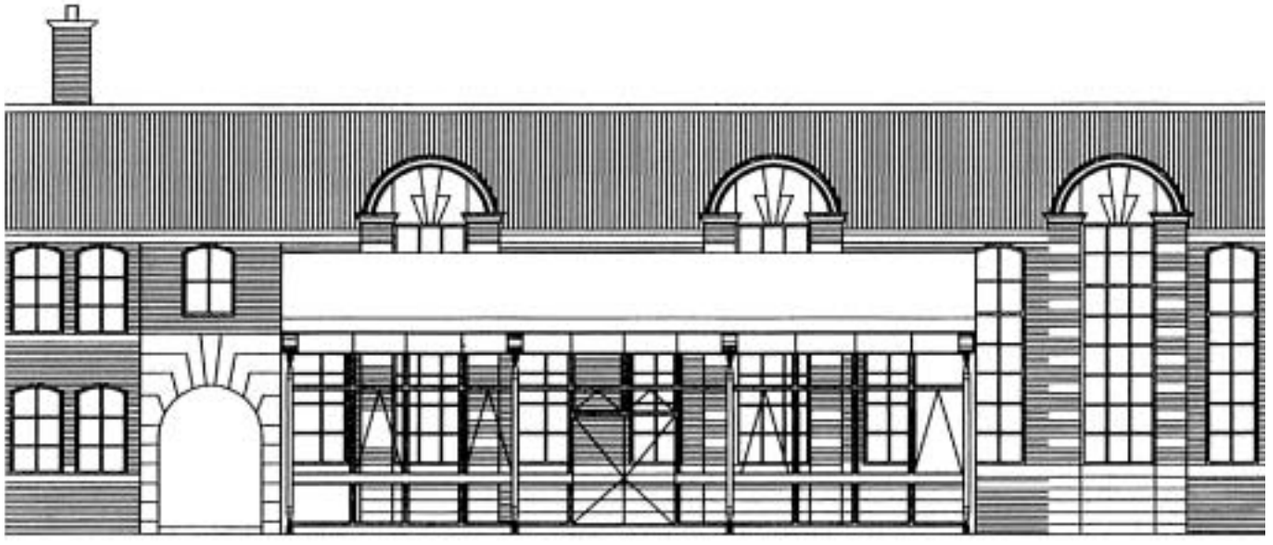
Programme

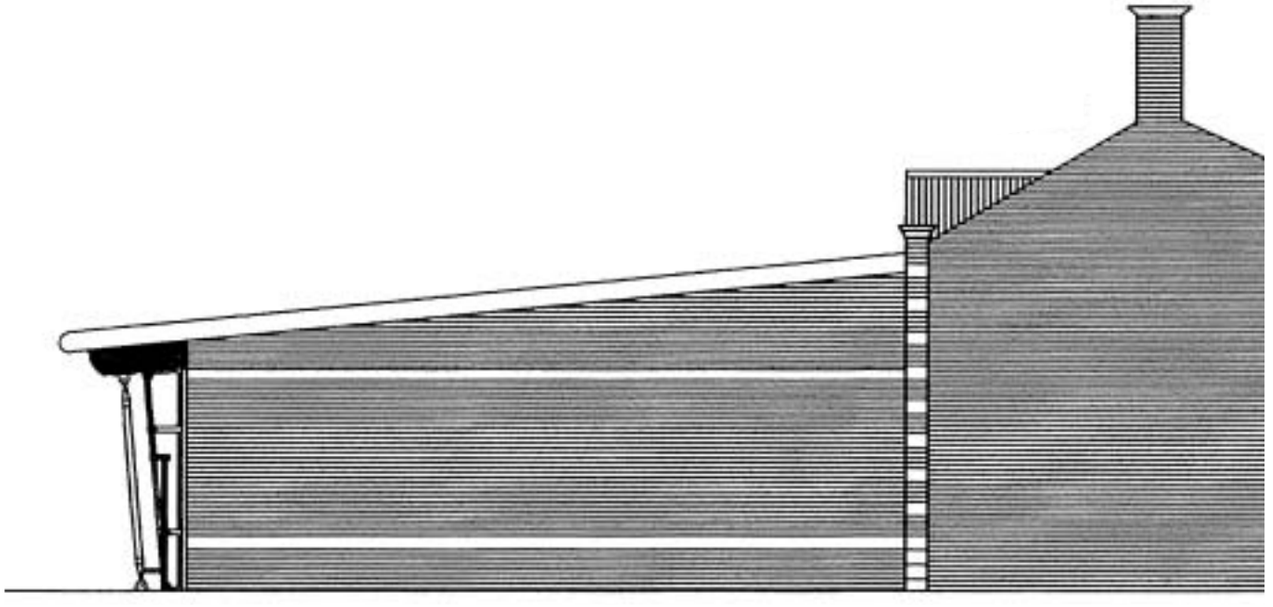
Due to be completed by the end of March 2003.

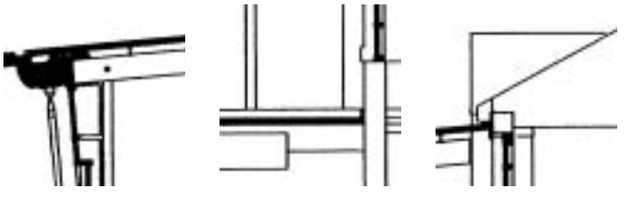


Top
Proposed extension
set against west elevation
of existing school

Bottom
South elevation
showing proposed
extension abutting
existing school







new seaham primary school
classrooms of the future – durham

Introduction

New Seaham is a large urban primary school.

Its Classroom of the Future will provide a quality learning resource centre for pupils and the community, and further enhance the staff training provided through its Beacon School activities.

Education

During the school day, activities in the centre will include:

- performing arts;
- video/film editing, animation, recording, multimedia presentations;
- broadband Internet access and portability to enhance learning and raise standards across the curriculum; and
- global lessons by expert staff in all areas of the curriculum, via video conferencing.

Beyond the school day, the centre will be used for:

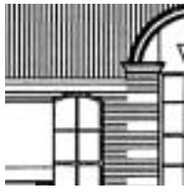
- Beacon activities with staff from partner schools and in-service training for school staff;
- after-school clubs for a choir, creative dance and performing arts, and a drama workshop;
- multi-media workshops;
- computer workshops for pupils and parents and an Internet café for the community; and
- a Performance Arts Centre for other schools and groups in the community.

Architecture

This is the only scheme of the three that is built off the existing building. The 150m^2 Seaham extension is, to a degree, a controversial project due to the quality of the existing façade, its layout and orientation. The extension is a contemporary design that meets the spirit of the Classrooms of the Future brief and the original brief for the school. It involves the creation of a monopitch roof, derived from the existing roof's pitch, with an internal/external structure of steel covered in a metal roofing sheet. The walls at high level are clad in a dry brick panel system, aiding the speed of erection. At low level, masonry will match the stone plinth to the existing building. There is a full height curtain walling system to the west elevation, allowing natural light and useful solar gain, with sun shading controlled by a brise soleil.

School

New Seaham Primary School
Byron Terrace
New Seaham
County Durham



Contacts

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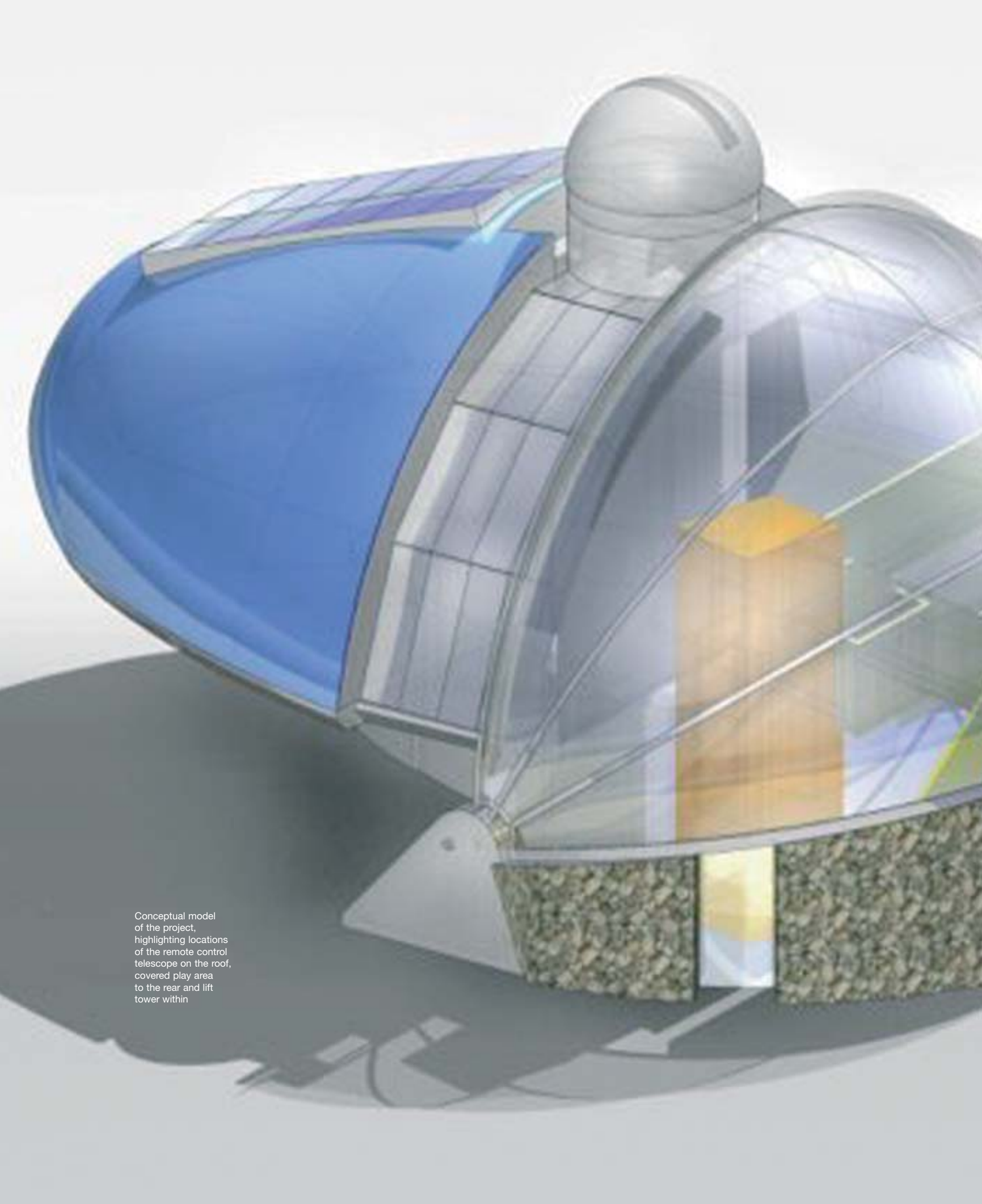
Kevin Stephenson
Project Architect
Environment and Technical Services
Durham County Council
Telephone: 0191 3864411
E-mail: Kevin.Stephenson@durham.gov.uk

Programme

Due to be completed by the end of March 2003.



Conceptual model of the project, highlighting locations of the remote control telescope on the roof, covered play area to the rear and lift tower within

kensington and chelsea

classrooms of the future

Introduction

With the Royal Borough of Kensington and Chelsea's Classroom of the Future project, we hope to create a building that is innovative both in its design and its function. The building will include a permanent classroom for 30 children, as well as two separate interactive learning zones accessible to up to 30 occasional visitors. Both the classroom and the learning zones will have access to a large remote control telescope, which will sit on the roof of the building under a dome.

The building will be built on a portion of St Francis of Assisi RC Primary School's playground, and will be raised off the ground to provide a covered play area for the children.

Education

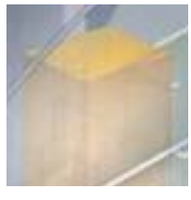
We intend to create a space that will allow teachers to design curriculum projects that will suit a range of children with different learning styles. The building's science focus will enable the children to move well beyond current national curriculum expectations in that subject, and flexible technology tools will dramatically increase the learning opportunities at their fingertips.

- Learner as Scientist

  By providing the telescope, chemistry lab and mini-biosphere within a building that actively feeds information to the learners, we intend to nurture the children's research and data collection skills, while also providing them with ample opportunities for scientific experimentation. Activities for these young learners will be highly structured so that they are trained to question the 'why' of things.

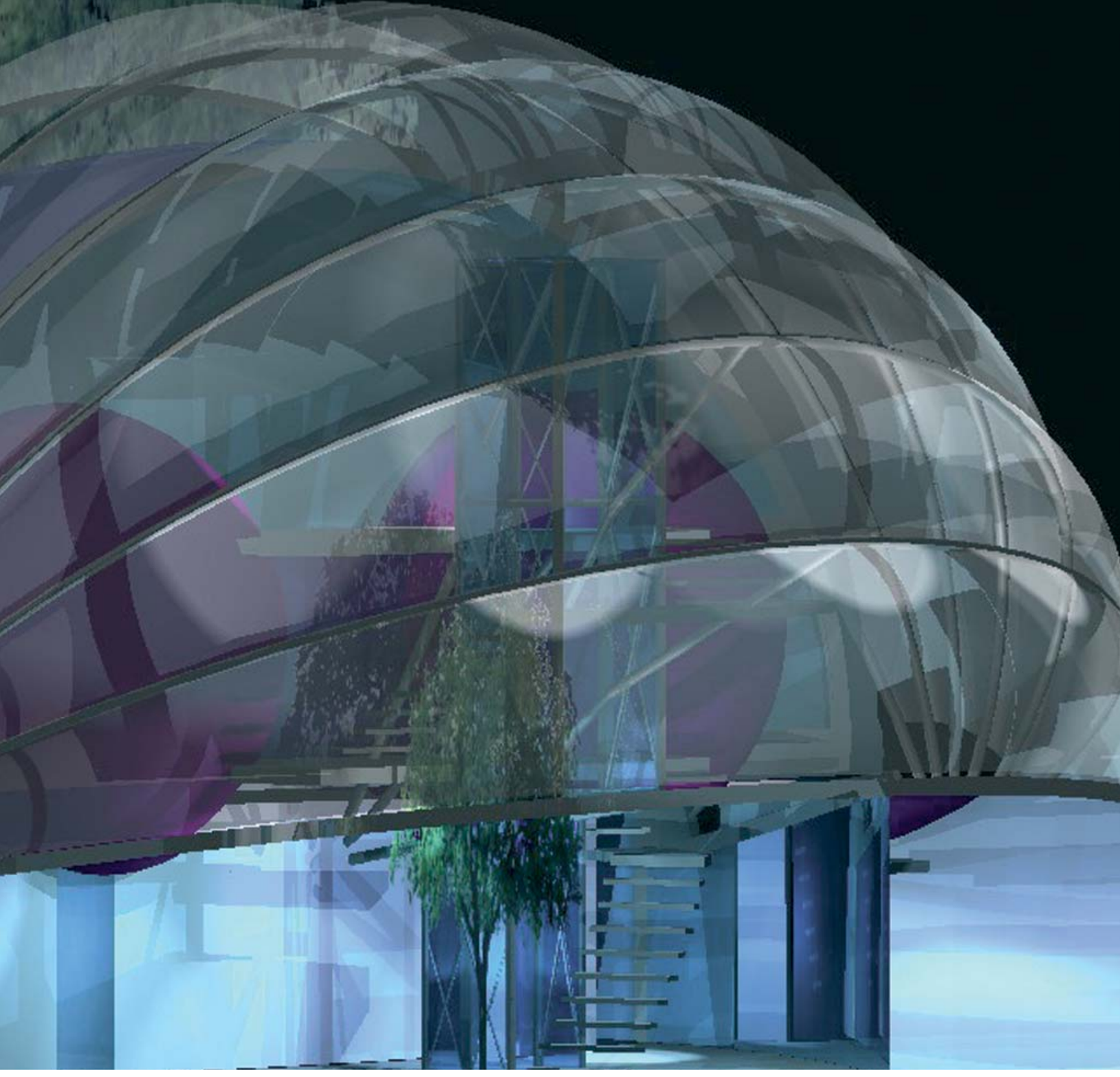
- Learner as Constructor of Knowledge

  Constructivists make a distinction between **teaching systems**, in which learners are passive recipients of 'expert' knowledge, and **learning systems**, in which learners are active constructors of knowledge. This new building will provide an ideal 'learning system' setting, emphasising relationships between learners who construct knowledge through experience, action and conversation.



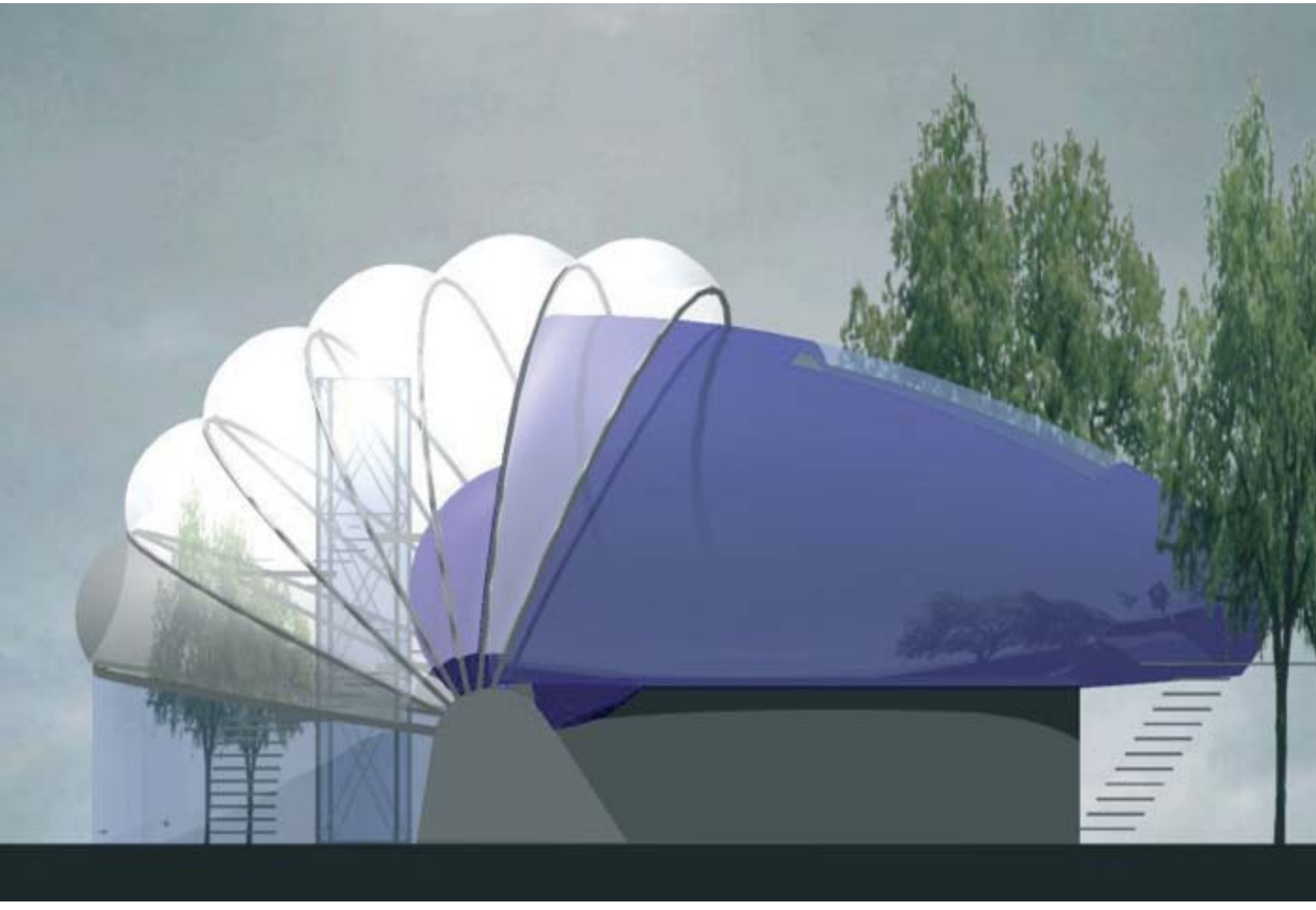
Details from the model

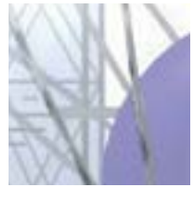
At night lighting from the two learning zones will shine through the transparent structure, causing the building to glow and illuminate its surroundings



Two shared learning zones are contained in the ETFE clad conservatory with the main classroom being enclosed in the curved timber pod

Bottom Opposite Page
An aerial view of the project





Architecture

The building itself will take on a pedagogical role, leading learners through scientific investigations by virtue of the transparency of its construction. The building will also have a building management system (BMS) that will transmit data such as CO_2 levels and energy consumption rates, enabling learners to monitor the health and efficiency of their learning environment.

The four key features of the building will be:

- the main classroom – a stressed skin, double curved timber pod constructed much like an upturned boat's hull in its form;
- the conservatory – a steel and ETFE construction. ETFE, a relatively new building material, is lightweight and thin, thereby requiring less structural support and very small quantities of material. The ETFE will form cushions around the steel structure, which will have air constantly pumped through them to maintain their shape. It is the same material as that used in the Eden Project in Cornwall;
- two ancillary classrooms – gaining benefit visually and environmentally from being sited in the ETFE conservatory; and
- the observatory – a prefabricated rotating dome containing a remote-controlled telescope.

School

St Francis of Assisi RC Primary School
Treadgold Street
London W11

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www.rbkc.gov.uk/EducationAndLearning/FutureClassroom/default.asp

Programme

Site Start: 17 June 2002
Ground Breaking Ceremony: 26 June 2002
Intended completion: early 2003.

The prefabricated unit at Caroline Haslett Combined School is equivalent to four standard classrooms in size.

It provides flexible spaces that can easily be configured as required

Internal details

milton keynes
classrooms of the future

Introduction

In Milton Keynes the age of transfer is 12, though this may soon change. The town is also expanding, and experiences population shifts from older to newer areas. Both these factors can result in some school buildings suddenly becoming too large, while others become desperate for more space. Milton Keynes's Classrooms of the Future pilots aim to overcome these problems by exploring new designs for prefabricated, relocatable units that will be able to help meet changing demographic demands. These will be capable of being moved quickly and easily, without having to compromise on the quality of the learning environment.

The pilot projects form two freestanding buildings on two existing school sites, Caroline Haslett Combined School and Denbigh Secondary School.

The combined school, which caters for years one to seven, has the equivalent of a four-classroom building with toilet facilities. These spaces are used by the older pupils. Caroline Haslett is a feeder school for Denbigh, where the three-classroom equivalent building is sited.

Education

Different teaching situations call for different sized spaces. Our aim is to provide flexible spaces that can easily be configured as required. The project at Caroline Haslett can be divided, using moveable walls, into the spaces required for particular uses. The smallest will be 21m^2, suiting small groups of around six pupils, while the largest possible space is 113m^2. At Denbigh, the three classrooms can be used independently, as two together, or as one large lecture space for delivering master classes to the older pupils.

It is intended that these flexible spaces will also suit community use and holiday play schemes, and that the spaces will be accessible to people of all abilities.

In order for the key stage three children at Caroline Haslett to benefit from the more specialist teaching at Denbigh, there will be a network connection between the schools. This will enable a lesson at Denbigh to be projected onto screens at Caroline Haslett, where a broadband system will allow the children to work on laptops. Denbigh will use fibre optics in their computer network and will have one room with full IT provision, while the other two will have seven computer points each.

Open, light spaces with higher than normal ceilings will provide a pleasant learning environment. Each block has fresh drinking water, which has been shown to increase concentration.

At Denbigh, small slit windows have been provided to allow a connection with the outside world, while maintaining security and maximising wall display space.

The prefabricated building at Denbigh Secondary School can be used as three independent classrooms, as two together, or as one large lecture space for delivering master classes to older children

Internal details

Architecture

Working together with National Energy Services, we have developed the designs to provide a comfortable internal environment all year round – particularly in the summer when teaching spaces often overheat and suffer from a lack of ventilation. The buildings incorporate under-floor heating, which can also be run with chilled water to give maximum temperature control. Low-level grilles at Denbigh, and low-level windows at Caroline Haslett, allow fresh air to be drawn in and cooled as it passes over the floor. This air will then rise and discharge through roof lights. Large window and roof light areas will give plenty of natural light, while the use of green solar reflective glass will reduce unwanted solar gain. External shading will further reduce solar gain on south-facing elevations in the summer.

At Caroline Haslett we will be recycling rainwater to provide water to flush the toilets. Windows and doors are aluminium, as this is recyclable and far more environmentally friendly to produce than UPVC. Wet floor areas are made of rubber – a natural material that can be recycled.

The buildings were prefabricated off site, resulting in less disruption to the schools and shorter construction times, and allowing us to provide the space when it is required. The quality of space, materials and finishes are equivalent to a traditional building, although we have chosen not to imitate the brick and tile construction of the two schools. The pilots are clad in high-pressure laminate panels, giving them their own identity, which better suits a relocatable building. However, it is important that the end users have no perception of the buildings being temporary.

Schools

Caroline Haslett Combined School
Faraday Drive
Shenley Lodge
Milton Keynes

Denbigh Secondary School
Burchard Crescent
Shenley Church End
Milton Keynes

Contacts

Alison Swarbrick
Project Architect
Architecture MK
Telephone: 01908 252495
E-mail: Alison.swarbrick@Milton-Keynes.gov.uk.

Website:
Under development

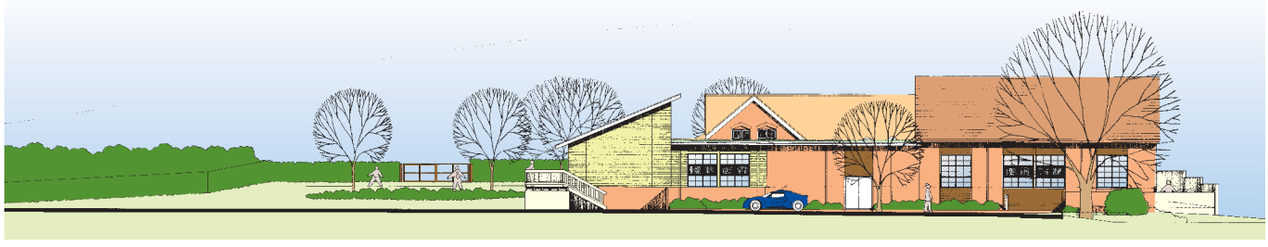
Programme

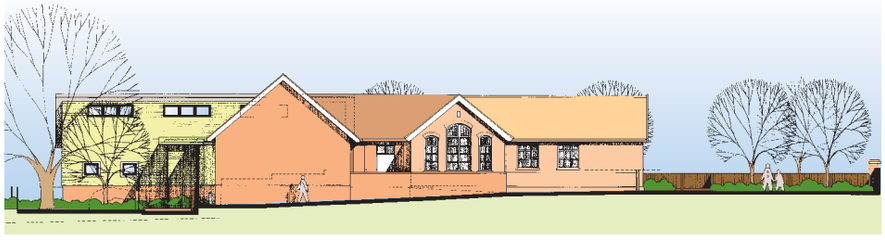
The prefabricated units were produced in two factories, one in Manchester and one in Nottingham, and delivered to the sites by the end of July.

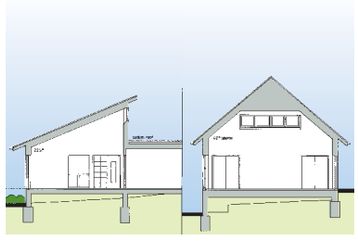
Both projects were completed and occupied by the end of October 2002.

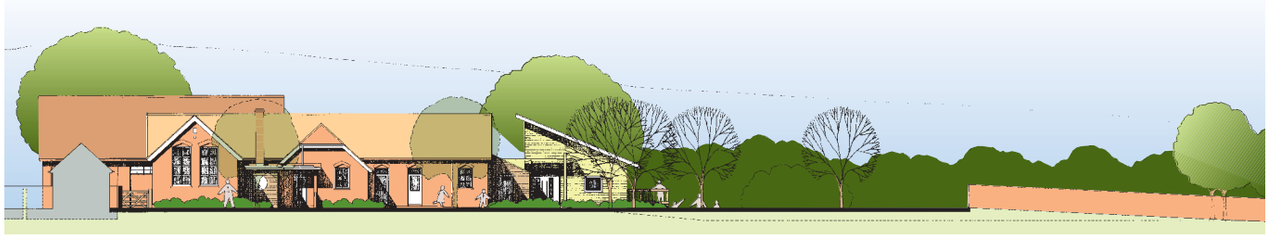
Hevingham Primary
School – 21st century
building in rural Norfolk.

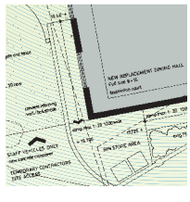
Elevations from top:
West, South, East
and North

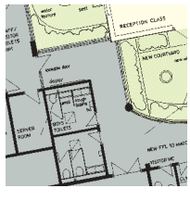












norfolk
classrooms of the future

Introduction

Norfolk is one of the largest Local Education Authorities in the UK and has 58% of its population living in a rural setting. It supports a large number of small, rural schools with less than 100 children on roll and has relatively high pupil transport costs. The challenges these schools present to OFSTED and the National Curriculum are key to our development of a Classroom of the Future. The projects seek to enhance and broaden educational experiences and opportunities for pupils, teaching staff and the wider community.

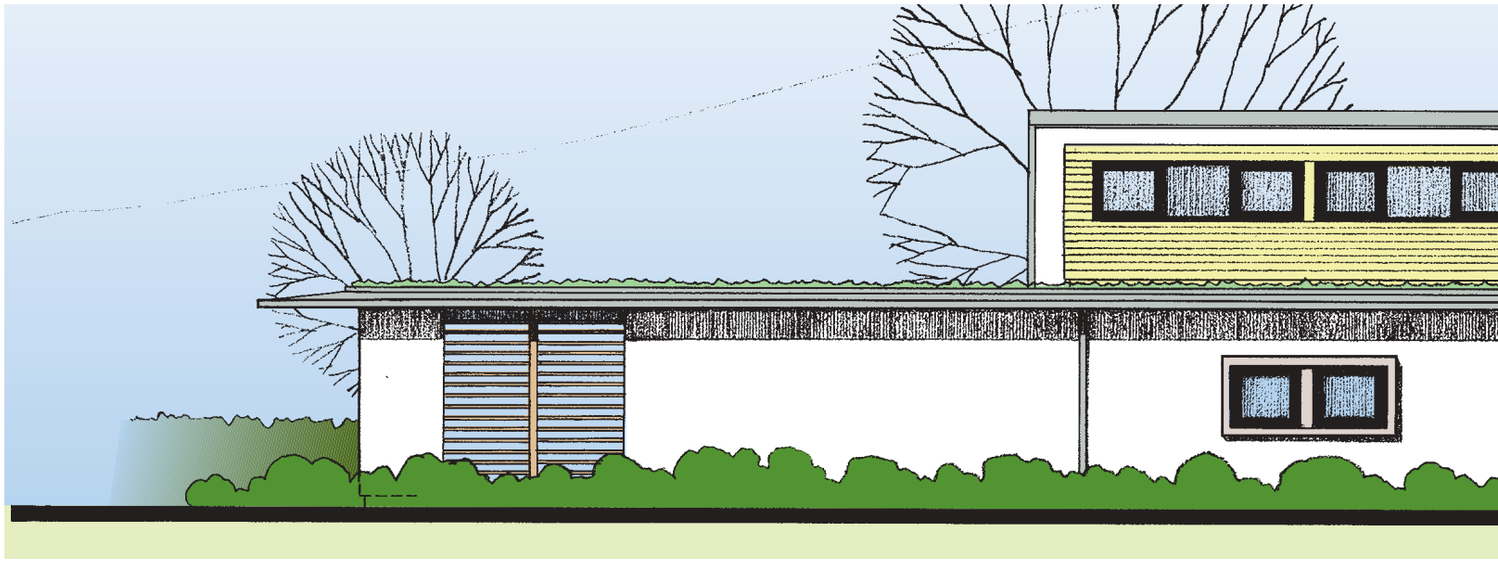
Norfolk recognises and values the important and increasing contribution small rural schools make to the wider community. The projects will address and support the many issues which challenge the management of these schools. The projects are being developed at Hobart High School, a rural high school at Loddon in the south-east of Norfolk, Thurlton Primary School, in the same part of the county, and Hevingham Primary School, an area of rural deprivation in the north of the county.

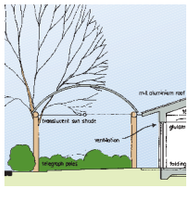
Education

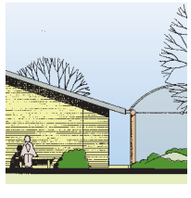
Through new technology, young people will positively engage with their learning environment, getting to know how to use the technology to explore their potential in creative thinking and action. In particular, the new technology will support direct video conferencing to boost teaching and interaction with other pupils, teachers and specialists across cluster schools – removing the need to travel and reducing energy costs.

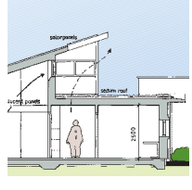
This will enable:

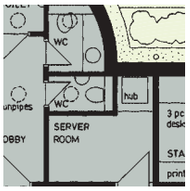
- Hobart High School to enhance its links with European partners in France and Germany via this facility, broadening horizons and improving language skills;
- cluster schools to share expertise and achieve consistency in curriculum planning and delivery, using interactive video and appropriate software; and
- the project to become a Lifelong Learning Centre, a more accessible community resource for lifelong learning, internet banking and library facilities, embracing those currently outside the learning zone.










WC
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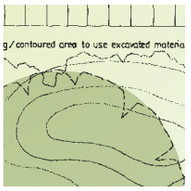
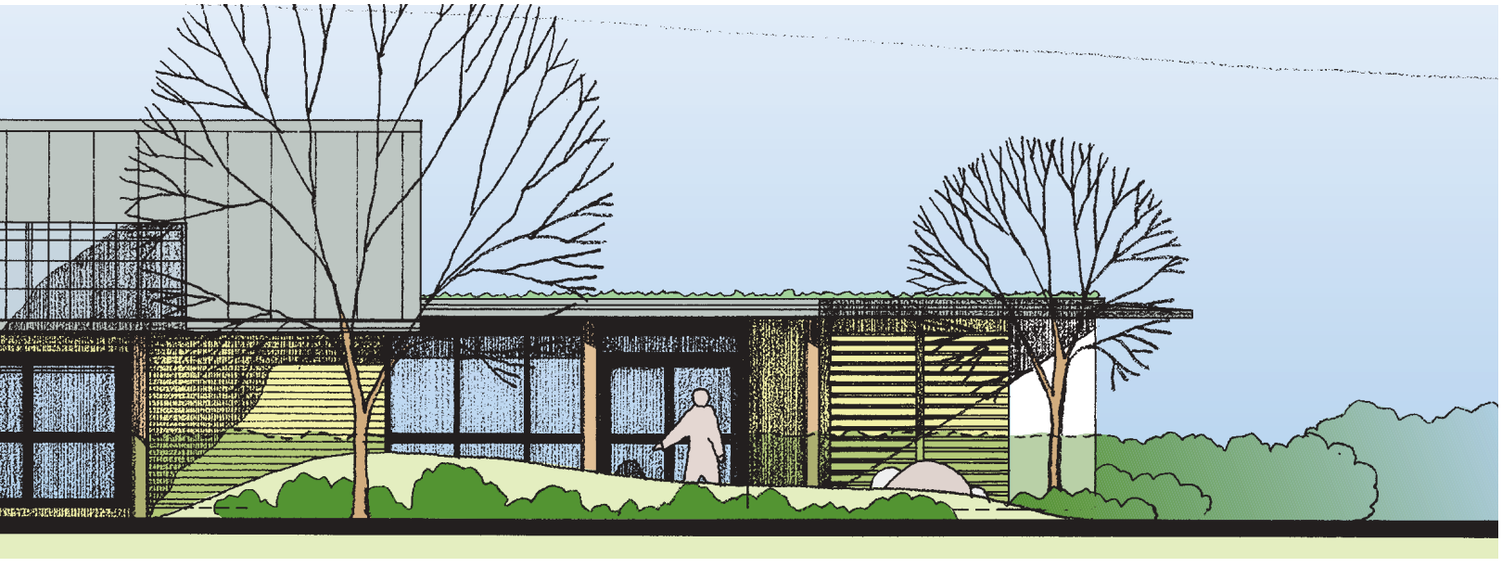
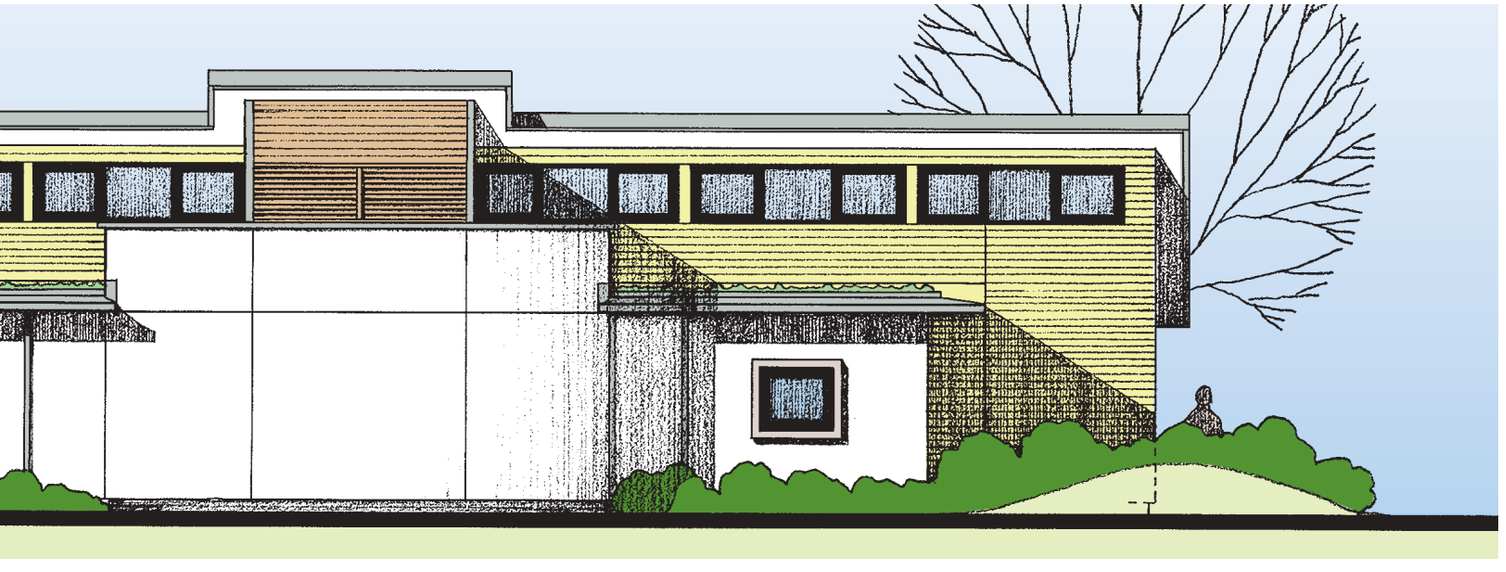
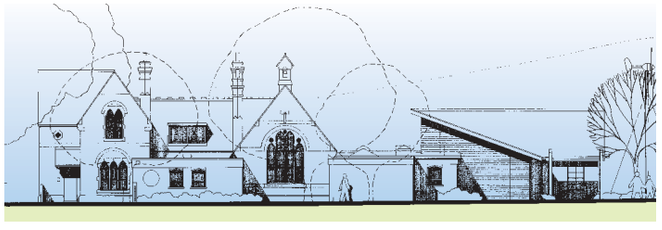


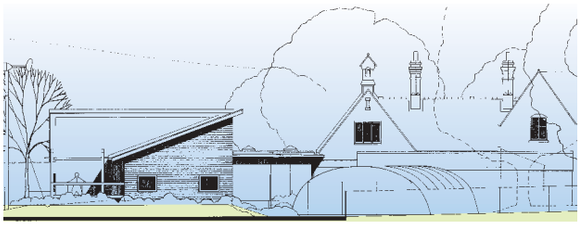


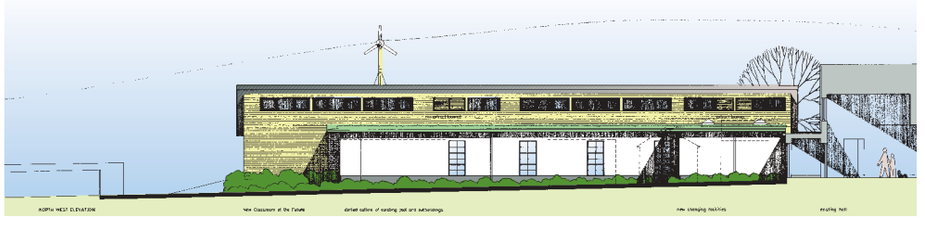


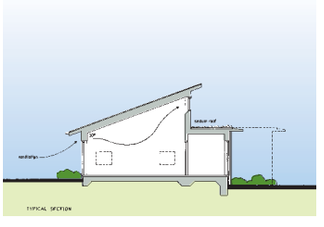
Thurlton Primary School
demonstrating wind power
in the Norfolk Broads.

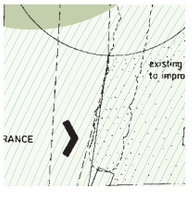
Views in order of illustration:
South-east elevation; south-west
elevation, showing school frontage
onto country lane. North-west
elevation; sections and photo
montage view from playing fields

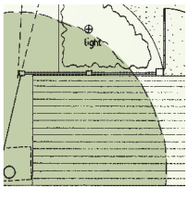












Architecture

Sustainability is a fundamental design aim in all three projects. Super-insulated construction will achieve very low U values. Under-floor heating systems will run off air to water heat pumps, with the possibility of summer cooling by switchover to cool water circulation. There will also be heat recovery off mechanical ventilation systems. Water will be heated by solar panels and rainwater will be recycled for use in toilets.

External 'breathing' walls will have cedar slatted louvres and reinforced insulating, cement-free rendering. Internally, robust dry wall construction will be used. Environmentally friendly sedum mat 'green' flat roofs will be incorporated, helping to reduce the impact of buildings on the landscape and on neighbours. Reduced on-site time will be achieved by extensive off-site prefabrication, incorporating timber beam frames.

Design features of the project at Hobart High School include:

- a glass entrance pavilion, which will be the focus of the existing school pedestrian access path;
- a dramatic over-sailing 'green' roof and water feature (illuminated at night);
- an entrance lobby that will double as a possible reception/exhibition/meeting space;
- a large, naturally lit, sub-divisible space, with semitransparent divides, a raking ceiling and natural cross ventilation;
- individual work bays suiting informal community/pupil study, which can take place simultaneously; and
- a glazed, vented shaft that directs sunlight and fresh air to the heart of the building.

On the south side will be a freestanding translucent curved sun screen canopy, possibly using reclaimed telegraph poles as columns.

The design of the project at Thurlton Primary School is intended to be in sympathy with the school's rural location on the edge of the Broads Authority area.

The building image has visual associations with the two other Classroom of the Future projects, while the scale and roof materials keep the design site-specific. It will have a natural slate pitched roof and aluminium rainwater goods and window systems. A wind turbine dramatically marks the entrance to the new building, serving both as a useful educational tool and a source of power for the heat pumps. A covered outdoor veranda maximises fine countryside views.

The project at Hevingham employs similar design features to Thurlton and Hobart, but will have the environmental bonus of a thermal bore, low-energy heating system. It features cedar wood boarding and an attractive brick plinth which supports the different land levels on the site. Clay tiles are used to match those of the existing roof.

Schools

Hevingham Primary School
Westgate
Hevingham
Norfolk

Hobart High School
Kittens Lane
Loddon
Norfolk

Thurlton Primary School
Church Road
Thurlton
Norfolk

Contacts

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Mark Kenney
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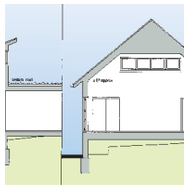
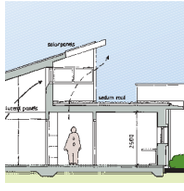
NPS Property Consultants
Telephone: 01603 706601
E-mail: mark.kenney.nps@norfolk.gov.uk

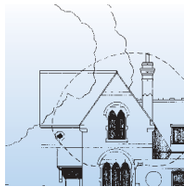
Website:
www.nps-property.co.uk

Programme

The project at Hobart should be completed early in 2003. Those at Hevingham and Thurlton are due on site in January and should be completed by April 2003.







The large curved teaching space is lit by ventilating windows in the roof, with a wall of glass at one end

richmond upon thames

classrooms of the future

Introduction

Our aim from the outset at Richmond was to bring together a world-class team of people to deliver a project of real significance. The team would cover advanced thinking in architecture and design, combined with the best practical educational expertise and insight into leading-edge technologies

The starting point was the belief that the qualities of the environment in which we learn – in particular light, space, colour and sound – make a real difference to how quickly we learn and how much we like learning.

The classrooms of the future must make children feel good, and allow them to learn in their own way.

Three stand-alone, factory-built classrooms are being constructed – one in a secondary school, one in a primary school and one in a school for children with severe learning difficulties. The schools are geographically close and used to working together. The area, Ham, is a mixed area including a large estate with high levels of deprivation, juxtaposed with more affluent housing. The classrooms are designed to challenge the traditional roles of teacher and learner, and to encourage creativity. Our aim is to make them high-quality, beautiful and inspirational spaces where children and adults will want to learn.

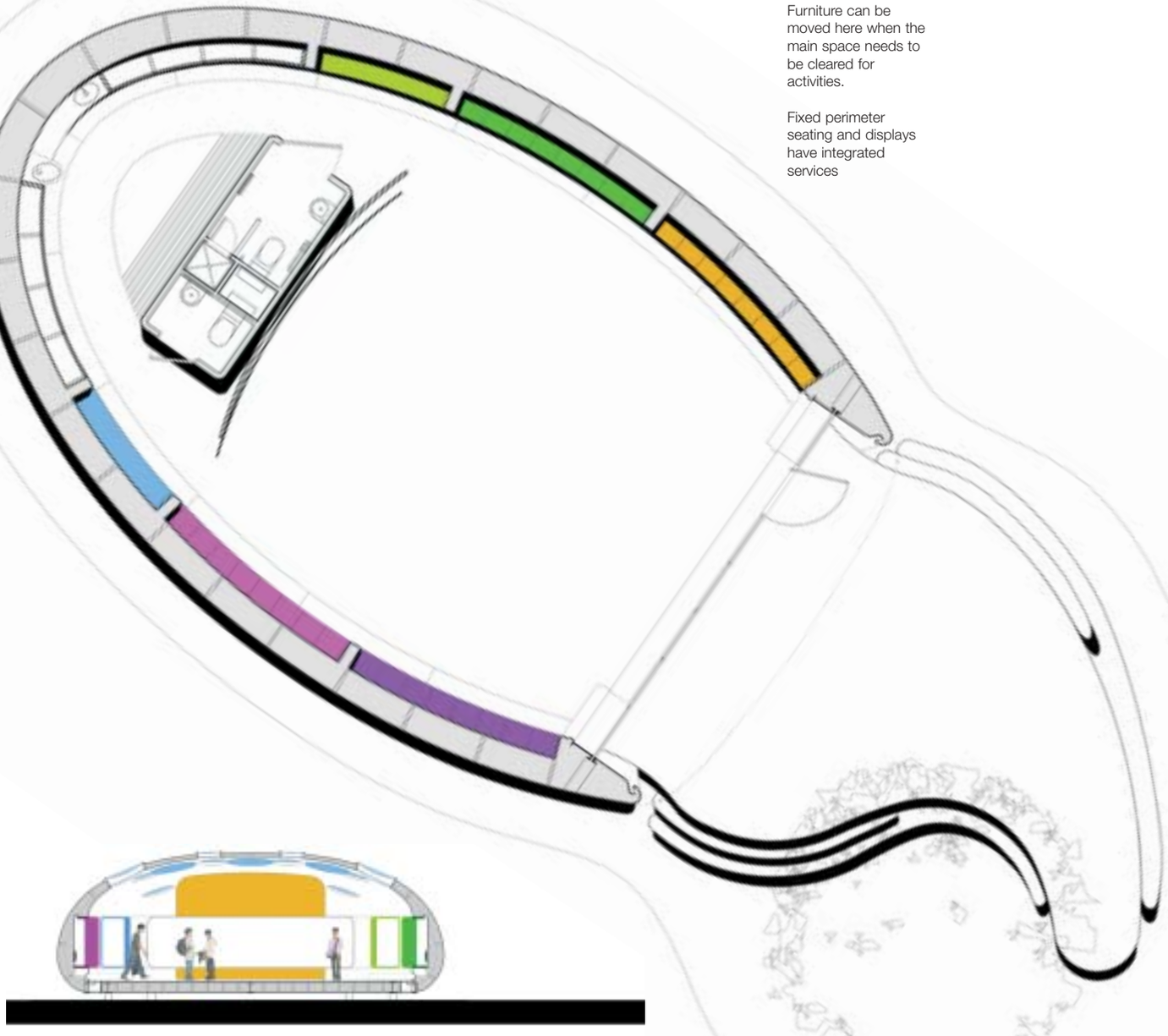
Circular roof lights and acoustic panels are integrated in the ceiling

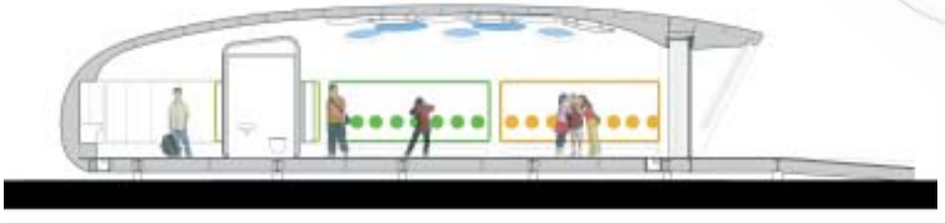
The classrooms are prefabricated in GRP to a high standard, enabling simple on-site assembly. Internal space extends out onto a terrace, which can be used for individual or group study and for performance

A service area for toilets, coats and storage is located behind the teaching wall.

Furniture can be moved here when the main space needs to be cleared for activities.

Fixed perimeter seating and displays have integrated services





The sections give an indication of how the prefabricated units sit on concrete foundations.

For ventilation, air is drawn from underneath the building and extracted through the roof

Education

The students of today and tomorrow must have the skills to survive and the creativity to thrive in a world characterised by continuous change and the emergence of a global knowledge-based economy.

In each individual we need to develop the capacity to become a creative, independent learner able to assess his or her own learning needs and develop the learning skills to meet those needs.

For this to happen we will need to create a new pedagogic paradigm that takes account of changes in technology and in our understanding of how the brain works.

We know that brains are highly individual. They access and process information in complex and variable ways that are altered by the environment. Learning is best achieved in environments that provide high challenge and low threat, high levels of sensory stimulation and the right 'physical readiness' for learning.

We also know that people learn in different ways and have different kinds of intelligence. We intend to use sound, colour, graphics, display and movement in our teaching, and to ensure that the classroom can easily be rearranged to suit a variety of teaching situations.

Finally, we know that social interaction is important in the learning process, and the classrooms of the future must encourage this. A sense of 'audience' is vital, and pupils and teachers need space to display their achievements.

Architecture

The starting point was to ask children and teachers from each of the three schools what sort of environment would excite them.
The design brief that evolved was for flexible, organic, light, colourful, learning spaces that could be adapted for use by large and small groups, and for performance as well as individual study.
As a result:

- the classrooms will be factory built to a high standard from moulded GRP; they will be moved onto site with minimal disturbance. They will be energy efficient, durable and eminently replicable. The design includes a service area for toilets, coats, storage, plant etc and a large curved teaching space lit by ventilating windows in the roof, with a wall of glass opening onto a terrace;
- the new spaces will allow students to use the widest possible range of new technologies creatively and co-operatively. Much care has been taken to ensure that, as far as is possible, the infrastructure is 'future proofed' and will allow teachers and pupils to bring any communication device – e.g. laptop, phone, tablet – into class and be able to connect it into the building's systems; and
- two further key features are that students are able to display their work all around the classroom and on the outside of the building, and that there is a real connection between inside and outside. The partly-covered terrace can be used for performances or for individual or group study, and wireless technology will enable all the ICT to be accessed on the terrace as well as inside.

Schools

Grey Court School
Ham Street
Ham
Richmond

Meadlands Primary School
Broughton Avenue
Ham
Richmond

Strathmore School (SLD)
Meadland Drive
Ham
Richmond

Contacts

Gill Marshall-Andrews
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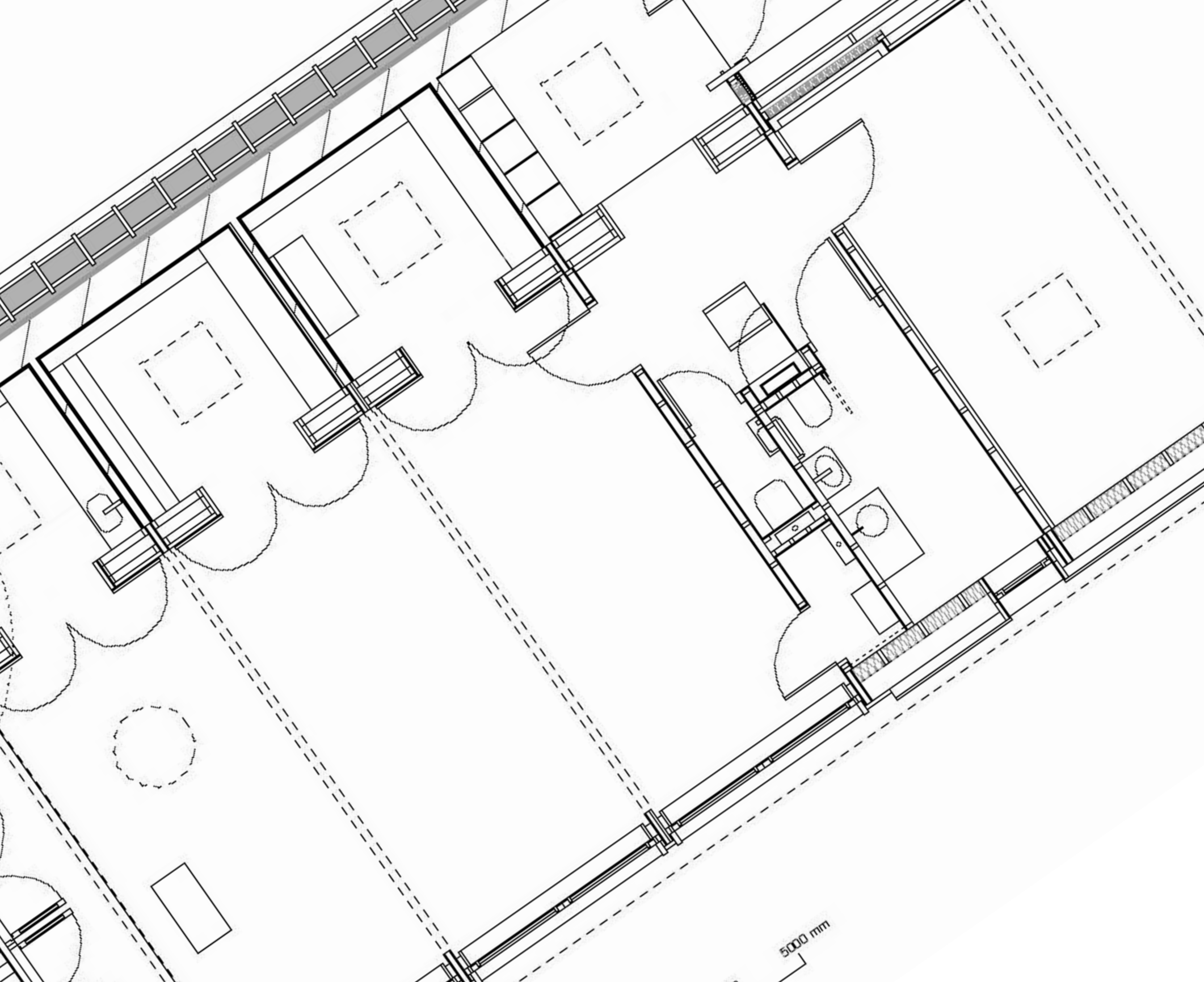
E-mail: m.andrews@dial.pipex.com

Jeffrey Morgan
Future Systems
E-mail: jeffrey@future-systems.com

Website:
www.worldclassrooms.net

Programme

Projects are due on site in August 2003 and should be fully operational during the Autumn.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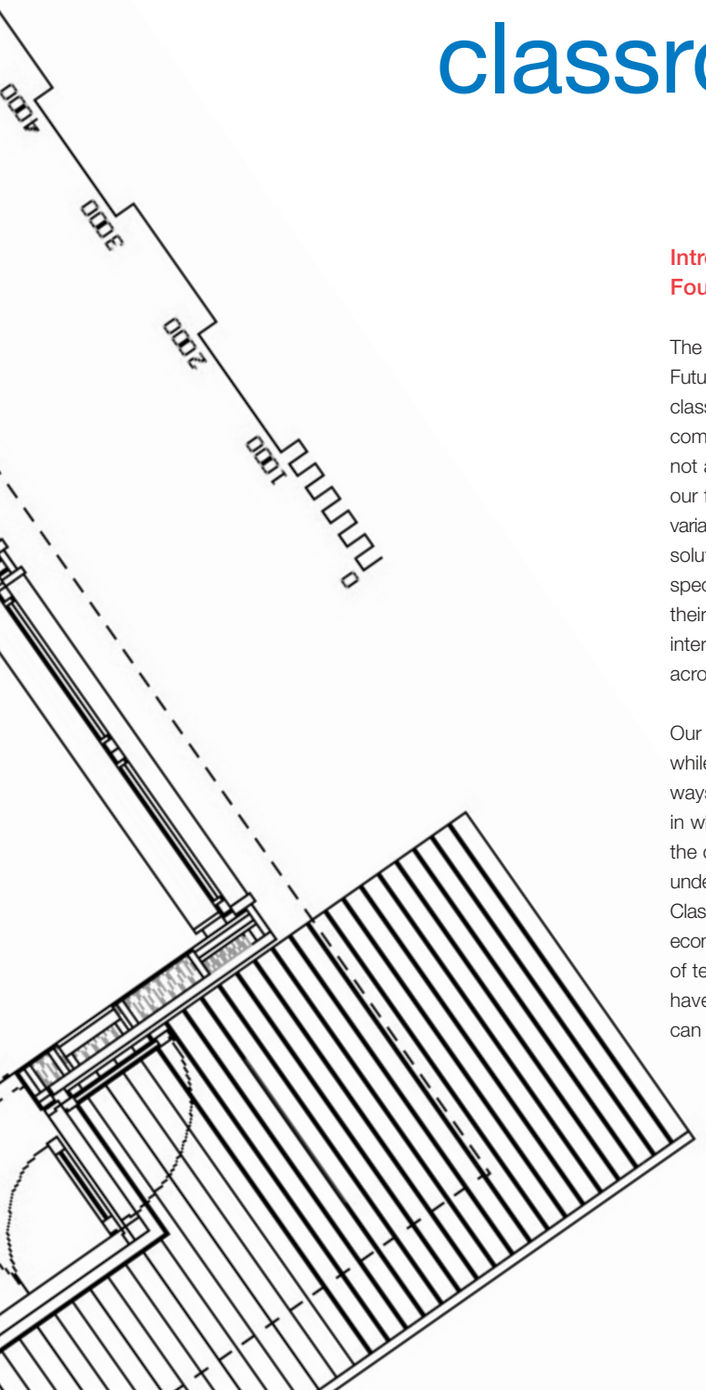
sheffield

classrooms of the future



Introduction: Design Approach for the Four Projects

The aim of Sheffield's Classrooms of the Future project is to make unique and innovative classroom buildings that will enhance and complement the existing environments. We do not aim to establish a common typology for our four buildings but, rather, to explore variations within similar spatial and constructional solutions. Each project presents different and specific challenges relating to the sites and their users' needs. We anticipate that the interventions proposed will raise aspirations across the entire school community.

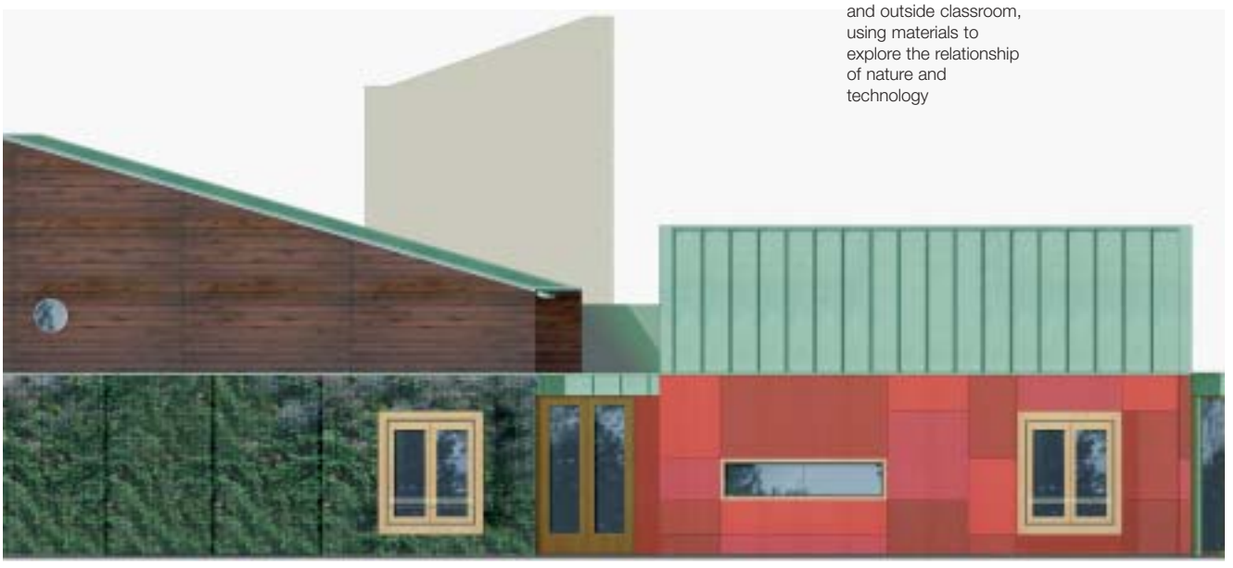
Our vision for the future recognises that, while the delivery of teaching will change in ways we cannot yet foresee, the environment in which education takes place is crucial for the development of a pupil's knowledge and understanding. Our approach to the Classrooms of the Future project seeks economic and practical solutions to the needs of teachers, while recognising that pupils have aspirations and dreams that architecture can support.

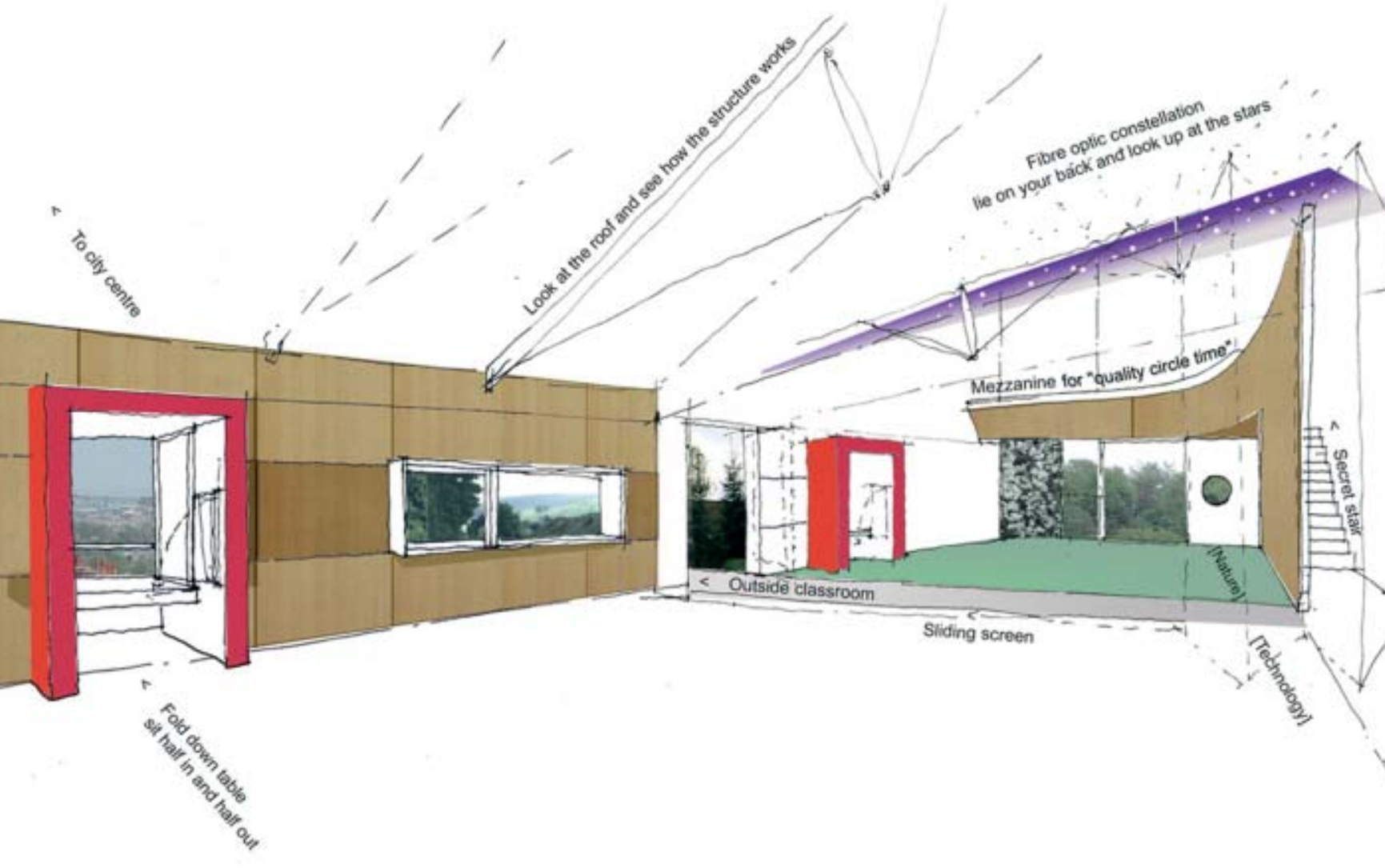
The areas addressed are:

- the use of a common language of materials, which can be replicated, not just between the four projects, but elsewhere in the UK;
- innovative solutions to the problem of storage;
- an exploration of the relationship between inside and outside, and particularly how technology relates to nature;
- developments in ICT;
- the use of sustainable technology; and
- the recognition and celebration of children's differing educational, physical or learning abilities.

The Classroom of the Future should be a place of interest, enjoyment, wonder and surprise. It should be uplifting and inspiring, for users now and in the future.

The façades express ideas of the inside and outside classroom, using materials to explore the relationship of nature and technology





ballifield community primary school

classrooms of the future – sheffield

Introduction

Located in a 1970's open-plan school in the south east of the city, this project challenges the existing ways classrooms are used and proposes a new model for the future. It is not intended to be a stand-alone prototype, but is being developed closely with all the people and elements that go together to make the school. It is the ideas and solutions of this specific classroom that could become prototypes for other classrooms.

Education

One of Ballifield School's greatest assets is its setting and grounds. There are distant views to the south over fields and to the north over playing fields, giving a great sense of open space and clean air for a school within a large city.

The proposal for the Classroom of the Future at Ballifield investigates how this strong natural link can be reconciled with increasing technological developments, both in the classroom and in building methods and materials. An approach is adopted that seeks to embrace the benefits of both nature and technology, rather than seeing them as opposing forces.

At present the natural conditions of the outdoor spaces are mainly engaged with at break times, and only in fine weather. The new classrooms will have a strong relationship with the natural conditions throughout the day and year, bringing qualities and experience of nature into the everyday teaching environment. Equally, technology will be implicit in the project's built fabric and in the way it helps the teaching methods employed.

Architecture

The project incorporates two new class bases, separated by a moveable screen, with a new main entrance, cloakroom and toilets. Externally the building engages with both the natural surroundings and the existing school. Children and visitors enter the building through a door in a hedge and the semi-glazed entrance hall continues a forest analogy. The spaces have their own expressed form and are largely timber-clad, but with green living walls. The building is designed to be light-hearted and fun.

Key elements of the design are:

- a structure that is deliberately highly visible;
- window seat alcoves, pushed out into the landscape, allowing six to eight children to withdraw for group work. They form part of the 'changing wall' that can be opened up in summer, with windows folding inwards to allow children to sit both inside and outside;
- a mezzanine or crow's nest reached by a secret stair, large enough to host 'quality circle time' for a whole class. This has distant views to the hills and a fibre-optic starry sky;
- storage walls, forming part of the fabric of the classrooms, which have other functions, such as a stair to the mezzanine level. They incorporate moveable storage, teacher's bases and whiteboards; and
- a healthy environment, with under-floor heating, good cross-ventilation, shaded natural light, water fountains and a careful use of natural materials and surface finishes.

The external classroom will be designed to provide a backdrop for science and nature lessons, allowing experimental work and observation. It will provide short nature walks, through new specimen trees and planting, to different water environments at the edge iof the pond. It will also contain a wildflower area, a productive garden and a butterfly garden.

School

Ballifield Community Primary School
Handsworth Grange Road
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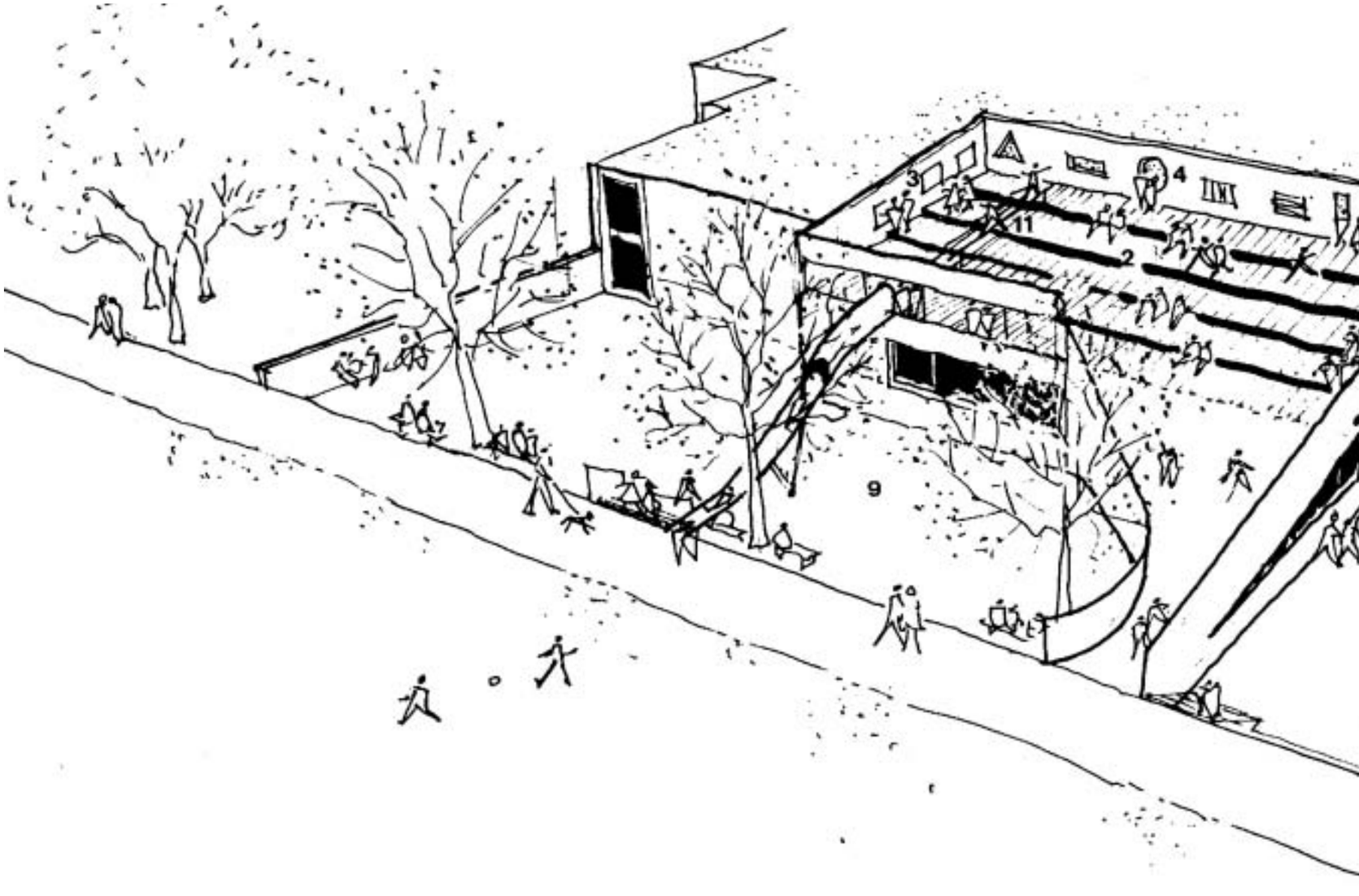
Programme

The project is due for completion in February 2003.

Under the sloping soffit formed by the ramp to the roof, a child-height retreat space is created off the main classroom area

A new and exciting playground will be formed on the roof of the project, replacing space lost in its creation



brunswick primary school

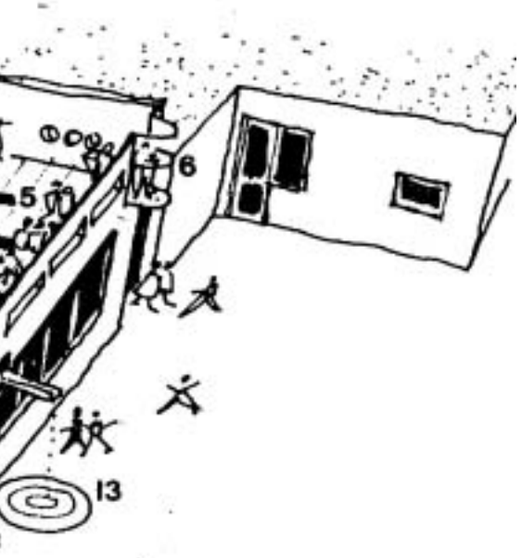
classrooms of the future – sheffield

Introduction

Brunswick Primary School is regarded as the centre of its community at the edge of Sheffield. The school has an enlightened 'open' policy, and local people are free to wander about the grounds at all times. This philosophy reflects the open-plan nature of the building, where classroom spaces are linked together to form larger spaces.

The Classroom of the Future project adds the equivalent of a further two classrooms to the school and builds on this philosophy, both internally and externally. Inside, the space provided is treated as a single space, which can be divided up when required. It can also be opened up to the existing classroom spaces. Outside, the new building can be used as a place for play by local children. The new classrooms will also be available to the community for use outside school hours.

All of this will reinforce the school's status as the centre of the community.



Education

The new spaces will be classrooms for the future, capable of adapting to future changes, and will form 'a space to support quality learning'. This will be exciting and stimulating for the children, simple, secure and beautiful. The school has a generous and community-minded 'open site' policy, and local children can enjoy the grounds out of school hours.

Architecture

At present some children climb onto the existing flat roof, which is a source of problems for the school. The playground space taken up by the project needs to be replaced. To resolve both these problems, an exciting but safe sloping rooftop play space/external classroom will be created, diverting children from the main roof. The resultant sloping soffit will then create a child-height 'retreat space' off the main classroom spaces.

Internally the spaces will have a natural feel with plenty of fresh air, plants and daylight. Building on the school's existing open plan philosophy, it will be possible to open up between the two classrooms and the existing adjoining classroom, with moveable partitions to allow flexibility of use for smaller and larger groups. As many as 60 children will be able to learn ICT skills at their tables, using laptops with wireless networking.

Flowing and splashing water will be integral to the classroom experience, and there will be views through to the existing adjoining swimming pool.

Strong links between the school and the local community will be further strengthened, not only through the provision of the new rooftop play space, but also inside.

The project will allow for an expansion of homework clubs, after-school learning and holiday clubs.

School

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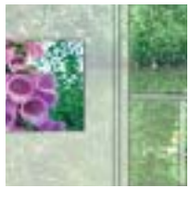
Programme

The project is due for completion early in 2003.

The classroom will offer a variety of views and interactions with the attractive grounds in which it is set.

A glazed section of flooring will enable children to see animals and plant life beneath the building



mossbrook special school

classrooms of the future – sheffield

Introduction

Mossbrook is a 76-place primary special school set in attractive grounds on the south side of Sheffield. It has an increasing proportion of children with severe disabilities and with autism. Many of these children are visual learners, and the environment has been developed to encourage learning and sensory stimulation. This project will provide a major boost to this environmental work and expand inclusive education to pupils from other schools. It will provide an extraordinary set of spaces that will be of intense benefit not just to the regular pupils, but to the wider community.

Education

The new classroom at Mossbrook is a science teaching space designed for learning about the natural environment through direct interaction with it. The school teaches the National Curriculum. For children with learning difficulties this is done in a demonstrative and experiential way, but the approach is relevant to all children and the new classroom will be a resource for pupils from schools throughout the Sheffield area.

In it, children will learn about sustainability by discovering how they form part of a large, complex set of related interactions with the world around them. In this context, technological gadgetry and tactile and sensory experience come together as ways of experiencing and interpreting the world. We see the Classroom of the Future as a learning environment in its own right, using light and materials as primary stimulation, in addition to the imaginative incorporation of new virtual technology.

Architecture

To respond to and stimulate the senses, the Classroom will incorporate a variety of different substances in its construction so that the children can learn about them at close hand. The new building is sited adjacent to a pond which the school has developed as a conservation area and nature reserve, allowing close interaction with the natural habitats of plants and animals around it. The Classroom forms a link between the school and this zone.

The design also incorporates a tree, which permits close observation of living phenomena under supervised conditions. The building is intended to attract animals and other wildlife to inhabit it. We are working with an artist, Susan Collins, to find exciting ways of using electronic technology to bring the external setting closer and to enhance the experience of the world around through different sensory means, both aural and visual.

The Mossbrook Classroom of the Future, which is fully wheelchair accessible, features:

- a main space of 6 x 10m;
- three learning resources rooms of 2 x 2m;
- a ball pool exercise room of 6 x 6m;
- a disabled WC/changing room and one further WC;
- an external deck overlooking the pond; and
- a vertical green ‘living’ wall for cultivating plants and flowers.

School

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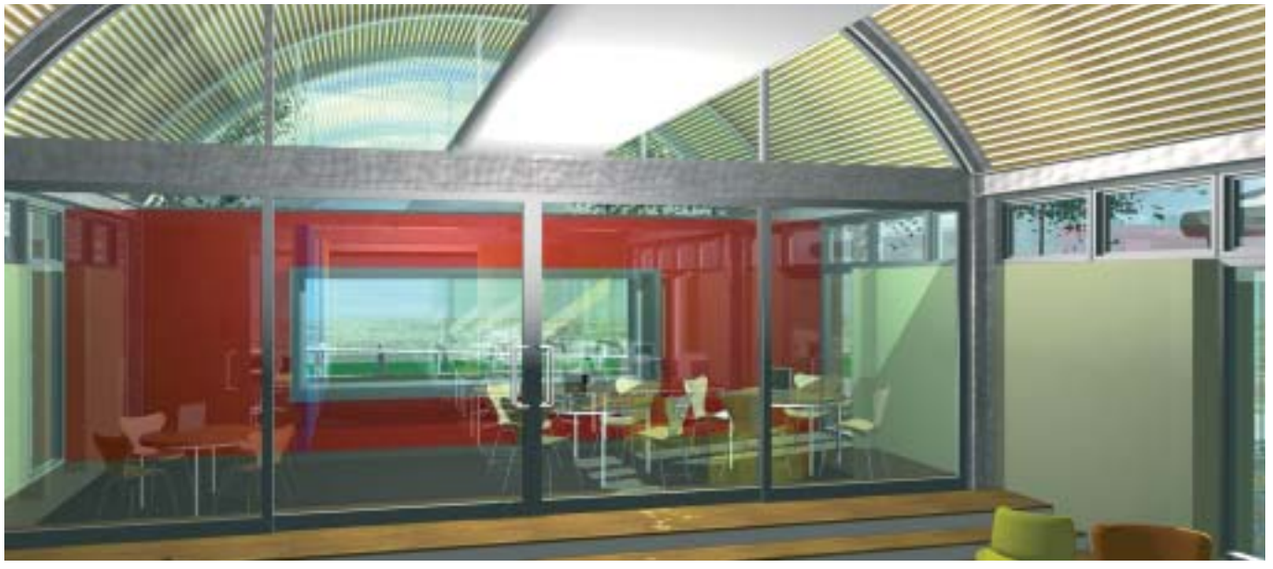
Programme

The project is scheduled for completion early in 2003.

The project incorporates a variety of different materials in its construction, so that children can learn about them close at hand

The new building is sited adjacent to a pond which the school has developed as a conservation area and nature reserve

The new design technology centre is a clean working environment which provides a range of teaching spaces, from open plan areas to closed seminar spaces



yewlands secondary school
classrooms of the future – sheffield

Introduction

Yewlands is an 11-16 comprehensive school in the north of the city, with technology college status. It was originally designed by Sir Basil Spence in the 1960s, and its technology spaces are now seriously outdated. This project will replace them with a flexible technology space that can be subdivided in different ways to deliver different areas of the technology curriculum. It will also be highly adaptable to cope with future change.

Education

This project will form a new technology facility at the school. Unlike a traditional classroom, where knowledge is presented by a single teacher to a group of 30 children under a continuous supervisory presence, in Yewlands' Classroom of the Future learning will be controlled virtually. Pupils can work on projects at their own pace and, to a certain extent, in their own way.

Individual pupils or small clusters will pursue their tasks in different learning and activity zones spread around the department. Learning is not sequential, rather it builds up as activity areas become available. There will be no queuing; pupils wishing to use a piece of equipment already in use will know this from the virtual plan of the department on their monitors. They can go on to another task until the equipment they need is free.

Architecture

The best way to describe the architectural strategy is to explain the process it is intended to support. A typical 'lesson' might unfold in the following way.

A central space will be used to brief 22 pupils at the beginning of each lesson. It will have a large electronic whiteboard, and be capable of fully closing itself off from the other areas of the Design Technology Department. Here, the teacher will present a task or project and clearly set out a range of menus from which individual pupils can draw required information to carry out the task.

Sources of this information will range from the Internet to pre-prepared teacher's notes and filmed video sessions. Pupils will sit at desks using their lightweight wireless laptops. When the initial briefing is complete, the walls of the space will open up to provide a larger open forum for meeting and discussing ideas. The new Classroom of the Future will then resume its role as a fluidly accessible part of the rest of the department. Existing departmental zones will be complemented by quiet zones.

These are best described as niche areas suitable for a maximum of three to four pupils at any one time, providing a more enclosed space for concentrated activities.

The whole design recognises that different pupils learn and develop in different ways and at different speeds. We do not wish to hold back fast learners. However, the Classroom of the Future will support those who are perhaps slower, more sensory learners. New technology enables efficient monitoring of pupil activity and the dissemination of vital information. We are proposing to move away from the traditional science lab approach to school design, towards a more flexible, open experience of the learning environment.

The form of the building is designed to offer extendibility. The project can be enlarged to replace older rooms that will eventually become redundant, thus organising the Design and Technology wing into its own department. Security and vandalism problems have been designed out, but not at the cost of turning the building into a fortress. Indeed, the room is an adult environment for learning where students will enact their roles in a space similar to a contemporary, well-designed office.

School

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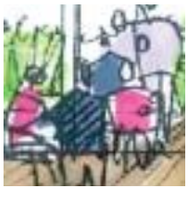
Programme

This project is due for completion in March 2003.

Wrockwardine
Wood CE (Controlled)
Junior School, clad
in cedar boards



telford and wrekin

classrooms of the future

Introduction

Our primary objective is to develop teaching and learning in the twenty-first century.

The Telford Classrooms of the Future will do this by:

- providing a flexible and sustainable learning environment;
- giving maximum access across the community to the inter-connected environment/network world;
- facilitating better use of teaching resources; and
- incorporating sustainable technologies to improve the performance of buildings, and monitoring performance within the curriculum.

We will use the pilot projects to develop and replicate a new standard for school construction, which will deliver better value and improved performance.

We aim to produce prototype classrooms for primary and secondary schools. These will demonstrate that standard factory-made modules can be adapted to fulfil a number of roles, and that they can be made to look attractive and in keeping with their surroundings.

The Lord Silkin Secondary School, clad in mesh with planting

Education

Our pilot projects seek to address these local and national issues:

- improving numeracy at primary level;
- providing the stimulus for learning for those failing to engage at secondary level;
- giving students more control over their environment;
- providing the means to involve teachers from other schools; and
- experimenting and piloting new ideas to test their effectiveness at all levels.

The Classrooms of the Future will have integrated ICT systems. They are designed to incorporate twin-screen, high-specification video conferencing, with personal terminals for students and queuing twin-screen arrangements for teachers. Interactive white-boards will be used for whole class learning and interactive plasma screens for small work groups. There will be some novel input/output devices, such as an interactive floor to engage students in learning through ICT, and novel radio arrangements. All of this will be flexible and accessible, while being unobtrusive. Systems will link with the NGfL network, allowing access to all schools in the area.

There will be the capability to add, remove or move equipment about as technology and requirements change, but this will be based on a hardwired power and data network with a grid of connections.

Curriculum applications will be created to turn the technology into a medium for learning. We propose to help students understand their own learning and team style through assessment software such as psychometric testing. Through building monitoring and control software, students will be able to learn about sustainability and care for the environment from the performance and operation of their own building (this will complement the work already done with Eco Warrior monitoring systems in schools and the curriculum CD already produced).

Architecture

Surveys of students, teachers, parents and others have indicated the need for:

- better seating;
- more and better designed storage areas;
- the ability to create virtual environments;
- colourful and creative designs to stimulate interest;
- the use of learning toys to stimulate interest; and
- flexible space to allow whole class, small group and individual learning.

In the Classroom of the Future, the learning environment will look and feel different. The buildings will be of robust construction, but will be friendly and welcoming, and their appearance will reflect their functions.

Off-site construction will be used to improve quality, reduce construction time and minimise accidents on site. The projects will be removable and transportable and will be replicable for future use, both within this Authority and nationally. Low-energy sustainable construction will be used and innovative sustainable technologies will be incorporated, to demonstrate independence from fossil fuel energy supplies. These include passive solar gain, photovoltaic cells, wind generation and rainwater harvesting. The projects will be flexible to meet a wide range of needs and will represent best value in life-cycle terms.

The units, or pods, are designed to make minimum impact on the environment and will not leave the landscape with significant damage when moved.

Furniture design is key to a Classroom of the Future. We are totally reviewing requirements and producing a new range of furniture fit for this project. This will be:

- comfortable and adjustable;
- capable of being folded away, to ensure the learning space is flexible and can be cleared for open use;
- suitable for as wide a range of ages and sizes of user as possible;
- attractive and in keeping with the building;
- capable of allowing use of the new learning technologies; and
- capable of allowing adequate controlled and secure storage of equipment and personal belongings. This will include personal swipe card access to lockers and recording of attendance for students.

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Under development

Programme

The units are due for delivery by early in 2003, and should be ready for occupation in March 2003.

afterword

classrooms of the future

These profiles of the pilot projects represent a snapshot in time, illustrating how far they had progressed by the early autumn of 2002. Many are now under construction and the majority will be completed during the spring and early summer of 2003. This is when the real testing phase commences.

To ensure that feedback is really useful, and capable of being disseminated widely, it is probably best to report the lessons learnt at two levels. One will be the particular issues that are being addressed locally, reported as case studies. The other will be an appraisal of objectives that are common across all of the pilots.

These are the kinds of questions we will be asking:

- has the pilot project had any measurable impact on pupil attainment, such as improvements in exam results?
- has the behaviour of pupils in the school been influenced by the design of the project, for example by improvements in pupil attendance?
- is there any evidence of changes in staff morale, for example evidenced in terms of numbers of days lost through illness?
- what impact has the project had upon the school's ability to recruit and retain staff?
- has community use increased since the new building was opened?
- have other types of out of hours use increased?
- how successful has the integration of ICT within the design been?
- what impact has it had on design?
- what are the designed-in strategies for adaptability and flexibility?
- how have these worked in practice?
- what were the technical innovations in design?
- how successful have they been?
- what suitability issues were addressed?
- how have the strategies worked out in terms of environmental impact, the users and running costs?

We hope and expect that the lessons learned from these pilots will produce lasting benefit both for education throughout the country and for the wider community, and we are grateful to all the project teams, teachers and children involved in these imaginative and innovative projects.

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