

Design and Build Projects within a School of Architecture

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Recent years have seen many developments in schools and colleges in those subjects which directly concern materials. Frequently the move has been away from the application of skills towards developing the creative and intellectual aspects of working with materials. The School of Architecture at Bristol gives its students a real and meaningful experience in the use of those materials which potential building designers will be expected to deal with. The School holds the view that realisation of design ideas is important, and to this end not only is an understanding of materials and their behaviour essential, but it is also necessary to gain experience in application. One of the most valuable activities to combine these objectives is a Design and Build project. Such a project not only involves the design of a building which has architectural merit but which also promotes quality in the construction method. In a well conceived project the student will not only learn about and experience the academic disciplines of Architecture but also in organisational and management matters relating to the building process and at the same time acquire some practical building skills. While there is nothing fundamentally new in designing and making it is a developing area within University departments of Architecture. An opportunity is thus given for students as part of their professional training, to realise their own designs and to be aware of the complex interaction between design decisions and practical problems of construction. This situation offers the ultimate in feed-back and as such is relatively unique in higher Design Education.

In the teaching situation many attractive and well conceived design problems are set up, analysed and solutions proposed but lack of realisation prevents adequate testing, particularly in the area of constructional feasibility and costing. The realisation of the solution is, of course, the quintessence of the exercise and is frequently the subject of

professional criticism. Theoretical knowledge without practical understanding of materials and processes involved inevitably results in buildings containing eg. structural failures, inadequate weather proofing, poor durability and shoddy appearance.

In order that students may be more aware of the building process, the Department of Architecture has built into its courses projects which introduce the realities of designing and building. Normally projects extend over a ten week period and are an alternative to, and run concurrently with the period of supervised professional experience with building contractors. The work is assessed and thus forms an important part of the students professional training.

One of the most important and difficult tasks is, of course, the selection of a suitable project. From time to time the University is approached concerning a specific problem and if it meets the criteria for a useful Design-and-Built project in educational terms, the Department will explore the possibility of undertaking it. The initial contact may be through formal application to the Department or through personal contact with a member of the staff.

It is necessary to establish clearly the criteria for evaluating the suitability of a Design and Build project.

There should be appropriate opportunities for designing, at both strategic and tactical levels.

It should afford opportunities for planning, programming, purchasing materials and components and organising labour and equipment.

It should also involve calculating, drawing, writing specifications and other aspects of communications such as meeting people and writing reports.

To summarise; the project should afford an opportunity for student architects to experience all those elements of work which are to be found in a small building project in

the real world. Students are allowed to choose whether or not to join a design-and-build project, the alternative as mentioned above, is to work in a contractors organisation. This element of choice places considerable responsibility on the individual student, requiring of him persistent application, tenacity, hard physical work and the ability to co-operate with his fellow students and other people affected by the project. The energy required of these projects from students and the staff involved is not inconsiderable. The burden of responsibility for the completion to the satisfaction of all parties cannot be ignored. Mistakes in drawing and models can nearly always be rectified, but mistakes on site or in purchasing and so on are another matter and can cause serious problems. A professional standard of supervision is crucial if good progress is to be made.

The cost of the building and the length of time it will take to complete are two very fundamental questions. To estimate the cost is a comparatively straightforward matter. The Department's principal interest is to provide for its students an opportunity for designing and building original and imaginative constructions and it recognises the interested people who make possible this experience. Quality designs can only be executed using the best materials and the sponsor will normally be expected to accept certain quality features in the design and detailing. The Department undertakes responsibility for designing and constructing a unique building, and the responsibility for providing the materials will be the sponsors.

The period of time for the completion of such a project, is of course, extremely difficult to assess. There are many unknown factors which influence the period of construction, two of the most important are the complexity of the project and the extent of the students experience. These projects are also undertaken during the winter months when the weather is unpredictable. An

ambitious project may encounter difficulty if there are insufficient students to complete the work within the allocated ten week period. An incomplete project presents problems as students other than those whose design is being realised may be called upon to finish the task. The situation is best avoided, as their lack of involvement with the original design will necessitate their contribution being in the area of construction only, and the period of building could be extended considerably. The member of the Department's staff who is responsible for these building projects is experienced in managing them, and these difficulties seldom arise although the possibility must be recognised, and compromises may have to be worked out.

These projects provide for the students an extremely valuable experience, and the educational benefits for those concerned are obvious. It would be unrealistic to expect that unique quality work could be undertaken unless there was a splendid student/staff relationship, a singleness of purpose and complete involvement.

While no difficulties have arisen with sponsors over projects that have been undertaken by the Department, a contract or document, explaining the project's aims, was considered to be desirable. All projects have been undertaken in a spirit of faith and goodwill, and this departure from the Department's normal practice will formalise the arrangements that have previously been taken for granted. This document is a statement of intent, and outlines the general procedures to be followed and the responsibilities of the people concerned: it aims to prevent misunderstanding. The sponsor must also be sympathetic towards the educational objectives of such work and will be expected to enter into the spirit of the project and to constructively help towards its successful completion.

Several design-and-build projects have been undertaken by the Department, the following are the most recent:—

Almondsbury Old School Hall

Almondsbury Old School Hall, now the Village Hall, provided for the students an opportunity to work on a building of architectural interest within a conservation area. The Old School Hall is in the centre of the village, close to the 12th Century Church and Primary School.

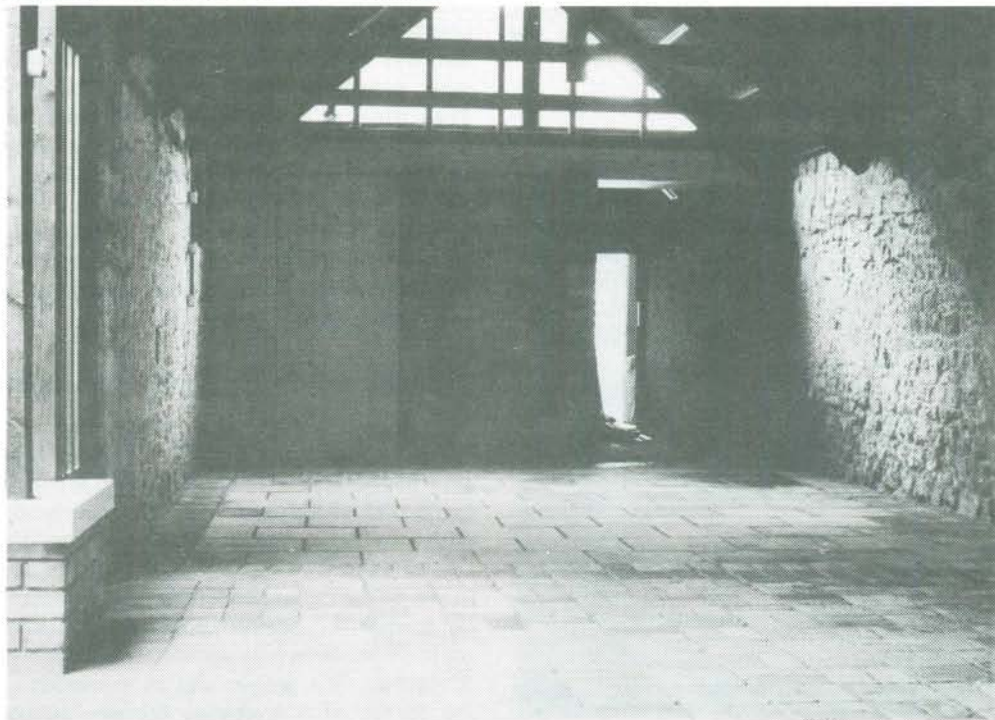
The Village Hall is the centre of village life, and as such its uses are many and varied: it houses a playgroup, the Women's Institute, the Guides and Brownies, and provides for the social activities of the local residents, and more recently, the newly formed Youth Group. To cater for the increasing demand on the existing hall, an additional small hall was proposed, and the Department of Architecture was approached concerning the designing and building of a hall to provide additional and suitable facilities for the local

community. The project was financed by local fund-raising activities, by discretionary Grants from the Local Authority, and supplemented by donations of materials.

There were several major constraints on the building, the existing boundary walls, the outside wall of the stone-built main hall, and a small enclosed yard which was to form a small patio and light source for the proposed extension. Within these constraints the building was designed.

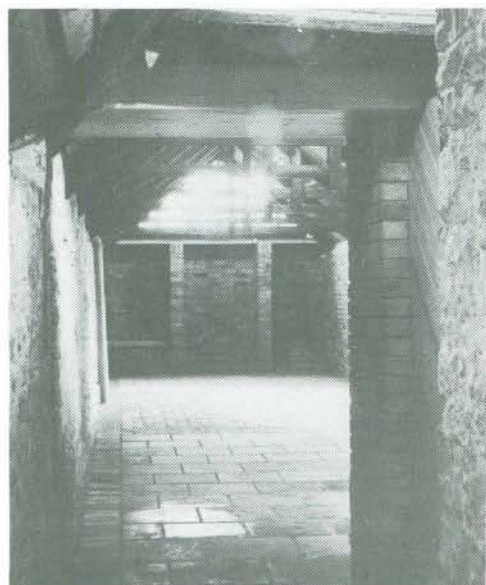
All the exterior walls of the building are of stone, and the roof is steeply pitched and clad in second-hand Welsh slates, the glazed gable ends are inset behind a parapet. The outside walls of the building, mainly facing private gardens, blend well with the traditional local style. The inside of the building is approached through a narrow entrance porch which accentuate the hall's spatial quality. Natural materials predomi-

Almondsbury Old School Hall – Interior



nate; the majority of the interior walls are of stone, but the end walls are of soft yellow brick. The roof structure is composed of eight heavy timber trusses, and the existing constraints dictated several methods of detailing to support them. These details have been effectively resolved by sockets which have been cast in concrete in-situ in the stone wall; on the brick section of the wall, the sockets have been constructed in brick. The brick piers supporting the trusses are within the cavity formed by the brick skin and the outside stone wall. The floor is composed of Severn Tunnel red bricks, soft yellow bricks, and grey slabs. Natural lighting is from the recessed glazed gable ends, and from an imaginatively designed centre section of the side wall which opens out onto the Courtyard. Water from the parapet gutters collects at the bay, and cascades from a lead-lined chute into a bricked recess in the Courtyard. The Courtyard is to be landscaped and planted. Many interesting details, such as these, give the building its unique quality.

Almondsbury Old School Hall – Interior



The nature and time-scale of the project was such that all the techniques chosen for the construction must be straightforward to carry out; the unpretentious quality of these techniques displays a sensitive combination of materials and constructions. The craftsmanship throughout the building exhibits careful and thoughtful design execution.

This ambitious community project started with Planning Permission in July 1975, and was completed in December 1976. Fifteen students have been involved in the project, and they have not only been concerned with all the roles normally found in a small contracting situation, but also at the strategic and detail levels of design. The interaction which exists in this situation between design ideas and realisation has considerable feedback benefits and is a contributing factor to the building's uniqueness.

The benefits of a project of this kind are considerable, not only to the organisation prepared to sponsor and support the project but also to the students who are concerned with designing and realising the building. Thus they, as students of Architecture, will experience a Client's or Sponsor's attitudes and responses, and will practise trade skills which they will eventually be required to supervise. For the Sponsor, the original and enthusiastic approach to the work results in a building which is of architectural merit and has been built for a modest price.

Bedminster Primary School Extension

The second project was undertaken at a Primary School in Bedminster. This is an area to the South of the City, and is mainly composed of tightly-packed terraced houses with very little open space. During the 19th Century the area was a prosperous one, and many of the larger properties bear witness to its former prosperity; unfortunately, some parts of the area now exhibit characteristics of decline. The project was an extension on the corner of a Victorian Primary School.

The original plan was for a play area, but as the project was nearing completion, an alternative use of the space was put forward.

The group of students who had chosen to undertake this project and who would form the Design-and-Build Team, visited the school and discussed with the Headmaster the substance of the brief.

On returning to the Department, discussions and preliminary design proposals were formulated. The design must not only meet all the requirements of the brief, it must also be undertaken within an extremely tight budget, sufficient only to purchase materials.

The designs were appraised by the students themselves, and their supervising tutor, and the most acceptable received more detailed consideration. Detailed

drawings were prepared and a model made, and submitted to the Headmaster for his consideration. On his acceptance of the proposals, the money was forthcoming.

There now follows the rewarding and valuable experience of realising the design and resolving the interaction between design decisions and the problems of construction. Many onsite skills must be mastered and the importance of team-work recognised. As in the previous project, all the building techniques were straightforward to carry out, and were well within the students' ability. The brick and block work is fair-faced, and the exposed roof structure, of post and beam construction, is of sawn timber only, the corners having been processed. There are windows on all sides of

Bedminster Primary School Extension



the building, and the sloping section of the roof is glazed. The wood-work, both inside and out, with the exception of the door, is finished with a preservative; the walls with Sandtex, and the floor is carpeted with Heuga Felt tiles.

The external face and form of the building is pleasing to look at, and blends well with the existing building. The atmosphere created is conducive to quiet study, and children enjoy using it.

The Department has also undertaken several other projects, and their undoubted success can be related to the tutorial facilities available and to Bernard Keay himself, whose interest, experience, and expert knowledge fit the many problems associated with these projects. The back-up facilities and resources of the Department reflect an interest and involvement in this type of work; the workshop is well-equipped with the basic machine-tools for cutting and shaping wood and metal; there is equipment for gas and electric welding, and a builders' yard with all its associated equipment. There are also laboratories for testing various structures and constructions.

Bedminster Primary School Extension



Teachers in design faculties in Secondary Schools could benefit by knowing more about the professional design work undertaken in the Universities and other Institutions of Higher Education, and its relevance to the work they also undertake. It would be useful to consider the similarities and differences of these design topics.

It is also pertinent to note the group activity methods practised by F.W. Sanderson at Oundle School at the turn of the Century, and mentioned by H.G. Wells in his biographical account of Sanderson's work.

'The year 1905 marked a phase in the co-operative system of work on the mechanical side with the machining and erection of a six-horse-power reversing engine, designed for a marine engine of 3,500 horse-power. Castings and drawings were supplied by the North Eastern Marine Engineering Works. The engine was a triumphant success, and thereafter a number of engines has been built by groups of boys. Concurrently with this steady replacement of the instructional-exercise system by the group-activity system, the mathematical work became less and less a series of exercises in style and more and more an attack upon problems needing solution in the workshops and laboratories, with the solution as the real incentive to the work. These dips into practical application have great stimulus to the formal mathematical teaching, for the boys realised as they could never have done otherwise the value of such work as a 'tool-sharpening' exercise of ultimately real value'.

The common factor in all these projects is people, the teacher and a group of young people and the college tutor and a group of students. Within these two main groups there are also fundamental differences; there is the pupil and student attitude, eagerness and enthusiasm: volunteering and persuasion. There is also the size of the labour force. This could be a comparatively large group of young people for a limited period each week over a protracted length of time, compared

with a student's involvement every day for ten weeks. These are major considerations when a project's feasibility is being explored initially. The principal aspects of these projects which are similar in both situations, are to develop an acute faculty of reasoning and to develop the basic skills of communication, drawing and making, albeit at different levels of ability and professionalism. The educational benefits to both groups are self-evident.

Another common factor in both situations is the students' basic knowledge and skill, and in order to achieve a satisfactory solution to these design problems, the building techniques must be extremely straightforward to carry out. If simple constructions are well executed, their unpretentious quality is pleasing.

Good designs should display an honesty in the use of materials and a truthfulness in construction. A student's awareness of these qualities should be developed at every possible opportunity. The problem in both cases could be similar but the complexities of designing and constructing may be very different. Projects undertaken by young people in school could be play structures, bicycle sheds, or animal houses, whilst those undertaken by design students could be similar to those outlined earlier which require more diverse skills and are more appropriate to a school of Architecture. The skills of brick and lead-work, an understanding of the complexities of roof structures, and all the relevant calculations which are necessary to determine the physical characteristics of the envelope, are a few of the many areas of knowledge that a student of architecture will need, and which are manifest in a project of this nature. Both groups of students will follow the same design and planning procedures, but each will have a different value and relevance for the students concerned: the objectives may well be different, but their true value is undoubted.

H.G. Wells records in his biographical account the following words of F.W. Sanderson, whom one must accept as a schoolmaster many years ahead of his time.

'No more valuable training can be given than this last — (Sanderson is referring to the preparation for a *Conversazione*) — well worth all the many kinds of sacrifice it entails. From it, at any rate, the spirit of competition is, I think, altogether removed. Boys, we believe, set forth to do their work as well as they possibly can — but not to beat one another ... I dwell upon these things because we hope that all boys will become workers at least, with interest and zeal, in some part of the field of creation and enquiry which is the true life of the world. It is from such workers, investigators, searchers, the soul of the nation is drawn. We will first of all transform the life of the school, then the boys, grown into men — and girls from their schools grown into women — whom their schools have enlisted into this service will transform the life of the nation and the whole of the world'.