SIMPLE CLASSROOMS FOR PACIFIC ISLANDS

C.R. Honey

Building Research Station of the Department of the Environment, Britain

Satisfactory classrooms for small communities on remote islands are more difficult to build than is generally believed. The problems are more practical than technical or economic. One must find a way of getting something reasonable built when suitable skills are scarce, local materials limited and transport difficult. The sophisticated technique, long-term programming and continuous collaboration in design and development which have made possible dramatic advances in the quality of school building in Europe are a world away. The need for satisfactory buildings remains. This paper outlines the approach recommended for two territories in the Western Pacific, by an architect from the Building Research Station of the Department of the Environment, in the course of an assignment concerned with building standards, techniques and organisations.

Background

Although circumstances differ widely between island territories, many are common to all and the principles underlying a solution for one place, although not the detail, may be valid for others. In this instance the New Hebrides presents an environment subject to earthquakes and hurricanes where, compared with other territories, labour is scarce and money plentiful. There is also no tradition of large buildings using local materials and techniques. The environment in the Gilbert Islands is much less demanding, labour is more plentiful and money is scarcer, and there is a tradition of very fine buildings using local materials and techniques. In both territories, few men skilled in western building techniques remain in the villages. Fewer still have the background, means or inclination to operate as contractors. Shipping services to outer islands are infrequent and sometimes unreliable; materials are brought ashore in small boats and often manhandled to the sites. Supervision in the conventional sense is at best intermittent. Projects require villagers to contribute a great deal of labour and sometimes money. In these circumstances classrooms range from unduly expensive (though not always well built) structures in western techniques to inadequate but low-cost accommodation of local materials as interim measures.

Approach

The solutions proposed (and in the New Hebrides actually implemented) take account of the limitations in skills, transport and money, and allow decisions to be made locally on the facilities to be provided and the order in which improvements are effected. The basic precepts are:

(a) Design accommodation of the right size and correctly sited, as part of a planned ultimate development;

(b) Construct at least the foundation, frame and roof of the accommodation immediately needed and provide

display areas and good storage for teaching materials;

(c) Provide initially as much of the flooring, walling, windows and ceiling as can be afforded. If there is not enough money to build them to a good standard at first, omit them or for the time being improvise, e.g. with coral floors and bamboo walls;

(d) Spend money only on materials which will be satisfactory for the ultimate building. Avoid expenditure on low-grade materials with the intention of replacing them later.

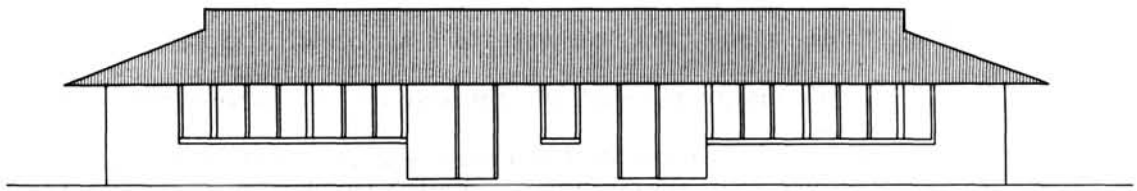
This approach is feasible because complete exclusion of weather from a classroom is not of over-riding importance in such an environment. Things, rather than people, require secure and weather-proof facilities. Further, a classroom needs continuous window openings and the walls need not be used to carry the roof: if they are, beams or lintels are essential to span the large openings. It is not necessary for the whole floor to be concreted before the superstructure is erected. This may delay the project until the large amounts of aggregate are brought to the site.

The New Hebrides

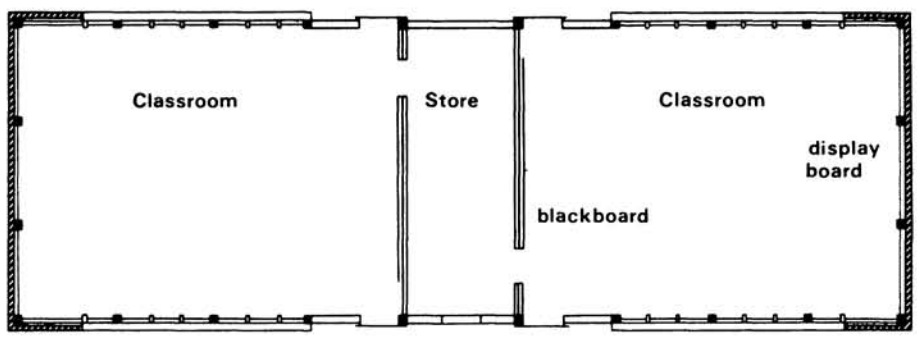
In the New Hebrides, this approach involved the use of a timber frame and a roof sheeted with galvanised corrugated iron. For the first two projects, built without supervision by a New Hebridean builder and two VSOs respectively, the posts, roof trusses and shutters were prefabricated in the Works Department and taken apart for shipment. The detailing of the bases of the posts did not require very accurate work in setting out and that of the window cills and wall plate (also prefabricated) ensured that the posts were brought to their proper position. A skilled man could equally well have cut the framing on site. If full overheads are charged, pre-fabrication in a workshop usually costs more. Local preference was strongly in favour of a "proper" building, which implies a concrete block structure. As a cladding material, concrete blocks are very suitable for schools and maintenance is limited to redecoration. As a load-carrying material in local circumstances they have disadvantages. Reinforced concrete beams and columns are needed under earthquake conditions and the uncertain quality of local workmanship and aggregates (usually uncrushed coral) make this an unreliable technique. Concrete blocks may be expensive if they have to be shipped to the site and variable in quality if made on it. Construction could be delayed while the blocks are curing.

If the blockwork is used only as cladding below the windows and as high as the wall plate at the ends of the building, and the roof load is carried on separate posts, no structural concrete is needed and the block-making and laying can proceed independently. All that is necessary is a footing sufficiently wide to carry the blockwork as well as the posts, and careful bracing of the posts until the blockwork is completed. Where blockwork is not feasible at all, flat asbestos-cement sheeting can be applied as cladding to the frame.

The windows in the first two schools were horizontally pivoted shutters with hooks to hold them open in one of two alternative positions. In one school they were faced with tongued and grooved boarding and in the other with flat asbestos-cement which lapped over the face of the openings so that accurate fitting was not important. If necessary, shutter frames could be faced initially with woven split bamboo.



Elevation



Plan

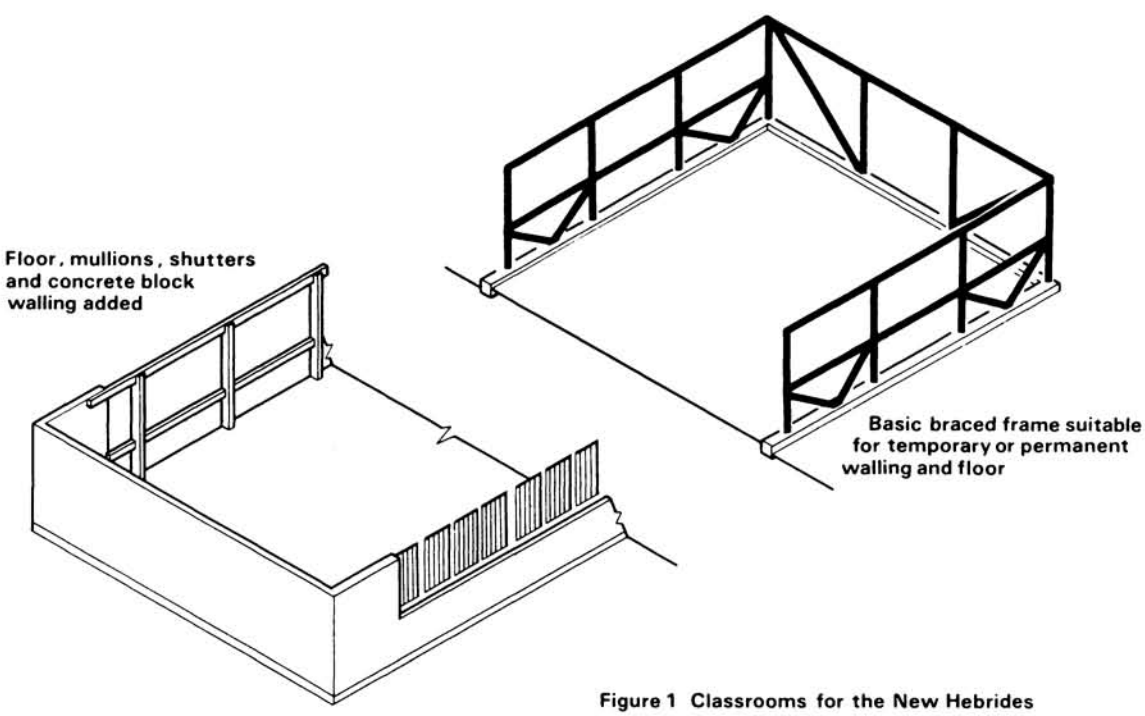


Figure 1 Classrooms for the New Hebrides

Gilbert Islands

For the Gilbert Islands a similar design is also suitable, particularly on Tarawa where adequate supplies of traditional local materials are difficult to obtain. On outer islands the situation is different. Local materials, mainly pandanus poles and thatch, are available and their use is well understood. There are economic reasons in favour of using them even when the relatively short life of thatch is considered. (There is, however, an understandable desire for a "proper" building, but in relation to local incomes this would bring a heavier financial burden than in the New Hebrides.)

The traditional Gilbertese maneaba structure provides a very satisfactory way of covering a large meeting space. The simplicity of the structure depends on a relatively square plan form and a very low eaves height and there are no walls. For teaching, however, a higher standard of daylighting, storage facilities and display space are needed, and for several classrooms in a block a more elongated structure is essential.

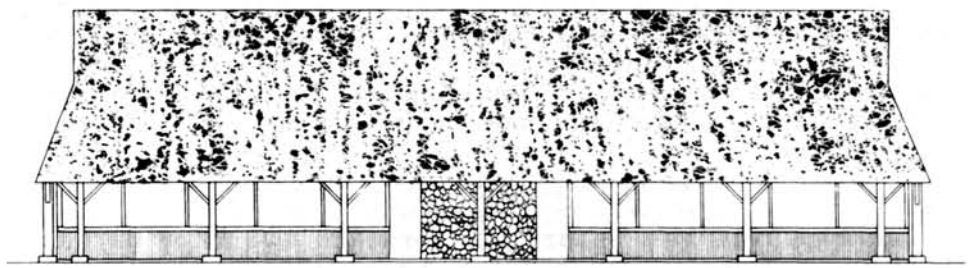
The modifications proposed to the traditional structure to meet these needs are increasing the eaves height by setting the roof on braced posts, providing a ceiling to reflect down on to the working plane daylight reflected up from the surrounding sand, and constructing a masonry store-room between pairs of classrooms to stabilise the building. These modifications radically change the original concept of the framing of the maneaba and require some understanding of structural principles. The provision of a floor, walls and windows is desirable, but not essential initially, and they can be made of whatever suitable materials are available.

Prefabrication

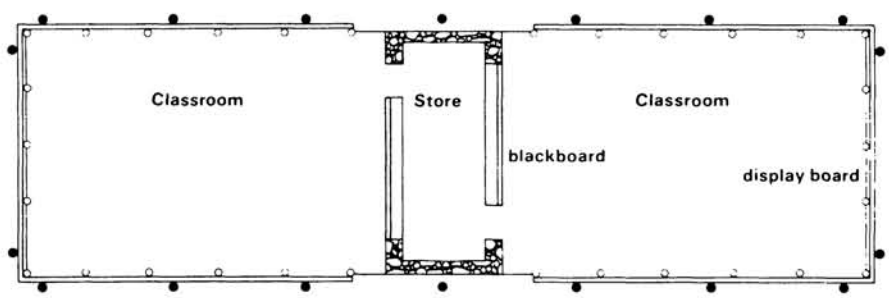
This approach to school building, whether it uses a timber frame on posts or a traditional structure of pandanus poles, is basically the same as using a prefabricated steel frame and it stems from the simple shape of classroom buildings in the tropics where continuous window openings for ventilation and light are needed on both sides. Steel frames have been used successfully for schools in the Pacific and in some places may cost no more than timber frames. Ordering and despatch need special care as does handling on arrival because damage or deficiency is difficult to remedy. It may be thought that, with the scarcity of resources on some outer islands, the simplest solution would be to provide a completely prefabricated building. In practice these solutions are seldom completely prefabricated and still require considerable work in site preparation, foundations and finishing. They may in fact complicate the work because of their need for greater accuracy and more care in shipment. Ideally, simple community buildings should provide an example of techniques which villagers can adapt for other buildings and which provide work for local skilled or semi-skilled men. In practice, the circumstances of each project will indicate what should be done.

Conclusion

Because circumstances can differ widely from project to project, it is useful to have ways of building which can be suitably varied. Not every educational authority would agree to the priorities between, say, storage, flooring and walling as suggested above, and there may be scepticism about techniques which provide only the carcase of a building and leave unresolved the question of timing and financing its completion. But in some cases they



Elevation



Plan

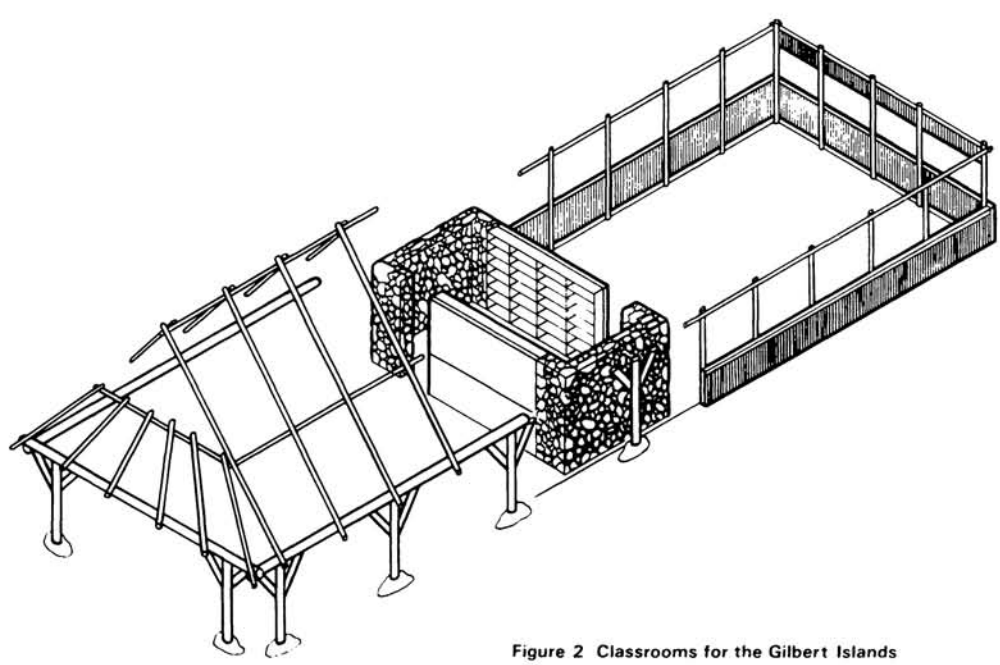


Figure 2 Classrooms for the Gilbert Islands

may enable a school to start this year instead of next year or to have three classrooms instead of two and this may sometimes be advisable even though walls and flooring have to be improvised. Where there is a system of subsidies for capital works, it can be used to influence local choice. For example, the full cost of all the essential features (foundation, frame and fittings) could be met centrally and the remaining items subsidised according to local preference and contributions. There may also be prohibitions on features known to cause trouble, to be executed poorly, or to require expenditure on short-lived materials such as untempered hardboard used externally, unpainted softwood exposed to weather or timber structural members buried in earth or concrete. Where there is not enough money for a well-made durable piece of work, it is better to have a "no-cost" short-term solution of local materials than a low-cost solution of imported materials that may last only a little longer. A floor of tamped coral is better than a very thin floor of weak concrete which will soon break up, and walls of woven bamboo or coconut mid-rib are better than unpainted hardboard which will soon deteriorate. Another doubtful form of economy is to build classrooms too small for their purpose. There is usually very little saving in reducing the width of a classroom but this can result in restriction of teaching methods.

The approach described requires little special technical skill either in design or construction, although some is needed. Outer islands contain too many derelict buildings which through ignorance or expediency were erected by amateurs. With the techniques outlined and sympathy for and understanding of local circumstances, a higher standard of school building could be achieved.