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School building programmes:
motivations, consequences and implications

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Introduction

Over the next fifteen years, the British government is committed to renewing, through replacement or refurbishment, the entire stock of state secondary schools (*Building*, 16 May 2003; www.bsf.gov.uk). While architects and others interested in the physical learning environment applaud this commitment, often arguing that such spending is overdue (Clark, 2002), it seems legitimate to question just what this investment can be expected to achieve. As Heppell *et al.* (2004) point out, such building 'is welcome news if we are building the right schools, but an accelerating crisis if we are not' (p. 2).

One way to assess likely outcomes is to consider past examples of large-scale building programmes, both in the UK and elsewhere. Indeed, those involved in the current wave of school building refer to previous bursts of building with, for example, a spokesperson for the DfES commenting that '*Building Schools for the Future* is the biggest capital investment project since the Victorian era' (*Guardian*, 3 December 2004). Therefore, it seems reasonable to consider the background to, and results of, these building projects in the expectation of finding implications for the current situation. Such a perspective could be expected to clarify aspects of the current situation and so provide understanding of likely consequences. For instance, although school buildings must reflect the assumptions and ideals behind contemporary education, this influence is often more obvious when the past is examined. Getzels (1975) suggests that changing conceptions of learning are reflected in changes in US classroom shape and layout through the twentieth century, from rectangular classrooms for empty learners, to square classrooms for active learners, then circular seating arrangements for social learners and finally open-plan schools for stimulus-seeking learners. If this is the case, it might be questioned what the arrangements of proposed new schools are conveying about current assumptions and concerns.

This literature review will consider previous phases of school building in the UK, as well as, where appropriate, elsewhere in Europe and in the USA. It identifies common themes in the aspects which initiate and then influence school building programmes, and it relates these to the outcomes and consequences of these past waves of building. This allows the important elements of the current situation to be seen more clearly and suggest implications for *Building Schools for the Future* (BSF).

Some themes

A central question for any enquiry into school building is the importance of the physical environment for learning. Architects tend to start from firm assumptions about the importance of buildings, including school buildings (e.g. Dudek, 2000; Slessor, 2004). These appear to be paralleled by the certainties expressed by the current government that spending money on school buildings is an obviously worthwhile investment. However, it is necessary to be cautious about translating these ideas into expectations of decisive effects on either teacher or student

behaviour (Higgins *et al.*, 2005). While there are elements of the school environment that are important to learning, there is no evidence of simple causal links between the environment and behaviour within it. The experience of open-plan schools, in both the UK and US, shows that a setting does not determine behaviour (Proshansky and Wolfe, 1975; Canter and Donald, 1987), while attempts to link student achievement with physical environment are often equivocal (Weinstein, 1979; PricewaterhouseCoopers, 2000).

However, such limitations to the effects of particular changes to the environment do not exclude the possibility that, on a larger scale, the way a large batch of schools is built might have consequences for education and perhaps other areas. For example, Becker (1966) considers that the tendency to reform education in Germany in the 1920s was held back by the existence of a good stock of old-fashioned schools. Although the effect of such buildings on individual teachers and pupils might be complex and varied, it is reasonable to hypothesise that, overall, the buildings prevented change from gathering pace since they provided a backdrop against which teachers, administrators and policy makers could continue as before. In contrast, in both West Germany and Britain, after World War Two the practical necessity of school rebuilding provided an opening for particular styles of school reflecting contemporary concerns. Such schools were built in huge numbers. Furthermore, as will be argued in more detail below, the nature of the post-war situation, and not just the educational ideas of the time, influenced how the schools were built, having consequences for education throughout later decades.

This introduces another important aspect to school building programmes: the ongoing influence of the particular sorts of schools built on future education policy and practice. The central position of this understanding of school building for the current British programme may be gauged by the title *Building Schools for the Future*. However, while it is necessary to recognise the future potential of schools built today, it is much more difficult to know how to deal with this responsibility. As will be shown, previous school building programmes have been similarly insistent on their aims of providing for the future, but later critics still argue that they failed. It may be questioned how much it is ever possible to judge future needs, and the implications of systematic difficulties in doing this will be considered.

Initiating building programmes

Unseen influences and retarding forces

Particularly in hindsight, it is tempting to see school building projects as singular, carefully planned and controlled events, with a certain style of school, reflecting contemporary values, reproduced across a country. However, the building bursts that have occurred do not stand alone in time, but are instead influenced by previous building; while the production of a particular style is generally a complex process of competing factors, although this is sometimes more or less pronounced. For example, currently references are made to the school building that took place in nineteenth century Britain, with, for instance, CABE producing a web page about 'Victorian Schools' (CABE, 2005).

This building wave and the schools it produced tend now to be seen as monolithic, but in fact there was complexity and variety in both the process and its results. Seaborne and Lowe (1977) comment on design, pointing out that the 'vast building programme for elementary schools which followed the 1870 Act disguised a wide variety in both internal organisation and external architecture' (p. 20). The expansion itself can be seen as happening via a 'balance of power' between church and state (Archer, 1979, p. 170), with the burst of building driven by competition between local state and national voluntary societies. This arose because the 1870 Education Act insisted on a locally run 'board' school only if there was not already an alternative church or charity school, prompting both sectors to build to assert influence.

Other writers have similarly drawn attention to the idea that the state may not be an all-powerful driver in the expansion of state education (Fuller *et al.*, 1992; Fuller and Rubinson, 1992). Fuller and Rubinson argue that in nineteenth century France school expansion was driven by a three-way competition between church, local politicians and the desires of middle class families. Meanwhile, the aim of Green (1992) is to explain just why Britain, with its apparently powerful state, took so much longer than comparable countries to achieve a national system of compulsory education. With these arguments in mind, it seems worth considering whether current states have the sort of simple control over the direction of education that might be expected, and which appears to be assumed by those involved in BSF. In the context of education expansion, Fuller and Rubinson (1992) point out that causes can be seen both below the state level in the actions of individuals or sections of society and above the state level, as global ideas have effects within countries. It seems likely that factors at these levels are operating in British education at the moment. It could be argued that some of these influences on school building are being identified and claimed by the government as their own. For example, the intention to build in an environmentally sensitive manner, presumably as a result of international concerns, features as a main priority in the BSF Building Bulletin (DfES, 2002). However, it might be questioned whether there are other factors that are part of the situation initiating BSF, of which the state is less aware.

A factor that will clearly be influencing the current plans, and over which current actors have little control, is the situation as it stands. As was mentioned above, the results of building bursts may sometimes seem to be quite distinct, and perhaps their planners would have preferred to see them as breaks with the past, but in fact it is generally possible to identify historical continuity. Sometimes this results from fairly clear design assumptions, but even where these are not in evidence there are usually cultural understandings which then influence building design.

For an example of the strength of continuing cultural assumptions influencing the practice of education even against a very determined change in policy, it is interesting to consider the development of Soviet education after the 1917 revolution. As Alexander (2000, p. 70) comments, 'Russia presents a much more extreme case than France of the thesis that social transformations, however radical, manage to ensure continuity as well as change'. A number of other writers have made similar points regarding the changes associated with the establishment of the USSR (Johnson, 1950; Zajda, 1980), while the assessment of Alexander also applies to the practice of

education since the collapse of the USSR. It can be argued that a particularly Russian conception of moral development can be seen to be influencing education through tsarist expectations of national service and orthodoxy (Alexander, 2000, p. 70) into Soviet education's concern with *vospitanie*, or up-bringing (Alexander, 2000, p. 73; Bronfenbrenner, 1970) and continuing to be seen in the collective style of teaching and provision of two-person desks (Alexander 2000, pp. 223–4). Holmes (1991) discusses in more detail how the practice of teachers in the 1920s in the USSR did not follow the policy being dictated by the state and argues that, in the end, policy was altered to fit practice. He claims that the 1920s radical curriculum was not implemented because 'teachers refused to cooperate in the critical area under their control – the classroom' (p. xiii). While it might be arguable how decisive teachers were in this case, it seems reasonable to conclude that the teaching profession is a means for continuing cultural assumptions to influence educational practice, and the idea of teachers, in their own classrooms or individual practice, failing to change will be returned to. In addition, others involved in the life of school, such as students and parents, might limit, or at least affect, the process of change. Hargreaves (1972) uses the concept of a 'working consensus' and suggests that pupils and teachers implicitly negotiate possibilities based on their expectations and aspirations.

Although the example of the USSR merely demonstrates a general cultural continuity, there have been other occasions when the existing situation has a more distinct effect on actual school architecture. There is a suggestion of this in the way that the concentration of American educational reformers of the 1830s and 1840s on physical defects in existing school rooms, and ways to remediate them, allowed them to ignore the design of the room. In the writings of Henry Barnard (Connecticut, 1842; Barnard, 1931), the schoolroom is taken as a given and while there are lengthy descriptions of innovations in heating, ventilation, furniture and other equipment, very little thought is given to the fundamental organisation of education and the nature of the space required.

In contrast, in nineteenth century England, where the underlying assumptions were less homogenous, the basic structure of the school was considered. As described by Seaborne (Seaborne, 1971; Seaborne and Lowe, 1977), there were two distinct forms of school to compare. The single-room schoolhouse, common in charity schools through the eighteenth century, was seen as potentially able to develop into an ever bigger auditorium, requiring particular organisation and design features. The British and Foreign Schools Society in the early nineteenth century proposed such a model school for 304 pupils, all in one room, with a gradually sloping floor and curtains to reduce acoustic reverberation (Seaborne, 1971). Yet there was also conflicting pressure to move to smaller classrooms, allowing more specialisation, both in terms of ages of children and areas of the curriculum. However, it was difficult to see how such schools could be operated across the country as education expanded in the 1870s because there were few qualified teachers, but many pupil monitors, a situation more suited to one-room education. Seaborne and Lowe (1977) argue that this situation in England led to the typical board school design, which became extremely prevalent, of a central hall with classrooms opening off (see Figure 1).

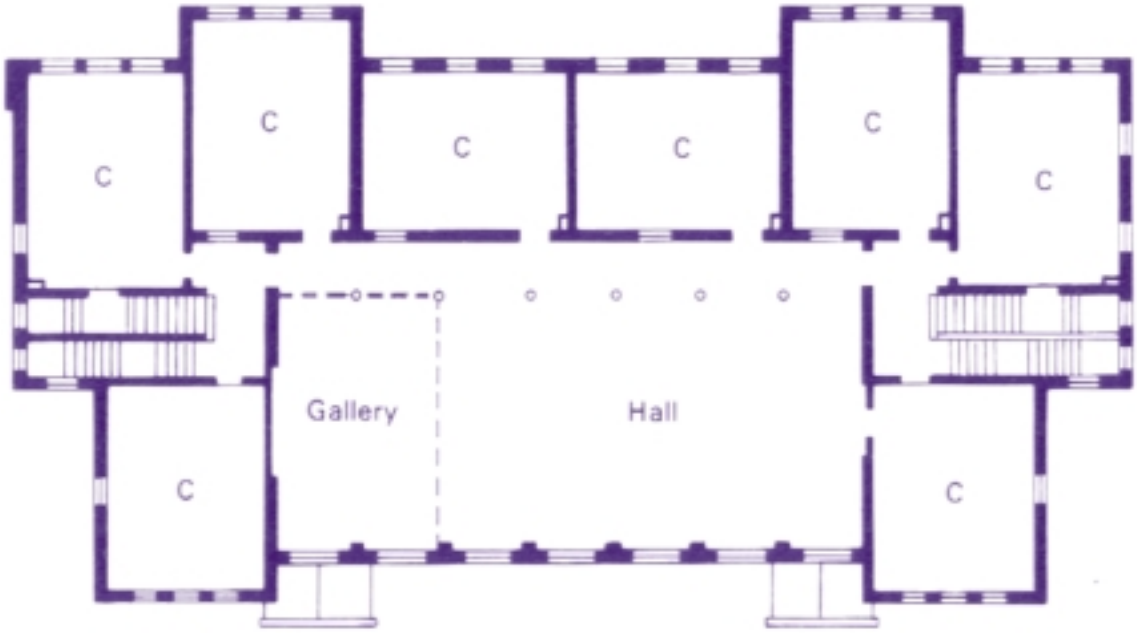


Figure 1 Central hall design, Jonson Street Board School, 1873 (Seaborne and Lowe, 1977, p. 26)

This layout allowed for surveillance by a headteacher, and so less immediate need for qualified teachers, but allowed a movement towards separate classroom teaching to begin. Therefore, although the design solution in this case can be seen as novel, it is clearly the result of historical developments and assumptions in education, together with factors of the contemporary situation. It is also interesting to note that this attempt to accommodate educational practice through building design was essentially a compromise and a 'cautious approach' (Seaborne and Lowe, 1977, p. 6).

More conspicuous forces driving the building of schools

Having considered some of the less evident or remarked-upon, yet still influential, forces involved in school building, it now seems appropriate to turn to those factors that are generally acknowledged. These include population changes, economic factors, legislation and consistent degradation of existing schools through war damage or age. It will be necessary, though, to question whether their impact is simple and predictable, with comparisons between building programmes being helpful.

The building of schools is often explicitly linked to increases in population, whether these come about through changes in birth and death rates, or through immigration. The impetus that was given to British school building post-WW2 by the climbing birth rate is frequently remarked upon (Seaborne, 1971; Seaborne and Lowe, 1977; Maclure, 1985; Saint, 1987; Gordon *et al.*, 1991). Through the 1950s and 1960s, the fluctuations in school building do appear to be quite neatly related to the birth rate, with primary school building peaks coming just after periods of raised birth rates and the first peak then being followed by the rise in secondary school building (Figure 2). Gordon *et al.* (1991) consider that the birth rate peaks had similar effects immediately

post war and in the 1960s: 'As the rising school population moved through the school system, shortcomings in that part of the structure became obvious' (p. 85). However, as will be discussed in more detail later, there are important differences in the schools that were built during the two peaks of primary school building, in the early 1950s and late 1960s. Furthermore, examination of other periods clearly demonstrates that more than population increase is needed to initiate school building.

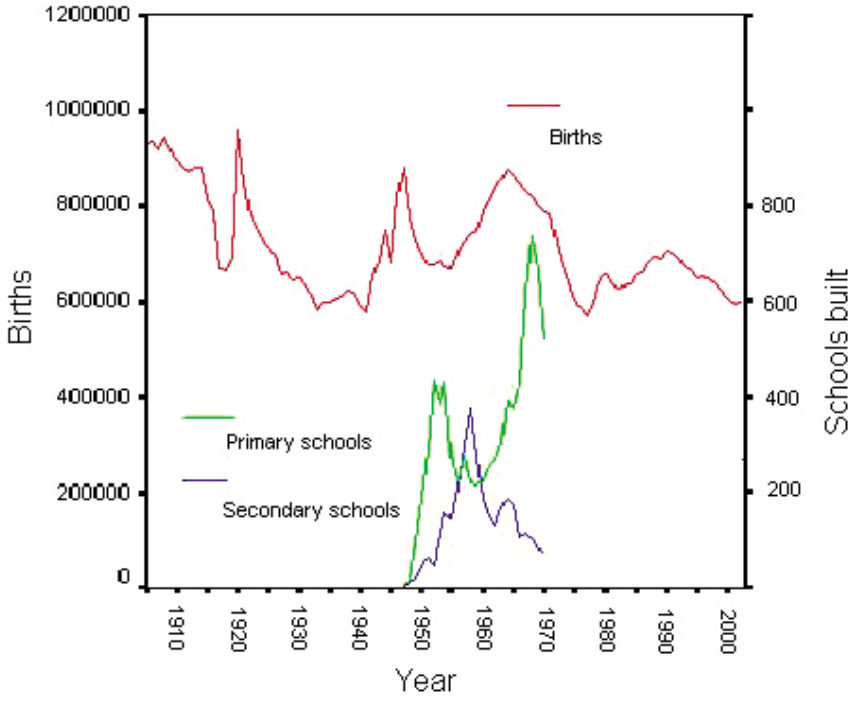


Figure 2 Births (1905–2003) and schools built (1945–1970) each year in the UK

Earlier in the century, in the UK, the birth rate had been reasonably high, only dipping briefly during the First World War and then reducing as the 1920s progressed, so it could be argued that there were population-driven needs for more schools. Yet there does not appear to have been much building during the early twentieth century, and then the economic situation, together with perhaps a lack of collective determination, meant that 'for much of the inter-war period, school building languished' (Maclure, 1985, p. 3). It might be thought that central government involvement is a vital variable, since after WW2, the demands of the 1944 Act to raise the school leaving age to 15 and provide proper secondary education seem to have been very influential. However, the 1926 Hadow Report, which recommended the abolition of all-age elementary schools, with schooling reorganised into primary and secondary phases, provoked only isolated change and, in general, allowed elementary schools to continue for another twenty years. Of course, part of this lapse of time is explained by the war and Saint (1987) explains the earlier failure to act through reference to the depression.

It could be argued that a decisive factor is legislation, since it was the 1936 Education Act, which eased funding and included a commitment to raising the school leaving age in 1939, that was followed by 'a short lived fever of school building' (Saint, 1987, p. 36). Of course, as was the case in 1944, legislation does not appear from nowhere and it is clear that the underlying cultural climate, including economic factors, affects exactly when important acts get passed. Yet, once they are in place, they can then function as distinct accelerators of change and of school building. Whatever the exact mechanisms, consideration of the inter-war period in British history does lead to some questioning of any simplistic link between population and school building. To further test such links, it is worth considering the development of the US education

system as population rapidly expanded towards the end of the nineteenth century and the beginning of the twentieth.

Rivlin and Wolfe (1985) argue that at the beginning of this period, the USA was on the cusp of providing the sort of universal, liberal education that would have been the envy of the world. Certainly, earlier in the century, Henry Barnard was advocating the standard provision of quite extensive collections of equipment, such as maps, plans, geometrical models, collections of scientific specimens and perhaps a magic lantern, together with the establishment of school libraries for the use of the whole community. It could be imagined that the increasing child population, which was particularly pronounced in urban areas, leading to a need for urban schools (Dewey and Dewey, 1915), would have been the force required for acceleration in this direction.

Instead Callahan (1962) describes how this need for investment in education coincided with increased suspicions about public sector overspending, popular notions of the need for efficiency in all areas and the high status of business. The increased numbers in the schools were partly due to immigration by poor, often uneducated, Europeans, resulting in older children starting schooling late and high proportions of children with English as an additional language. This could have led to demands for a more extensive and imaginative education system, but instead seems to have fed into concerns about inefficiency, often measured by the inevitable high numbers of children repeating years, and simplistic demands for business-like 'scientific management' of schools. Edwards and Richey (1963) see the conservatism within the American educational system of the time as a more predictable feature of the political triumph of capitalism and industry over rural and land-owning concerns, and the resulting acceptance of certain assumptions.

A clear effect on the building of schools was the insistence on efficient use of space and the popularity of 'platoon schools', where even very young children moved between classrooms, halls and playgrounds so that all space was continually occupied. For an example of the implanting of these ideas, it is interesting to look at a major reference book of the time which aimed to bring together best architectural practice and guidance for further improvement for school building. In this (Donovan, 1921), the main author, a school architect, has many humane and thoughtful proposals to make regarding education but still refers to 'plant and equipment of the school day' (p. 21) and draws an analogy with a factory, saying that '[i]n school planning, the routing of the human material is essential' (p. 20).

It can be seen that although demographic factors are undoubtedly related to, and influential upon, school building fluctuations, this relationship is not simple. As has been shown, there is a complex interplay between population and other influences, including economic factors, popular or cultural ideas and legislation. This has both quantitative and qualitative effects on school building, so that more than population influences how many schools are built and of what type. This issue of school design will be considered in much more detail later, but the example of the USA suggests the importance of considering the range of influential factors.
Before moving on to examine the detailed development of school building bursts and

the architecture involved, however, it is appropriate to consider one more factor which should initiate building. This is the extent and physical state of the existing stock of school buildings, which has clearly been influential in the past. Furthermore, the current state of British secondary school buildings is often referred to as a reason for BSF. For example, a Bradford school involved in the first wave of BSF states on its website that: 'We urgently need these new buildings. The original school, opened in 1956, is now in a poor state and many of our classrooms are too small' (Buttershaw, 2005).

Initially it seems sensible to consider the effect that the absolute number of schools has on building before moving on to the apparently more subtle question of their adequacy. However, even the question of whether there are enough schools is seldom straightforward. A major reason why there might seem to be insufficient schools is that the school population changes. A fundamental cause of this was considered previously in the discussion of demographic influences and it became apparent that many other factors are involved in any reaction to increased numbers of children. Such complexity is still more clearly involved where the school population increases because of political decisions and legislation, such as increasing the school leaving age or increasing rights to nursery provision. It seems likely that the detail of a situation needs to be considered before any precise prediction about the outcome of a shortfall in school buildings can be made.

However, it would appear that actual destruction of schools and the resulting need for rebuilding does have quite a distinct impact. In Britain after WW2, the considerable war damage and lack of maintenance during the war meant that there were not enough schools for the immediate need, and certainly more would be required to cope with the increased birth rate and the raising of the leaving age. The totality of the situation does seem to have resulted in a notable determination and consensus so that 'the [political] parties argued in the 1950s over delays, temporary curtailments and reluctance to push harder, but all were agreed on the need for building programmes' (Gordon *et al.*, 1991, p. 64). In West Germany, there were similar challenges of war damage, and although here progress lagged behind that in the UK for obvious reasons (detailed by e.g. Huebener, 1962), by the 1960s a similar burst of school building was under way. Huebener (1962) talks about 'ambitious building programs' (p. 70), with Stuttgart having completed 84 new school buildings within the previous two years. Meanwhile Karl Otto's (1966) book of exemplar schools, which was published in 1963 in West Germany, is clearly a response to a national vigour and determination, which he intends to channel into producing suitably modern schools.

It seems possible that it was the collective vision and determination that resulted from the necessity of post-war rebuilding in both the UK and West Germany that particularly drove school building. In a related way, Green (1992) argues, nationalism has on occasions fuelled the expansion of state education. He claims that in America, a post-independence desire to build up the American nation led to the dominance of state-run schools over private schools; while in eighteenth century Prussia, a determined nationalism, orchestrated by the central state, accompanied the beginning of a system of education. Furthermore, Green asserts, it was the resurgence of national identity after the Napoleonic occupation that produced, by the early

nineteenth century, Prussia's universal, compulsory state school system which was 'for its time, a unique achievement' (p. 120). It is perhaps possible to detect such a similar determination to restart and rebuild schools after the natural disaster of the recent Asian tsunami (see e.g. Harding, L., Trickling back to a city's only school, *Guardian*, London, 13 January 2005).

It would seem then that, although not always simple, a collectively agreed and understood shortage of schools can be very powerful in driving school building, particularly if national pride is involved as it is after a war, occupation or other disaster. It is more complicated, however, when it is claimed that there is an effective shortage of schools because so many are inadequate. Clearly outcomes then must depend on arguments about, and interpretations of, the nature of the inadequacy, bringing in many cultural influences and educational ideals.

The idea of inadequate schools is generally linked to age, and so can be expected to be a perennial problem as each wave of schools gets old. This expectation is indeed fulfilled when opinions on schools through time in the USA and UK are considered. In the 1840s in the USA, Henry Barnard was highly critical of existing schools' ventilation, lighting and furniture, while also complaining about their continued adherence to 'the old Connecticut plan' of desks arranged around the sides of the schoolroom (Barnard, 1839). At the end of the twentieth century, American writers are still voicing much the same complaints about 'old' schools, although virtually all of these will have been built since Barnard's time. For example, Tanner (2000) refers to the 'deplorable conditions of school facilities in the United States' (p. 309), while Young *et al*. (2003) comment that 'substantial numbers of schools have inadequate ventilation systems' (p. 12). If this repetition seems surprising, it is perhaps worth considering the criticism of Rivlin and Wolfe (1985) that those involved with school renewal often have a vested interest in building new schools and are therefore keen to find fault with existing buildings. More moderately, it is perhaps inevitable that the attractions of the new will tend to be obvious and can be used to denigrate features of older buildings.

Given the difficulties of answering to everyone's satisfaction the question of when an old school is too old, there is often a reliance on the argument that such schools have become inappropriate for modern needs. In the past, technological changes have meant that certain features come to be perceived as indispensable parts of a full education. Thus British industrial development encouraged the provision of laboratories in grammar and early technical secondary schools. After WW2, the needs of industry and business led to the importance of space for vocational training, such as workshops and typing rooms, in secondary modern schools (Seaborne and Lowe, 1977). Over recent years, the development of ICT has changed the curriculum and affected teaching approaches, and is acknowledged to have implications for school architecture (DfES, 2002). The problem is one of agreeing exactly what these are and therefore how much older schools fail to meet these needs.

The more general educational consequences of outdated buildings are suggested by such claims as that of Becker (1966) who, as discussed previously, argued that old-fashioned schools held back pedagogical reform in 1920s Germany. Although this is not an unreasonable proposition, it seems possible that conversely, the reforming,

child-centred approach was too individualistic to emphasise the collective side of education, including the nature of the school building. Furthermore, it can be argued that if individual educational reformers or modernisers are determined enough, a mere building is not a hindrance. Examples here include the revolutionary changes made by headteacher Edward O'Neill within a standard elementary school in Prestolee, a Lancashire mill town, in the 1920s (Holmes, 1952) and the conclusions of Rutter *et al.* (1979) on their comparisons of 1970s secondary modern schools in London. They comment that 'the schools varied greatly in how they responded to the physical conditions available to them… some of the older buildings had been made pleasant and attractive places… other schools, by contrast, had done little to transform their surroundings' (p. 101).

However, this returns us to the difficulty of deciding when uninspiring buildings, which can be shown to be ignored by an inspired individual, might begin to have a detrimental, or at least conservative, effect on the overall conception of education. Related to this is the observation that assessments change as to how much of a hindrance a particular design of school is for 'modern' education. In the 1930s, the old British elementary schools appear to have been seen as impossibly fixed in their time, with a Board of Education publication in 1936 remarking that they were 'built to last a century and too solid for adaptation without excessive cost' (Maclure, 1985, p. 6). Yet by the 1970s, perhaps because the contemporary open-plan style of interlinked rooms and shared spaces had some similarity to the central hall arrangement common in nineteenth century schools, there were some attempts at refitting older schools. Pearson (1972), in his descriptions of 1970s primary schools, includes two case studies of such refurbishment: one where alterations were made to an 1871 school and another of extensive remodelling of an 1881 school (Figure 3).

In conclusion, then, it can be seen that a complex of factors, some more obvious than others, appear to initiate bursts of school building. An examination of the timing of waves of building suggests that they are somewhat cyclical and this can be related to the age of existing buildings, but also to changes in society and changing expectations of education.

Figure 3 Compton Primary School, built 1881, remodelled in 1970s (Pearson, 1972, p. 332)

Development and progress of school building programmes

Once a building surge is initiated, by whatever complex of factors, the focus of interest is on how the building progresses, and perhaps changes, and on the results. This development will presumably be affected by the details of the situation that set the building in motion as well as particular related events, such as economic changes. However, there will also be general underlying influences in the form of contemporary ideas about architecture and about education. As many writers in this area have argued (Bennett *et al.*, 1980; Cooper, 1981; Maclure, 1985; Saint, 1987), a vital aspect is the relationship between architecture and pedagogy that occurs at a particular time and which is developed by increased school building. Past experiences in this respect would seem to have distinct implications for current building work, especially regarding the consultation and involvement of school users in building design.

Currently architects seem extremely aware of the issue of consulting users and of attempting to understand the educational use of a school. Dudek (2000) argues that such understanding is vital, and he provides a chapter entitled 'The educational curriculum and its implications', which he intends as 'an overview of the current educational debate, aimed at architects and designers who perhaps have little conception of the complexities surrounding the role of a classroom teacher' (p. 41). Meanwhile in a recent interview (Curtis, 2003), Steve Clow, the Head of Architecture at Hampshire County Council, comments, 'It is crucial that we work with headteachers and governors who will then involve teachers and parents, and perhaps pupils' (p. 27).

It has been noted within environmental psychology that consultation is more of a necessary than a sufficient condition for good building, and should not be viewed as a panacea (Sundstrom, 1987), while both architects and educationalists have discussed the difficulties inherent in the process (Bennett *et al.*, 1980; Horne, 1998). However, there appears to be agreement on all sides that it is important for school architects to understand education, and part of this involves talking to educators and other participants. Such a consensus is evident in the BSF Building Bulletin (DfES, 2002), where a section on consultation advises that 'All potential users in the community should be consulted' (p. 63).

Clearly consulting teachers is only one possible part of a certain sort of relationship between pedagogy and architecture, and it is worth considering the nature of this relationship, and any resulting consultation, on other occasions of school building. In the early nineteenth century, in both the UK and USA, consultation was not recognised and, in fact, the relationship of a building's educational and architectural aims was not explicitly considered. As has been discussed previously, Henry Barnard concentrated on the educational aspects of school buildings while Dudek (2000) argues that the British school architect Henry Kendall mainly considered the architectural side and 'urged the use of gothic style, with little or no reference to the interior function of the building' (p. 11).

Of course, just because the architecture is not designed for particular pedagogical purposes does not mean that it cannot embody certain ideas about education, as well as other values of society. Markus (1996) argues that the organisation of early nineteenth century schools reflected contemporary society's ideas about class, 'reflecting in microcosm the new economic relations of the free market and class solidarity' (p. 49). He also notes the analogies suggested at the time, which likened the monitor-based schooling to factories and steam engines, with the teacher 'directing the movements of the whole machine instead of toiling ineffectually at a single part' (Bernerd, 1809). A number of writers (Markus, 1996; Lawn, 1999; Dudek, 2000) comment on the assumptions underlying the design of nineteenth century schools to facilitate constant surveillance, but Dudek also mentions the aspirational ideas associated with early board schools, which some of the exteriors attempt to convey (2000, p. 10). Seaborne and Lowe (1977) point out that 'the view was widely held, although less often articulated, that the school building should contribute to the aesthetic sensibility of the child by showing him standards beyond those of his home' (p. 4). Related aspirational ideas were expressed by the American school architect John Donovan in the 1920s and, currently, both architects and educators often make references to such considerations (Dudek, 2000; Lucy Ward, A school's great expectation, *Guardian*, London, 14 September 2004).

In the UK by the mid nineteenth century there was beginning to be a desire for the styles of buildings to suggest their uses, for schools to be immediately recognisable as such. There were also assertions about respecting simplicity. However, these intentions appear to be at odds with the 'architectural flourishes' (Seaborne and Lowe, 1977, p. 9) often seen on schools of this era, demonstrating the potential for the divergence of acknowledged aims from actual, often implicit, desires. Seaborne and Lowe describe some of the possible causes of the architectural decoration, pointing out the power, at the time, of civic pride, and its effect particularly on the larger school boards, such as London. They also argue that the need of the voluntary sector to compete with the board schools and 'attempt to stem the onset of secularism' (p. 20) produced unremarkable, rather cheap interiors, contrasting with exteriors which were 'often fairly pretentious' (p. 20). Meanwhile, the school boards' awareness of the values conveyed by a building seems to have led to 'suppressing ecclesiastical connotations wherever possible' (p. 28). In these ways, the political background to the 1870 Act contributed to the way that both explicit ideas and unspoken assumptions about education affected the design of school buildings.

Yet, even if, as suggested above, school architecture inevitably implies values about education, it is possible to identify a distinct change in the relationship, which occurred during the twentieth century in the UK and other countries. The beginning of this change is suggested by the comments of the British school architect, Philip Robson, who complains that 'Architects generally regard schools as the easiest buildings to plan, and much difficulty arises from the fact that architects will not take the trouble to understand the educational side of the case' (Robson, 1911, p. 15). Numerous writers have commented on the much closer and more explicit relationship that developed (Maclure, 1985; Saint, 1987; Dudek, 2000) in the UK through the middle years of the twentieth century. The idea seems to have grown that architecture, through engaging with educational aims, could assist and positively influence that process.

It is possible to trace this realisation back to the hygiene concerns of the early years of the century (evident in Robson, 1911; described e.g. by Seaborne and Lowe, 1977; Lowe, 2003). School buildings were designed not just to proclaim ideals about the health of their charges, but to try actively to improve it, through the provision of ventilation and outdoor space (see Figure 4). It seems possible that such thinking might develop into the determination of 1960s architects to plan, in particular, primary schools where the building was specifically designed for a certain sort of 'child-centred' practice. However, it will be argued that this was not inevitable, with elements of the post-war situation and ideas within architecture also being important.

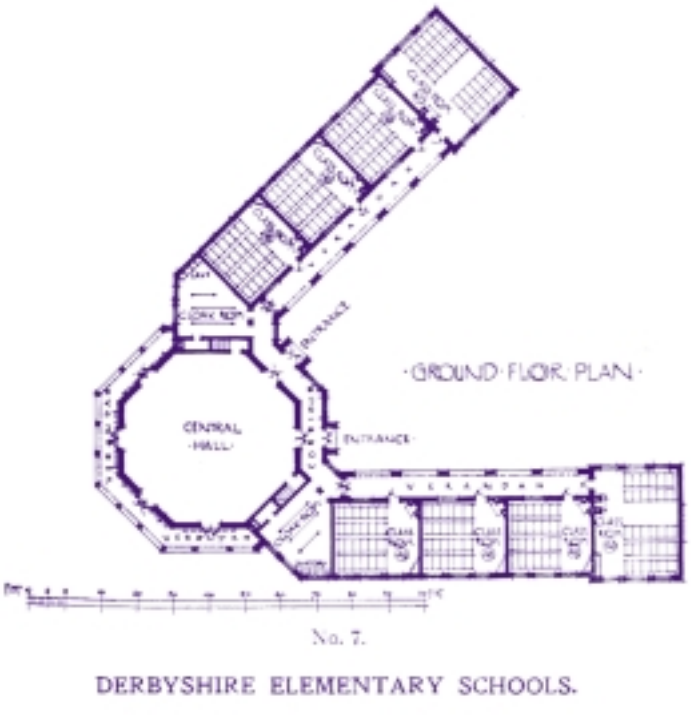


Figure 4 A design by Robson where 'each room opens direct into the fresh air' (Robson, 1911, p. 17; picture, p. 57)

British post-war school building

It is appropriate then to turn to the UK post-war school building programme, considering the details of the architecture–education relationship, including its precedents, and the buildings which resulted. For approximately twenty years, from the late 1940s, many schools were built. However, there were distinct phases of building, as can be seen from the earlier diagram (Figure 2). Immediately after the war, accommodation was provided for the extra secondary pupils through huts (the HORSA programme – Hutting Operation for Raising the School-leaving Age), so the pressing need was for primary schools to accommodate the post-war baby boom. Therefore, there was a peak in primary school building in 1954, with 436 built, and a later peak in secondary schools in 1958, when 375 were built (figures from Seaborne and Lowe, 1977, p. 155). Since a proportion of the primary schools were newly established, built to serve new or expanded housing, there continued to be concern about old, inadequate buildings. In 1962, the results of a detailed government survey into primary school buildings was published (DfES, 1962) and then the new Labour government of 1964 reinvigorated school building (Saint, 1987; Dudek, 2000). The birth rate remained high and through the 1960s the number of schools built climbed steadily, peaking in 1968 with 736 built. It can be seen then that although the later building can be understood as part of the post-war renewal, it was in some ways quite separate and considerably later. As will be discussed below, the resulting schools do differ.

Assessing the outcome of this extended building effort is difficult and controversial. Although some have pointed enthusiastically to the idealist approach of post-war school architects, working together with certain educationalists (Maclure, 1985; Saint, 1987), there have also been detailed criticisms of the schools (NUT (England) 1974;

Bennett *et al.*, 1980) and some criticism of the nature of the relationship that developed between education and architecture (Cooper, 1981). The two central issues, which continue to be discussed with reference to schools of this age, are the type of building materials used and the tendency for an open-plan design.

These schools are generally of a fairly light construction, quite different from the solid Victorian elementary schools, and making use of prefabricated and standardised parts (Figure 5). Open-plan design became increasingly prevalent in primary schools with, for example, a standard architect's reference book of the 1970s (Mills, 1976) able to assume open planning as the norm for primary schools and all the example schools being so designed. Although an open plan is much less common in secondary schools, there were some open-plan secondary schools built and the effect on teaching and learning investigated (McMillan, 1983). Both these aspects of the 1950s and 1960s schools, their method of construction and interior design, continue to be discussed and argued about, so they need to be considered in some detail. Although the two issues are clearly linked, an attempt will be made to consider each separately.

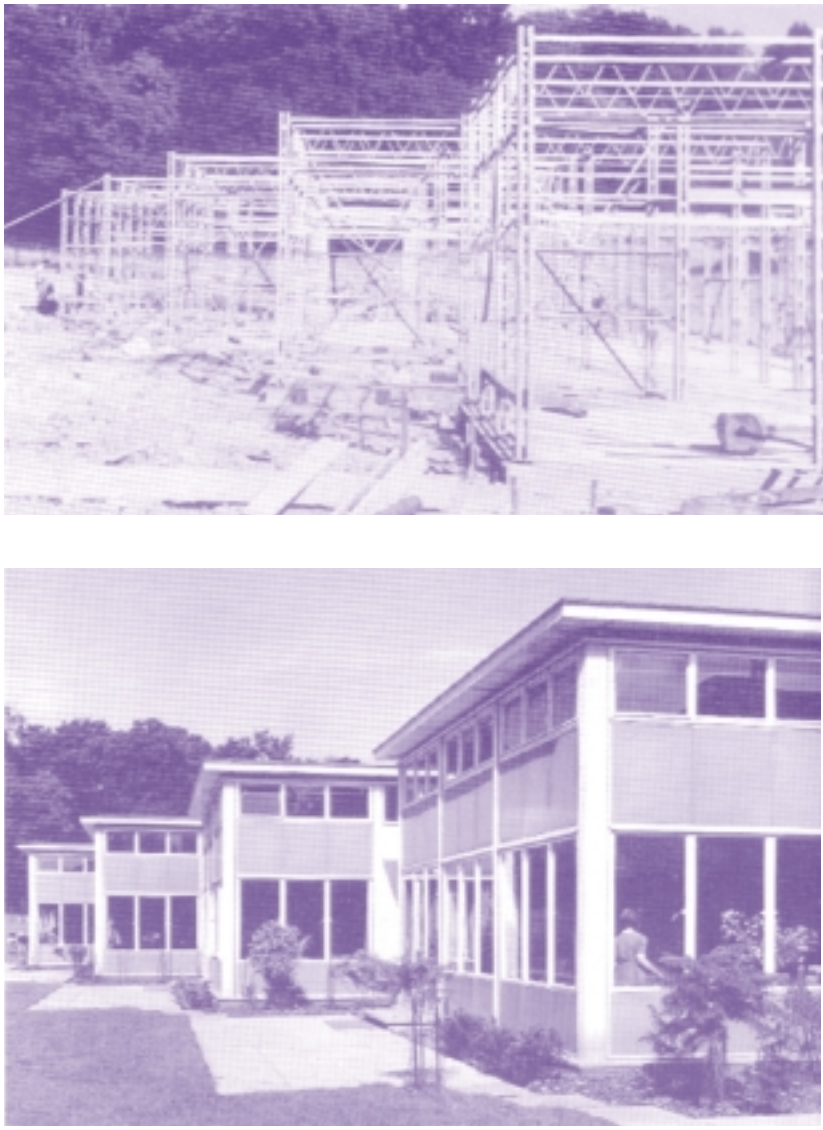


Figure 5 Templewood School, Herts LEA, built 1949–50, showing the steel frame construction (above) and complete (below) (Saint, 1987, p. 80)

The essential motivations for the use of standardised, factory-made components were the need for speed of building, given the particular post-war circumstances, and the desire to save money on construction. A contemporary enthusiast for such building, the Hertfordshire school architect Bruce Martin (1952) argues forcefully for lighter construction and cutting labour costs, saying 'Every section of the building needs to be overhauled with a view to reducing costs' (p. 120). Although this might sound mean, later commentators have pointed out the underlying egalitarian aims of saving money on external features so that it could be spent on other aspects and of attempting to share resources so that everyone benefited. Saint (1987) comments on both these points:

> Even when materials and labour were to be had, their use might delay a vital housing development elsewhere, especially in hard-pressed Herts. It was a conscious part of Johnson-Marshall's strategic philosophy that his team must, if necessary, be self-denying in the wider national interest. So the means of construction had to 'alternative', sparing and made up of components light enough to be borne by two or three men. [pp. 66–67]
>
> Care was lavished upon lighting and colour… works of art were encouraged… and sensitive landscaping was undertaken. At the same time, the designers rebelled against traditional attitudes to architecture in which the 'look' of the building had dominated. [p. 234]

Both Saint and Maclure (1985) discuss the developments in school architecture, and in architecture generally, during the 1930s that made the post-war popularity of such construction likely. These included the growth of modernism and interest in simpler, more functional buildings, including frustration with the heavy, solid and difficult to alter schools of the past. It could be argued that architects were ideologically committed to the new building methods, rather than impartially assessing and evaluating them. Certainly this is the thesis of architect Leon Krier, who argues (Krier, 1998) that, within architecture in general, important elements of modernism have been 'raised to a level of metaphysics and exclusive dogma' (p. 63). It is also worth noting that some of the claims made for the new school construction methods were not really fulfilled with, for example, Saint (1987) commenting that 'In reality none of the early schools, so urgently needed, was spectacularly quick to build' (p. 94). Furthermore, these methods were perhaps more talked about than actually used, particularly outside the notable LEAs, such as Herts, who had adopted them so wholeheartedly. Maclure (1985) mentions that three quarters of the schools built in the 1950s actually used traditional construction.

Yet by the 1960s, the adoption of the new building methods was certainly gathering pace and, it must be noted, there were general advantages and specific successes. The use of prefabricated parts made sense, given the shortages of skilled labour and materials, and helped LEAs such as Herts to make rapid progress with their building plans. The method of planning and designing also allowed a group of LEAs to develop an innovative, cheap and successful way to cope with mining subsidence. This involved abandoning the traditional method of very heavy foundations and instead designing a building that would flex around its steel frame (Figure 6).
The innovation was made possible by the collective style of working then popular, the buying power of

Figure 6 Innovative steel frame to cope with mining subsidence, 1957, CLASP (Maclure, 1985, p. 103)

several LEAs and the post-war openness to experimentation (Maclure, 1985). Clearly it was dependent on standardising parts, which could then be used to build different schools in the many areas with subsidence problems. The consortium (CLASP – Consortium of Local Authorities Special Programme) went from strength to strength from 1957 into the 1960s, inspired other consortia and even won some architectural prizes (Figure 7).

Figure 7 A CLASP school won prizes at the Milan Triennale, 1960 (Saint, 1987, p. 172) RIBA Library Photographs Collection

It would seem fair then to conclude that big, general arguments both for and against the new building methods could be advanced, with some truth on each side. As Maclure (1985, p. 95) opines,

> It was repeatedly stated that without the extensive use of prefabrication the school building programmes of the 1950s could never have been completed within the time and money available. And while it is obviously possible to prove or disprove a statement of this kind, the hypothesis was sufficiently plausible to convince those who had responsibility for national policy and planning.

However, many of the criticisms of the schools built during this time, using both traditional and prefabrication methods, are more specific and it is to these that we now turn.

Saint (1987) mentions that the early schools experienced problems with the cladding that was used on the outside and describes the attempts with a number of different materials to improve performance. In addition to practical problems, though, he also discusses the appearance of much of the cladding, commenting that 'the concrete finishes of the Herts schools were never popular with teachers or administrators'

(p. 95). Certainly these exteriors can seem drab and contribute to the problems that Seaborne and Lowe (1977) identify of monotony and box-like appearance. They link this latter observation to another troubling feature: the flat roof.

Flat roofing is obviously convenient when system building, since the components can be more general and classrooms just piled up into a number of storeys. An early Herts system-built school, Burleigh Infants School, was built with sloping roofs, but this proved complicated and was abandoned. However, the fact that traditionally built schools of the time also had flat roofs demonstrates that there were other reasons, presumably including cost and architectural fashion. Certainly flat roofing makes building on a slope more straightforward and allows courtyards which are not too shaded. Saint (1987) points out that both traditionally and prefabricated flat roofs have a tendency to leak (p. 233) but he also complains that for the early Herts schools, 'the roof coverings… with the optimism of cloud-cuckooland, were devised for a mere twenty-year life' (p. 85).

When post-war schools are evaluated now, attention is often drawn to their inadequate roofs (see Figure 8).

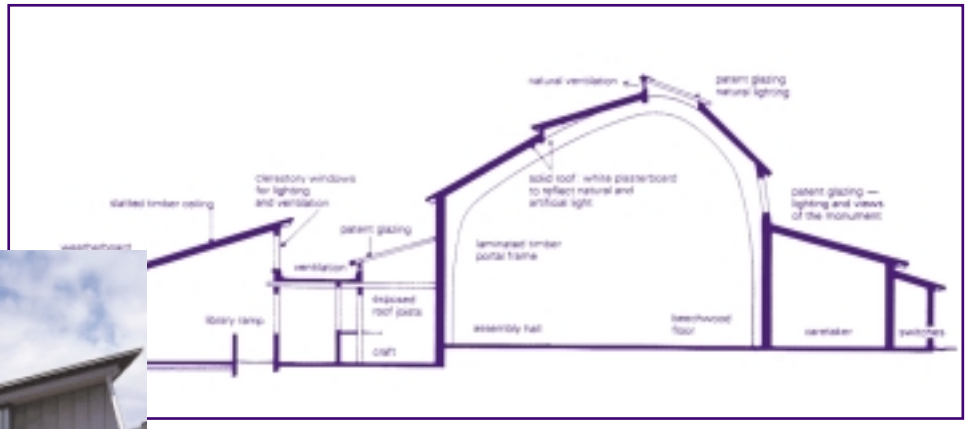
Figure 8 Allenbourn School's web page picture, captioned 'The current school – now you can see why we're getting a new one!!' (www.allenbourn.dorset.sch.uk/Buildings home page.htm)

Furthermore, it is notable that recent exemplar or award-winning schools tend to have pitched roofs (Dudek, 2000; Curtis, 2003). There is a current prefabricated system that does not rely on flat roofs (www.yorkon.co.uk/sector-education.dc) and even CLASP in its later projects chose to use pitched roofs (Saint, 1987, p. 181).

If flat roofs are not inevitably linked to system building, problems that are more difficult to avoid result more directly from the light form of construction. As Saint acknowledges, this does tend to lead to difficulties of heating, ventilation and acoustic control. The schools tended to have little insulation, making them hard to heat in winter and often too hot in the summer. However, with modern, higher standards and expectations of insulation, as well as better understanding of the problem, it seems likely that a school built now to a post-war design would incorporate more insulation. In fact, many modern school designs go further and include energy-efficient features

to make the temperature more comfortable, such as carefully pitched roof lighting, overhangs above windows and passive ventilation systems (Figure 9).

Roof overhang (below) for shade at Haute Vallee School, Jersey
DfES, 2002, photo Jonathan Moore
www.jonathanmoore.co.uk



Building for ventilation at Woodlea School, Hampshire
Curtis, 2003, p.117 Photo Hampshire County Council

Figure 9 Recent solutions to light, shade and ventilation problems

To briefly mention acoustics, there were problems with flimsy partitions that allowed too much noise to travel between rooms. However, the issue of noise is intimately bound up with the open-plan design that became so prevalent, and it is the progression towards it becoming standard that must now be examined.

The story of open planning in British school architecture centres on the relationship of education to architecture and, in particular, the close relationship of educationalists and architects. Given the current popularity of consultation and the calls for the integration of architecture and education (Dudek, 2000; Horne-Martin, 2004), this has clear implications for the current building programme. However, before this can be explored, it seems sensible to consider the argument sometimes advanced that open-plan schools were less about architectural or educational ideals and more the simple result of cost cutting. Bennett *et al*. (1980) discuss this issue at some length and conclude that, overall, trends in pedagogy were more important than cost cutting. However, they mention the general perception among teachers and others that open planning was mainly developed to save money. Furthermore, while they are convinced about the original pedagogical impetus for open-plan schools, they conclude that 'it is probably true to say that the basis for their continued development has been an economic one' (p. 231). This is partly based on their observation that school areas had declined steadily, which they illustrate with a graph of area per cost place (Figure 10).

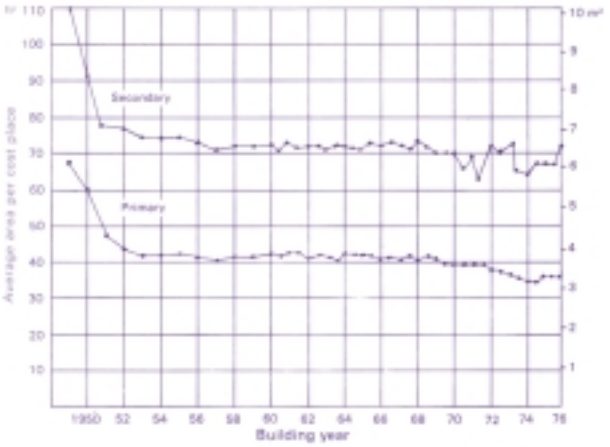


Figure 10 Area in post-war schools as seen by Bennett et al. *(1980, p. 167; © Crown copyright material is reproduced with the permission of the Controller of HMSO and Queen's Printer for Scotland)*

However, the same graph, with a slightly different scale and the addition of information for 1977–78 (reproduced as Figure 11) is used by Maclure (1985) to back

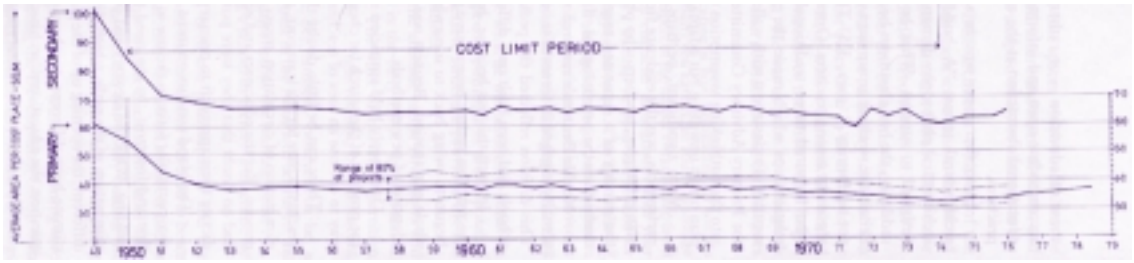


Figure 11 Area in post-war schools as seen by Maclure (1985, p. 140)

up his argument that 'areas per cost place remained fairly standard from about 1954 to 1966… This does not suggest any increased subordination of planning to economic constraints' (p. 141).

It is also worth noting that the really dramatic reduction in space occurred at the beginning of the 1950s, when the post-war building regulations were scaled down and very tight cost limits were set. The effect was a change from 'finger-plan' schools to a more clustered design (see Figure 12), with much less area given over to extensive corridors. This change, though clearly driven by economics, is generally considered to have improved the architecture of schools since it made the school more compact, avoided institutional style corridors and encouraged cosy squares and courtyards. It also caused architects to question essentials of school architecture, encouraging a more inventive, less conservative approach.

Inevitably, such an approach required architects to know more about what went on in schools and here it is possible to see the take-off of the special post-war relationship between architecture and education. Although it was helped by post-war tendencies to prefer collective and interdisciplinary ways of working, it seems fair to say that an important impetus for the relationship was the

Burleigh Primary School, Herts, 1948 (above)

Greenfields Primary School, Herts 1952 (left)

Figure 12 Earlier Herts 'finger-plan' design (above) compared to later more clustered design (from Maclure, 1985, p. 149 and p. 159)

implication of the early 1950s restrictions on building costs. Although the initial results were generally welcomed, they presumably set a precedent for imaginative design solutions based on the attempted understanding of educational practice.

The results were the increasing prevalence of open-plan schools and the parallel development of complaints about working in them. A report by the National Union of Teachers (NUT (England) 1974) and the detailed survey of Bennett *et al*. (1980) note some of the problems, including noise levels, teachers lacking specific training for this environment and worries that for some children open-plan spaces might be inappropriate, producing behaviour problems and lack of involvement. There is now a considerable body of research, from the UK and USA, which examines how open-plan schools are actually used. A major conclusion is that the design does not determine the teacher's practice, with wide variations in how open-plan space is used (Gump, 1975; Rivlin and Rothenberg, 1976; McMillan, 1983). Bennett *et al*. (1980) include a case study of a comparison of practice in two identically designed units, containing the same number of pupils, with dramatically different teaching styles and organisation. They argue that 'expertise and philosophy of the staff are the central determinants, not the design of the building' (p. 222).

However, while a building might not dictate teaching practice, it can help or hinder it. The NUT report advances the idea that the concern with providing an environment appropriate to a particular sort of teaching undermines the proclaimed ideal of flexibility. Dudek (2000, pp. 59–61) makes similar points about the deterministic tendencies of a more recently built open-plan infant school, which is difficult to use except in the manner envisaged by the designer. Of course, this will be particularly problematic if, as surveys such as that of Bennet *et al*. in the 1970s and 1980s began to suggest, the majority of teachers continue to teach in a traditional way. It is this mismatch of the pedagogical intentions of the architecture and the practice of the teachers that Cooper (1981) is most critical of. He argues that by systematically exaggerating the move towards 'progressive' educational practices, the educationalists who advised the architects misled them into believing that a particular style of teaching had become the norm and required appropriate buildings. More moderately, Maclure (1985) discusses the inevitable difficulties of trying to distinguish a genuine development in education from the activity of an adventurous few that will never catch on. As he points out, this was not helped by the tendency of architects to meet teachers and LEA advisors at the vanguard of educational practice. A contemporary example of this is provided by Pearson's (1975) recommendation that architects engage with 'those teachers at the spearhead of educational innovation' (p. 46). As Maclure describes the situation, 'They conceived it to be their business to understand what was going on at the cutting edge, and this carried with it the perennial risk of "trendiness" when they ventured too far ahead of the silent majority' (p. 127).

To return to the issue of flexibility, raised above through reference to the NUT's concerns about school design, it is worth noting the importance attached to this concept. Architects of the time were convinced that schools they designed needed to be extremely flexible, allowing for lots of different uses. For example, in the 1976 architects' reference book (Mills, 1976), Mary Medd, a notable post-war school architect, advises that it is necessary 'to provide space and equipment for such

frequently changing patterns of work and materials and… achieve a balance between small scale privacy for young children and large scale exploration' (p. 1_1). This was partly because of architects' perceptions of educational practice, which, as discussed above, were probably not particularly accurate reflections of contemporary teaching practice. However it was also reasoned that through flexible design elements a school could be made more responsive to later changes in teaching practices (see OECD, 1976). It is notable that such hopes are still expressed, with, for example, Dudek (2000) proposing that 'the modern environment needs to be flexible, so that it too can evolve, to create an architecture which is reflective in its own right' (p. 53).

It can be argued, however, that such ambitions result from the running together of the two separable concepts of flexibility and adaptability. The OECD (1976) publication argues that these are 'two quite distinct concepts', which it defines separately (p. 10). Yet this is followed by an admission that the 'two qualities are not necessarily mutually exclusive in any one building' and the later suggestion that 'the greater the flexibility the less the need for adaptation' (p. 87). In the BSF Building Bulletin (DfES, 2002), a similar distinction between flexibility and adaptability is advanced, though it remains to be seen whether these two issues will be separately considered as BSF progresses. The issue of adaptability will be discussed further below, when the nature of the needs of the future are considered.

Figure 13 A mobile sink: The concept of flexibility taken to extremes? (OECD, 1976, p. 100; from the catalogue of the ff5 School Casework System of Cameron McIndooo, Don Mills, Ontario, Canada)

It seems worth looking first at the elements themselves that were supposed to promote flexibility. Some instances of design for flexibility are examples of the basic problem suggested by the NUT to underlie open planning, where 'flexible' elements only allow certain sorts of behaviour and so are only flexible up to a point. For example, Mary Medd (Mills, 1976) wrote that 'Large areas of chalking surfaces for directional exposition are not now needed. Small areas, dispersed on walls and on furniture (e.g. movable screens and space divider units), are more useful' (p. 1_17). A possible result of such design is documented by Bennett *et al*. (1980) who report that some headteachers had added extra furniture and 'many had purchased blackboards since some LEAs clearly felt them to be inappropriate in open plan schools and did not provide them' (p. 86).

The other way of designing in flexibility is to try to leave a building as uncommitted as possible to any particular use. Although this sounds essentially sensible, it can be argued that a truly flexible building is very difficult for its occupants to use. The OECD report (OECD, 1976, p. 100) warns of the 'dangers of this uniformity', argues that 'treating the mobilisation of furniture and equipment as an article of faith… can ultimately be self-defeating' and illustrates this point with a picture of a mobile sink (see Figure 13).

Furthermore, several writers (Bennett *et al.*, 1980; Maclure, 1985) have argued that it was a tendency towards an apparently more flexible, more American, 'school without walls' interpretation of open planning that accompanied the growing distrust of such architecture in the UK (see Figure 14).

Eastergate School, opened 1970: interior view (left) Maclure, 1985, p. 136

(Right) Maclure, 1985, p. 175

Figure 14 British 'school without walls' (Maclure, 1985)

Evaluation

As the above discussion makes clear, the evaluation of school buildings is important, if sometimes difficult to achieve. The sort of large-scale evaluation of a whole era attempted above is more achievable if smaller-scale evaluations of specific schools and particular design features are carried out. In addition, ongoing evaluation allows alterations and improvements to be made to subsequent similar schools. During the post-war building programme, the record on such evaluation was mixed. In the Herts architecture department, as Saint (1987, p. 109) describes, 'regular post-mortems' were part of the general ethos of progression and development. However, a 'limitation to the exercises in participation and research undertaken by the A&B branch [the Ministry of Education's architects] was that they rarely looked back' (p. 190). Here Saint argues that the architects needed to get beyond assessment of specific projects and consider the wider 'picture of what the mass of teachers, let alone children, thought about the post war schools' (p. 190).

Yet it should be noted that sometimes a true evaluation might take time. For example, the central feature of the CLASP schools, their ability to withstand mining subsidence, was not really tested until nearly ten years had elapsed. By this time over two hundred schools had been built, which would not have happened if the architects had waited for definite confirmation of their design. Since it was a successful innovation,

this appears now as legitimate risk taking, but it would be seen differently if the design had failed.

Having considered the contemporary attempts at evaluating post-war schools, it seems reasonable to ask whether there is evidence of any similar evaluation of earlier school building, when consultation was not as prevalent. As might be expected given this, there is not much evidence of assessing users' reactions to buildings and any evaluation of certain physical elements tends not to be carried out explicitly. However, there is evidence of school architects experimenting with design ideas, assessing outcomes and so making specific recommendations. For example, the British architect Philip Robson relates his experience in his book of school architecture (Robson, 1911). Considering flooring, he writes: 'Our floors are usually of maple nailed to coke-breeze concrete, or are of wood blocks on concrete. I have tried two small jointless mastic floors, but neither has proved a success. I have also tried asphalt, but it is cold to the feet' (p. 19). Similarly, Donovan's (1921) advice for American school architects is based on his own experience and accumulated knowledge rather than on independent evaluation.

To what extent such evaluation at the time could be particularly revealing is hard to know, since many of the failings of a school only seem relevant when times and ideas change. So, for example, the early board schools were criticised for lack of ventilation once 'hygiene' concerns developed in the early twentieth century (Seaborne and Lowe, 1977) and Saint (1987) describes the 1930s schools built to maximise day light as 'over glazed' (p. 38). Other innovations or developments can only be fully evaluated when the passing of time allows an accumulation of relevant experience. So, for instance, Saint argues that it took time during the post-war period for architects to realise that prefabrication has 'its own inflexibilities and drawbacks' (p. 177). It is hard to avoid the conclusion that while evaluation might seem obviously beneficial and something to be encouraged, it is more difficult to specify precisely how it can be most usefully carried out.

Planning for the future

As was touched upon in the introduction, those involved in the current wave of British school building show awareness of the challenge of providing schools appropriate to future, as well as present, requirements. For example, early in the BSF Building Bulletin (DfES, 2002), an attempt is made to identify the key issues to be considered if 'schools are to provide excellent educational facilities for the next 20 to 30 years' (p. 4). It might be questioned how other building programmes and expansions have addressed this issue.

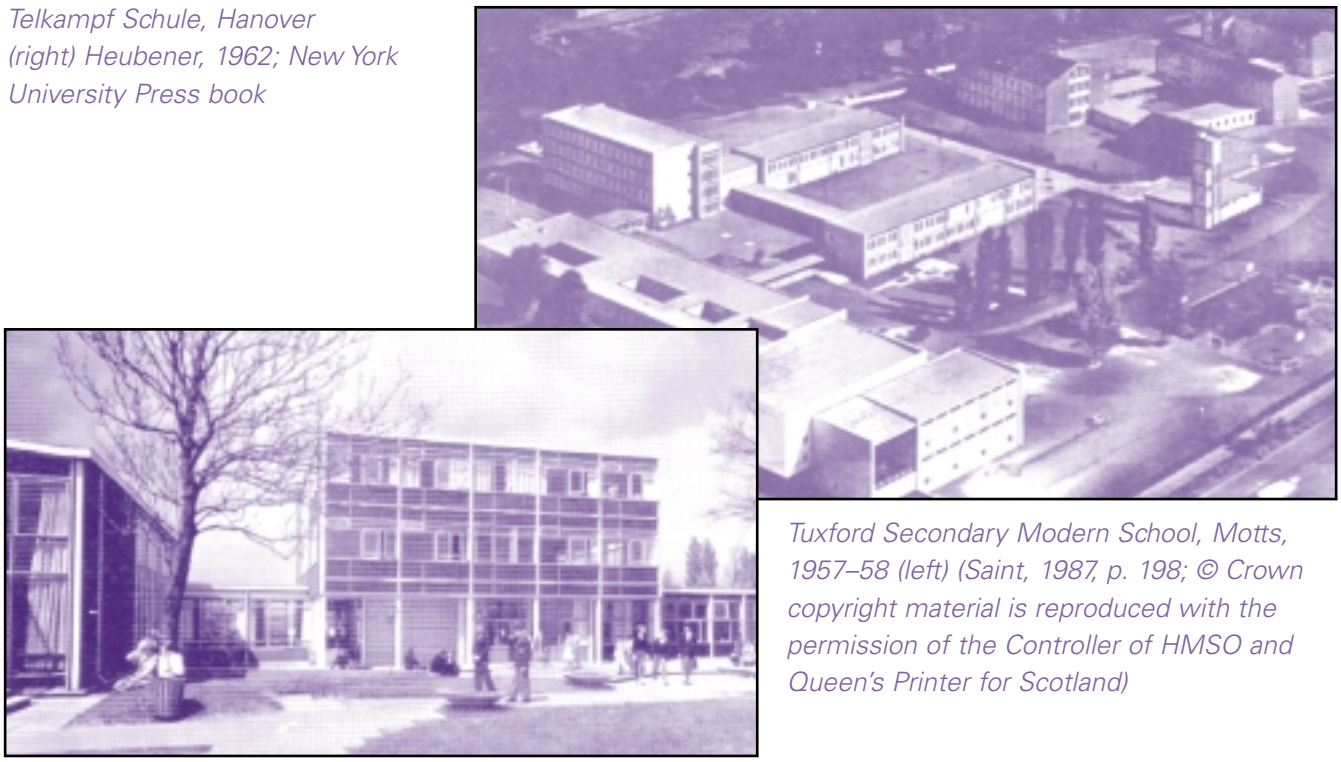
Although the school building of the nineteenth century, both in the UK and in the USA, seemed more concerned with contemporary issues than with the future, this appears to have altered through the twentieth century. So, although Robson (1911) does not mention building for future needs, Donovan (1921) refers to the 'school of the future' several times (e.g. pp. 20, 21 and 23). However, he does not always manage to specify the physical features required by future needs, which he tends to

mention rather generally. Showing similarly inclined intentions together with lack of specificity, Becker (1966, in Otto, 1966) argues that the post-war West German schools would need to be adequate for current practice while allowing for future developments, but he does not indicate how this should be achieved.

The main body of this book (Otto, 1966), though, recommends long-term architectural adaptability through school buildings that can be easily adjusted, suggesting, for example, the use of skeleton construction so internal walls can be moved. Similar recommendations regarding architecture, together with suggestions of leaving space on site, perhaps through initially building a single storey school, are made by the OECD (1976) for coping with future change. However, this report also advises against getting too concerned about the future, commenting that 'It is hard to justify meeting the unknowable needs of the future where it is at the expense of the known needs of today' (p. 97). Yet, as Beare and Slaughter (1993) point out, education is inevitably concerned with the future since educational objectives 'necessarily refer forward to future ends' (p. 103), so it is probably not possible or desirable to ignore this aspect of school building. The question then becomes one of identifying how previous architects attempted to equip their schools to cope with change, together with the success or failure of particular measures and features, in the hope of finding recommendations for current school builders.

Changes in perceptions and needs

Looking now at pictures of initial post-war school buildings, it is easy to dismiss as obvious the characteristic appearance of flat-roofed, large-windowed and panelled boxes piled together along pathways and around courtyards (Figure 15). However, it



Telkampf Schule, Hanover (right) Heubener, 1962; New York University Press book

Tuxford Secondary Modern School, Motts, 1957–58 (left) (Saint, 1987, p. 198; © Crown copyright material is reproduced with the permission of the Controller of HMSO and Queen's Printer for Scotland)

Figure 15 Post-war schools in West Germany and the UK

must be remembered that these were examples of innovative design, which must have seemed very fresh and appropriate to the egalitarian hopes that many had for the post-war period. Partly these buildings have just got old, and some might argue that they have not weathered particularly well. However, they have also become so ubiquitous that it is difficult to believe there was a time when schools did not look like this. This demonstrates a problem for any architecture in that, if it is successful, it risks becoming common and seeming obvious, so that the most impressive innovations might be overlooked by future generations. This happened with other aspects of the post-war educational innovations. Saint (1987) reports the architect Henry Swain as commenting on an early Herts primary school as follows: 'Things I now take for granted in design of infant schools then leapt at me – little chairs twelve inches high, low window sills for children to see out of, little child-sized lavatories and wash-basins' (p. 75).

It is worth noting that this 'institutionalisation' of child-sized fittings has tended to be more positive, with such features accepted, generally without question, while the post-war school exteriors seem predictable but open to criticism and question. Even if it is difficult to recapture the initial reaction to them, current users and designers feel quite comfortable about changing them. Yet while changes have been made so that, as mentioned above, recent roofing is usually pitched, other elements of the post-war design have been accepted. There has been no return to long corridors, with more clustered designs still predominant, often including courtyard and garden areas. Despite some dislike of very open-plan schools, the essential ideas of shared resource areas and spaces that function as both circulation and work or social areas are still used (see Figure 16).

Figure 16 Shared space at Woodlea Primary School, Hampshire (Dudek, 2000; photo Tony Weller)

In some ways then, the post-war schools could be said to have been appropriate for the future, since in that future many of their features are being incorporated into new schools, looking to a further future. It could be countered, however, that architects and, especially, current users have adapted the innovations to their own purposes, and in doing so have perhaps minimised them. Very little of the art incorporated into the Herts schools remains and Saint (1987) comments about the bold use of colour (Figure 17) that 'Nearly all the schemes have been watered down now' (p. 91).

Figure 17 Templewood Primary School, Herts (built 1949–1950), showing colour scheme (Saint, 1987, p. 100)

In a related vein, it can be argued that ordinary users fail to make appropriate use of buildings, and so do not benefit from the designed features. For example, Bennett *et al.* (1980, p. 158) describe an open-plan primary school where groups simply moved between areas according to a rigid timetable so that 'if the class was doing comprehension and was timetabled for the wet area, then it did comprehension in the wet area' (p. 158). Many writers have commented on the way teachers may continue to try to teach conventionally in an open-plan school with, for instance, McMillan (1983) commenting that 'there was little evidence, except in a few isolated instances, of teachers putting into practice the methodologies which open plan was supposed to encourage' (p. 102). Some have argued that this significantly contributed to the perceived failure of open plan (Rivlin and Wolfe, 1985; Gump, 1987). However, some adaptation of a building is surely appropriate as teachers make it relevant to the curriculum and organisation of the time. Sometimes non-standard use of the environment is welcomed as innovative, as when teachers in nineteenth and early twentieth century schools made use of wasteful corridors for reading or painting (Figure 18).

Figure 18 From The Story of a School, *1949, HMSO (Maclure, 1985, p. 24)*

Furthermore, sometimes the environment is simply inappropriate and then it is clearly sensible for future users to alter it. An example of a mistaken design feature with which contemporary users coped as best they could was the over-use of carpeting in 1970s primary schools. The OECD reports (OECD, 1976) that 'many cases were found where teachers were obliged to cover universal carpeting with untidy plastic sheets in order to carry out wet or messy activities' (p. 98). Bennett *et al.* (1980, p. 194) discovered a more extreme reaction to the same problem with a teacher

not using paint or glue and worrying about chalk dust. The school's insistence on the children changing shoes when they came inside had produced a policy of only allowing them out for breaks in the summer. It is worth mentioning that these problems with carpet result from attempting to maximise flexibility through providing a more uniform space. The disadvantages, including appearance and difficulties of use, have been previously discussed and it was observed that the preference generally seen in British school architecture has been for a variety of quite specific spaces. The potential for failure with this approach is demonstrated by the OECD report's illustration of a specialist typing room (OECD, 1976, p. 86), which the near future would of course find completely superfluous (Figure 19).

Despite such occasional failures, it would still seem reasonable to achieve both short-term flexibility and suitability for the future by designing a range of spaces within a school. However, sometimes such built-in flexibility is insufficient to cope with bigger changes in pupil numbers, organisation or curricula, which require more dramatic adaptation. It is the issue of trying to build a school that is adaptable which will now be considered.

Figure 19 Hi-tech, 1970s style (OECD, 1976, p. 86; Providing for future change: Adaptability and flexibility in school building, *Copyright OECD, 1976)*

Building adaptable schools

As has been mentioned previously, the brick-built British schools of the late nineteenth and early twentieth centuries have sometimes been seen as a hindrance because they were built so substantially. Robson (1911) briefly discusses 'Novel Materials and Methods', including steel-framed buildings, but claims that 'none of these systems have stood the test of time' and recommends brick-based cavity walls (pp. 45–47). Clearly the architects of this period valued longevity and must have assumed that educational needs would not change enough to make their schools inappropriate. As noted previously, they did not appear to consider future needs and therefore did not attempt to build to accommodate change.

Partly in reaction to this attitude, and the solid schools that were its legacy, architects designing schools immediately after WW2 were enthusiastic about lighter forms of construction. Although this also fitted in with other needs for rapid building and minimum amounts of labour and materials, they emphasised the adaptability of the buildings and celebrated their short life spans. Saint (1987, pp. 67–68) includes a quotation from architect Bruce Martin where he argues that traditional building materials were no longer appropriate, urging that 'We must build lightly for a life of free and changing activity, for families with the space in which to grow as needs and ideas change'.

Buildings with a deliberately short life span are only sensible if these spans are not too short and they are replaced as appropriate. As discussed previously, Saint is critical of roofs that were only designed for twenty years and raises concerns about the durability of other elements, such as cladding. Meanwhile, Maclure (1985) is concerned that in the 1980s, when he was writing, school building had slowed so

that 'at this rate many schools will still have to be kept in service long after they should be' (p. 270). In this case the future could be seen as letting the architects of the past down, since they made certain assumptions about continued school building. Certainly, the assumptions of the two periods seem to be decidedly at odds, as had happened before between the Victorian and post-war periods, and perhaps this is always a problem for the overarching conceptions and priorities which govern how architecture is carried out.

It might seem likely that attempts to build in adaptability could similarly fail because ideas change about how much proposed adapting is reasonable before it becomes more sensible to demolish and rebuild. As has previously been mentioned, there is evidence for changes in attitudes from the 1930s to the 1970s to the remodelling of 1870s schools, although immediate capital cost continued to be a disincentive (see e.g. Pearson, 1972). Given that from the immediate post-war period onwards, there seems to have been openness to the idea of adapting existing buildings, provided that this is not too expensive, it is interesting to question whether the adaptability allegedly built into post-war schools was ever utilised.

A number of writers discuss methods of making buildings more adaptable (Otto, 1966; OECD, 1976), including recommendations to avoid deep designs that limit movement of walls because of scarcity of windows, leave space behind ceilings or floors for the possible extension of services (OECD, 1976) and anticipate where later extensions might be added (Mills, 1976). Through the 1960s and 1970s a consensus can be seen in a number of countries that adaptability could be achieved through a frame, or skeleton, construction where the internal walls are not load bearing and so can be easily moved (Otto, 1966; OECD, 1976). Looking for evidence for this actually being done at a later date suggests a mixed situation. It is quite easy to think of post-war education buildings, designed to be adaptable, that have never in their now quite long lifetimes been altered. However, while some schools have not been adapted, others have. Maclure's collection of plans of post-war schools includes a number that were adapted, often in the 1970s, for a changed intake, either a different number or a different age range of pupils. Also, at this time many secondary schools, usually built as secondary moderns, had to adapt to becoming comprehensives.

These are examples of change imposed on the schools from outside and although their adaptation suggests the success of their design, it might be questioned whether schools ever initiate the altering of their premises. From examples known to the author, it can be asserted that some do, such as a primary school that removed walls to extend teaching areas into cloakrooms and a secondary school that added walls to enclose open-plan spaces. The fact that many schools do not make such alterations does not seem to depend on the level of adaptability designed into the schools and can perhaps be explained by educators' ignorance, and perhaps nervousness, of design and architecture. This has been discussed by architects (Dudek, 2000; Horne-Martin, 2004), who often conclude that teachers need educating about these issues. However, it could be argued that taking the initiative to alter a building is just another aspect of a certain sort of school, which has a tendency to innovate and experiment in a variety of ways. Given this suspicion, it would be interesting to examine the schools that are particularly instrumental in attracting BSF funding and that have clear ideas about their requirements, perhaps expressed as a remodel rather than a rebuild.

Education beyond schools

A major change in education which is already occurring and is therefore easy to foresee is the growth of ICT. Increasing use of ICT is one of the key reasons, according to BSF, for new schools (DfES, 2002). However, some commentators argue that ICT is a major reason why society should be planning to educate outside schools and that new school buildings are, therefore, likely to be unnecessary (Heppell *et al.*, 2004). Yet, essentially this argument forms part of a tradition within recent Western thought, that sees schooling as the antithesis of true education, which it is hoped can be set free within society as a whole (Illich, 1976). The advent of computers might give new impetus to this idea but it must be asked whether they can really be the foundation to any dramatic change. Heppell *et al.* (2004, p. 33) imagine a scenario where learners use the Internet to access information and contribute to seminars from home, but could not similar learning have been pursued throughout the last century with access to a good library? The fact that it was not suggests there are other reasons for the traditional school structure, including individual preferences for social contact and guidance, together with society's requirements for childcare and control. Furthermore, the current interest in more distinctive and aspirational styles of school building suggests that the school as a physical entity is as valued as ever. This perhaps signals a shift away from the post-war emphasis on function, within which it would be possible to imagine the needs of education expanding beyond the physical form of the school.

The other way that education has been understood as extending beyond the conventional school and pupils is through a more pronounced integration of school and local community. This is currently a popular idea, with the government encouraging 'extended schools' (Cummings *et al.*, 2003) and community use forming an important part of planning new schools within BSF (DfES, 2002). As an idea, this also has a long history. Henry Barnard (Barnard, 1931) advised that 'the school-house is the appropriate depository of the district library' (p. 249), since then it could be used by the whole community. An important element of the innovative Prestolee School in the 1920s was the involvement of parents, past pupils and others, who were encouraged to use the building into the evenings for educational and social purposes (Holmes, 1952). There were other advocates at this time of such an approach and a few schools were built to accommodate it (see e.g. Saint, 1987, p. 41 for descriptions of the Cambridgeshire 'village colleges'). Immediately post war, interest seems to have focused on other issues and the schools were often built in a way that suggested isolation from the community. Saint (1987, p. 132) comments that 'suburban secondary schools of the 1950s tended to appear marooned in an undifferentiated expanse of playing field'. However, by the 1960s, 'community schools' were back on the agenda and some notable examples were built (see e.g. Seaborne and Lowe, 1977).

Although the desire for a school more open to and used by the wider community has implications for its design, the fact that the idea has been around for so long but has not become the norm is suggestive. It can be argued that it is the whole organisation of society, and the accepted position of schooling within it, that has prevented community schools from developing everywhere, rather than any failure of design. In fact as Prestolee School demonstrates, community involvement can occur in any school building, if the determination to achieve it is present. Of course, the current

government interest in extended schools could be a symptom of a genuine change in society which will make us more receptive to the concept and, if that is the case, it is sensible to build schools that are easy to use in this manner. The difficulty is in deciding whether contemporary ambitions are accurate reflections of a genuine trend, and not just short-lived enthusiasms tied to the conditions of the moment. This is an issue that is key to understanding the school building of the past and will be central to the concluding part of this review where implications for today's school building will be considered.

Implications of past building programmes for the present

In considering the implications for BSF of previous school building projects, it is evident that there are some general implications which can be drawn from across the periods considered. These arise from the generalities and similarities observed in how a range of building bursts have developed. These include the influence of contemporary assumptions about education on the school architecture of the time alongside the complexity of the background to any increase in school building. It has also been observed, in a number of different times and places, that although new schools may seem to break with the past, there are important continuities, with a major factor being the tendency of teachers to continue as before. This can be understood as conservatism, or due to lack of training, or as a reaction to heavy-handed architectural determinism. These ideas should suggest caution to current school planners, since they surely imply that the reality of school building and school use is a subtle and complicated business.

Alongside these general observations, it might be possible to reveal more specific implications through considering an analogy with a particular period of school building. Although, as has been argued throughout this review, it is possible to learn from the building of various eras, it seems inevitable that some periods are more like the current one and so their outcomes have particular resonance. The building burst that seems most like the current one is the one that occurred in the UK in the 1960s, which, it has been argued previously, was reasonably distinct, despite being a part of the post-war building boom. As is the case now, this building was not in response to a clearly perceived and understood distinct need, such as the end of WW2 or the passing of the 1870 Education Act. There were many old schools, with inadequate facilities, and the steady, high birth rate meant that pupil numbers were going to increase quite alarmingly, but neither of these factors provides a single, clear initiating instance. Similarly, many schools today, particularly secondary schools, are old and tired-looking but the situation is not desperate enough for school building to seem like an immediate necessity. Such a perception is suggested by the relatively long time span planned for BSF.

It might be argued that a major impetus for the current building is political, and here again similarities can be seen to the 1960s building project. Architect Mark Dudek draws this analogy, when he proposes that 'school building comes about as political and economic transformations force change and modernization in roughly 35-year

cycles. The last such phase, again precipitated by a reforming Labour government, encapsulated an ideologically driven political climate' (Dudek, 2000, p. xiii). More generally, it is possible to see parallels between many of the assumptions and ideas of the two periods. Both eras value consultation, and, in both cases, there are many within education and architecture who argue for a closer relationship, perhaps integration, of the two perspectives on schools. Sometimes forming a part of this, both now and then, is an explicit looking to the future, including attempts to design buildings that can accommodate certain foreseen change.

Clearly there are also important differences between the situation in the 1960s and the current position. Then, the main need was for primary schools, whereas BSF is concerned with secondaries. Pupil numbers are currently considerably lower than the peaks in the 1970s, which the 1960s building was anticipating, and, given the recent birth rate, it looks unlikely that sizeable increases will occur. Although similarities in assumptions about school building can be found between the two periods, there are also differences in popular ideas. In the 1960s there seems to have been a greater enthusiasm for change, particularly in the building and organisation of the urban environment. Now, partly as a result of the mistakes that were made, there is a tendency to be more pessimistic and reluctant to get carried away with big schemes. Saint (1987) discusses some of the resulting distrust of architecture and planning, arguing, for instance, that problems with the post-war house building programme have fed into a 'hatred of prefabrication' (p. 232).

In essence, then, a difference between the 1960s and the present is that the events of the 1960s have occurred and ideas about the results have become part of current understanding. In that sense, it is evident that there has been some learning from the past, which is encouraging, given the intentions of this review. However, if this general change in perspective that results from past events is to be utilised, it is necessary to consider explicitly the implications that arise for particular aspects of school building. It is such an examination that is now required, but it is important to bear in mind the points made above about general ideas that cut across eras and the closer analogy that can be seen between current and 1960s building.

Consultation

As was described above, consultation with educators, and sometimes other users, has only become established over the last fifty years. Several writers have argued, with reference to nineteenth century schools, that adequate schools can only be built when architects try to understand the business of schooling and build appropriately (Robson, 1911; Seaborne and Lowe, 1977; Dudek, 2000). Consultation is one way of achieving such an understanding, which also allows the educator to add their own ideas and perceived needs, rather than just relying on the observations of the architect. Support for consultation has been voiced repeatedly over the last half century, from the proposals of post-war architects (Otto, 1966) to more recent determination to involve the whole community (DfES, 2002; Curtis, 2003). However, experience over this period suggests that it is mistaken to see consultation as a panacea.

Bennett *et al.* (1980) point out that it is difficult to consult on newly established, as

opposed to replacement, schools since there is no staff to consult. This bodes well for BSF, which is mainly replacing or remodelling existing schools. However the research of Bennett *et al.* and of McMillan (1983) also suggested that even where schools were built as replacements in the 1960s and 1970s, and the staff could have been consulted, this did not always happen. Furthermore, these researchers express doubts that it is really valued, with Bennett *et al.* arguing that 'Even when consultation is offered, there is evidence that motives are often political rather than a genuine desire to assure constructive involvement' (p. 89). The NUT report (NUT (England) 1974) makes related points about pseudo-consultation and the lack of involvement of teachers (p. 6, paragraph 24). Therefore a clear implication can be seen for BSF in that just talking about and recommending the consultation of individual users does not guarantee that it will happen or be acted upon.

Of course, one reason that ideas produced by consultation might be ignored is that they might contradict other needs and requirements. Thus in the 1920s and 1930s, when most architects were agreed on the benefits of day-lighting and on the priority of this for school design, a teacher who preferred more subdued lighting would tend to be ignored. A minority of the respondents to the survey of Bennett *et al.* made the related point that individuals should not be consulted because they would only give their own narrow view, which might not concur with the needs of all the other, and future, users of the space. Concern about the conservatism of the majority of teachers is one reason why many post-war architects endeavoured to understand education by talking to those at the cutting edge, who, it was presumed, would be more able to predict future developments. As has been discussed, it is possible to be very critical of this and, with hindsight, it can be questioned in a number of ways.

Although the schools initially produced by this method were well received, including some open-plan schools such as Finmere Primary School (Figure 20), the resulting adoption of open plan as the norm produced problems which can be related to the method of consultation. The main one was that the schools were appropriate to the educational ideals of advisers and headteachers, rather than to the actual practice of most teachers. The tendency to teach conventionally continued to be reinforced by teacher training, despite the recommendations of Bennett *et al.* and the NUT report, presumably because it was still the practice of the majority. This resulting lack of

Figure 20 Finmere School, Oxfordshire, 1958–59: Early open plan as the result of successful consultation (www.finmere.org.uk/now/school/new_school.htm; photo Andy Boddington)

change also demonstrates the failure of the cutting edge educators to see what the future held, and suggests that if one wants to see where society is heading, it is as useful to consult those holding it back as those pushing it forward. This should be remembered by those involved in current building programmes and they should think more precisely about *who* they need to consult. Following the argument of Cooper (1981), it is also important to be clear about *why* an individual is being consulted, to what extent their perspective is likely to be representative, and to avoid implying that the aspirations of a few are the current practice of many.

Looking to the future

One objective of the post-war consultation with certain chosen people was to predict the future, in terms of curriculum and teaching style. As has been discussed, this was not very successful, but there were other ways in which school architects attempted to accommodate future change. This is relevant to current school building, because those involved are acutely aware of both the fact of schools needing to serve future cohorts and of some of the ways this might be achieved. The BSF building bulletin (DfES 2002) discusses both flexibility (pp. 18–23) and adaptability (pp. 52–53).

Of some concern is the fact that this bulletin seems to recommend a sort of flexibility achieved through uniformity, since it recommends that 'It is useful to standardise room proportions so that different activities can be accommodated in a number of different spaces. Oddly-shaped spaces which can only be organised in one way should be avoided' (p. 19). Similarly, a recurring theme in ICT provision is that interactive whiteboards are provided in every room (DfES, 2002, pp. 8, 22). As has been discussed, it was the sort of flexibility attempted through uniformity that seemed most problematic in the schools built in the late 1960s and into the 1970s. The much more open 'schools without walls' style of open plan tended to be disliked (Seaborne and Lowe, 1977; Maclure, 1985), while many educationalists and architects of the time, who were enthusiastic about open plan, criticised this version (Pearson, 1972; Maclure, 1985). Reference has also been made above to the difficulties encountered by teachers in primary schools where all areas were carpeted. What these problems have in common is that flexibility is attempted through minimal differentiation of the space. Of course, while it is possible to see this flexibility negatively as the absence of design, it is also possible to argue that providing a more designed space is authoritarian and additionally makes erroneous assumptions about space determining behaviour. It can also be argued that the problems referred to above resulted from quite specific problems with the barn-like schools and with the carpeting, rather than resulting from the uniformity of space. Yet it must be concluded that at the very least, these problems with an aspect of design were more pronounced because the aspect was repeated across the school, and perhaps this is the fundamental problem with uniformity.

Returning to the BSF recommendation, quoted above, it is notable that the form of uniform provision suggested sounds like a return to the 'long rows of similar box-like classrooms' (Pearson, 1972, p. 283), which many architects in the 1960s and 1970s hoped to escape. Although there were problems with the resulting rush to open plan, it is necessary to remember that it was real frustration with the earlier provision that provoked it and it seems unwise to encourage a return to such designs. Finally, it is

worth noting that the BSF Building Bulletin proposes that 'the most flexibly designed spaces can only work if building users have a flexible attitude' (p. 19). At the time of most debate about open-plan schools, concerns were raised over how much flexibility it was reasonable to expect from the teacher, while various reports and pieces of research noted the demands that this particular sort of flexible environment made on teachers (NUT (England) 1974; Bennett *et al.*, 1980; McMillan, 1983).

In general, the BSF Building Bulletin seems to recommend flexibility without really engaging with the controversy and potential contradictions which recent history shows exist. That this is an unfortunately typical position is suggested by Curtis (2003), who comments that flexibility is a concept often referred to but with its 'meaning seldom clarified' (p. 10). Encouragingly, the BSF bulletin is considerably more exact in its recommendations for adaptable schools. It illustrates with examples of actual schools built the idea of achieving this through leaving space on site for more building later, as has been recommended in the past (OECD, 1976). There are some quite specific, and perhaps useful, suggestions for ways of designing classroom blocks so extra space can easily be added on at a later date (Figure 21). While this appears a sensible way to anticipate change, it must be questioned whether the potential will be used in many cases.

Figure 21 Alfred Salter School, London: Classroom wings designed so more rooms can be added (DfES, 2002, p. 53 Photographer Peter Mackertish)

As this review has shown, there was general agreement after WW2 about the benefit of constructing buildings so their internal organisation could be changed. Yet there is some doubt about whether this is very frequently utilised, which is perhaps not unexpected given the reluctance of people, noted by environmental psychologists, to alter their physical surroundings (David, 1975; Rivlin and Wolfe, 1985). Perhaps the sort of adaptability likely to be built into the schools currently being planned will be more immediately obvious and so will be used. Furthermore, it could be argued that if such parts of the design do not add to the cost or limit the architect, they might as well be included. However, if this is not the case, it is worth keeping in mind the opinion of the 1970s OECD report (OECD, 1976), quoted previously, that it is unwise to spend today's money attempting to accommodate an unknowable future.

Optimal features for a new school

It must be questioned whether an ideal school can be built, even if the challenge is simplified by giving up the attempt to predict the future. As has been shown, nineteenth and early twentieth century architects seemed more inclined to the view that it is possible to build a school that fulfils all the requirements at least of its own

time and is therefore the best design. The tone of Philip Robson's book on school architecture (Robson, 1911) is one of continual improvement and refining, so that some designs are considered to be unarguably better than others, rather than just different or the results of prioritising differing elements.

During the post-war period, however, this attitude changed, partly as a result of coping with a stock of schools where any design disadvantages of a particular era were repeated across the country. The idea that there is no ideal school design is in evidence in the fairly wide range of designs tried by Herts LEA in the immediate post-war period, while, some years later, the OECD argue that there is not even an ideal building system so that 'the "optimum grid" for the structural frame… is a chimera' (OECD, 1976, p. 98). Yet for all the theoretical certainty about avoiding ideals, the schools built during each part of the post-war building have distinct characteristics and share common flaws, much as the older schools did. It would appear that even with a commitment to avoid searching for an ideal form, architects of a certain time find what appear to be particularly appropriate solutions to certain problems, which seem to bear repeating.

That a similar failure to reconcile theory and practice on this issue still exists among architects is suggested by Dudek (2000). He argues that 'The notion of the ideal classroom… is a Platonic vision rather than a standard for imitation. To reiterate, it depends on a whole set of variables specific to a particular context' (pp. 56–57). However, this comment occurs after he has listed the key features required by a modern classroom that have emerged from the work of a number of school architects. Furthermore, it is possible to see in some of the recently built schools certain commonalities, such as the current popularity of atria and glass-covered corridors, which often combine circulation and social space (Figure 22).

Figure 22 Airy social and circulation spaces: Atrium (right) at Blyth Community College (Waring and Netts, www.protechresourcing.co.uk/waring.asp) and glazed corridor at Hayes School, Kent (DfES, 2002, p. 32; © Grant Smith/VIEW)

Past experience with design innovations and fashions would suggest that there may be particular problems associated with these features, which with time will become apparent. Educators of the future may then be exasperated that the same difficulties are repeated in schools across the country. Yet if lessons are to be learned from

previously built schools, it might be inevitable that new schools, if they take into account this knowledge, will have many features in common. For example, past experience would seem to suggest that flat roofs be avoided, and it appears that this advice is being heeded. It is not then sensible to complain if most schools now have pitched roofs.

If the similarities in the current style of roofing are so clearly a result of past experience, it must be questioned whether other aspects of recently built and proposed schools are considering or ignoring the past. Despite the 'profound public suspicion and resentment about the whole concept of systems building', which Saint (1987, p. 206) argues developed during the 1970s and 1980s, these building methods, now referred to as 'modular', show signs of making a return. The concern is that planners might not have understood the disadvantages associated with these methods in the past and continue to suffer many of the problems previously identified. This is perhaps suggested by the way the advantages of such building are described in almost identical terms to those used by the post-war champions of prefabricated systems. So, Herts architect Alan Meikle recalls his excitement at 'the concept of having a school that came in a furniture van…, of putting this upon a pristine slab, totally dry construction… no wet trades, no dirt' (Saint, 1987, p. 106). Currently, a modular building company includes in its list of benefits of this style of construction the following claims: 'Work on site is safe, quiet and clean' (Yorkon, 2005).

Meanwhile, a fundamental complaint about the post-war systems building was that it was formulaic, especially as time went on. It has been questioned whether truly individual and aesthetically pleasing buildings can be constructed using these methods. Although the answer is generally a qualified 'yes' (Seaborne and Lowe, 1977; Saint, 1987), it must be noted that the modern systems tend to be based on a much more rigid system of units than most of the post-war building with its Meccano-style (Saint, 1987, p. 67) approach. Effectively, some modern systems have resurrected the 'bay' system of school building, discussed during WW2, but quickly rejected after the war in favour of much more flexible 'grid' systems (Seaborne and Lowe, 1977; Maclure, 1985; Saint, 1987).

Another aspect of modern school buildings where there exists concern that past lessons have not been learned is circulation space. As has been described, although some reduction in circulation space from the initial post-war designs was reasonable, the continued paring down of such space began to cause problems. In the later open-plan schools much of the teaching space was supposed to double as circulation space. While sometimes difficulties arose because of particularly poor design (Bennett *et al.*, 1980; Maclure, 1985), it can be argued that often there just was not enough space. As a respondent to the NUT survey (NUT (England) 1974) wrote, 'There can be no movement or activity on any scale where there is no room to move' (p. 29).

The BSF bulletin notes that 'many existing schools have narrow, poorly lit corridors with low ceilings. These spaces are unattractive and lead to congestion and, in the worst cases, behavioural difficulties' (DfES, 2002, p. 28) and provides suggestions for avoiding these problems. Also, some recent school designs seem to address this

issue of circulation space, often through the atria mentioned previously. However, there is some concern among architects that this is not general. In a review of a German secondary school, Blundell Jones (2004) comments on 'the quality of the circulation space' and claims that 'This is one way in which the building scores heavily over some recent British Private Finance Initiative (PFI) schools, where everything is flooded in the same dingy fluorescent light summer and winter, and blind smelly corridors are automatically double-loaded for economy' (p. 42). The suspicion, expressed here and elsewhere by some architects (Slessor, 2004), is that the demands of economy and cost cutting are taking priority over all other needs. Given that dislike of later post-war schools was fuelled by a perception that the only reason for their design was cost cutting (Bennett *et al.*, 1980; Maclure, 1985), it would seem important for those currently involved in funding and designing schools to avoid a similar perception developing now.

Concluding thoughts

The central conclusion that can be drawn from this review is that it is generally informative to examine past waves of school building and this provides a valuable perspective from which to consider current building plans. However, it can be seen that no burst of building is entirely predictable or straightforward, and considering previous waves demonstrates the complexity of the initiating conditions and the development of building programmes. There would appear to be no simple mechanisms and, even with a good understanding of the current situation bolstered by studying the past, it is difficult to predict how BSF will develop, what the results will be and how these will be judged by future generations.

Yet there are indications of likely directions, some of which it would be wise to try to avoid, and these will now be briefly described. Firstly, considering the planning process, it seems likely that consultation of users will be recommended and talked about, but might fail to be carried out in a way that satisfies those involved or produces useful information to feed into the planning process. This happened during the 1960s building phase, and the post-war experience in its entirety demonstrates the difficulties and contradictions of consultation. Saint (1987), Bennett *et al.* (1980) and the NUT report (NUT (England) 1974) all discuss this issue and conclude that consultation is best conducted with fairly senior, or architecturally experienced, teachers who feel able to take decisions and are more likely to produce useful input. Although this perhaps risks making the mistake of the post-war architects, who met many more progressive than traditional teachers and formed an inaccurate impression of schooling, with care and awareness this can probably be avoided. Dudek (2000, pp. 50–55) describes an intensive and quite lengthy consultation which involved ordinary teachers but aimed to develop their understanding of design issues before expecting them to make recommendations. If such methods were to be generally adopted, it seems likely that consultation could be made to work, but whether BSF will actually achieve this remains to be seen.

Moving onto the school buildings themselves, it is difficult to make any specific recommendations. Inevitably, the style and content of the school curriculum has implications for the buildings in which it is to be taught. Previous experience shows, however, that while educational needs might lead to suggestions for more and less

appropriate architecture, the relationship is not deterministic. Although a building might help or hinder particular educational aims, it does not necessitate some and deny others. Conversely, while aspects of the curriculum might suggest building features, they should not be seen as necessitating them. Taking such a perspective is probably easier if the curriculum is flexible and this point was made by the OECD report (OECD, 1976). This argues that it is more difficult to ensure the flexibility and adaptability of school buildings over time if 'educational policy imposes rigid patterns of daily activity on the school' (p. 107). Furthermore, it can be argued that binding architecture and pedagogy too tightly can be problematic. The mid twentieth century tendency to see school buildings and the curriculum as entwined manifestations of post-war egalitarian ideals provided a powerful understanding of education (see e.g. Lawn, 1999), but Maclure considers that ultimately it was destructive for both the architectural and the pedagogical ideas. In particular, he argues, the criticisms of modernist architecture in the late 1970s and 1980s led to more pressure on education, with which it had become associated.

This interpretation bolsters the idea, which has recurred in this review, that it is prudent to aim for variety, both in the way space is used within a school and in the design of different schools. As has been argued previously, uniformity through a school seems to lead to problems and, despite occasional failures such as the 1970s typing room, a range of different spaces with specific designed purposes appears to work well in the present and into the future. Here immediate evaluation can be helpful since it can ensure that any mistakes about the actual use of space are not endlessly repeated.

This review has discussed the irritation of educators who have to cope with the same design disadvantages throughout a batch of schools of any one era, even where contemporary architects were trying to avoid building the same school again and again. Therefore, although a consideration of the past recommends the benefit of building a variety of schools, it also suggests the difficulty of achieving this. However, such an understanding could usefully inform the design process and suggest a prudent approach to learning from other schools. The suggestion that it is possible to build a variety of schools is given plausibility by the recent schools built by Hampshire LEA, each of which is fairly distinctive.

One reason for similarities and repetitive features amongst schools built around the same time is the institutionalisation of particular aspects, so innovations come to be seen as self-evident. It has been shown how both generally valuable, but also quite mistaken, ideas become standard. This can in itself be a problem if the feature is really misjudged, but even acceptable design solutions can become rather tired and perhaps be implemented lazily once their original impetus has been lost. Thus the school plan particularly criticised by Bennett *et al.* (1980, pp. 222–230) not only has circulation problems, but was also badly sited so that the infant unit faced due north and so was almost always in shadow. This suggests a slap-dash approach to the school's architecture with a by then (1975) fairly standard open-plan design rolled out without much thought. Such an occurrence should be of concern to BSF as it goes on and the designs used run the risk of becoming formulaic.

In this case, a reasonably rapid and focused evaluation identified many design problems and this suggests the potential benefits of evaluating school buildings once they are in use. This should include the responses of teachers and students, but, as was mentioned in the introduction, it should not be expected that a particular building will have immediate effects on such easily measurable outcomes as attainment. Yet it might be valuable to track other indicators of behavioural and attitudinal change, such as staff turnover or staff and student absence rates, as well as carrying out studies of how particular spaces within a new school are used.

However, this review has also described occasions where genuine evaluations take time, and, more generally, the way that changing circumstances and needs gradually bring to light the consequences of particular designs. Furthermore, cultural ideas and assumptions change so that, for example, the problem of balancing aesthetic and functional requirements is resolved differently at different times. Nineteenth century school architects, despite some claims to the contrary, liked decorated facades; but post-war designers emphasised function, as they understood it, and attempted to ignore the external aspect. Current school architecture favours more consideration of external appearances and would seem to be returning to a more obviously aspirational style of architecture. Whether this is how the resulting schools come to be perceived remains to be seen and this will affect how the current balance of form and function, in its implementation in particular design aspects, is judged by history.

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Title page photographs

Cray Valley Technical School, Kent, 1934–38 (Saint, 1987, p. 38; AP Archive/RIBA Library Photographs Collection)

The Woodlands Comprehensive School, Coventry, built in 1950s, photograph taken 1985 (Saint, 1987, p. 169)

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