
*Prefabrication, aesthetics and the welfare state:
the case for the post-war British public school*

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Abstract

The post Second World War welfare state in Britain was based on three pillars: housing, health and education. This paper focuses on education and critically reviews the post-war school building programme in Britain during the first decade following a publication by the Royal Institute of British Architects entitled *New Schools*, a milestone in school design in the British Isles. Introducing prefabrication in the design of public schools was the way forward to cater for the significantly large number of school spaces required within a short timeframe. As an effective solution to meet the government's programme, a new aesthetic emerged associated with this mode of construction. These themes are investigated in this study, successes and limitations are identified, criticism levied and final comments put forth. Post-war public schools are a further development of the typology of educational buildings in Britain, a typology which although already present in Northern Europe, left its mark on British architectural history of the twentieth century. This development is an evolution resulting from an awareness of the revolution which industrialization had brought about on war machine production coupled with the emerging political ethic.

Introduction

It is the duty of a government to do whatever is conducive to the welfare of the governed. (Nassau Senior, Oxford lectures, 1847-48)

In England, debates about the State's contribution to the social welfare of the governed date back to the eighteenth century. The above quotation from Senior, an architect of the 1834 English Poor Law, highlights the social philosophical thought advocated within the Oxford tradition. After the Second World War, the 'social service state' became the 'welfare state'. The shift was not just in terminology but in essence. The 'social service state' provided welfare for the people in need while the 'welfare state' provided the basic minimum to meet the standard of living for all the governed.ⁱ

It was increasingly regarded as a proper function or even obligation of government to ward off distress and strain not only among the poor but among all classes of society. And because the area of responsibility had so perceptibly widened, it was no longer thought sufficient to provide through various branches of social assistance a standard of service hitherto considered appropriate for those in receipt of poor assistance". (Titmuss, 1950, p.506)

Welfare policy was the main theme of the electoral programme which brought the Labour Party to power in 1945.

The late 1940s were characterized by a clear shift of emphasis from aesthetics to welfare policy. Planning was more important than design (Mordaunt Crook, 1989, pp. 256-257). The 1944 Education Act and the 1946 New Towns Act were the main factors responsible for post-war social reconstruction. The former led to the construction of 2,500 schools within a decade while the latter led to the design of ten new towns built on the model of Letchworth Garden City (Frampton, 1994, p. 262). These Acts were reinforced by the 1947 National Health Act. The Honourable Aneurin Bevan, its architect and the then Minister of Health, exclaimed that "homes, health, education and social security, these are your birthright" (Briggs, 1973, p. 513).ⁱⁱ This social restructuring provided the setting for the British post-war school building movement.

To investigate the relation between the ‘welfare state’ and education in post-war Britain, and its subsequent influence on prefabrication, I intend to look at three main aspects. These are the state of education in Britain at the time, and prefabrication perceived as failure and as success respectively. Finally, I intend to look briefly at the new aesthetic emerging in prefabricated schools. The discussion will be limited to the first twelve post-war years. During this period, nearly two million extra school places had to be provided. In 1958 the number of primary school children started to decrease for the first time since 1946. Throughout this time span, all the budget of the Ministry of Education was voted to create more school places. Minor works were also oriented towards this objective. By 1958/59, provisions were being made to improve existing schools. Preference was given to science facilities in secondary schools with a considerable number of children over 15 years of age (Department of Education, 1977, p. 64).

The status of state schools in Britain

The capacity of post-war public schools, both primary and secondary, was very limited since the demand for new school places increased. The Labour Government realized that if children were to be accommodated in existing schools, the resulting overcrowding would have been unacceptable by educational and sanitary standards.ⁱⁱⁱ New schools were not a luxury but a basic need. Ten thousand schools had already been ‘blacklisted’ before the war (Sheppard, 1946, p.11). The damage caused to over one sixth of British schools during the war, cessation of school-building projects during the inter-war period, and higher birth rates in the middle and late 1940s all contributed to create this demand. Raising the school-leaving age to fifteen and reducing the number of children per class in 1947, a follow-up of the 1944 Education Act, helped to increase the demand (Sheppard, 1946, p.11).^{iv} The New Towns Act of 1946 and new housing on the peripheries of towns, especially during the period of 1946-60, led to the development of new communities. To cater for children’s education, schools had to be built within travelling distance from these areas. Population movement created a lesser demand for school places than did the overall growth of population.

In the midst of all these reforms in education, school building was the means to reach these ends. Architects of the school building movement were inspired by the urban theory

of Raymond Unwin, the pragmatic philosophy of Walter Gropius and the scientific spirit of John Desmond Bernal (Saint, 1987, p.226). Furthermore, the Royal Institute of British Architects (RIBA) had been active since the start of the reforms. In 1945 the RIBA Council set up the School Design and Construction Committee. In 1948, this Committee, in collaboration with the Exhibition Sub-Committee of the RIBA Public Relations Committee, set up the 'New Schools' Exhibition.^v In 1948 it published a handbook to the Exhibition. This was effectively an official handbook to school design. It included a brief discussion of the history of Education in Britain, site location, planning and design, and construction requirements for building new schools. The introduction was written by George Tomlinson, then Minister of Education.

During the post-war years, especially up to the mid-1950s, meeting the demand for new school places was the Education Department's top priority policy. Major works were committed to meet the demand. All resources were voted for this need. The Ministry of Education set up an organization to allocate funds in line with the Ministry's policies. All school building budgets were managed by this organization. Any improvement in the existing school places was only incidental or through some minor works. Meeting the demand for school places sometimes involved a degree of improvement in school buildings. To ensure and enforce the commitment of school-building resources to major works as opposed to improving and replacing existing schools, a minor work limit was introduced by the Department of Education in 1948.^{vi} Although, by 1955, the demand for new school places and development of new housing estates was less pressing, it remained the main priority up till 1959/60. Variation in primary and secondary school population for England and Wales over the period 1946 - 1958 is illustrated in Figure 1 (Department of Education, 1977, p.70).^{vii} The total amounts of expenditure for major and minor works in schools over the period 1946/47 to 1957/58 are plotted in Figure 2 (Department of Education, 1977, p.67).^{viii} The annual numbers of school places stated and completed over the same period are plotted in Figure 3 (Department of Education, 1977, p.68).^{ix}

“Contemporary school design involves the welding into one unit of three distinct requirements - education, health, and architecture” (RIBA, 1948, p.8). Contemporary style was mainly based on the official Swedish welfare state architecture (Frampton,

1994, p.262). The 1948 RIBA handbook includes a number of photographs of schools in Sweden and Switzerland as illustrations of suitable and humane environs for schools (RIBA, 1948, pp.6, 23 and 25). The axioms of the post-war school building movement were related to the building process and not to its appearance. They were all borrowed from modern architecture. In Andrew Saint's words, these axioms are summarized thus:

A1 : ... Everything about architecture and building ought to be submitted to the test of the most searching, rational scrutiny;

A2 : The benefits of a better architecture had to be conferred evenly upon the whole population, not reserved for one small segment; and

A3 : The methods of architecture had to be intensely co-operative and collaborative. (Saint, 1987, p.225)

These three axioms led to the fourth, namely that "buildings were to be the embodiment of a continuous, developing process between architect, client, user and maker" (Saint, 1987, p.225). At this time, Brutalism was still in fashion. It was "not offering a style but a set of moral responsibilities" (Mordaunt Crook, 1989, p.258). The main precept of such architecture up to the mid 1950s was truth to materials. Brutalist architecture claimed to express and not hide the articulation brought about by materials and structure. The Smithson's Hunstanton School is such a case study (Frampton, 1994, p.265).^x

Figure 1: School population of England and Wales
(Adopted from Department of Education, 1977, p.70)

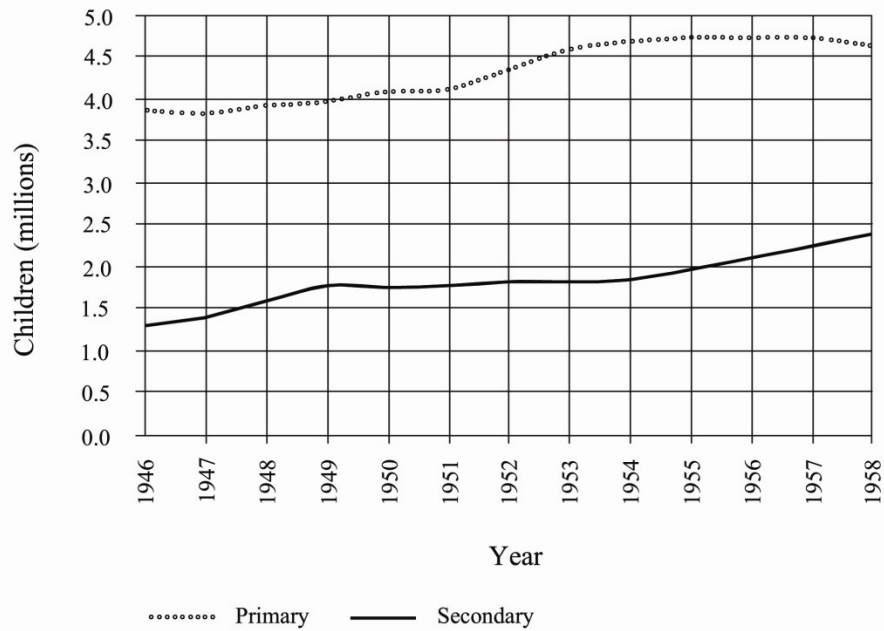


Figure 2: School building programmes for England and Wales
(Based on Department of Education, 1977, p.67)

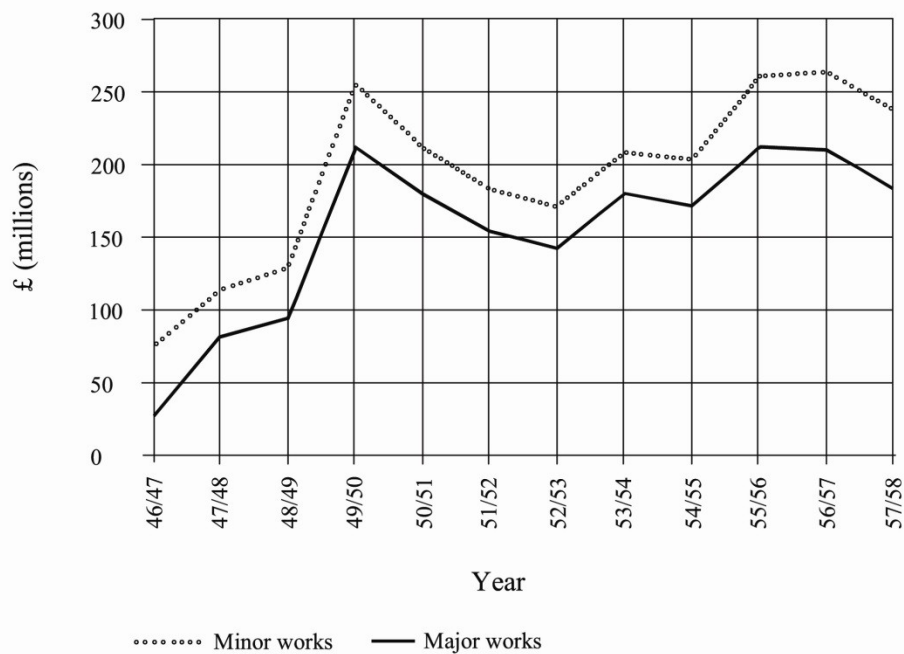
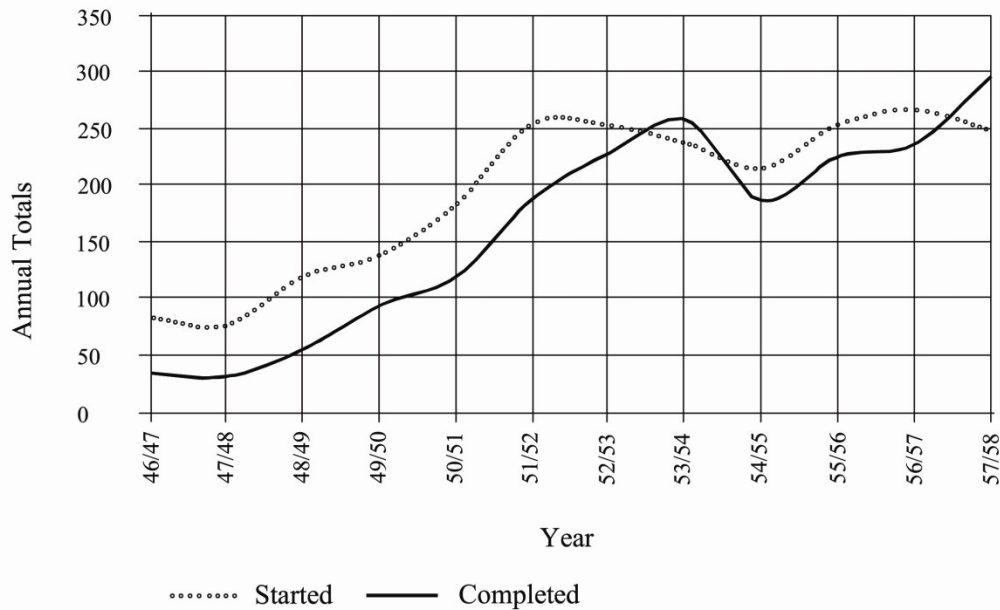


Figure 3: School places for England and Wales
(Based on Department of Education, 1977, p.68)



Prefabrication: The failures and successes

The pioneering post-war school architects, in an effort to build schools quickly and in large numbers, had to aim towards an industrial methodology which did not hinder their aims and ideals. Some local authorities' architects, such as Charles Herbert Aslin at Hertfordshire, resorted to various methods of prefabrication. Saint argues that such architects conceived prefabrication in terms of components and not in terms of units (Saint, 1987, p.225). This was certainly not the case for the 1940s. A book published by The Architectural Press in 1946 stated, in a footnote, that there were many definitions of prefabrication but none distinguished between mass-produced materials and mass-produced components (Sheppard, 1946, p.9(n)). In 1944, the Ministry of Works defined prefabrication as "the formation of buildings or components for buildings by the assembly of materials or units otherwise than in their final position" (Ministry of Works, 1944).^{xi}

The importance of prefabrication as a method of building was increasing prior to, during, and after the war. Prefabrication was a reality. It was a need, not a choice, to integrate the shortages of the post-war years with the demands of the period. It was a way of

shaping the building industry and society at large. Through prefabrication, the pioneers hoped that they might change the construction process from a less planned to a more organized one.

School builders noted from the beginning “that good prefabricated design must be based on a language of refined interchangeable components, not on the complete unit or classroom” (Saint, 1987, p.233). By 1948, the RIBA was aware of the significant contribution made by specialized building companies. It acknowledged the advantage of being able to obtain off the shelf quality products ranging from fittings to systems of construction.^{xiii} Construction companies sold their respective methods to suit the market. Two such companies were Orlit Construction and Hills “Presweld” Ltd. The Orlit method of construction was responsible for works at Wexham Road School at Slough while Hills “Presweld” Components were used in Hemel Hempstead Primary School at Hertfordshire. Both methods of construction were advertised as being economical in the use of material, money, and speed of erection. As Hills “Presweld” Components assured the architect “of complete freedom in architectural planning and design”, the Orlit method of construction allowed “the architect full opportunity to exercise his skill in design” (Association of Education, 1951).

School builders “approached prefabricated building pragmatically, borrowing from traditional building technique to solve problems of joints, seals, and profiles” (Saint, 1987, p.233). Prefabrication was for them a mode of building more schools with more space and better services. Two main failures and limitations for the system were cited: prefabricated schools are usually hotter in summer and cooler in winter and sound insulation was not good enough (Saint, 1987, p.233). Local climate and other contextual conditions needed to be taken into account when designing a building in any method of construction. The school builders approached prefabrication pragmatically not only when it came to detail but also in the overall layout. A design intended for an equatorial climate is almost uninhabitable if implemented in Northern countries. Furthermore, one must not underestimate the fact that building technology can evolve only through thorough development. Adjustment and further development will in turn follow. Through experience, technical problems will be identified, tackled, and eventually solved.

Ancillary to the idea of prefabrication is the idea of standardization. Standard components make mass production feasible. Prefabrication must incorporate standardization of components. This does not imply that a building may not be prefabricated without being standardized. A building may be prefabricated without being standardized and may be such without being prefabricated. Both concepts were developed in the United States prior and during the Second World War. Post-war British architects were too rapid to adopt the idea of line production of war machines to the building industry. War machine production lines evolved during long periods of experimentation and intensive use. However, certain methods of construction, especially traditional ones, are not suited for such mass production. Flexible production of buildings was foreign to Europe.

In the post-war period, prefabrication was perceived as the solution to the social and architectural problems which confronted architects at the time. They had to build a large number of buildings in a short time span. In Johnson Marshall's words, during a brief talk on a BBC programme in 1950 entitled 'Can we build more simply?' he stated that "the whole problem [was to devise] ... a fundamentally simpler technique; a technique which will give us greater beauty, comfort and value at lower cost".^{xiii} The various methods of prefabrication used led to the rise of a Consortium of Local Authorities Special Programme (CLASP) in 1957. CLASP exploited the current prefabrication techniques and developed them into a coherent metal-frame and concrete system.

Research, development, and collaboration with offices such as Herts and London County Council were responsible for the technical innovations in the post-war British school industry. They lead to numerous technical solutions.^{xiv} Old ideas were improved while new ones were introduced. Since these public sector offices were subsidized by public funds, the research and innovations were published and thus made available to the public. They found their way into building practices and to the public at large. Much of this research was later incorporated in British Standards' range of building products and thus adopted to the service of the British nation and the Empire.

The British state school and aesthetics

If prefabrication was a success for the school builders, the aesthetics was a failure. Post-war school architecture was centred on the social dimension of teaching in a more contented and more humane environment. School buildings must be light, healthy and “must express, in architectural form, the culture which is the basis of our society” (RIBA, 1948, p.28). The quality of the environment was an integral part of the architecture. Lighting and colour were of principal concern in the design of early Herts primary schools; wall murals were encouraged and sensitive landscaping was undertaken. Although interiors improved in appearance, the exteriors lagged behind. “The social ideals of the school builders reinforced the stringencies of the cost limits” (Saint, 1987, p.234). When faced with priorities, money voted for the exterior of buildings was diverted to maintain and improve standards and services of the interior.

By the late 1940s it was thought feasible for architects to produce designs of high quality using standard components:

Standard structural units, were used, can still be the best that can be formulated, governed by aesthetic considerations of form and outline as well as by dimension, strength and economy. (RIBA, 1948, p.22)

Architects worked hard to improve external components of the system.^{xv} The nature of the system prevented most architects from designing freely as they might have wished. It encouraged architects with strong aesthetic sensibilities to quit school-building and turn to other building types.

Technical development and aesthetics were the main weaknesses of post-war school buildings. The achievement of the school builders was the development of policies and modes of construction which provided accommodation for millions of children to a standard which was inconceivable before the war. “Imaginative practicality ... was the distinguishing mark of the post-war British public schools” (Saint, 1987, p.226).

Critique and final comments

Honourable Tomlinson stated that the 1944 Education Act arose “out of the new conception of Education which was gaining ground before the war and designed to

promote and encourage development of that conception” (RIBA, 1948, p.2). The Act focused on the child as the centre of the educational system. It was designed to suit and serve the child’s developmental and educational interests.^{xvi} Class sizes were reduced to enable better social interaction.^{xvii} A class of 40 or 50 pupils “is not education but mass production” (RIBA, 1948, p.5).

The shift from war-time to peace-time economy was characterized by a limited supply of material, labour force, and design staff in local authorities. The study of the Department of the Environment on school building states that the following four measures were taken by the Education authorities to meet the initial urgent demand for school places (Department of the Environment, 1977, pp.63-64):

1. To save time and utilise the advantage of bulk ordering, standard huts were erected;^{xviii}
2. Approximately 500,000 places were provided through minor works in the form of extensions to existing schools;
3. For a number of major school-building projects, an operational programme was initiated in 1946; and
4. A short-term programme was designed for other projects such as special education.

The programme was projected to commence between 1947 and 1948. By the end of 1948, less than 20% of the new places projected by the operational and short-term programmes were completed.^{xix} By 1948, over 80% of the existing schools were not up to the standards specified by the Act (RIBA, 1948, p.8).

Town planning considerations stipulated in the Town and Country Planning Act of 1947 put limits on locations and layouts of schools. Proposals for new or reconstructed school buildings needed permit from Planning Authorities. Applications for a development permit had to incorporate not only the site plan and layout of the school but also its relation to other urban parameters such as distance of the catchment area from school and means of transport.^{xx}

The pioneering architects of the school building movement were not interested in the creation of a new style. Their objective was to provide educational buildings which were

firm, comfortable and delightful within the stringencies of sites, money, materials and labour. They tried to integrate in the design the current trends in environmental and social sciences. Their buildings were an organic creation of the interaction of these various disciplines. The composition of their design was formed by selection, modification and transposition of practical design elements (RIBA, 1948, p.22).

An account of the history of prefabrication must include an account of the commercial exploitation which resulted within the social and industrial contexts. The social and economic structure of the country significantly defines the limits of the evolution of prefabrication at any particular time in history. The limits related to industrial processes, materials and social needs at the time when Crystal Palace was designed are no longer present. Evolution has altered the essence of the problem.

In Britain, systematic building research commenced only in the late 1940s. Prior to the war, there was less experiment with prefabrication in Britain than in the United States. Most experiments carried out in Britain were related to precast concrete. Types of prefabricated construction, involving other construction materials, were hardly investigated (Sheppard, 1946, p.21). The RIBA was aware of the limitations in the range of materials and their influence on the structure, appearance and on the planning of schools (RIBA, 1948, p.8).

The building process involves various decisions regarding the desired quality - whether in terms of architecture, or materials and finishes employed - and costs of the end product, the building.^{xxi} The costs of the construction method adopted and materials to be used should be weighed against the desired quality and resources available.^{xxii} Materials used in the interiors should be assessed in terms of their maintenance and cleaning costs. Large window spaces, open plan and cost of coal, made most school buildings expensive to heat and ventilate. In this respect one may argue that the 'New Schools' Exhibition partially failed to induce architects to create an environmentally sound school architecture as emphasized in the handbook to the Exhibition (RIBA, 1948, pp.22-25).

Various widely acknowledged arguments were put forward by nostalgic idealists of the traditional crafts against prefabrication. Were these arguments directed towards

prefabrication *per se* or at the practical reasons for its shortcomings? While shortcomings in traditional building techniques are accepted as a necessary evil, the same defects will be highly accentuated when they appear in new techniques such as prefabrication.^{xxiii} The factory production line of building materials ensures a consistent product. To ensure economic viability of the system, mass production necessarily leads to standardization of both size and quality. The first large building which was designed on a standardized module was Crystal Palace. The module was determined by the width of the glass, limited by the process of glass manufacture, and by the standard sizes of cast iron elements. Thus, complete opposition to prefabrication is complete opposition to industrialization. The meccano ideology is the dictum of industrialized buildings, especially high-tech ones. The legacy of prefabrication is not stylistic but ideological.

Prefabrication should be judged with respect to its suitability and effectiveness in use. Its appropriateness as a method of construction in Europe and the British Isles should not be grounded solely on its alien approach to traditional building construction. Criticism put forward against William Morris' critique of Capitalism is applicable here. There is no virtue in a craft for its own sake except for the craftsman. At this stage one ought to note that, with respect to the post-war schools, the most designed were too mechanical in Morris' sense. They were mechanical not only with respect to the employment of factory line mass production but also with respect to the non-imaginative way in which most designs were produced.

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ⁱ The history of the education system can be traced through the evolution of the 'social service state' (and later the 'welfare state') in the last century and a half of British economic history.

ⁱⁱ Bevan resigned in protest against the new charges which the Labour Government wanted to levy in order to maintain the National Health Scheme. The welfare legislation programme further decelerated after the Conservative victory in the 1951 general elections (Briggs, 1973, p.514).

ⁱⁱⁱ Minimum standards were stated in the *Standards for School Premises Regulations* (S.R. and O., N.345, 1945) proposed under Section 10 of the Education Act. These standards came into effect on 1 April 1945.

^{iv} The 1944 Act can be best viewed within the perspective of the historical struggle for free education, dating back to the early nineteenth century. The struggle was initially socio-religious with religious institutions opposing reforms intended to make education available to all strata of society. The Whitbread Bill of 1806 catered for rate-aided parish schools. The Bill did not get through due to the opposition of the Church, arguing that "it would enable the labouring class to read seditious pamphlets, vicious books and publications against Christianity" (RIBA, 1948, p.4). Two Acts were enacted in 1833. The first forbade employment of children under 9 years and limited working hours for children under 13 years and youths under 18 years to a maximum of 48 and 69 hours per week respectively. The second Act introduced a grant to the National and Foreign Schools Society. The grant was increased by 50% in 1839. In this year the Committee of the Privy Council on Education was set up to study and report on the possibility of extending the education system; its work was wasted due to fighting by various religious factions. The Education Department was established in 1856 and, in 1868, William Edward Forster, together with Edward Cardwell, introduced a Bill providing for free compulsory education out of public funds to poor children. The Act failed because local authorities did not comply. Two years after, the Bill was amended and school boards of management were formed by local authorities under the auspices of the Central Government. The amendment was so successful that by 1877 free education was provided for over five million children. Between the Forster Act and 1890, £40 million was spent on school building. The Government Board of Education, the forerunner of the Ministry of Education, was established by an Act of Parliament in 1899. An Act, establishing day-continuation schools for children between 14 and 18 years, was passed in 1918. By the Consolidated Education Act (1921) the administration of public funded education was entrusted to County and Borough Councils. Still the "Government exercised over-riding control without undue despotism" through Treasury grants (RIBA, 1948, p.4). The conditions upon which Government grants were assigned were later defined in *The Code of Regulations for Public Elementary Schools*, issued in 1926. Numerous reports were also undertaken. The Hadow Reports (vide Gillard, 2006) and the discussions of the London County Council Education Committee should not be underestimated. They were revolutionary in viewing education and in introducing unorthodox, more scientific, teaching methods.

^v The Exhibition was a follow up of a two-day conference on School Planning and Construction held in 1947 by the RIBA in collaboration with the Ministry of Education.

^{vi} Minor work limit was £5,000 at prices then current (Department of Education, 1977, p.67(n)).

^{vii} The figure in the study of the Department of Education illustrates the changes in the total primary and secondary school populations for 1946-76.

^{viii} The values in £ millions were calculated on the average prices of the first three quarters of 1976 stated in the Department of the Environment's Cost of New Construction Index.

^{ix} Annual total school places exclude HORSAs (Hutted Operation for the Raising of School Leaving Age) places.

^x Beauty derived from materials, form, and finish, was the ambition of school architects:

Designers of these new schools take a genuine delight in the frank expression of beautiful structural forms. A new feeling for texture, colour and pattern in materials, the sleekness of glass, polished metal and other machined finishes, contrasted with the richer and more varied surfaces of concrete, wood and brick, shows itself in their work. Skillful use is made of the interaction of mass and void, and of the interplay of light-absorption and light-reflection in preference to applied ornament. (RIBA, 1948, p.24)

^{xi} This quotation is also included in Sheppard (1946, p.9(n)).

^{xii} The book of the 1948 Exhibition on 'New Schools' includes, at the end, advertisements of specialist building firms (RIBA, 1948, pp.39-56).

^{xiii} As quoted in Saint (1987, p.237).

^{xiv} Saint states the following main technical successes : better school furniture, warm-air heating, good lighting (natural and artificial), rubberized studded flooring and a solution of building on mining-subsidence sites (1987, p.232).

^{xv} Such improvements include refinements of eaves and re-entrants, searching for sightlier aggregates for concrete cladding, and redesigning window frames (Saint, 1987, p.234).

^{xvi} Education was perceived as a process which progresses from childhood to adolescence, and finally to adult life. One of its primary aims is to prepare individuals to lead a useful, healthy life in the community (*School and Life*, M. of E., 1947 stated in RIBA, 1948, p.26). With its emphasis on the importance of continuity of education, the Act was the forerunner of the principle of life-long education advocated in later decades.

^{xvii} The maximum sizes for schools stated in *New Schools* (RIBA, 1948, p.7) are :

- Primary : (5 to 7 years) 240 places per 2 acre site
- Junior : (7 to 11 years) 320 - 360 places per 2 acre site plus 3.5 acres for playing fields
- Secondary : (11 to 16 years) 450 per 3 acre site plus 14 acres for playing fields

^{xviii} This was known as HORSAs, Hutted Operation for the Raising of the School-Leaving Age. It commenced in 1945 and had provided some 170,000 places.

^{xix} Most schools took a long time to be built and they were costly. To increase the economic viability of the scheme, a maximum cost per place was introduced. This measure was intended to reduce the overall cost of the building through good design and optimization of space (Department of Education, 1977, p.64).

^{xx} An initial planning consideration in locating new schools are public transport routes. Secondary school children are likely to use this mode of transport to go to school. The RIBA considered it good practice to limit transport routes to primary and junior schools so as not to be more than half and three-quarters of a mile respectively from residence of children (RIBA, 1948, p.6).

^{xxi} A building of the 1930s which utilized materials and modern techniques to create sound environmental architecture, was Goldfinger's house at No. 2 Willow Road. Goldfinger's design was not only innovative in the ingenious use of structure and its materials; it was in harmony both with the historic and urban character of the surrounding locality.

^{xxii} In the late 1940s, one of the main problems in school building was a variation in the price of building materials. Costs for building materials, whose manufacture depended on coal, had risen due to increased coal prices (RIBA, 1948, p.34).

^{xxiii} Corrosion and jointing problems are two such examples.