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William Allen and the 'Scientific Outlook' in Architectural Education, 1936–66

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ABSTRACT

Modern architects in the inter-war period were enthused by the potential of science and technology to inform their work. The educational dimension of this changing mindset was first recognised and explored at the Bauhaus in Germany, the experiments of which were to inspire the teaching of architecture in schools across Europe and the United States, particularly after the end of the second world war. In the United Kingdom, the quest for a more science-based approach to architectural education had an equally important source in the work of the government's Building Research Station (BRS). From the early 1930s, the BRS initiated steps to familiarise architectural students with its methodologies, and in the post-war years such concerns were channelled into a comprehensive pedagogical reform agenda that culminated in the landmark Oxford Conference on Architectural Education of 1958. This article argues that it was William Allen (1914–98), rather than better-known figures such as Leslie Martin and Richard Llewelyn-Davies, who was the driving force behind this agenda. As chief architect to the BRS, Allen took up a pivotal position at the intersection of building science and professional practice. The article shows how, over the course of two decades, Allen used the institutional machinery of both the BRS and the Royal Institute of British Architects to inject a scientific outlook into the training of architects. His success in doing so positions Allen as a major figure in British post-war architecture, even though his own attempt to implement his vision as principal of the Architectural Association (1961–65) ended in failure.

> It is the most solemn fact we face today that this is now a world characterised by the power of science, and modern architecture is the architecture of the age of science. The world can never again be as it was before its advent, and unless we comprehend what science is, what its potentialities are, and what its limitations, we are ignoring the very well-spring of our function in life today. (William Allen, 1966)[1]

Modernism has been described by Sarah Williams Goldhagen as a discourse framed by a changing set of propositions on the way in which architecture might 'grapple […] with the phenomenon of modernity'.[2] In the 1920s, much of this discourse centred on the question as to how, and to what extent, advances in science and technology might inform the work of modern architects. For some, new materials such as concrete and glass inspired the quest for a new formal vocabulary; others identified the potential

of industrial production methods to revolutionise the building process and remodel the shape of cities. Proponents of the Neue Sachlichkeit — a particularly influential grouping which came to dominate the proceedings of CIAM, the International Congresses of Modern Architecture — believed that scientific analysis would offer an objective and quantifiable answer to any design problem.

It was at the Bauhaus in Germany that the educational implications of this approach were first recognised. In the mid-1920s, the director of the school, Walter Gropius, shifted its outlook from the craft-based expressionism of its early years towards a preoccupation with science and advanced technology: what were once 'workshops' were now 'laboratories […] for mass production'.[3] Hannes Meyer, who succeeded Gropius in 1928, entertained close contacts with the logical positivists of the Vienna Circle and promoted their 'scientific world-conception' at the Bauhaus; he introduced science subjects into its curriculum and invited guests to lecture his students on sociology, hygiene, acoustics and lighting.[4]

Yet the Bauhaus had no immediate impact on the training of architects elsewhere. The 1928 founding declaration of CIAM was disdainful of the 'aestheticism and formalism' inherent in the prevailing Beaux-Arts methods and called for architecture to be 'set free from the sterilizing grip of the academies'.[5] However, it did not suggest an alternative mode of education and the question was not discussed in any detail in the following years. At the end of the 1930s, leading Bauhaus figures such as Gropius, László Moholy-Nagy and Ludwig Mies van der Rohe took charge of a number of schools in the United States, but it was not until the post-war years that — chiefly through Gropius — education began to feature more prominently on CIAM's agenda (and even then with comparatively little effect).[6]

Developments on the Continent had not gone unnoticed in British schools of architecture. In the early 1930s, students of the Architectural Association (AA) and the Liverpool School of Architecture began to adopt a modernist idiom in their projects. In 1933, the Modern Architectural Research Group (MARS) was formed as the English offshoot of CIAM, and in the second half of the decade several of its members taught in schools across the country, including William Holford, Max Lock, Leslie Martin and Richard Sheppard. Yet neither Gropius nor Moholy-Nagy, who both lived in Britain at the time, obtained any teaching roles (a reason for their onward journeys to the US). Gropius did have a manifest influence on an emerging network of student activists, to whom he lectured in the winter of 1935–36.[7] Its best-known outcome was the 'Yellow Book', issued in 1937 by a group of AA students calling for higher entry standards and compulsory science subjects.[8] More importantly, members of this wider network such as Martin and Richard Llewelyn-Davies re-emerged as protagonists in the events surrounding the 1958 Oxford Conference on Architectural Education, which established architecture as an academic discipline to be taught at universities and with an emphasis on science-based postgraduate studies.

While modernisers such as Martin and Llewelyn-Davies were inspired by the Bauhaus, an equally important (and hitherto overlooked) impulse to put architectural education on a scientific basis came from the government's Building Research Station (BRS), founded in 1921.[9] The BRS carried out pioneering investigations into the properties of materials and structures, and from the early 1930s made targeted, if largely fruitless,

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efforts to familiarise architects with its findings. During the second world war, these efforts began to crystallise into a coherent pedagogical reform agenda, which would eventually culminate in the Oxford Conference.

The principal figure behind this agenda was William Allen (1914–98), the chief architect to the BRS, who occupied a unique position at the intersection of building science and professional practice. Allen's thinking was grounded in the assumption that science was the defining value system of his age, which imposed on architects the professional responsibility to develop a 'scientific outlook' to guide their work.[10] In Allen's view, the quality of creative acts — including architectural design — depended on a background of knowledge that could only be acquired through methodical research. A scientific outlook would enable architects to contribute to such research; more importantly, it would allow them to understand and reconcile the discrete findings of scientists as part of their design process. To make a balanced judgement, what was required of architects was not an encyclopaedic knowledge of factual detail, but an understanding of its underlying principles.

Allen's ideas echoed those of W. R. Lethaby, who a quarter of a century earlier had called on architects to adopt a 'spirit of experiment' and carry out scientific investigations into the 'first principles' of architecture.[11] Yet Allen did not become familiar with Lethaby's work until after the second world war; Allen's thinking on 'principles' was inspired by the Cambridge-based physicist J. D. Bernal, who advocated a broader and more benevolent role for science in society.[12] Bernal had close ties with the BRS and was a leading light of early British modernists, who shared his belief in the latent potential for science and technology to transform architecture into a service to society, and a corresponding enthusiasm for new building materials and advanced constructional techniques.[13] After the second world war, such ideas became widespread as building science became integral to the work of the various development groups driving the reconstruction programmes of local councils and government ministries. As recounted by Mark Crinson and Jules Lubbock, in the early 1950s leading members of these development groups moved into teaching positions where they promoted higher academic standards and a curriculum enriched by scientific content.[14] These included Robert Gardner-Medwin, who in 1952 left the Department of Health for Scotland to join the University of Liverpool; Robert Matthew, who one year later moved from the London County Council (LCC) to the University of Edinburgh; and Leslie Martin, Matthew's successor as chief architect to the LCC, who in 1956 became the inaugural professor of architecture at the University of Cambridge.

Through Allen, a more direct line can be drawn between organised building research in the 1930s and the educational system set in place at the Oxford Conference. Although his interest in an enhanced role for science in architecture was shared by others in the country, it was Allen who first saw this primarily as an educational problem. Allen's intellectual leadership was acknowledged by his contemporaries. Jack Napper, the head of the school of architecture at Newcastle, who met Allen during the war, later referred to him as a 'one-man postgraduate course for the profession'.[15] Llewelyn-Davies, Napper's counterpart at the Bartlett School in London, spent two weeks with Allen at the BRS and said he learned more there than in five years as a student at the AA.[16] According to Gardner-Medwin, he and his colleagues were 'impressed by

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Fig. 1. *William Allen's house, Welwyn, Hertfordshire, street front, photograph of* c. *1960 (William Allen Papers; courtesy of Nicholas Allen)*

[their] association with Bill Allen', whom he credited for giving a 'great lead in making architects more scientifically-minded'.[17]

Allen worked closely with his allies to bring about the desired changes to the educational policy of the Royal Institute of British Architects (RIBA). Yet once they had achieved their common goal, their coalition fractured. Universities imposed their structures on architectural education and Martin, as chairman of the Oxford Conference, advanced his understanding of architectural research as a means to establish a theoretical framework for the teaching of architecture, rather than merely a vehicle for building science.[18] Allen opposed these developments and, as principal of the AA between 1961 and 1965, tried to install a pedagogical model that deviated from the nascent educational mainstream. This experiment foundered and Allen's reputation was soon overshadowed by that of his more successful colleagues. Crinson and Lubbock count Allen among a half-dozen 'key figures' behind the Oxford Conference (although not as one of its 'leading lights').[19] More recent scholarship has focused largely, and sometimes exclusively, on the contributions of Martin and Llewelyn-Davies, which came to epitomise the new educational paradigm.[20] This article seeks to rebalance these accounts. It portrays Allen as a foundational figure who was instrumental in initiating and sustaining the reform agenda behind the Oxford Conference — even if his attempt to implement it ultimately failed.

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BUILDING RESEARCH AND THE EDUCATIONAL LANDSCAPE IN 1930S BRITAIN

Allen was the scion of an illustrious family of Canadian academics and the epitome of an architect–scientist. From an early age, he was drawn in equal measure to architecture and science, and throughout his life he refused to see a conflict between the two.[21] In 1932, he enrolled as an architectural student at the University of Manitoba, where his father held the inaugural chair of physics. At the time, Frank Allen, whose principal research interests included the physics of the human sensory system, acted as a consultant on the acoustics of Winnipeg's new Civic Auditorium. William Allen assisted his father in this work and, when he graduated as an architect four years later, his intention was to pursue postgraduate research, preferably in architectural acoustics.[22] Determined to escape post-depression Canada and attracted by the new auditoria of Stratford-upon-Avon and Liverpool, he sailed for Britain to further his studies.[23]

Allen's hopes of finding in Britain an environment alive to the scientific aspects of architecture were quickly dashed. Half a century earlier, the RIBA had set up a Science Standing Committee, and in 1906 it had organised and financed the work of a multidisciplinary committee that produced a ground-breaking piece of research into reinforced concrete.[24] However, the RIBA soon abandoned its interest in scientific experiment and yielded the initiative to the BRS, founded in 1921 to investigate alternative building methods in support of the government's post-war housing drive — a key recommendation of the 1917 Tudor Walters report drafted by the architect and town planner Raymond Unwin.[25] The BRS came too late to make a notable contribution to that particular cause, but in 1925 the health minister Neville Chamberlain instigated a substantive expansion of its research programme.[26] Under the BRS director Reginald Stradling, a civil engineer, teams of chemists, physicists and engineers carried out research into the weathering of materials and the strength and fire resistance of structures. It was this dual emphasis on materials and structures that defined the novel concept of 'building science', with 'efficiency of buildings from the standpoint of the user' (that is, the study of their internal environment) initially of comparatively minor importance.[27]

The BRS was aware that the new 'building science' (by the early 1930s a well-established term) would be of limited value unless fully understood and applied by architects.[28] It was therefore eager to familiarise them with its methods and findings — a tricky task given that few architects had any background, or apparent interest, in science.[29] In conjunction with the RIBA's Science Committee, Stradling organised quarterly (but poorly attended) visits to the BRS, and in 1933 he arranged the first 'refresher' courses for practising architects.[30] The Science Committee, in turn, co-opted Stradling and, in December 1934, launched a series of 'informal meetings' aimed at younger, scientifically minded members of the RIBA.[31] Yet, without the full institutional weight of the RIBA behind it, such initiatives had no significant impact on the profession as a whole. Much the same was true of the enquiries service through which the BRS offered its advice on technical matters.[32] Although the demand for it grew over the course of the decade, it, too, remained confined to a relatively small number of architects. 'Why,' wondered the RIBA librarian Edward Carter in 1938, 'is the work of the Building Research Station only known to half the profession and only made use of by a hundredth part of it?'[33]

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Fig. 2. *William Allen's house, Welwyn, Hertfordshire, garden front, photograph,* c. *1960 (William Allen Papers; courtesy of Nicholas Allen)*

Crucially, with the exception of the RIBA's informal meetings, such efforts to close the gap between architecture and building science invariably excluded those still in training, on whose support their success ultimately depended. The BRS organised workshops for teachers in building subjects, but there was no sustained connection with any of the schools of architecture.[34] In the early 1930s, some of these began on their own initiative to incorporate some notion of research in their curricula. At Liverpool, fourth-year students were formed into 'research groups' to study particular building types.[35] At the AA, research content — in the loosest sense of the term — was built up progressively through the course: in the lower years, the drawing of the Orders gave way to 'research' into the Orders; later on, students proceeded from the study of individual building elements to comparative plan analyses as part of their design process. In the final year at both schools, prescriptive Beaux-Arts programmes gave way to what we would today recognise as a design thesis, with students required to choose their own topic, write their own brief and carry out thorough investigations.[36]

At a conference at the RIBA in July 1935, Thomas E. Scott, the head of the Northern Polytechnic and chairman of the Science Standing Committee, stressed the need for the teaching of building science to be more closely related to the work of the BRS.[37] The plea for a more scientific cast to their education as an antidote to Beaux-Arts principles meanwhile pervaded discussions within an emerging nationwide network of student activists. Inspired by Gropius, who addressed them on two separate occasions in the winter of 1935–36, the students considered how a modern architectural education might be framed to take account of recent advances in science and technology.[38] In the so-called 'Yellow Book', issued by a group of AA students in May 1937 with the encouragement of sympathetic members of staff

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Fig. 3. *William Allen's house, Welwyn, Hertfordshire, living room and dining room extension, photograph from* Daily Mail Ideal Home Book 1953–4 *(Associated Newspapers)*

— the AA vice-principal L. W. Thornton White was the secretary of the Science Standing Committee – they called for higher entry standards and compulsory science subjects to facilitate more advanced lecture courses.[39] For the time being, such ideas remained wishful thinking. Academic entry requirements remained low (in fact, non-existent), and not a single school of architecture offered such advanced courses, let alone facilities for postgraduate study in anything other than history or town planning.[40]

Such was the situation when Allen arrived in England in September 1936. Through his father, Allen had established contact with Hope Bagenal, an internationally renowned acoustic consultant and lecturer at the AA.[41] Bagenal did not manage to line up suitable study arrangements for his young protégé, but the following year he did find him an opening at the BRS. Here, Allen came under the 'civilised and inspiriting direction' of Robert Fitzmaurice, an engineer with firm architectural leanings and close links with modernist circles.[42] As the officer in charge of the BRS's enquiries service, Fitzmaurice was conscious that architects were not able to 'digest its results in even its more palatable forms'.[43] He addressed this problem in his landmark *Principles of Modern Building*, the first volume of which was published in 1938.[44] Written at the joint request of the RIBA and the Chartered Surveyors' Institution, Fitzmaurice's textbook on the science of building materials and construction was notable for its focus on principles rather than technical detail. In Allen, one of only two architects on his staff, he found a devotee even more passionate about the need to bridge the divide between architecture and science.[45] In 1939, Fitzmaurice invited his young colleague, who had been put in charge of acoustics research at the BRS, to work with him on a book about sound transmission, as well as on the second volume of the *Principles*.[46]

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By the end of the 1930s, the movement towards a more science-based approach to architecture was gathering pace. Students and young architects were well organised, and with the AA students' magazine *Focus* they had a potent medium to make their voices heard.[47] Fitzmaurice's *Principles* and his subsequent collaboration with Allen indicated that the concerns of architects were gaining currency within the BRS. Indeed, even the RIBA appeared to respond to the changing climate of opinion. In 1938, it transformed its Science Standing Committee into a smaller, more agile body, and one year later its Board of Architectural Education (BAE) launched a fellowship for postgraduate research and set up a 'Special Committee' to carry out a comprehensive review of architectural education.[48] The time seemed ripe for architectural education to adopt a more 'scientific outlook' — and then the war came.

THE ARCHITECTURAL SCIENCE GROUP

The war period was a demoralising one for architects. Neither military authorities nor their civilian counterparts had much use for them.[49] The British army offered no dedicated corps for architects (as it did for other professions such as doctors, teachers or engineers) and four months into the war the government removed architects from the schedule of reserved occupations recognised as providing a vital service to the community.[50] Young architects were thus obliged not only to serve, but to do so submerged into other branches, without the opportunity to contribute their particular set of skills to the war effort.

After the war, the ability to collaborate across disciplines would benefit architects entrusted with complex and unprecedented reconstruction programmes. At the time, however, the lack of official recognition was widely deplored and particularly disheartening for those who remained at home. A few found employment in William Holford's reconstruction team at the Ministry of Works, and the BRS gave a home to a small number of technically gifted architects.[51] However, for many others there was little to do. Allen, who headed a BRS team preparing standard war factory designs and carried out lighting studies that formed the basis of future building controls in high-density urban areas, later recalled a widespread sense of frustration and shame among architects that 'our skills were presumed useless for the national effort'.[52]

'Resigned to fighting the war in lobbies', architects across the country formed study groups to discuss the challenges awaiting the profession in the post-war world.[53] Of these, the most important was the Architectural Science Group (ASG), a quasi-independent, BRS-centred think-tank founded in December 1939. Officially this was the outcome of a formal exchange between the BRS director Reginald Stradling and the RIBA president E. Stanley Hall; in fact, it was the result of Allen's 'gad-fly tactics', as the group's secretary put it.[54] In addition to Allen, the group comprised like-minded architects such as Sheppard, Godfrey Samuel, Basil Ward and F. R. S. Yorke, as well as distinguished engineers and scientists, notably Bernal. According to the *Architect and Building News*, it thus 'succeeded in collaring most of the best brain-power available in these times'.[55] Certainly, the rigour with which it carried out its work contrasted sharply with the dilettante approach of the RIBA's own, wholly ineffectual Research Board, which was established the following year to coordinate the efforts of the various study groups, including the ASG.[56]

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The ASG set out a broad vision of 'architectural science' (as distinct from 'building science'). For architecture to carry out its proper function, two problems needed to be tackled: one was to assess the 'building needs of the community in quantity and quality'; the other was to satisfy these needs with the 'minimum of cost and maximum of utility and convenience'.[57] Building science as currently constituted provided the technical means to solve some of the 'detailed problems', but the full value of science to architecture could not be realised until it was applied to the whole range of architectural problems.[58] In addition to the technical studies carried out at the BRS, this necessitated research of a sociological, economic and physiological nature.

The ASG set up four committees, the most productive of which tackled the question of education.[59] In addition to Allen, who convened its inaugural meeting on 18 December 1939, the core membership of the committee included Sheppard, Samuel and Fitzmaurice as well as W. N. Thomas, a professor of civil engineering, and J. Leask Manson, a structural engineer and author of a standard work on building science.[60] One year later, in December 1940, in a paper given to the national student conference at Hull, Allen explained his concept of architectural education. Allen argued that post-war reconstruction and the fast pace of technological progress would require architects to 'improvise wisely and effectively with an inadequate and fluctuating supply situation'.[61] The current mode of teaching science as a set of disconnected and soon-to-be-obsolete facts was, in his view, inadequate to prepare architects for this situation. Instead, the aim should be to instil a broad scientific outlook in students, which would allow them to develop 'an instinct to relate any problem and every decision to the fundamental operative natural principles'.[62]

In its first report, 'The Place of Science in Architectural Education', issued in January 1941, the ASG Education Committee set out how this scientific outlook could be brought into school curricula.[63] The committee proposed two different and fully worked-out schemes: one for schools in universities and technical colleges, where such topics were usually covered separately by specialist staff from other departments; and the other for independent schools, notably the AA, where they were combined into one comprehensive subject, commonly called 'building science' and taught by architects.[64] In both these schemes (of which the committee favoured the latter), the teaching of scientific principles in the first three years was to be followed by advanced technological studies in the final two, with the possibility of continuing these into the postgraduate stage.[65] The committee did not call for higher entrance standards, which would have been illusory in wartime conditions, when even leading schools struggled to attract a sufficient number of students to their courses. However, it did recommend that mathematics and at least one science subject be made compulsory to support the proposed changes.[66]

The report had no impact on the RIBA, not least because, by the time it was issued, there was no committee left to receive its recommendations: the Science Committee and the BAE's 'Special Committee' had both been in abeyance since the outbreak of the war and the Research Board had never got active in the first place. The Special Committee resumed its work soon after, but spent months in 'exploratory discussions', and in the meantime the ASG Education Committee pressed ahead with a follow-up report on the teaching of construction.[67] Frictions between the Special Committee and its energetic rival

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were not long in coming.[68] To defuse the situation, in June 1941 the RIBA's War Executive invited the ASG to reconstitute itself as the official RIBA Architectural Science Board (ASB) — on the condition that it disband its existing committees.[69] Designation as a board of the RIBA (one of only two, the other being the BAE) promised a considerable increase in prestige and proved too tempting to refuse. Even so, it was not until September 1942 that the terms were formally agreed and eventually, in June 1943, the ASG dissolved its Education Committee and forfeited its pedagogical agenda.[70] Allen left the group at once.

TOWARDS THE OXFORD CONFERENCE

The exigencies of war familiarised architects with 'operational research' — 'the bringing to bear […] of combined special intelligences on a problem [through] the collaboration and co-operation of people with different technical and different scientific contributions to make', in Bernal's slightly cumbersome wording.[71] In the post-war years, such methods became an essential part of architectural practice as public authorities formed so-called 'development groups' to drive their ambitious reconstruction schedules.[72] In 1941, Martin assembled a research unit to investigate the prefabrication of stations for the London, Midland and Scottish Railway.[73] One year later, Martin was joined by Llewelyn-Davies, who later carried the technique to the Nuffield Foundation and applied it to the planning of hospitals.[74] In 1945, C. H. Aslin instigated the schools programme at Hertfordshire County Council, and his deputy, Stirrat Johnson-Marshall, established the model of the development group on a national scale when, three years later, he became the chief architect to the ministry of education.[75] In all these cases, the goal was to synthesise the expertise of designers, scientists, manufacturers and client representatives to improve the design of a particular building type and increase the rate of its production.

To Allen, such development groups epitomised the convergence of architecture and science he had been promoting since the late 1930s.[76] His main agency had been the ASG, but Allen missed no opportunity to find a broader audience for his ideas. During the war, he addressed two national student conferences, visited schools of architecture and gave talks to small groups of isolated anti-aircraft personnel.[77] A prolific writer, he published widely in the professional press and co-authored with Bernal and Alec Skempton the section on the building industry in Penguin's *Science in War* (1940), which sold tens of thousands of copies.[78] At the BRS, besides his regular duties, Allen co-edited (with Cecil Handisyde) three of the *Post-War Building Studies* commissioned by the Ministry of Works, which he conceived as 'virtually a series of text-books for the advanced education of the industry and related professions'.[79]

Allen's primary research interests lay in the effect of heat, light and sound on the human sensory system — 'flare, glare and blare', as he called it.[80] His three building studies — on 'Heating and Ventilation', 'Lighting' and 'Sound Insulation and Acoustics' — defined standards for a range of environmental factors affecting the performance of buildings and gave, according to Allen, 'a new direction to researches in these fields by introducing into them the values and judgemental criteria of architecture'.[81] They reflected a shift in emphasis within the BRS, from quantitative investigations into structures and materials towards a broader set of criteria, including qualitative ones concerning the comfort and convenience of building users.[82] In essence, it was a shift

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from a narrow pre-war focus on 'building science', as traditionally understood at the BRS, towards the more encompassing concept of 'architectural science', as defined by the ASG. Specifically, it indicated a greater appreciation for its physiological aspects, which had a direct bearing on architectural design — what was termed, in BRS parlance, 'efficiency of buildings from the standpoint of the user' and would from the late 1950s be called 'environmental physics'.

This shift in emphasis received formal recognition when, in 1945, the BRS instituted a new 'architectural physics division' and appointed Allen as its deputy head. Composed of architects and physicists on equal terms, the division worked closely with the major development groups on studies into the heating of houses, the lighting of factories and classrooms, and the acoustics of the Royal Festival Hall.[83] Characteristically, in 1947, Allen used the home he designed for his family in Welwyn as a research object. It was the first fully floor-heated house in Britain and served to demonstrate the suitability of this system for open planning, specifically in terms of draughts and noise transmission.[84] Four years later, Allen applied the lessons to an extension of his house (Figs 1–3), as well as two other houses in the same neighbourhood — the first designed by Leo de Syllas of the Architects' Co-operative Partnership in 1951, the second by his BRS colleague John Bickerdike in 1952.

In the immediate post-war years, Allen embodied the link between building research and professional practice, and as such emerged as a pivotal figure in British architecture. In response to this, in 1953, the BRS created a separate architects' division around Allen, giving him direct responsibility for all architects on its staff and enabling him to devise a programme of work from a specifically architectural viewpoint.[85] In the event, his new division was, in his words, 'landed with the modular studies', a government-driven attempt to standardise dimensions in order to increase efficiency and reduce building costs. Throughout the second half of the 1950s, Allen's team focused its research on the problem of 'modular co-ordination'. Eventually, it prepared a table of 'preferred dimensions' to reconcile new building components with traditional brick measurements, and in 1960 Allen supervised the construction of an experimental housing scheme in Hatfield, Hertfordshire, to test the feasibility of this dimensional scheme (Fig. 4).[86] On the whole, however, modular coordination proved a thankless task, mired in controversies in which Allen had limited interest.[87]

Partly as a result of this, Allen focused his attention on the RIBA. Already, in 1944, he had initiated the RIBA's Professional Text and Reference Books Committee to redress 'deficiencies in books for teaching purposes', specifically in science and technology.[88] In June 1951, the RIBA dissolved the ASB, the relative autonomy of which had been a constant thorn in its side, and in its place constituted a new Science Committee answerable directly to the Council.[89] Unlike the current members of the ASB, who interpreted this move as a 'reprimand' and deplored the loss of independence, Allen saw it as an opportunity to inject the 'scientific outlook' directly into the Council's deliberations.[90] As secretary and (from 1953) chairman, Allen used the new committee to advance his educational ideas and filled it with like-minded colleagues, including Llewelyn-Davies, Matthew, Douglas Jones and Gardner-Medwin.[91]

An indefatigable networker, Allen emerged as the spokesman for a ginger group of architects in the public service who were concerned about the state of the profession and

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the low esteem in which it appeared to be held by society.[92] This group, which centred on Allen, Aslin and Johnson-Marshall, saw the remedy in putting the profession as a whole on a firm factual basis, using data collection and analysis to improve its operation.[93] When, in 1954, Allen was elected to the RIBA Council, he used his position to promote the formation of a research branch within the institute, devised to supply it with its own economic data (and producing as its most significant output the so-called 'Office Survey' of 1962).[94] The push for pedagogical change became part of this broader technocratic agenda. Accordingly, the emphasis in Allen's argument shifted. He continued to believe that a scientific outlook in the education of architects was indispensable to improve the quality of their work. However, in his public announcements at least, he increasingly stressed the need for a more advanced type of education as a means to enhance their professional status.

> We have an educational problem to face; are we getting the right balance of training for architects? […] We have got to get technology allied to the other sides of our art if we are to have power and influence. In the modern world these come from technology.[95]

In the early 1950s, this notion — that higher academic standards were needed to raise the standing of architects — began to gain traction within the profession. Yet there was no response from the BAE, which had, in April 1952, appointed a committee under Donald McMorran to carry out a review of examination subjects and standards in schools of architecture.[96] A private practitioner in the traditional mould and an outspoken critic of the ASB, McMorran despised the idea of school-based architectural training and fiercely opposed attempts at raising its profile.[97] He rejected the Science Committee's suggestion of raising entry standards and stipulating a compulsory science subject.[98] When the AA principal Michael Pattrick submitted the proposal to enshrine postgraduate study as a cornerstone of any future policy, McMorran ruled it outside the committee's terms of reference and ignored it.[99] Pattrick's frequent attempts to influence the direction of the committee fell on deaf ears until, in November 1953, he was joined by Gardner-Medwin, the new principal at Liverpool.[100] Together they managed to garner sufficient support to challenge McMorran's most contentious proposals and derail his 'private vendetta against the recognized schools'.[101] Eventually, after three years' deliberations, the committee issued its final report — 'innocuous', as the *Architects' Journal* sneered, and notable not so much for what it covered, but for what it left out.[102]

The more important debates had meanwhile shifted to other committees. Allen used the Science Committee to promote his pedagogical ideas within the RIBA machinery, and the McMorran committee in particular. He soon found an ally in the RIBA Schools Committee, which comprised the heads of the recognised schools, a growing number of whom were in sympathy with his ideas. In addition to Pattrick and Gardner-Medwin, these included Jones at Birmingham and Matthew at Edinburgh. After McMorran's refusal to consider the AA's proposal on postgraduate studies, the Schools Committee had adopted the cause.[103] In January 1955, Matthew and Gardner-Medwin submitted separate but complementary memoranda, both lamenting the absence of science-related postgraduate research in British schools of architecture and the RIBA's lack of action on the matter.[104]

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Fig. 4. *Experimental housing for the Building Research Station, Hatfield, Hertfordshire, William Allen (chief architect) and T. L. Carhart-Harris (project architect), photograph of 1960 (RIBA Collections)*

By the time McMorran issued his report, Allen had been elected to the RIBA Council and so had Matthew, Sheppard and Aslin. Not surprisingly, the report received a 'mixed reception' and the suggestion to follow it up with a conference on architectural education focusing on postgraduate research met with little resistance.[105] Allen served on the organising committee for the event, which eventually took place in May 1958 in the unprecedented form of a three-day residential conference at Oxford.[106]

EDUCATION AND TRAINING: THE OXFORD CONFERENCE AND ITS AFTERMATH

The Oxford Conference set out to establish a new framework for architectural education in the UK. The initial intention was that the conference should be chaired by Antony Part from the ministry of education, a powerful figure yet at the same time sufficiently detached from the inner workings of the RIBA. When Part declined, the organising committee invited Martin to take his place, presumably because it saw him in a similar light.[107] Martin's chairmanship and a carefully vetted membership limited to just over fifty participants ensured that the conference agreed the twin pillars of the new educational framework — higher entry standards and provisions for postgraduate study — without apparent dissent.[108]

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At the time of the conference, the academic qualifications required of prospective architects — five GCE subjects at O-level — were considerably lower than those of doctors and lawyers and about to fall beneath those of other building professionals, with both engineers and quantity surveyors revising their standards at the time.[109] Worse still, even these low qualifications were never enforced even by major schools of architecture such as the AA, the Bartlett and the London polytechnics.[110] As a means to enhance the professional standing of architects and spare the schools from getting 'the academic dregs of the secondary school system', as Sheppard put it, raising attainment to university standards — two GCE subjects at A level — found broad support even among those who were otherwise doubtful about the new educational system.[111]

The advocacy of postgraduate specialisation meanwhile accelerated a trend already in progress at the AA and at some of the northern schools. In October 1954, the AA had instituted its Department of Tropical Architecture, the first non-planning-related postgraduate department in any British school of architecture. In June 1957, the University of Liverpool inaugurated the country's first department of building science (and tried in vain to attract Allen to the chair), and this was followed shortly after by a department of building at the Manchester College of Science and Technology.[112]

Even so, the apparent attempt to streamline the conference proceedings was only partially successful. Although the new framework appears to have been uncontroversial, there was disagreement over its appropriate institutional setting. The chairman, Martin, was professor of architecture at Cambridge and university representatives made up the single largest contingent at the conference. On the other hand, the AA as the country's leading school was keen to preserve its independence and Part was not prepared to weaken the position of schools that fell within his remit, notably the London polytechnics. Although Part had declined the offer to chair the conference, he made his presence felt by forcing a compromise whereby courses would be 'situated in universities or institutions where courses of comparable standard can be conducted'.[113]

In the event, the distinction was of little consequence as it was the university schools that came to set the agenda. Chief among these was Cambridge, since 1922 home to a comparatively minor school of architecture which was only partially recognised by the RIBA. In 1956, the university had established a chair of architecture and appointed Martin, formerly the chief architect to the LCC. Martin, whose duties included the promotion of research, had a different understanding to Allen, both of architectural research and of its place in education. Whereas for Allen research served to enhance the practice of architecture, for Martin it was the tool by which to advance the theory of architecture.[114] This he considered essential in order to establish architecture as an academic discipline, which could — beyond the professional training of architects — 'perform a useful function in relation to the education of others in the University'.[115]

In the first couple of years after the Oxford Conference, all schools faced the challenge of repositioning architecture as an academic discipline. Martin had anticipated the magnitude of this shift and from 1956 devised his course to align with it. When, three years later, this course was fully recognised, only Cambridge offered a ready-made template for others to follow. At the heart of this template was a division into distinct stages for 'education' and 'training'. Backed by the formidable academic reputation of his university, Martin promoted a model whereby students' 'education' was covered in

the first three years of their undergraduate course, while the final two years offered a special type of professional 'training' framed by the school's postgraduate research.[116] Adopted more widely, this model would give students the opportunity to specialise. Some might wish to pursue their particular interests with a research-orientated course such as Cambridge, but the majority of them would transfer to other schools, which would prepare them for 'ordinary' architectural practice. Indeed, by covering formal education in an initial three-year period and awarding a first degree consonant with university norms, schools would enable their students to continue their studies in fields other than architecture.[117]

These advantages were not lost on other university schools, the majority of which soon adopted the same approach. Of these, the most important was the Bartlett, where from October 1960 Llewelyn-Davies installed a science-oriented curriculum with a strong emphasis on postgraduate research, specifically in environmental studies. Llewelyn-Davies did not share Martin's interest in architectural theory; his outlook was closer to Allen's and centred, as Robert Maxwell has written, on the impartial application of the 'scientific method' to the 'physical reality of building', that is, on 'building science'.[118] However, Llewelyn-Davies endorsed Martin's ideas on the diversification of professional studies and he agreed with him that such diversification should be the preserve of the senior years and carried by distinct programmes of postgraduate research. To foster the desirable exchange of students at intermediate level, their formal education had to be brought to a common standard, and Martin and Llewelyn-Davies lost no time in aligning their syllabi to that end.[119] Their approaches differed, but they differed within the same parameters.

Allen played a comparatively marginal part in these crucial developments immediately following the Oxford Conference. He remained an active figure on the various RIBA committees refining the new educational system, yet, with the system itself in place, the focus was now on implementation. In the middle of 1960, Allen left the BRS, tempted by various offers of professorial and directorial positions both in Britain and abroad.[120] Concerned by the rise of its competitors, the AA was particularly eager to appoint Allen as its new principal. Eventually, in February 1961, Allen accepted the offer, expecting perhaps that a school which had built its reputation on its thirst for experiment would give him sufficient scope to explore his vision of a science-based architectural education outside the university mainstream.[121]

Allen was indeed sceptical of the way the leading university schools interpreted the new framework. This concerned not least the question of scientific content. Although they held similar views on the role of science in architecture, Allen questioned the lack of balance in Llewelyn-Davies's Bartlett curriculum. Surprisingly perhaps, but altogether characteristically, Allen refused to specify the A-level subjects expected of prospective students. When, in 1961, the new academic requirements came into force, several schools began to prioritise entrants from a science background and the Bartlett effectively stipulated A-level mathematics to support its technology-oriented course (as did the universities of Edinburgh, Glasgow and Liverpool).[122] Allen's AA was among the small number of leading schools which resisted this trend and continued to prefer graduates to have 'as broad a general education as possible'.[123] In his view, this included science as well as, rather than instead of, the humanities.[124]

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Allen also differed from his colleagues on the way in which the architectural course ought to be structured. In particular, he rejected the growing tendency of university schools to divide the course into distinct stages for 'education' and 'training'. Two RIBA reports, both published in 1962, supported this tendency. One was the so-called 'Office Survey', which stressed the need for architects with specialist skills and called for a corresponding diversification of study courses.[125] The other was Elizabeth Layton's report on practical training. This recommended that the newly required two-year practical training period be divided into two slices, the first to be inserted after the third year and the second after the fifth, thereby establishing the 3+1+2+1 pattern still operative today.[126]

This pattern was anathema to Allen, to whom the cohesion of the five-year course was sacrosanct.[127] At the Bartlett and at Cambridge (and at an increasing number of other university schools), the final two years of the course were associated with programmes of postgraduate research, which provided a framework for the design process. Implicitly at least, research and design were seen as distinct practices, the former preceding the latter and taking primacy over it. Indeed, when aimed at the creation of theory, as at Cambridge, research might be severed completely from the design process. Allen retained a different understanding of architectural research, the intrinsic value of which he saw in its linkage with a clearly framed design programme, as exemplified by the various development groups and his own work at the BRS. Design, in his view, involved a continuous interplay between creative and intellectual efforts — 'an intimately alternating process of imagination and analysis'.[128] Though cutting-edge research was necessarily the domain of a selected few, the 'scientific outlook' as he understood it could not be delegated and had to infuse the design process throughout. For this reason, he considered the established British system with its blend of education (lecture courses) and training (studio design) to be 'absolutely sound' and — in sharp contrast to Martin and Llewelyn-Davies — called for more, not less, integration between the two.[129]

Allen's attempts to realise his ideas at the AA failed. He encouraged his specialist lecturers to teach their subjects from a specifically architectural viewpoint and inject their expertise directly into the studio environment, steadfast in his conviction that their scientific outlook would enrich rather than impoverish architectural design and should therefore permeate every aspect of the curriculum.[130] Many design teachers rejected such interference and began actively to oppose the new measures. Allen was not able to keep a lid on these tensions; unlike Martin and Llewelyn-Davies, he never established effective leadership in his school. Tellingly, it was a damning report on the AA by the BAE's visiting board in March 1963 that triggered Allen's downfall.[131] The board, the membership of which included Layton and Llewelyn-Davies, welcomed the thinking that had inspired the recent changes at the school, but was unimpressed by the outcome. Allen's support on the AA's governing body eroded and much of his energies in his final two years in office were absorbed by fruitless altercations with students, staff and council.[132]

Allen became disillusioned about both his prospects at the AA and the trajectory of architectural education more generally as he questioned the increasingly stringent way in which the BAE enforced the new educational framework.[133] Following

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his forced departure from the AA in December 1965, he turned his attention to the practice he had co-founded with John Bickerdike, a former BRS colleague (and fellow Science Committee member). The partners carried out architectural commissions and developed their practice into an internationally renowned consultancy on acoustics and lighting. Allen became an authority on building defects, whose services as an expert witness in litigation were in high demand. In September 1966, he gave his final paper on architectural education and he never revisited the topic.[134]

CONCLUSION

The Oxford Conference severed architectural education from its vocational roots and put it on an academic basis. Those who emerged as its principal figures had been inspired by Gropius and the Bauhaus to seek a convergence of architecture and science through educational reform. Before the war, Llewelyn-Davies had been one of the co-authors of the Yellow Book and Martin had invited Bernal and other scientists to address a national conference of architectural students at Hull. Both subsequently fostered this convergence in their professional practice, but neither sustained a tangible interest in its pedagogical dimension. It was not until the mid-1950s that Llewelyn-Davies joined the RIBA's Board of Architectural Education and began to turn his attention to the question of postgraduate research.[135] In 1958, Martin chaired the Oxford Conference, yet he was not one of its instigators, as is often claimed, and took no active part in organising it.

It was Allen's perseverance that distinguished him from his allies. Allen, it is worth remembering, came to Britain for no other reason than to link his interest in science with his further education as an architect. This brought him into the fold of the Building Research Station, which he used as the platform for an educational reform agenda he carried for a quarter of a century. This article has outlined the different stages of Allen's campaign. During the war, he organised the influential ASG Education Committee, which anticipated much of the programme of the Oxford Conference as it sought to enhance the intellectual content of the architectural course through compulsory science subjects and postgraduate studies. In the post-war years, Allen initiated a major programme of architectural research within the BRS and used his influence within the RIBA to push for higher academic standards and extended provisions for postgraduate education. By the time of the Oxford Conference, these ideas were widely shared among educational modernisers, who enshrined them as the pillars of the RIBA's new policy framework.

It was only after the conference that cracks appeared in what had previously been a united front. Allen's primary aim was a rebalancing of the educational system, a strengthening of its academic and scientific aspects in relation to its vocational and artistic ones. In theory at least, his allies shared this aim. In his inaugural lecture at the Bartlett, Llewelyn-Davies invoked the Renaissance ideal of the *uomo universale* as the guiding principle of his course.[136] Yet, at a time of unquestioned faith in the benevolence of technological progress, few eventually resisted the temptation, in Kenneth Frampton's words, to 'reconstitute architecture as an applied science' (which was resolutely not what Allen had in mind — nor, it should be said, Martin, to whom Frampton was referring).[137] Nowhere was this more noticeable than at the Bartlett,

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where Llewelyn-Davies installed a science-heavy curriculum with scant consideration for the humanities — producing graduates in the image not so much of a Vitruvian *uomo universale*, but rather of Max Frisch's *Homo faber*.[138]

Allen witnessed such developments with unease. He was equally sceptical of the tendency, pioneered by Martin at Cambridge, to align architectural research with university norms and reframe it as a purely intellectual exercise removed from any practical application. Research, to Allen, was not an activity aimed at the creation of an a priori theoretical framework for ordinary practice, but an intrinsic part of such practice in a profession imbued with a scientific outlook. To prepare students for this, Allen favoured a pedagogical model that closely integrated formal education and studio-based training.

Allen's understanding of architecture as an integrated process conflating scientific enquiry and creative design anticipated some of the present-day thinking on design research as an interactive and symbiotic activity. Yet, at the time, Allen's approach was out of touch with the educational mainstream. Worse still, he tried to implement it at the most unsuitable of places. Sooner than other schools, the AA saw a forceful reaction against the scientism taking hold in British architectural education. Allen's nuanced views were lost on an institution that traditionally thrived on heated polemic rather than reasoned debate. In AA circles, he was dismissed as a 'high priest of technology', and elsewhere he has been unfairly portrayed as a power-hungry technocrat without any interest in, or appreciation for, the qualitative aspects of architectural design — a victim to the 'fallacy of imputed philistinism', to use Philip Steadman's apposite phrase.[139]

Bernal was one of many who had awaited Allen's arrival at the AA with anticipation:

> At the BRS he was trying to teach the scientist architecture. Now in his new place at the AA I hope he will teach the architects science, or at least let them learn something of it.[140]

Allen did not fulfil these expectations. His ideas never amounted to a comprehensive pedagogical concept and he lacked the authority to impose them on his school. Yet, as chief architect to the BRS, Allen had removed barriers between architects and scientists, and his own work on environmental physics had a lasting effect, both on professional practice and on the way the teaching of science was subsequently framed in architectural schools. Equally importantly, Allen's forceful and strategic advocacy of a scientific outlook ensured that it became central to the discourse on architectural education in the post-war period, culminating in the creation of an educational system which, in its essence, survives to the present day.

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BIOGRAPHY

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NOTES

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25 Swenarton, *Building the New Jerusalem*, pp. 167, 183.
26 Swenarton, *Building the New Jerusalem*, pp. 168, 176–80.
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39 'Report of Students' Sub-committee on the School System', p. 92.
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72 Saint, *Towards a Social Architecture*, pp. 115–17, 229–32.
73 'The Research Unit of the Architect's Office, London, Midland and Scottish Railway', *RIBA Journal*, 48, no. 6 (1941), p. 107.
74 See, for example, R. Llewelyn-Davies, 'On the Frontier of Knowledge', *Architects' Journal*, 14 April 1955, pp. 507–08.

75 Saint, *Towards a Social Architecture*, p. 230 and *passim*.
76 See, for example, Allen's comments in Robert H. Matthew and S. A. W. Johnson-Marshall, 'Research and Development in Public Offices', *AA Journal*, 66, no. 750 (1951), pp. 166–76 (p. 176).
77 See, for example, MLA, 11.7, [William Allen], lecture notes, [15 December 1940]; *AA Journal*, 58, no. 673 (March 1943), p. 71; Architectural Association Archives [hereafter AAA], C403, minute of AA School Committee meeting, 4 December 1944.
78 [William Allen, J. D. Bernal, Alec Skempton], 'Building for Victory', in *Science in War* (Harmondsworth, Middlesex: Penguin, 1940), pp. 113–19; see also Saint, *Towards a Social Architecture*, p. 20.
79 WAP, Allen, 'Submission for the Fellowship of the RIBA'.
80 Allen quoted in RIBA, RIBA/ED 7.1.3, Robert Gardner-Medwin, 'Post-graduate Research', attached to minute of Schools Committee meeting, 5 January 1955. See also, for example, Allen, 'New Materials and Developments in Design', p. 269.
81 WAP, Allen, 'Submission for the Fellowship of the RIBA'. The three building studies are: The Lighting Committee of the Building Research Board of the Department of Scientific & Industrial Research, *Post-war Building Studies No. 12: The Lighting of Buildings* (London: HMSO, 1944); The Acoustics Committee of the Building Research Board of the Department of Scientific & Industrial Research, *Post-war Building Studies No. 14: Sound Insulation and Acoustics* (London: HMSO for the Ministry of Works, 1944); The Heating and Ventilation (Reconstruction) Committee of the Building Research Board of the Department of Scientific & Industrial Research, *Post-war Building Studies No. 19: Heating and Ventilation of Dwellings* (London: HMSO for the Ministry of Works, 1945).
82 WAP, Allen, 'Submission for the Fellowship of the RIBA'. See also Allen, 'The Relationship Between Science and Architecture', pp. 142–43.
83 WAP, Allen, 'Submission for the Fellowship of the RIBA'; Lea, *Science and Building*, pp. 104, 118 and *passim*. For the work of the architectural physics division, see Saint, *Towards a Social Architecture*, pp. 24, 85–87. For Allen's work on the Royal Festival Hall, see Hope Bagenal, 'Musical Taste and Concert Hall Design', *Proceedings of the Royal Musical Association*, 78th Session (1951–52), pp. 11–29.
84 'House at Welwyn, Herts', *Architects' Journal*, 8 July 1948, pp. 43–44.
85 WAP, letter from William Allen to Robert Gardner-Medwin, 13 November 1955; WAP, Allen, 'Submission for the Fellowship of the RIBA'. See also Harrison, 'Building Research Establishment', p. 42.
86 'BRS Housing, Hatfield', *Builder*, 2 September 1960, pp. 410–12.
87 WAP, Allen, 'Submission for the Fellowship of the RIBA'. Many architects objected to the idea of modular coordination. Others supported it primarily for aesthetic reasons and rejected the science-based approach of the BRS. The research programme was partly financed by the European Productivity Agency, established in 1953 as part of the Marshall Plan's programme of technical assistance. It never delivered on its promise and Allen doubted 'if the return on that investment can be considered satisfactory' (WAP, Allen, 'Submission for the Fellowship of the RIBA'). See also W. A. Allen, 'Modular Co-ordination Research — The Evolving Pattern', *Architect and Building News*, 31 March 1955, pp. 394–98 (p. 398).
88 RIBA, RIBA/ED 7.1.4, William Allen and Cecil C. Handisyde, 'A Memorandum on the Provision of Professional Text and Reference Books', 3 January 1944, attached to minute of meeting of the officers of the BAE held on 9 February 1944.
89 *RIBA Journal*, 58, no. 8 (June 1951), p. 299.
90 'Report of the Architectural Science Board', 28 April 1950.
91 See, for example, RIBA, RIBA/ScTech 9.11, minute of Science Committee meeting, 13 December 1951.
92 WAP, Allen, 'Submission for the Fellowship of the RIBA'. All available evidence suggested that, in the early 1950s, architects, particularly in salaried positions, earned considerably less than other professionals. See, for example, 'The 114th Annual General Meeting of the RIBA', *RIBA Journal*, 59, no. 7 (1952), pp. 240–44 (p. 240).
93 'Choose Your Leaders', *Architects' Journal*, 13 May 1954, p. 573; WAP, Allen, 'Submission for the Fellowship of the RIBA'.
94 RIBA, *The Architect and His Office* (London: RIBA, 1962). In 1958, the RIBA created an economic research department to carry out such investigations — in Allen's view, 'the best thing we ever did': Allen, 'The Education of Architects', p. 211. See also Allen's comments in 'The 119th Annual General Meeting of the RIBA', *RIBA Journal*, 64, no. 7 (1957), pp. 272–78 (pp. 276–77).
95 Allen, quoted in 'Discussion at the Second Meeting of the Conference', *RIBA Journal*, 61, no. 8 (1954), pp. 324–27 (p. 324).
96 RIBA, RIBA/ED 7.1.2, minute of Joint Sub-Committee of the Examinations and Schools Committees (later the Architectural Education Joint Committee, aka 'McMorran committee') meeting, 23 April 1952.

97 See, for example, 'The 111th Annual General Meeting 3 May 1949', *RIBA Journal*, 56, no. 7 (1949), pp. 303–08 (pp. 307–08); 'The 113th Annual General Meeting of the RIBA 1 May 1951', *RIBA Journal*, 58, no. 7 (1951), pp. 263–67 (pp. 265, 266); 'Interrelated Training for the Building Industry', *Builder*, 10 February 1956, pp. 214–16, 221–24.
98 RIBA, RIBA/ScTech 9.11, 'The Place of Science in Architectural Education', memorandum to the McMorran Committee, May 1952, attached to minute of Science Committee meeting, 29 May 1952.
99 RIBA, RIBA/ED 7.1.2, minute of McMorran Committee meeting, 16 March 1953; RIBA, RIBA/ED 7.1.1, Donald McMorran, 'First Interim Report of the Architectural Education Joint Committee', 4 May 1953, attached to BAE meeting, 8 June 1953; AAA, 2007:65, minute of a joint meeting of the AA Council and its advisory committee, 21 May 1953. For the AA's proposal, see AAA, 1991:8, letter from A. R. F. Anderson to the chairman of the RIBA Joint Committee on Education, 27 January 1953. The letter was signed by the AA president, but drafted by Pattrick (AAA, C403, minute of AA School Committee meeting, 16 January 1953).
100 RIBA, RIBA/ED 7.1.2, minute of McMorran Committee meeting, 4 November 1953.
101 *Architects' Journal*, 16 February 1956, p. 199. See also, for example, RIBA, RIBA/ED 7.1.2, minutes of McMorran Committee meetings, 11 February 1954 and 8 April 1954.
102 'The Innocuous McMorran Report', *Architects' Journal*, 10 February 1955, p. 187.
103 RIBA, RIBA/ED 7.1.3, comments to the BAE, attached to minute of Schools Committee meeting, 28 May 1953.
104 RIBA, RIBA/ED 7.1.3, Robert Matthew, 'Post-graduate Architectural Studies', and Robert Gardner-Medwin, 'Post-graduate Research', both attached to minute of Schools Committee meeting, 5 January 1955.
105 RIBA, RIBA/ED 7.1.3, minute of Schools Committee meeting, 5 January 1955; RIBA/ED 7.1.1, minute of BAE meeting, 14 February 1955; Allen quoted in RIBA, RIBA/ScTech 9.11, minute of Science Committee meeting, 5 January 1955.
106 RIBA, RIBA/ED 7.1.1, minutes of BAE meetings, 22 October 1956, 11 February 1957 and 27 May 1957.
107 The records allow no conclusive statement on this point. I am grateful to Raymond Verrall, whose doctoral research centres on the Oxford Conference, for confirming this finding.
108 Martin, 'Conference on Architectural Education', pp. 281–82.
109 RIBA, RIBA/ED 7.1.2, 'Standards of Entry to Other Professions', attached to minute of Committee on the Oxford Architectural Education Conference meeting, 30 July 1958.
110 In October 1956, more than a third of the twenty-four recognised schools accepted students who had not met the minimum GCE requirements: RIBA, RIBA/ED 7.1.3, minute of Schools Committee meeting, 10 October 1956.
111 Sheppard quoted in *Architects' Journal*, 19 March 1959, p. 433.
112 WAP, letter from Robert Gardner-Medwin to William Allen, 15 November 1955; WAP, letter from Sir James Mountford (vice-chancellor, University of Liverpool) to William Allen, 3 October 1956.
113 Martin, 'Conference on Architectural Education', p. 281.
114 Martin, 'Conference on Architectural Education', p. 280.
115 Martin quoted in RIBA, RIBA/ED 7.1.1, minute of BAE meeting, 24 May 1961.
116 RIBA, RIBA/ED 7.1.1, Leslie Martin, 'A Note on Education and Training', attached to minute of BAE meeting, 12 April 1961. See also *Architects' Journal*, 27 November 1958, pp. 772–73; 'Cambridge University School of Architecture', *Builder*, 3 November 1961, p. 875.
117 Martin, 'A Note on Education and Training'. See also RIBA, RIBA/ED 7.1.1, minute of BAE meeting, 24 May 1961.
118 Maxwell, 'Education for the Creative Act', p. 63.
119 In June 1963, Cambridge University, Durham University and the Bartlett set the precedent, still followed today, of schools accepting each other's first degrees (RIBA, RIBA/ED 7.1.3, minute of Schools Committee meeting, 20 June 1963).
120 William Allen, 'School of Architecture Annual Prize Giving', *AA Journal*, 78, no. 865 (1962), p. 118; see also Herbert, 'Keeping a Human Scale', p. 292.
121 Allen took the job against the advice of his BRS colleagues Bagenal and Handisyde, both long-time lecturers at the AA. Bagenal doubted whether Allen would be 'able to bring a measure of realism into AA teaching' (WAP, letter from Hope Bagenal to William Allen, 12 August 1961). Handisyde questioned whether '"Congratulations" is the appropriate word' and sent Allen 'good wishes for your future in the Asylum' (WAP, letter from Cecil Handisyde to William Allen, 27 February 1961).

122 RIBA, RIBA/ED 7.1.1, minute of BAE meeting, 19 June 1961. See also E. Maynard Potts, 'Schools of Architecture: Requirements From Sixth Forms', *Times Educational Supplement*, 20 October 1961, p. 514.
123 RIBA, RIBA/ED 7.1.1, minute of BAE meeting, 19 June 1961.
124 Allen disapproved of the English secondary school system, which compelled pupils to opt for either an arts or a science stream. His ideal would have been a combination of a wide range of subjects, 'all brought to similar levels somewhere between current "O" and "A" standards' (Allen, 'The Education of Architects', pp. 211–12).
125 RIBA, *The Architect and His Office* (London: RIBA, 1962).
126 Elizabeth Layton, *The Practical Training of Architects* (London: RIBA, 1962), p. 43. Layton was Allen's research assistant. She based her work on a twenty-five-page memorandum in which Allen had argued for research to be accepted as a form of professional experience for intending architects, another of the recommendations in her report. See Layton, *The Practical Training of Architects*, p. 59; also RIBA, RIBA/ED 7.1.1, William Allen, 'Practical Training for Architects — A Report for the Board of Architectural Education', attached to minute of BAE meeting, 15 November 1961.
127 Allen, letter to the editor, *Architects' Journal*, 28 March 1962, p. 656.
128 Allen, 'The Training and Education of Architects', p. 225.
129 Allen, 'School of Architecture Annual Prize Giving', p. 119; Allen, 'The Training and Education of Architects', p. 225; Allen, 'The Education of Architects', p. 216. See also, for example, Richard Llewelyn-Davies and John Weeks, 'Education for Building', *Architects' Journal*, 13 September 1961, p. 389.
130 William Allen, 'The AA School Today', *AA Journal*, 79, no. 879 (1964), pp. 211–13 (p. 213); AAA, 1991:31, William Allen, 'Principal's Notes for Studio Staff and Lecturers', 1964.
131 AAA, 2007:67, 'Report of the RIBA Visiting Board on the Architectural Association School of Architecture', March 1964, enclosed in minute of AA Council meeting, 26 October 1964.
132 Patrick Zamarian, *The Architectural Association in the Postwar Years* (London: Lund Humphries, 2020), pp. 130–35.
133 See, for example, Allen, 'The Education of Architects', pp. 213–14.
134 William Allen, 'Our Education Revolution', *RIBA Journal*, 73, no. 11 (1966), pp. 522–23.
135 RIBA, RIBA/ED 7.1.1, minute of BAE meeting, 31 May 1954; Llewelyn-Davies, 'On the Frontiers of Knowledge'.
136 Richard Llewelyn-Davies, 'The Education of an Architect', *Architects' Journal*, 17 November 1960, p. 709.
137 Kenneth Frampton, 'The Mutual Limits of Architecture and Science', in *The Architecture of Science*, ed. by Peter Galison and Emily Thompson (Cambridge MA: MIT Press, 1999), pp. 353–73 (p. 354). See also Philip Steadman, 'Research in Architecture and Urban Studies at Cambridge in the 1960s and 1970s: What Really Happened', *Journal of Architecture*, 21, no. 2 (2016), pp. 291–306.
138 Until 1977, it was possible for Bartlett students to graduate without any instruction in history: Mark Swenarton, 'The Role of History in Architectural Education', *Architectural History*, 30 (1987), pp. 201–15 (p. 209).
139 Archie McNab, 'The Architectural Association Since the War', *Building*, 20 October 1972), pp. 71–78 (p. 75); Crinson and Lubbock, *Architecture — Art or Profession?*, p. 158; Steadman, 'Research in Architecture and Urban Studies', p. 297.
140 J. D. Bernal, 'Modern Science in Architecture', *AA Journal*, 78, no. 866 (1962), pp. 156–67 (p. 157).