



This is a repository copy of *Education and learning*.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/203719/>

Version: Accepted Version

Book Section:

Ellis, H. orcid.org/0000-0001-8571-0340 (2023) Education and learning. In: 19th Century British Society. Routledge Historical Resources . Routledge .

<https://doi.org/10.4324/9780367030278-hobs21-1>

This is an Accepted Manuscript of a book chapter published by Routledge in 19th Century British Society on 1 January 2023, available online: <https://www.taylorfrancis.com/british-society/?context=hobs>

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



eprints@whiterose.ac.uk
<https://eprints.whiterose.ac.uk/>

Education and Learning

Heather Ellis

School of Education, University of Sheffield, UK

Abstract

This essay provides an overview of key shifts in the history of education and learning in Britain over the course of the long nineteenth century, from 1770 until 1914. It examines the transformation of educational opportunities for children and adolescents, which saw the patchy and voluntary-controlled provision of the earlier part of the century, replaced with a state-directed and funded nationwide system of formal elementary education after the Education Act of 1870. It also considers the ways in which secondary education for the children of middle-and-upper-class families developed over the same period. Finally, it explores important changes in adult and higher education, in particular the flourishing of locally based initiatives such as mechanics' institutes in the first half of the nineteenth century, followed by a considerable expansion of university provision into London and the major provincial towns from the 1820s onwards.

Introduction

The period between 1770 and 1900 was one of the most significant in the history of education and learning in Britain. In almost every aspect, it witnessed a complete transformation of the institutions, structures and experiences of learning for men and women from all social classes across the British Isles. The first part of this essay will explore the transformation brought about in the provision of elementary education. In particular, the shift towards a national system of formal schooling, increasingly subsidised and managed by the state, will be examined. While moves

towards this formalised system were gradual in the first half of the century, following the report of the Newcastle Commission, in 1861, which had been tasked with assessing the quality and effectiveness of current elementary provision, the pace quickened substantially, leading to the official instigation of a national system of elementary schooling with the Education Act of 1870.

The second part will consider developments in the education of children from middle-and upper-class families, including an unprecedented expansion of Britain's private secondary schools. Widespread and thoroughgoing reform to the organisation, ethos, and curriculum of private schools began in the first half of the nineteenth century and gained momentum following the report of the Clarendon Commission in 1864 and the Public Schools Act of 1868.

Finally, we will examine some of the significant changes taking place in the field of adult and higher education. In the first half of the nineteenth century, innovations in adult education were dominated by the development of local initiatives, in particular mechanics' institutes (providing basic literacy and technical education), literary and philosophical societies, mutual improvement societies, and other less formal reading groups. These initiatives were designed to promote forms of adult (self) education for the working and lower- middle classes who had been excluded from the patchy elementary provision that existed in the early nineteenth century.

It will also consider some of the ways in which this provision changed with the growth of the university sector in England and Wales, beginning in London in the 1820s and 30s before expanding into major provincial cities like Leeds, Liverpool and Sheffield in the later part of the century.

Elementary Schooling

Historians estimate that roughly 40% of men and 60% of women were illiterate in England and Wales in 1800; one hundred years later, this had fallen to just 3% for both sexes. This significant growth in literacy was largely due to substantially increased levels of elementary schooling over the

course of the intervening century, in particular for children from poorer backgrounds. In the early years of the nineteenth century, education for working-class children was patchy and varied across England and Wales. Much of what was available was provided by churches – Anglican, Catholic and various non-conformist denominations – and took the form of both Sunday schools and day schools (Stanton, 2013).

With every Sunday school teaching reading (enabling children to read the Bible) and some providing instruction in writing and basic arithmetic as well, they were important providers of education for poorer children. Sunday schools began to appear in significant numbers towards the end of the eighteenth century and were popular with children from across the social spectrum. There were approximately 2000 in 1800 with an estimated 10% of all children aged between 5 and 18 in England and Wales on their rolls. Fifty years later, numbers of Sunday schools had grown to some 23,000 with almost 2.4 million children (55% of the total) enrolled. By 1850 it is likely that almost 75% of working-class children had some experience of attending a Sunday school (Stanton, 2013). Day schools were also operated by the Church of England, the Catholic Church as well as some nonconformist denominations. These were often referred to as ‘voluntary’ schools. The British and Foreign School Society was set up in 1808 and was non-denominational; three years later in 1811, the Church of England established the National Society for Promoting the Education of the Poor. The British and Foreign School Society adopted the educational system pioneered at the end of the eighteenth century by the Quaker Joseph Lancaster, which relied on older children (monitors) who had already received some education to teach their younger counterparts. In this way, it was able to provide a basic education at low-cost, without requiring a large number of teachers.

Alongside the growth in voluntary schools, the first half of the nineteenth century witnessed a substantial increase in the number of private schools. The quality of education provided in these

schools varied greatly, including, at one end, so-called 'dame schools' which functioned frequently as providers of childcare rather than academic education, as well as highly reputed private schools for children from poor families. Elementary education was also accessible in other settings such as in factories and workhouses. Yet, in the 1850s, almost half of children living in England and Wales did not attend any school apart from Sunday school. With day schools charging fees and occupying children's time during the working week, they were nowhere near as popular as Sunday schools. Many parents from poorer families found it necessary to have their children undertake some form of paid work. Furthermore, with those children who did attend day schools doing so on average only for around three years, it is likely even this group only achieved a basic level of education.

Only very gradually did the state increase its involvement in educational provision over the course of the nineteenth century. In the early part of the century, the view that working-class children should be educated was receiving increasing support; however, there was substantial disagreement about how much education they should receive, what subjects should be taught, and to what extent the state should be involved. Most controversial was the question of religious education and the role the churches should play in educational provision. In particular, various nonconformist churches objected to government subsidies for schools run by the Church of England. The earliest state intervention in the funding of public education as a whole, took place in 1833 with the granting of an annual subsidy of £20,000 towards the building, operation, and maintenance of voluntary schools. This grant had ballooned to £775,000 by 1862. As early as the late 1830s, the government began to involve itself in the business of inspecting schools supported by the annual subsidy and in the early 1860s a system of payment by results was established in these schools.

Pressure was building, however for a more thoroughgoing reform. The Newcastle Commission was set up in 1858, to consider the state of elementary schooling in England and Wales. With the

working class holding increased political power following the enfranchisement of many working men with the Second Reform Act of 1867, many within government considered it imperative that their children should receive some form of education. Three years later, in 1870, the Elementary Education Act was introduced which saw the state assume responsibility for the organisation and funding of elementary education for the first time. Despite this significant change, the network of voluntary schools was maintained; where there were not enough schools in a particular area, the government ordered new 'board schools' to be built which were controlled and funded locally. It was made compulsory for children aged between 5 and 10 to attend elementary school in 1880 and eleven years later in 1891 attendance was made free for all children.

Elementary education developed differently in Scotland. Religious disputes were nowhere near as influential here. Education was provided at parish level – each parish was responsible for setting up and maintaining schools. They were expected to fund schools from a local tax levied on property. Socially, these schools were more mixed with middle class children attending, as well as their poorer and working-class peers. In general, they also provided a higher quality education and produced better results than schools in England and Wales. There was an Education Act for Scotland in 1872 which made school attendance obligatory for all children between the ages of 5 and 14. Under this Act, Scotland's parish and voluntary schools were handed over to school boards, such as were already operating in England and Wales. It also ensured that large numbers of new schools were built in Scotland. While all children in Britain were supposed to attend school from 5 or 6 years old, until the age of 14, from the early days of the new schooling systems in the 1870s, this was understood flexibly. Families were permitted to take their older children out of school without punishment under certain circumstances. Indeed, it took until 1914 before most children in Britain completed a full eight years of schooling.

Across Britain, pupils in elementary schools in the late nineteenth century primarily followed a

curriculum of reading, writing, and arithmetic, supplemented by geography, history and some elementary science or nature study. In spite of the growing influence of child-centred pedagogy, especially the ideas of Froebel and Pestalozzi, in the years leading up to the First World War, relatively few changes in either the curriculum or teaching practice took place. Elementary education in Britain was certainly no motor of social mobility in the late nineteenth century. While the cleverest children were singled out and (if necessary) supported by state-funded bursaries to go on to the few secondary schools that existed at this time, the vast majority of pupils did not experience education beyond the elementary level. There was no complementary system of state-funded secondary schools; secondary education remained exclusively in the hands of private and charity schools, and these institutions were reluctant to accept pupils on government bursaries. State-funded secondary schools only began to grow in number following the Education Act of 1902. Well into the twentieth century however, take-up of secondary school places remained low especially among girls (Brockliss and Sheldon 2012).

This situation was almost certainly intended by the educational establishment. At most, the percentage of children attending elementary schools who were thought capable of pursuing a secondary education was perhaps as low as 10 per cent (Anderson 1989). Of particular concern, as Robert Morant (then secretary to the British Board of Education) made clear in 1897, was the risk that children from working-class backgrounds would develop ambitions to move outside their class and unsettle the social balance of Britain. They must not, he declared, 'be given an education which would give them too ambitious an outlook' (qtd. in Brockliss and Sheldon 2012, 15).

Indeed, historians have argued that the reforms Morant introduced, further entrenched a distinction between 'education for leadership' and 'education for followership' (White 2006, 8). The main justification given for providing all children with elementary education was to improve their moral and spiritual character. There was also a growing conviction that a better-educated and disciplined working class would be able to meet more effectively, the growing competition from

industrial rivals overseas, such as Germany and the USA. Moreover, there was the practical consideration that children of elementary school age were now banned from working in factories, mines and other places and could not be allowed to roam the streets. The first widespread concerns about the problem of juvenile delinquency in Britain, and overseas, were expressed in the final years of the nineteenth century (Bradley 2008). Such fears were exacerbated by research in the new field of child psychology, which argued that late childhood and early adolescence were particularly challenging periods in the life of an individual.

Another means of binding working-class children to the state, was through the growing significance of the British Empire in the classroom. As many historians have pointed out, the impact of possessing an overseas empire was also very much felt 'at home' (Goodman, McCulloch and Richardson 2009; Heathorn 2000). Yet by 1900, the promotion of a popular imperialism had become the focus of intense effort in the elementary education system. Historians like Linda Colley (2002) have highlighted the 'tightening grip of empire on Britain's culture and self-image' and the fundamentally entangled nature of Britain's domestic and imperial endeavours (1). Stephen Heathorn and others have shown how the language of imperial citizenship came to infiltrate schools across Britain by means of textbooks, pageants, wall charts, poems, songs, and annual commemorative events like Empire Day (Heathorn 2000; Bartie Fleming, Freeman et al. 2017). As their research shows, there were concerted attempts to cultivate an overarching imperial loyalty in an effort to bind the increasingly powerful working classes to the traditional elites. Imperialism, in this sense, was designed to lessen a sense of cleavage between rich and poor - those Benjamin Disraeli (1845) famously compared to 'two nations',

between whom there is no intercourse and no sympathy; who are as ignorant of each other's habits, thoughts, and feelings, as if they were dwellers in different zones, or inhabitants of different planets; who are formed by a different breeding, are fed by a different food, are ordered by different manners, and are not governed by the same laws (76).

Concern over the physical health of working-class children is also visible in the early years of the elementary education system. At the same time as child psychology was developing as a field, a new field of medicine devoted to improving the physical health of children was also emerging – paediatrics. Gradually, the government had access to better understandings of children’s growth and development and schools were viewed as increasingly important in measuring children’s development. Appointments of school medical officers began as early as the 1890s and this concern with children’s physical well-being continued apace in the early years of the new century. The Education (Provision of Meals) Act of 1906 gave local authorities the ability to provide hot meals for poor children (Welshman 1997). The offering of free school meals symbolises one of the most important transformations in the history of education in nineteenth-century Britain - the increased willingness of government not only to finance and intervene in education, but to expand its very remit to include the physical and psychological health of children as well as their moral and academic development. This transformation is evident also when we consider changes in government spending on education between 1870 and 1910. Over the forty years following the establishment of the elementary education system, public funding rose substantially from £1.27 million to £18 million which meant, when viewed internationally, that Britain was one of the countries spending most on education at this time (Brockliss and Sheldon, 2012).

Middle-Class and Elite Education

During the nineteenth century, there was a network of private secondary schools operating in England and Wales that was almost entirely restricted to the children of the middle and upper classes. Scotland had a system of burgh schools which provided a form of secondary education

and were attended by children from a much wider range of backgrounds. Between 1800 and 1850, increasing numbers of boys from middle and upper-class families were attending formal school settings, including both boarding and day schools. Formal education was viewed as increasingly important for the sons of middle-class families as they began to work in growing numbers in the fields of commerce, industry, and the learned professions. Others were educated by tutors in the home or in grammar schools funded by an endowment. Many middle-class families began to send their sons to the new private schools which were opening across the country.

Previously dominated by the gentry and aristocracy, the traditional elite boarding schools (known somewhat confusingly as public schools) such as Eton and Harrow, also saw a significant expansion in middle class pupils in this period. These schools underwent significant changes over the course of the nineteenth century, spearheaded by reforming headmasters like Thomas Arnold at Rugby, and more broadly following the Clarendon Commission, which had been set up to investigate the quality of education provided in nine of England's most elite private schools. By the end of the nineteenth century, these schools, and many of the less expensive private schools which emulated them, came to stress alongside intellectual achievement, gentlemanly behaviour, moral manliness, and self-reliance. Many of these qualities were explicitly framed within the context of training up elite young men as future leaders of the empire. Several aspects of this effort have been examined in detail by historians, in particular the emphasis on a classical education, which encouraged parallels with the imperial culture of ancient Rome (Hagerman 2005) and a growing cult of athleticism which reached its apogee around 1900 (Mangan 2012). As well as going on to study at the 'ancient' English universities of Oxford and Cambridge, many graduates of private schools took up positions in the home and imperial civil service, the learned professions or joined the ranks of commissioned officers in the army. Following the 1870 Education Act, there were also important links established between the elite private schools and

the newly founded elementary schools, which helped to ensure a similar emphasis on the importance of empire in elementary classrooms (Ellis 2012).

The majority of middle and upper-class girls were either educated in the home by tutors or governesses, or else in private boarding schools throughout the nineteenth century. Although, in many cases, middle-class girls' education continued to focus on 'accomplishments' such as dancing, piano playing, drawing and languages, a growing number of schools chose to implement a broader range of academic subjects. From the 1850s onwards, schools such as Cheltenham Ladies' College offered girls from elite families a high quality, academic, education. The 1870s saw the Charity Commissioners and the Endowed Schools Commissioners establish increasing numbers of girls' grammar schools. By 1900, both private schools and grammar schools were increasingly preparing girls for entering the recently founded women's colleges such as Newnham and Girton at Cambridge, and Somerville at Oxford.

Adult Learning and Higher Education

While the state did slowly increase its involvement in the schooling of children, adult education in Britain was left almost entirely to private initiative. Throughout the eighteenth and early nineteenth century, dissenting academies provided a high-quality education in a wide range of literary and scientific subjects, long before England's ancient universities could claim this. They enjoyed close ties with research-active, learned societies and the Scottish universities where a similar spectrum of subjects was taught. They were open to all men (but not women) regardless of religious affiliation and formed a significant feature of Britain's educational landscape from the seventeenth, through to the nineteenth centuries (Reid 2010; Burden 2012).

The final years of the eighteenth century and early years of the nineteenth witnessed unprecedented efforts to bring basic literacy, numeracy and science education within the reach of adult working men. On the eve of the French Revolution in 1789, James Keir, the chemist and prominent member of the Lunar Society of Birmingham, pronounced ‘the diffusion of general knowledge and of a taste for science, over all classes of men...to be the characteristic feature of the modern age’ (Berg 2007, 123). We tend to think of education mainly in terms of reading, writing and academic skills - and adult education, in this sense, was vigorously promoted by a range of institutions, most notably mechanics’ institutes, mutual improvement societies, and more informal reading groups that began to be established in considerable numbers from the 1820s onwards. This often took the form of evening classes and lectures given by local and visiting lecturers. Circulating libraries also became increasingly important in this period.

However, as Edward W. Stevens has suggested, the shift towards a manufacturing base and mass production which took place in the first half of the nineteenth century demanded a ‘new’ type of ‘technical literacy’ from working men, which institutions like the mechanics’ institutes sought to provide. Stevens has argued that the new ‘technical literacy’ required familiarity with multiple notational systems, including not simply the traditional alphabet, but also scientific notation, mathematical notation and spatial-graphic representation. The challenges of teaching this new literacy were considerable. In particular, Stevens suggests that, unlike traditional alphabetic literacy, it required the merger of ‘a culture of print with a non-verbal culture of experience’ (Stevens 1995, 4-5). The earliest mechanics’ institute to be established was founded in Edinburgh in 1821 and was intended to deliver technical education to working men in the surrounding area. A second was set up in Glasgow two years later, in 1823. This institute had grown out of an earlier group established in the first years of the century by George Birkbeck who had previously organised free lectures on the arts, sciences, and technical subjects in 1800. In England, the first

mechanics' institute was established at Liverpool in 1823, followed by another in London the same year. This would later become Birkbeck College. By 1850, there were more than 700 mechanics' institutes in towns across Britain and the British Empire, with over 120,000 members (Song, 2012; Walker 2016).

In 1770, there had been just two universities in England – the ‘ancient’ universities of Oxford and Cambridge, which catered for a tiny minority of the social and economic elite of the country. Focused almost exclusively on classical learning, mathematics, and theology, they trained the clergy of the Anglican Church. Relative to the size of its population, Scotland was much better supplied with universities, that were much more socially inclusive, taking many children directly from local parish schools. They also offered a more modern curriculum including scientific subjects and enjoyed a Europe-wide reputation for the study of law and medicine. The 1820s and 30s saw the foundation of higher education institutions in England and Wales for the first time outside of Oxford and Cambridge. St David’s College, Lampeter in Wales gained its Royal Charter in 1828; Durham in 1833 and, following the establishment of King’s College London and University College, London in the 1820s, the University of London was officially constituted as a degree-granting body in 1836. By the end of the nineteenth century, a significant number of ‘civic universities’ had been founded across England, Wales and Ireland. Based in the chief provincial towns, these institutions catered for students from the local region in places such as Manchester, Liverpool, Sheffield, Leeds, and Bristol. In many cases, these civic universities grew out of (or were otherwise connected with) pre-existing adult education initiatives such as mechanics’ institutes and literary and philosophical societies (Whyte 2015). In turn, the new universities began to take over responsibility for providing scientific and technical instruction, while evening lectures were increasingly attended by members of the middle classes, who demanded talks on a much wider variety of topics.

In order to chart the history of research and the training of future researchers in early nineteenth-century Britain, it is necessary to look outside the ancient universities of Oxford and Cambridge. The years between 1770 and 1840 saw the establishment of hundreds of smaller learned societies, assuming a variety of names (the most common being ‘literary and philosophical society’), in towns and cities across the country ([Lyell], 1826; Hilton, 2006). Some, like the Literary and Philosophical Society of Manchester, were international in significance, attracting members of considerable fame, such as the chemist John Dalton. Many others acted as intellectual centres for local professional and industrial elites. Sometimes dismissed as merely convivial groups, learned societies carried out serious intellectual work, above all, in the pursuit of original knowledge. According to William C. Lubenow (2015), they functioned as Britain’s chief ‘sites for intellectual innovation’ throughout the nineteenth century (27). While those scholars who have recognised the knowledge-producing function of literary and philosophical societies have stressed their importance as sites of scientific research, recent work suggests that they did in fact undertake original research in the full range of academic disciplines, from literature, history and archaeology to the natural sciences (Mee and Wilkes, 2015). Moreover, in many instances, they helped to provide theoretical and practical training for future researchers, more so, arguably, than any other contemporary institution. In this sense, they deserve to be thought of as institutions of higher education.

Nor did this situation end with the so-called ‘triumph’ of the German research university, which is usually seen as reaching Britain in the 1870s and 1880s. While these years witnessed a sustained campaign for ‘the endowment of research’ at Oxford and Cambridge, led by figures such as Mark Pattison, (Jones, 2007), William C. Lubenow (2015) has shown that Britain’s learned societies continued to carry out many of discursive, training and research functions of universities in the final decades of the nineteenth century and beyond.

This essay has sought to offer an overview of some of the most important developments in the history of education and learning in nineteenth-century Britain. It has explored the wholesale transformation of elementary education, from a poorly funded, patchy network of voluntary and charity run schools, to a nationwide state-funded and controlled system of formal schooling, embracing the vast majority of children in Britain from the ages of 5 to 14. It also examined important developments in private secondary education for children of the middle and upper-classes and the beginnings of state-funded secondary schooling. Finally, it has considered key shifts in opportunities provided for adult learning, from the development of local initiatives such as mechanics' institutes and mutual improvement societies in the first half of the century to the expansion of universities into provincial towns and cities in its final decades.

References

Anderson, Robert (1989) *Education and Opportunity in Victorian Scotland: Schools and Universities*, Edinburgh: Edinburgh University Press.

Bartie, Angela, Fleming, Linda, Freeman, Mark, Hulme, Tom, and Readman, Paul (2017), 'Commemorations through dramatic performance: Historical pageants and the age of anniversaries, 1905-1920' in Thomas G. Otte (ed) *The Age of Anniversaries: The Cult of Commemoration, 1895-1925*, London: Routledge, 195-218.

Berg, Maxine (2007) 'The genesis of 'useful knowledge'', *History of Science* 45(2): 123-133.

Bradley, Katharine (2008) 'Juvenile delinquency, the juvenile courts and the settlement movement 1908–1950: Basil Henriques and Toynbee Hall', *Twentieth Century British History* 19(2): 133–155.

Brockliss, Laurence and Sheldon, Nicola (2012) (eds) *Mass Education and the Limits of State Building, c. 1870-1930*, Basingstoke: Palgrave Macmillan.

Colley, Linda (2002) *Captives: Britain, Empire and the World, 1600-1850*, London:

Jonathan Cape. Disraeli, Benjamin (1845) *Sybil; Or, The Two Nations*, New York: George Routledge and Son.

Ellis, Heather (2012) 'Elite education and the development of mass elementary schooling in England, 1870-1930' in Laurence Brockliss and Nicola Sheldon (eds) *Mass Education and the Limits of State Building, c. 1870-1930*, 140-166, Basingstoke: Palgrave Macmillan, 46-70.

Goodman, Joyce, McCulloch, Gary and Richardson, William (2009) 'Empires overseas' and 'empires at home': Postcolonial and transnational perspectives on social change in the history of education', *Paedagogica Historica* 45(6): 695-706.

Hagerman, Christopher A. (2005) 'Muse of Empire? Classical Education, The Classical Tradition and British Attitudes to Empire, 1757-1902', PhD diss., University of Toronto.

Heathorn, Stephen J. (2000) *For Home, Country and Race: Constructing Gender, Class and Englishness in the Elementary School 1880-1914*, Toronto: University of Toronto Press.

Hilton, Boyd (2006) *A Mad, Bad and Dangerous People?: England, 1783-1846*, Oxford: Oxford

University Press.

Jones, H.S. (2007) *Intellect and Character in Victorian England: Mark Pattison and the Invention of the Don*, Cambridge: Cambridge University Press.

Lubenow, William C. (2015) *'Only Connect': Learned Societies in Nineteenth-Century Britain*, Woodbridge: The Boydell Press.

[Lyell, Charles] (1826) 'Scientific institutions', *The Quarterly Review* 34(67): 153-179.

Mangan, James A. (2012) *Athleticism in the Victorian and Edwardian Public School: The Emergence and Consolidation of an Ideology*, London: Routledge.

Mee, Jon and Wilkes, Jennifer (2015) 'Transpennine enlightenment: The literary and philosophical societies and knowledge networks in the north, 1781-1830', *Journal for Eighteenth Century Studies* 38(4): 599-612.

Mill, James (1817) *The History of British India Vol. I*, London: Baldwin, Cradock and Joy.

Reid, David A. (2010) 'Education as a philanthropic enterprise: The dissenting academies of eighteenth-century England', *History of Education* 39(3): 299-317.

Song, Jin-Woong (2012) 'When science met people through education: the mechanics' institute movement in nineteenth-century Britain', *Journal of the Korean Association for Science Education* 32(3): 541-554.

Stanton, Naomi (2013) *From Sunday Schools to Christian Youth Work: Young People's Engagement with Organized Christianity in Twentieth Century England and the Present Day*. PhD thesis, The Open University.

Stevens, Edward W. (1995) *The Grammar of the Machine: Technical Literacy and Early Industrial Expansion in the United States*, London: Yale University Press.

Walker, Martyn (2016) *The Development of the Mechanics' Institute Movement in Britain and Beyond: Supporting Further Education for the Adult Working Classes*, London: Routledge.

Welshman, John (1997) 'School meals and milk in England and Wales, 1906-45', *Medical History* 41(1): 6- 29.

White, John (2006) *Intelligence, Destiny and Education: The Ideological Roots of Intelligence Testing*, London: Routledge.

